

Prepared For:

Transylvania County Solid Waste Department

500 Howell Road

Brevard, North Carolina 28712



Submitted By:

LaBella Associates

400 South Tryon Street, Suite 1300

Charlotte, North Carolina 28285

(704) 376-6423

NC License No. C-0430



WOODRUFF LANDFILL (NCDEQ PERMIT NO. 8807)

PHASE 7 EXPANSION

PROJECT MANUAL

ISSUED FOR REBID

FEBRUARY 2025

LABELLA PROJECT NO. 2250798 PHASE 02

TABLE OF CONTENTS

PART I – BIDDING REQUIREMENTS

<u>Section Number</u>	<u>Title</u>	<u>Page</u>
00111	Advertisement for Rebid	00111-1 – 0011-2
00112	Bid Submittal Checklist	00112-1
00200	Instructions to Bidders for Construction Contract	00200-1 – 00200-12
00410	Bid Form for Construction Contract	00410-1 – 00410-7
00430	Bid Bond Penal Sum	00430-1 – 00430-2
00440	List of Subcontractors	00440-1 – 00440-2
00450	Non-collusion Affidavit	00450-1 – 00450-2
00451	Qualifications Statement	00451-1 – 00451-11

PART II – CONTRACT FORMS

00510	Notice of Award	00510-1
00520	Suggested Agreement Between Owner and Contractor	00520-1 – 00520-7
	Article 1 - Work	00520-1
	Article 2 - The Project	00520-1
	Article 3 - Engineer	00520-1
	Article 4 - Contract Times	00520-1
	Article 5 - Contract Price	00520-2
	Article 6 - Payment Procedures	00520-2
	Article 7 – Contractor Documents	00520-3
	Article 8 – Representations, Certifications, and Stipulations	00520-4
	Article 9 - Miscellaneous	00520-6
00550	Notice to Proceed	00550-1
00610	Performance Bond	00610-1 – 00610-4
00615	Payment Bond	00615-1 – 00615-4
00620	Application for Payment	00620-1 – 00620-4
00625	Certificate of Substantial Completion	00625-1
00626	Notice of Acceptability of Work	00626-1
00940	Work Change Directive	00940-1
00941	Change Order	00941-1
00942	Field Order	00942-1

PART III – CONTRACT CONDITIONS

00700	General Conditions	00700-1 - 00700-68
	Article 1 - Definitions and Terminology	00700-1
	Article 2 - Preliminary Matters	00700-7
	Article 3 - Contract Documents : Intent, Amending, Reuse	00700-8
	Article 4 – Commencement and Progress of the Work	00700-11
	Article 5 – Site, Subsurface and Physical Conditions; Hazardous Environmental Conditions	00700-13
	Article 6 – Bonds and Insurance	00700-21
	Article 7 – Contractor’s Responsibilities	00700-26
	Article 8 – Other Work at the Site	00700-39
	Article 9 – Owner’s Responsibilities	00700-41
	Article 10 – Engineer’s Status During Construction	00700-42
	Article 11 – Changes to the Contract	00700-44
	Article 12 – Claims	00700-48
	Article 13 – Cost of the Work; Allowances; Unit Price Work	00700-50

	Article 14 – Tests and Inspections; Correction, Removal, or Defective Work	00700-54
	Article 15 – Payments to Contractor; Set-offs; Completion; Correction Period	00700-57
	Article 16 – Suspension of Work and Termination	00700-65
	Article 17 – Final Resolution of Disputes	00700-67
	Article 18 – Miscellaneous	00700-67
00800	Supplementary Conditions	00800-1 - 00800-15
00900	List of Drawings	00900-1
00909	Submittal Form	00909-1

PART IV – SPECIFICATIONS

DIVISION 1

GENERAL REQUIREMENTS

<u>Section Number</u>	<u>Title</u>	<u>Page</u>
01010	Summary of Work	01010-1 – 01010-6
01025	Measurement and Payment	01025-1 – 01025-13
01050	Field Engineering	01050-1 – 01050-2
01060	Licenses and Permits	01060-1
01153	Change Order Procedures	01153-1 – 01153-4
01250	Construction Progress Documentation	01250-1 – 01250-3
01300	Project Management and Coordination	01300-1 – 01300-8
01305	Request for Information	01305-1
01315	Administrative Requirements	01315-1 – 01315-6
01320	Submittals	01320-1 – 01320-4
01400	Quality Control	01400-1 – 01400-2
01410	Quality Assurance	01410-1
01500	Construction Facilities and Temporary Controls	01500-1 – 01500-2
01568	Erosion and Sediment Control	01568-1 – 01568-3
01570	Traffic Control	01570-1 – 01570-2
01600	Materials and Equipment	01600-1 – 01600-3
01700	Contract Closeout	01700-1
01720	Project Record Documents	01720-1 – 01720-3
01740	Warranties and Bonds	01740-1 – 01740-3

DIVISION 2

SITE WORK

<u>Section Number</u>	<u>Title</u>	<u>Page</u>
02100	Site Preparation and Restoration	02100-1 – 02100-3
02200	Earthwork	02200-1 – 02200-8
02202	Rock Removal	02202-1
02210	Compacted Soil Liner	02210-1 – 02210-5
02218	Test Pad	02218-1 – 02218-4
02220	Trenching, Backfilling and Compacting	02220-1 – 02220-5
02222	Excavation	02222-1 – 02222-4
02225	Drainage Layer (Aggregate)	02225-1 – 02225-3
02274	Riprap	02274-1 – 02274-2
02420	Run-on and Run-off Control Systems	02420-1 – 02420-4
02500	Stone Surfacing	02500-1 – 02500-3

02618	High Density Polyethylene (HDPE) Pipe & Fittings	02618-1 – 02618-4
02714	Leachate Force Main	02714-1 – 02714-2
02716	Hydrostatic Testing	02714-1 – 02714-3
02721	Underdrain Pipe Systems	02720-1 – 02720-2
02725	Precast Concrete Utility Structures	02725-1 – 02725-11
02936	Seeding	02936-1 – 02936-4

DIVISION 3

CONCRETE

03300	Cast-In-Place Concrete	03300-1 – 03300-15
-------	------------------------	--------------------

DIVISION 13

SPECIAL CONSTRUCTION

13302	Geocomposite	13310-1 – 13310-9
13310	Geotextile	13310-1 – 13310-7
13315	Geosynthetic Clay Liner	13315-1 – 13315-8
13318	Geogrid	13318-1 – 13318-4
13320	Textured Geomembrane (White)	13320-1 – 13320-15
13325	Geomembrane Leak Location Survey for Exposed Geomembranes	13325-1 – 13325-3
13330	Geomembrane Leak Location Survey for Covered Geomembranes	13330-1 – 13330-4
13400	Interface Friction and Soil Strength Testing	13400-1 – 13400-4
13500	Rain Cover (White)	13500-1 – 13500-4

DIVISION 15

MECHANICAL

15160	Leachate Pumping System (Side Slope Pump)	15160-1 – 15160-8
15170	Electromagnetic Flow Meter, Liquid, Single-Channel	15170-1 – 15170-8

PART V - CQA PLAN

PART VI – BORROW STUDY REPORTS

PART I – BIDDING REQUIREMENTS

**SECTION 00111
ADVERTISEMENT FOR REBID**

**WOODRUFF LANDFILL: PHASE 7 EXPANSION CONSTRUCTION
TRANSYLVANIA COUNTY, NORTH CAROLINA**

General Notice

Transylvania County, North Carolina (Owner) is requesting Bids for the construction of the following Project:

**Woodruff Landfill: Phase 7 Expansion Construction
Transylvania County Project or Proposal Number: 10002**

The Owner will be accepting sealed bids for construction of the Phase 7 Expansion (approximately 6.0 acres) at the County's Woodruff Landfill located at 500 Howell Road, Brevard, NC 28712. Bids for the construction Project will be received at Transylvania County Administration Building located at 101 South Broad Street, Brevard, NC 28712, Attn: Jennifer Galloway, Purchasing Coordinator, until Tuesday, March 18, 2025, by 5:00 P.M. local time. At that time, the Bids received will be publicly opened and read.

The Project includes, but is not limited to, the following Work:

- Erosion and sedimentation controls;
- Construction of one (1) sediment basin;
- Modification of one (1) sediment basin;
- Construction of two (2) sediment traps;
- Earthwork;
- Site preparation & clearing;
- Unclassified excavation;
- Placement of structural fill;
- Construction of low permeability soil liner;
- Construction of a composite liner system;
- Culverts installation;
- Access roads construction;
- Leachate collection and conveyance system construction;
- Riser, pumps, and concrete sump headwall construction;
- Revegetation;
- Stormwater conveyance channels; and,
- Facilitation/Coordination of cell tower power line and fiber optic cables relocation.

Obtaining the Bidding Documents

Information and Bidding Documents consisting of Instructions to Bidders, Bid Forms, Contract Documents, Technical Specifications, and Construction Drawings for the Project will be on file and open for public inspection beginning Friday, February 21, 2025, at the following locations:

Transylvania County, NC
101 South Broad Street
Brevard, NC 28712
Attn: Jennifer Galloway
Purchasing Coordinator
Email: jennifer.galloway@transylvaniacounty.org
Phone: (828) 884-3100

LaBella Associates
400 South Tryon Street, Suite 1300
Charlotte, NC 28285
Attn: Rohit Garg
Senior Project Engineer
Email: rgarg@labellapc.com
Phone: (980) 985-0164

Bid documents can be found on the Transylvania County website at the address below:

www.transylvaniacounty.org/request-for-proposals-bids

If interested bidders want hard copies of the Project Manual (i.e., Bid Documents without the Construction Drawings), physical copies of the Project Manual can be provided to the bidders for a fee.

Pre-bid Conference

A pre-bid conference for the Project will be held on February 27, 2025, at 10:00 A.M. at the Woodruff Landfill located at 500 Howell Road, Brevard, NC, 28712. Attendance for the pre-bid conference is not mandatory, but **highly encouraged**. Interested bidders shall contact Jennifer Galloway (jennifer.galloway@transylvaniacounty.org) and Kenn Webb (kenn.webb@transylvaniacounty.org) to schedule a site visit. Bidders that cannot attend the pre-bid conference in-person can virtually attend the conference using this link: <https://shorturl.at/42TTP>

Bidder Qualifications

The successful bidder shall be a General Contractor in the State of North Carolina, who has experience with the following but not limited to:

- Landfill construction and familiarity with particular requirements of landfill construction;
- Subtitle D composite liner systems;
- Low-permeability soil liner construction;
- Leachate collection and conveyance systems; and,
- Managing landfill gas and leachate.

Section 00451: Qualifications Statement Form will be used to evaluate the Bidder's experience record. At least two (2) Subtitle D composite liner system projects totaling a minimum of 500,000 square feet of constructed liner within the last five (5) years is required to have been successfully completed by the General Contractor in addition to the requirements of the synthetic liner installer as set out in the specifications. A North Carolina General Contractor License is required for this project.

Bidding Schedule

Bidding documents for Contractors available on:	February 21, 2025
Pre-bid conference held onsite:	February 27, 2025, at 10:00 A.M.
Questions submitted by email to LaBella Associates:	March 4, 2025, by 5:00 P.M.
Sealed bids will be due no later than:	March 18, 2025, by 5:00 P.M.

Sealed bids will be due by 5:00 P.M. on Tuesday, March 18, 2025, at the Transylvania County Administration Building located at 101 South Broad Street, Brevard, NC 28712, Attn: Jennifer Galloway, Purchasing Coordinator. Sealed bids can be mailed to Transylvania County at 101 South Broad Street, Brevard, NC 28712. It is the responsibility of the bidders to ensure that mailed bids arrive prior to the bid due date.

Place "BID ENCLOSED" and bid opening date on the envelope. Bids will be opened and publicly read aloud immediately following the bid submission deadline. Award will be made in the best interest of Transylvania County. The right to reject any or all bids and proposals, and to waive informalities in bids is reserved.

Instructions to Bidders

For all further requirements regarding bid submittal, qualifications, procedures, and contract award, refer to the Instructions to Bidders that are included in the Bidding Documents.

This Advertisement is issued by:

Owner: Transylvania County, NC
By: Jennifer Galloway
Title: Purchasing Coordinator
Date: February 13, 2025

**SECTION 00112
BID SUBMITTAL CHECKLIST**

Project: Woodruff Landfill: Phase 7 Expansion Construction

Contractor is required to attach this completed form as part of the bid documents and must provide the following documents for the bid:

- | | | |
|---|--------------------------|-----------------|
| 00410 Bid Form for Construction Contract | <input type="checkbox"/> | Initials: _____ |
| 00430 Bid Bond (Penal Sum Form) | <input type="checkbox"/> | Initials: _____ |
| 00440 List of Subcontractors | <input type="checkbox"/> | Initials: _____ |
| 00450 Non-collusion Affidavit | <input type="checkbox"/> | Initials: _____ |
| 00451 Qualifications Statement | <input type="checkbox"/> | Initials: _____ |
| Evidence of Insurance (refer to Supp. Conditions) | <input type="checkbox"/> | Initials: _____ |
| Acknowledgement of Addenda | <input type="checkbox"/> | Initials: _____ |

Signature: _____

Date: _____

SECTION 00200
INSTRUCTIONS TO BIDDERS FOR CONSTRUCTION CONTRACT
TABLE OF CONTENTS

	Page
Article 1— Defined Terms	1
Article 2— Bidding Documents	1
Article 3— Qualifications of Bidders	2
Article 4— Pre-Bid Conference.....	3
Article 5— Site and Other Areas; Existing Site Conditions; Examination of Site; Owner’s Safety Program; Other Work at the Site	3
Article 6— Bidder’s Representations and Certifications.....	5
Article 7— Interpretations and Addenda.....	5
Article 8— Bid Security	5
Article 9— Contract Times.....	6
Article 10— Substitute and “Or Equal” Items	6
Article 11— Subcontractors, Suppliers, and Others.....	6
Article 12— Preparation of Bid	7
Article 13— Basis of Bid.....	8
Article 14— Submittal of Bid.....	8
Article 15— Modification and Withdrawal of Bid.....	9
Article 16— Opening of Bids	9
Article 17— Bids to Remain Subject to Acceptance.....	9
Article 18— Evaluation of Bids and Award of Contract.....	9
Article 19— Bonds and Insurance.....	10
Article 20— Signing of Agreement	10
Article 21— Sales and Use Taxes.....	11
Article 22— Payment of wages, release of lien, and periodic payments.....	11
Article 23— Time for beginning and completing work	11
Article 24— Retainage	12
Article 25— Negotiation	12

ARTICLE 1—DEFINED TERMS

- 1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:
- A. *Bidder* – The individual or entity who submits a Bid directly to Owner.
 - B. *Issuing Office* – The office from which the Bidding Documents are to be issued, and which registers plan holders.
 - C. *Successful Bidder* – The lowest responsible Bidder submitting a responsive Bid to whom Owner (based on Owner’s evaluation as hereinafter provided) makes an award. Award will be made in the best interest of Transylvania County, NC. The right to reject any or all bids and proposals and to accept bids other than the low bid is reserved.

ARTICLE 2—BIDDING DOCUMENTS

- 2.01 Bidder shall obtain a complete set of Bidding Requirements and proposed Contract Documents (together, the Bidding Documents). See the Agreement for a List of the Contract Documents. It is Bidder’s responsibility to determine that it is using a complete set of documents in the preparation of a Bid. Bidder assumes sole responsibility for errors or misinterpretations resulting from the use of incomplete documents, by Bidder itself or by its prospective Subcontractors and Suppliers.
- 2.02 Bidding Documents are made available for the sole purpose of obtaining Bids for completion of the Project and permission to download or distribution of the Bidding Documents does not confer a license or grant permission or authorization for any other use. Authorization to download documents, or other distribution, includes the right for plan holders to print documents solely for their use, and the use of their prospective Subcontractors and Suppliers, provided the plan holder pays all costs associated with printing or reproduction. Printed documents may not be re-sold under any circumstances.
- 2.03 Bidder may register as a plan holder and obtain complete sets of the Project Manual (i.e., Bidding Documents without the Construction Drawings) in the number and format stated in the Advertisement for Bids from the Issuing Offices. Bidders may rely on the sets of the Project Manual obtained from the Issuing Offices are complete unless an omission is blatant. All registered plan holders will receive Addenda issued by Owner and Engineer.
- 2.04 *Electronic Documents*
- A. When the Bidding Requirements indicate that electronic (digital) copies of the Bidding Documents are available, such documents will be made available to the Bidders as Electronic Documents in the manner specified.
 - 1. Bidding Documents will be provided in Adobe PDF (Portable Document Format) (.pdf) that is readable by Adobe Acrobat Reader. It is the intent of the Engineer and Owner that such Electronic Documents are to be exactly representative of the paper copies of the documents. However, because the Owner and Engineer cannot totally control the transmission and receipt of Electronic Documents nor the Contractor’s means of reproduction of such documents, the Owner and Engineer cannot and do not guarantee that Electronic Documents and reproductions prepared from those versions are identical in every manner to the paper copies.
 - B. Unless otherwise stated in the Bidding Documents, the Bidder may use and rely upon complete sets of Electronic Documents of the Bidding Documents, described in Paragraph 2.04.A above. However, Bidder assumes all risks associated with differences arising from transmission/receipt of Electronic Documents versions of Bidding Documents and reproductions prepared from those

versions and, further, assumes all risks, costs, and responsibility associated with use of the Electronic Documents versions to derive information that is not explicitly contained in printed paper versions of the documents, and for Bidder's reliance upon such derived information.

- C. After the Contract is awarded, the Owner may provide or direct the Engineer to provide for the use of the Contractor documents that were developed by Engineer as part of the Project design process, as Electronic Documents in native file formats.
 - 1. Electronic Documents that may be available in native file format include:
 - a. Drawings
 - 2. Release of such documents will be solely for the convenience of the Contractor. No such document is a Contract Document.
 - 3. Unless the Contract Documents explicitly identify that such information will be available to the Successful Bidder (Contractor), nothing herein will create an obligation on the part of the Owner or Engineer to provide or create such information, and the Contractor is not entitled to rely on the availability of such information in the preparation of its Bid or pricing of the Work. In all cases, the Contractor shall take appropriate measures to verify that any electronic/digital information provided in Electronic Documents is appropriate and adequate for the Contractor's specific purposes.
 - 4. In no case will the Contractor be entitled to additional compensation or time for completion due to any differences between the actual Contract Documents and any related document in native file format.

ARTICLE 3—QUALIFICATIONS OF BIDDERS

- 3.01 Bidder is to submit the following information with its Bid to demonstrate Bidder's qualifications to perform the Work:
 - A. Written evidence establishing its qualifications such as financial data, previous experience, and present commitments.
 - B. A written statement that Bidder is authorized to do business in the state where the Project is located, or a written certification that Bidder will obtain such authority prior to the Effective Date of the Contract.
 - C. Experience Record, with present projects, names, and phone numbers of Owner's representatives. Each bidder must have experience with landfill construction, Subtitle D composite liner systems, low-permeability soil liner systems, and leachate collection and conveyance systems. Each Bidder must be familiar with the particular requirements of landfill construction, including, but not limited to handling leachate, moving waste and working in conditions where landfill gas is present. At least two (2) Subtitle D composite liner projects totaling a minimum of 500,000 square feet of constructed liner within the last five (5) years is required to have been successfully completed by the Bidder in addition to the requirements of the installer as set out in the specifications.
 - D. Bidder's state or other contractor license number, if applicable.
 - E. Insurance as required in the Supplementary Conditions.
 - F. Subcontractor and Supplier qualification information.
 - G. Complete and submit the attached Section 00451: Qualifications Statement form.

- 3.02 A Bidder's failure to submit required qualification information within the times indicated may disqualify Bidder from receiving an award of the Contract.
- 3.03 No requirement in this Article 3 to submit information will prejudice the right of Owner to seek additional pertinent information regarding Bidder's qualifications.

ARTICLE 4— PRE-BID CONFERENCE

- 4.01 A pre-bid conference will be held on February 27, 2025, at 10:00 A.M. at the Woodruff Landfill located at 500 Howell Road, Brevard, NC, 28712. Representatives of the Owner and Engineer will be present to discuss the Project. Attendance for the pre-bid conference is not mandatory; however, it is highly encouraged for Bidders to attend. Bidders that cannot attend the pre-bid conference in-person can virtually attend the conference using this link: <https://shorturl.at/42TTP>. Interested Bidders shall contact Jennifer Galloway (jennifer.galloway@transylvaniacounty.org) and Kenn Webb (kenn.webb@transylvaniacounty.org) to schedule a site visit.
- 4.02 Information presented at the pre-bid conference does not alter the Contract Documents. The Owner will issue Addenda to make any changes to the Contract Documents that result from the discussions at the pre-bid conference. Information presented, and statements made at the pre-bid conference will not be legally effective unless incorporated in the Addendum.

ARTICLE 5—SITE AND OTHER AREAS; EXISTING SITE CONDITIONS; EXAMINATION OF SITE; OWNER'S SAFETY PROGRAM; OTHER WORK AT THE SITE

5.01 *Site and Other Areas*

- A. The Site is identified in the Bidding Documents. By definition, the Site includes rights-of-way, easements, and other lands furnished by Owner for the use of the Contractor. Any additional lands required for temporary construction facilities, construction equipment, or storage of materials and equipment, and any access needed for such additional lands, are to be obtained and paid for by Contractor.

5.02 Existing Site Conditions

A. *Subsurface and Physical Conditions; Hazardous Environmental Conditions*

- 1. The Supplementary Conditions identify the following regarding existing conditions at or adjacent to the Site:
 - a. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data.
 - b. Those drawings known to Owner of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data.
 - c. Reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site.
 - d. Technical Data contained in such reports and drawings.
- 2. Owner will make copies of reports and drawings referenced above available to any Bidder on request. These reports and drawings are not part of the Contract Documents, but the Technical Data contained therein upon whose accuracy Bidder is entitled to rely, as provided in the General Conditions, has been identified and established in the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any Technical Data or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.

3. If the Supplementary Conditions do not identify Technical Data, the default definition of Technical Data set forth in Article 1 of the General Conditions will apply.

B. *Underground Facilities:* No information and data regarding the presence or location of Underground Facilities are indicated in the Contract Documents. The Contractor is solely responsible for coordinating any work relating to underground utilities with the appropriate agency or utility.

5.03 Other Site-related Documents

A. In addition to the documents regarding existing Site conditions referred to in Paragraph 5.02.A, the following other documents relating to conditions at or adjacent to the Site are known to Owner and made available to Bidders for reference:

1. **Borrow Study Report**, prepared by LaBella Associates, dated March 14, 2024.

Owner will make copies of these other Site-related documents available to any Bidder on request.

B. Owner has not verified the contents of these other Site-related documents, and Bidder may not rely on the accuracy of any data or information in such documents. Bidder is responsible for any interpretation or conclusion Bidder draws from the other Site-related documents.

C. The other Site-related documents are not part of the Contract Documents.

D. Bidders are encouraged to review the other Site-related documents, but Bidders will not be held accountable for any data or information in such documents. The requirement to review and take responsibility for documentary Site information is limited to information in (1) the Contract Documents and (2) the Technical Data.

E. No other Site-related documents are available.

5.04 Site Visit and Testing by Bidders

A. A site visit is scheduled upon the conclusion of the pre-bid conference. However, if there are Bidders who do not attend the pre-bid conference and would like to perform a site visit, a site visit can be scheduled by contacting the individuals listed in Paragraph 4.01.

B. Bidders visiting the Site are required to arrange their own transportation to the Site.

C. All access to the Site other than during a regularly scheduled site visit must be coordinated through the following Owner contact: **Kenn Webb** (kenn.webb@transylvaniacounty.org). Bidder must conduct the Site visit during normal working hours.

D. On request, and to the extent Owner has control over the Site, and schedule permitting, the Owner will provide Bidder general access to the Site to conduct such additional examinations, investigations, explorations, tests, and studies as Bidder deems necessary for preparing and submitting a successful Bid. Owner will not have any obligation to grant such access if doing so is not practical because of existing operations, security or safety concerns, or restraints on Owner's authority regarding the Site. Bidder is responsible for establishing access needed to reach specific selected test sites.

E. Bidder must comply with all applicable Laws and Regulations regarding excavation and location of utilities, obtain all permits, and comply with all terms and conditions established by Owner or by property owners or other entities controlling the Site with respect to schedule, access, existing operations, security, liability insurance, and applicable safety programs.

F. Bidder must backfill all excavations and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies.

5.05 Owner's Safety Program

- A. Site visits and work at the Site may be governed by an Owner safety program. If an Owner safety program exists, it will be noted in the Supplementary Conditions.

5.06 Other Work at the Site

- A. Reference is made to Article 8 of the Supplementary Conditions for the identification of the general nature of other work of which Owner is aware (if any) that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) and relates to the Work contemplated by these Bidding Documents. If Owner is party to a written contract for such other work, then on request, Owner will provide to each Bidder access to examine such contracts (other than portions thereof related to price and other confidential matters), if any.

ARTICLE 6—BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

6.01 Express Representations and Certifications in Bid Form, Agreement

- A. The Bid Form that each Bidder will submit contains express representations regarding the Bidder's examination of Project documentation, Site visit, and preparation of the Bid, and certifications regarding lack of collusion or fraud in connection with the Bid. Bidder should review these representations and certifications and assure that Bidder can make the representations and certifications in good faith, before executing and submitting its Bid.
- B. If Bidder is awarded the Contract, Bidder (as Contractor) will make similar express representations and certifications when it executes the Agreement.

ARTICLE 7—INTERPRETATIONS AND ADDENDA

- 7.01 Engineer on its own initiative may issue Addenda to clarify, correct, supplement, or change the Bidding Documents.
- 7.02 Bidder shall submit all questions about the meaning or intent of the Bidding Documents to Engineer in writing. Contact information and submittal procedures for such questions are as follows:
 - A. Email Rohit Garg at rgarg@LaBellaPC.com
- 7.03 Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda delivered to all registered plan holders. Questions received after the question deadline on March 4, 2025 after 5:00 P.M. will not be answered.
- 7.04 Only responses set forth in an Addendum will be binding. Oral and other interpretations or clarifications will be without legal effect. Responses to questions are not part of the Contract Documents unless set forth in an Addendum that expressly modifies or supplements the Contract Documents.

ARTICLE 8—BID SECURITY

- 8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of five percent of Bidder's maximum Bid price (determined by adding the base bid and all alternates) and in the form of a Bid bond issued by a surety meeting the requirements of Paragraph 6.01 of the General Conditions. Such Bid bond will be issued in the form included in the Bidding Documents.
- 8.02 The Bid security of the apparent Successful Bidder will be retained until Owner awards the contract to such Bidder, and such Bidder has executed the Contract, furnished the required Contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be released. If the Successful Bidder fails to execute and deliver the Contract

and furnish the required Contract security within 15 days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited, in whole in the case of a penal sum bid bond, and to the extent of Owner's damages in the case of a damages-form bond. Such forfeiture will be Owner's exclusive remedy if Bidder defaults.

- 8.03 The Bid security of other Bidders that Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of 7 days after the Effective Date of the Contract or 61 days after the Bid opening, whereupon Bid security furnished by such Bidders will be released.
- 8.04 Bid security of other Bidders that Owner believes do not have a reasonable chance of receiving the award will be released within 7 days after the Bid opening.

ARTICLE 9—CONTRACT TIMES

- 9.01 The number of days within which, or the dates by which, the Work is to be (a) substantially completed and (b) ready for final payment, and (c) Milestones (if any) are to be achieved, are set forth in the Agreement.
- 9.02 Bidder must set forth in the Bid the time by which Bidder must achieve Substantial Completion, subject to the General Conditions Section 15.03. The Owner will take Bidder's time commitment regarding Substantial Completion into consideration during the evaluation of Bids, and it will be necessary for the apparent Successful Bidder to satisfy Owner that it will be able to achieve Substantial Completion within the time such Bidder has designated in the Bid. Bidder must also set forth in the Bid its commitments regarding the achievement of Milestones and readiness for final payment. The Successful Bidder's time commitments will be entered into the Agreement or incorporated in the Agreement by reference to the specific terms of the Bid.
- 9.03 Provisions for liquidated damages, if any, for failure to timely attain a Milestone, Substantial Completion, or completion of the Work in readiness for final payment, are set forth in the Agreement.

ARTICLE 10—SUBSTITUTE AND "OR EQUAL" ITEMS

- 10.01 The Contract for the Work, as awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration during the bidding and Contract award process of possible substitute or "or-equal" items. In cases in which the Contract allows the Contractor to request that Engineer authorize the use of a substitute or "or-equal" item of material or equipment, application for such acceptance may not be made to and will not be considered by Engineer until after the Effective Date of the Contract.
- 10.02 All prices that Bidder sets forth in its Bid will be based on the presumption that the Contractor will furnish the materials and equipment specified or described in the Bidding Documents, as supplemented by Addenda. Any assumptions regarding the possibility of post-Bid approvals of "or-equal" or substitution requests are made at Bidder's sole risk.

ARTICLE 11—SUBCONTRACTORS, SUPPLIERS, AND OTHERS

- 11.01 A Bidder must be prepared to retain specific Subcontractors and Suppliers for the performance of the Work if required to do so by the Bidding Documents or in the Specifications. If a prospective Bidder objects to retaining any such Subcontractor or Supplier

and the concern is not relieved by an Addendum, then the prospective Bidder should refrain from submitting a Bid.

- 11.02 The apparent Successful Bidder, and any other Bidder so requested, must submit to Owner a list of the Subcontractors or Suppliers proposed for the following portions of the Work with the Bid:
- Geosynthetic Materials Suppliers;
 - Geosynthetic Installer; and,
 - Pump manufacturer.
- 11.03 If requested by Owner, such list must be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor or Supplier. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor or Supplier, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit an acceptable substitute, in which case apparent Successful Bidder will submit a substitute, without an increase in Bid price.
- 11.04 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors and Suppliers. Declining to make requested substitutions will constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor or Supplier, so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to subsequent revocation of such acceptance as provided in Paragraph 7.07 of the General Conditions.
- 11.05 The value of work performed by Subcontractors shall not exceed 35% of total value of the Contract, exclusive of materials.

ARTICLE 12—PREPARATION OF BID

- 12.01 The Bid Form is included with the Bidding Documents.
- A. All blanks on the Bid Form must be completed in ink or typewritten and the Bid Form signed in ink. Erasures or alterations must be initialed in ink by the person signing the Bid Form. A Bid price must be indicated for each section, Bid item, alternate, adjustment unit price item, and unit price item listed therein, or the words “No Bid,” “No Change,” or “Not Applicable” entered.
- 12.02 If Bidder has obtained the Bidding Documents as Electronic Documents, then Bidder shall prepare its Bid on a paper copy of the Bid Form printed from the Electronic Documents version of the Bidding Documents. The printed copy of the Bid Form must be clearly legible, printed on 8½ inch by 11-inch paper and as closely identical in appearance to the Electronic Document version of the Bid Form as may be practical. The Owner reserves the right to accept Bid Forms that nominally vary in appearance from the original paper version of the Bid Form, providing that all required information and submittals are included with the Bid.
- 12.03 A Bid by a corporation must be executed in the corporate name by a corporate officer (whose title must appear under the signature), accompanied by evidence of authority to sign. The corporate seal must be affixed and attested by the corporate secretary or an assistant corporate secretary. The corporate address and state of incorporation must be shown.
- 12.04 A Bid by a partnership must be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The official address of the partnership must be shown.

- 12.05 A Bid by a limited liability company must be executed in the name of the firm by a member or other authorized person and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm must be shown.
- 12.06 A Bid by an individual must show the Bidder's name and official address.
- 12.07 A Bid by a joint venture must be executed by an authorized representative of each joint venturer in the manner indicated on the Bid Form. The joint venture must have been formally established prior to submittal of a Bid, and the official address of the joint venture must be shown.
- 12.08 All names must be printed in ink below the signatures.
- 12.09 The Bid must contain an acknowledgment of receipt of all Addenda, the numbers of which must be filled in on the Bid Form.
- 12.10 Postal and e-mail addresses and telephone number for communications regarding the Bid must be shown.
- 12.11 The Bid must contain evidence of Bidder's authority to do business in the state where the Project is located, or Bidder must certify in writing that it will obtain such authority within the time for acceptance of Bids and attach such certification to the Bid.
- 12.12 If Bidder is required to be licensed to submit a Bid or perform the Work in the state where the Project is located, the Bid must contain evidence of Bidder's licensure. Bidder's state contractor license number must also be shown on the Bid Form.

ARTICLE 13—BASIS OF BID

13.01 Unit Price

- A. Bidders must submit a Bid on a unit price basis for each item of Work listed in the unit price section of the Bid Form. This includes those items for which the unit is shown as "lump sum."
- B. The "Bid Price" (sometimes referred to as the extended price) for each unit price Bid item will be the product of the "Estimated Quantity", which Owner or its representative has set forth in the Bid Form, for the item and the corresponding "Bid Unit Price" offered by the Bidder. The total of all unit price Bid items will be the sum of these "Bid Prices"; such total will be used by Owner for Bid comparison purposes. The final quantities and Contract Price will be determined in accordance with Paragraph 13.03 of the General Conditions.
- C. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum. Discrepancies between the figures and the word on the Bid Form and the correct sum of any column of figures on the Unit Price Schedule will be resolved in favor of the correct sum.

ARTICLE 14—SUBMITTAL OF BID

- 14.01 The Bidding Documents include one separate copy of the Bid Form and the Bid Bond Form. The copy of the Bid Form is to be completed and submitted with the Bid security and the other documents required to be submitted under the terms of Article 3 of the Bid Form.
- 14.02 A Bid must be received no later than the date and time prescribed and at the place indicated in the Advertisement for Bids and must be enclosed in a plainly marked package with the Project title, and, if applicable, the designated portion of the Project for which the Bid is submitted, the name and address of Bidder, and must be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid must be enclosed in a separate package plainly marked on the

outside with the notation "BID ENCLOSED." A mailed Bid must be addressed to Jennifer Galloway, Purchasing Coordinator at 101 South Broad Street, Brevard, NC 28712.

- 14.03 Bids received after the date and time prescribed for the opening of bids, or not submitted at the correct location or in the designated manner, will not be accepted and will be returned to the Bidder unopened.

ARTICLE 15—MODIFICATION AND WITHDRAWAL OF BID

- 15.01 An unopened Bid may be withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.
- 15.02 If within 24 hours after Bids are opened any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, the Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is rebid, the Bidder may be disqualified from further bidding on the Work.
- 15.03 No bid may be withdrawn within thirty (30) days after scheduled time for bid opening.

ARTICLE 16—OPENING OF BIDS

- 16.01 Bids will be opened at the time and place indicated in the Advertisement for Bids and read aloud publicly.

ARTICLE 17—BIDS TO REMAIN SUBJECT TO ACCEPTANCE

- 17.01 All Bids will remain subject to acceptance for the period of time stated in the Bid Form, but Owner may, in its sole discretion, release any Bid and return the Bid security prior to the end of this period.

ARTICLE 18—EVALUATION OF BIDS AND AWARD OF CONTRACT

- 18.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner may also reject the Bid of any Bidder if Owner believes that it would not be in the best interest of the Project to make an award to that Bidder, subject to the requirements of North Carolina Law. Owner reserves the right to waive all minor Bid informalities not involving price, time, or changes in the Work.
- 18.02 Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible.
- 18.03 If Bidder purports to add terms or conditions to its Bid, takes exception to any provision of the Bidding Documents, or attempts to alter the contents of the Contract Documents for purposes of the Bid, whether in the Bid itself or in a separate communication to Owner or Engineer, then Owner will reject the Bid as nonresponsive.
- 18.04 If Owner awards the contract for the Work, such award will be to the Bidder whose Bid is in the best interest of the Owner.
- 18.05 *Evaluation of Bids*
- A. In evaluating Bids, Owner will consider whether the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Bid Form or prior to the Notice of Award.

- B. More than one Bid for the same Work from an individual or entity under the same or different names will not be considered. Reasonable grounds for believing that any Bidder has an interest in more than one Bid for the Work may be cause for disqualification of that Bidder and the rejection of all Bids in which that Bidder has an interest. Any or all bids will be rejected if there is any reason for believing that collusion exists among any of the Bidders; participants in such collusion will not be considered in future bids.
 - C. Award will be made in the best interest of Transylvania County, NC.
 - D. In evaluating whether a Bidder is responsible, Owner will consider the qualifications of the Bidder and may consider the qualifications and experience of Subcontractors and Suppliers proposed for those portions of the Work for which the identity of Subcontractors and Suppliers must be submitted as provided in the Bidding Documents.
- 18.06 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders and any proposed Subcontractors or Suppliers.
- 18.07 If the Contract is to be awarded, OWNER will give the apparent Successful Bidder a Notice of Intent to Award within 30 business days after the day of the opening of the Bids.

ARTICLE 19—BONDS AND INSURANCE

- 19.01 Article 6 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner’s requirements to performance, and payment bonds, other required bonds (if any), and insurance. When the Successful Bidder delivers the executed Agreement to Owner, it must be accompanied by required bonds and insurance documentation.
- 19.02 Article 8, Bid Security, of these Instructions, addresses any requirements for providing bid bonds as part of the bidding process.
- 19.03 Before any contract can be awarded, the successful Bidder will be required within fifteen (15) calendar days following notification to furnish to the Owner, in at least three (3) counterparts, the Performance Bond and the Payment Bond in the forms substantially prescribed for execution of bids (Paragraph IB-4 (c), excepting that all members shall have corporate surety satisfactory to the Owner, and authorized to conduct business in *North Carolina*; shall be paid for by the Contractor and shall be for 100% of the Contract Price. Following delivery of the properly executed bonds, the Owner may award the Contract. Following notice of award, the successful Bidder shall sign and deliver to the Owner in at least three (3) counterparts, the Agreement required by the Contract Documents.
- 19.04 *Bid Check or Bond*
- A. Each bid must be accompanied by a certified check, bank cashier’s check, or a bid bond, for not less than five percent (5%) of a base bid, payable to the Owner as security for execution of Contract, etc., under terms embodied in the form of bid. If Bid Bond is used, it **MUST BE IN THE FORM FURNISHED WITH THE CONTRACT DOCUMENTS**, must be executed by the Bidder as provided and must have corporate surety satisfactory to the Owner and be authorized to conduct business in the State of North Carolina.

ARTICLE 20—SIGNING OF AGREEMENT

- 20.01 When Owner issues a Notice of Award to the Successful Bidder, it will be accompanied by the unexecuted counterparts of the Agreement along with the other Contract Documents as identified in the Agreement. Within 15 days thereafter, Successful Bidder must execute and deliver the required number of counterparts of the Agreement and any bonds and insurance documentation required to be delivered by the Contract Documents to Owner. Within 10 days thereafter, Owner will deliver one fully executed counterpart of the Agreement to Successful

Bidder, together with printed and electronic copies of the Contract Documents as stated in Paragraph 2.02 of the General Conditions.

- 20.02 A pre-construction meeting will take place within twenty (20) business days of the Notice of Award at which the Contractor and his agents, the Owner and his agents, and the Engineer and his agents will attend. The purpose of this meeting is to resolve questions concerning the Agreement and other Contract Documents and to have all required parties sign the Agreement and all supporting Contract Documents. Any other questions concerning the start of the project can be resolved at this meeting. The date for the meeting will be mutually agreed upon between the Owner, the Engineer, and the Contractor. The Contractor is advised to use this meeting as an opportunity to present Shop Drawings and other submittals to the ENGINEER.

ARTICLE 21—SALES AND USE TAXES

- 21.01 Owner is not exempt from North Carolina and Transylvania County sales and use taxes on materials and equipment to be incorporated in the Work. Said taxes shall be included in the Bid.

ARTICLE 22—PAYMENT OF WAGES, RELEASE OF LIEN, AND PERIODIC PAYMENTS

22.01 Payment of Subcontractors

- A. Contractor agrees that should any Subcontractor be employed by the CONTRACTOR for the provisions of any goods and services under this Contract, the CONTRACTOR agrees to the following:
1. The CONTRACTOR shall, within seven (7) days after receipt of any payments from the OWNER pursuant to this Contract either:
 - a. Pay the Subcontractor for the proportionate share of the total payment received from the OWNER attributable to the goods or services provided by the Subcontractor.
 - b. Notify the OWNER and the Subcontractor, in writing, of the intention to withhold all or part of the Subcontractor's payment with the reason for non-payment.
 2. The CONTRACTOR shall pay interest to the Subcontractor on all amounts owed by the CONTRACTOR that remain unpaid after seven (7) days following receipt by the CONTRACTOR of payment from the OWNER for work performed by the Subcontractor under Contract except amounts withheld pursuant to subparagraph A.2. above.
 3. CONTRACTOR agrees to provide the following in all Contracts with Subcontractors: "Unless otherwise provided under the terms of this Contract, interest shall accrue at the rate of one percent per month."
 4. CONTRACTOR shall include in all its Contracts with Subcontractors a provision that each Subcontractor is to include or otherwise be subject to the same payment of interest requirements with respect to each lower-tiered Subcontractor as is CONTRACTOR bound to its Subcontractors.

ARTICLE 23—TIME FOR BEGINNING AND COMPLETING WORK

- 23.01 The Contractor shall complete work within 270 days of the date specified in the notice to proceed. In case of failure on the part of the Contractor to complete the work within the time fixed or any extensions thereof, the Contractor shall be liable to the Owner for any damages

sustained by the latter through extra charges or any other costs of any nature incurred by reason of the Contractor's failure to complete the work within the time fixed.

ARTICLE 24—RETAINAGE

24.01 Provisions concerning Contractor's rights to deposit securities in lieu of retainage are set forth in the Agreement.

ARTICLE 25—NEGOTIATION

25.01 In the event the bid from the lowest responsible bidder exceeds available funds, the Owner may negotiate with the apparent low bidder to obtain a contract price within available funds. The procedures for such negotiations shall be as follows:

- A. County, Engineer, and apparent low bidder together will review the project and attempt to find mutually agreeable proposed changes that will effectively reduce the cost of the project.
- B. Apparent low bidder will present reasonably documented and substantiated proposed deductions in project cost for each potential project change, which will allow the Owner to evaluate each proposed deduction.
- C. The parties will attempt to negotiate and sign a reasonable contract for the entire project, the price of which does not exceed available funds.

END OF SECTION 00200

**SECTION 00410
BID FORM FOR CONSTRUCTION CONTRACT**

The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

ARTICLE 1—PROJECT IDENTIFICATION

1.01 Woodruff Landfill: Phase 7 Expansion Construction, Transylvania County Woodruff Landfill, Brevard, NC.

ARTICLE 2—OWNER AND BIDDER

2.01 This Bid is submitted to: Transylvania County, NC, 101 South Broad Street, Brevard, NC 28712, Attention: Jennifer Galloway, Purchasing Coordinator.

2.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

2.03 Bidder accepts all the terms and conditions of the Advertisement for Bid and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. The Bid will remain subject to acceptance for 90 days after the Bid opening, or for such longer period that Bidder may agree to in writing upon request of OWNER. Bidder will sign and deliver the required number of counterparts of the Agreement with the Bonds and other documents required by the Bidding Requirements at the pre-construction meeting to be scheduled within 20 business days after the date of Owner's Notice of Award.

ARTICLE 3—ATTACHMENTS TO THIS BID

3.01 The following documents are submitted with and made a condition of this Bid:

- A. Required Bid security in the form of 5% of the maximum bid price;
- B. List of Proposed Subcontractors;
- C. Non-collusion Affidavit;
- D. List of Project References;
- E. Evidence of authority to do business in the state of the Project;
- F. Contractor's license number as evidence of Bidder's State Contractor's License; and,
- G. Required Bidder Qualification Statement with supporting data.

ARTICLE 4—BASIS OF BID—UNIT PRICES

4.01 *Unit Price Bids*

A. Bidder will perform the following Work at the indicated unit prices as totaled from the attached Table of Prices:

Base Bid Price (Items 1 through 32)

_____ (word)

(\$ _____)(figures)

Alternative Bid Price (Items 1 through 34)

_____ (word)

(\$ _____) (figures)

B. Bidder acknowledges that:

1. Each Bid Unit Price includes an amount considered by Bidder to be adequate to cover Contractor's overhead and profit for each separately identified item, and
2. Estimated quantities are not guaranteed and are solely for the purpose of comparison of Bids, and final payment for all Unit Price Work will be based on actual quantities, determined as provided in the Contract Documents.

ARTICLE 5—TIME OF COMPLETION

5.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.

5.02 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 6—BIDDER'S ACKNOWLEDGEMENTS: ACCEPTANCE PERIOD, INSTRUCTIONS, AND RECEIPT OF ADDENDA

6.01 *Bid Acceptance Period*

- A. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

6.02 *Instructions to Bidders*

- A. Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security.

6.03 *Receipt of Addenda*

- A. Bidder hereby acknowledges receipt of the following Addenda:

Addendum Number	Addendum Date

ARTICLE 7—BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

7.01 *Bidder's Representations*

- A. In submitting this Bid, Bidder represents the following:
1. Bidder has examined and carefully studied the Bidding Documents, including Addenda.
 2. Bidder has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

3. Bidder is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.
4. Bidder has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.
5. Bidder has carefully studied the reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, with respect to Technical Data in such reports and drawings.
6. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, if selected as Contractor; and (c) Bidder's (Contractor's) safety precautions and programs.
7. Based on the information and observations referred to in the preceding paragraph, Bidder agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
8. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
9. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
10. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
11. The submission of this Bid constitutes an incontrovertible representation by Bidder that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

7.02 Bidder's Certifications

A. The Bidder certifies the following:

1. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation.
2. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid.
3. Bidder has not solicited or induced any individual or entity to refrain from bidding.
4. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 7.02.A:
 - a. Corrupt practice means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process.
 - b. Fraudulent practice means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at

artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition.

- c. Collusive practice means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels.
- d. Coercive practice means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

ARTICLE 8—MBE/WBE REQUIREMENTS

8.01 The undersigned acknowledges that this bid is subject to a 5% Minority Business Enterprise and a 5% Woman owned Business Enterprise target participation as a requirement for the work. Failure to meet this requirement does not invalidate the bid, but bidders meeting the requirement to a greater degree may be selected over a lower bid that fails to meet the MBE/WBE requirement. Bidder shall list all MBE/WBE subcontractors and suppliers with estimated contract amounts here:

MBE(s) - _____, _____ %
- _____, _____ %
- _____, _____ %
WBE(s) - _____, _____ %
- _____, _____ %
- _____, _____ %

BIDDER hereby submits this Bid as set forth above:

Bidder:

(typed or printed name of organization)

By:

(individual's signature)

Name:

(typed or printed)

Title:

(typed or printed)

Date:

(typed or printed)

If Bidder is a corporation (add seal), a partnership, or a joint venture, attach evidence of authority to sign.

Attest:

(individual's signature)

Name:

(typed or printed)

Title:

(typed or printed)

Date:

(typed or printed)

Address for giving notices:

Bidder's Contact:

Name:

(typed or printed)

Title:

(typed or printed)

Phone:

Email:

Address:

Bidder's Contractor License No.:

Woodruff Landfill: Phase 7 Expansion Construction

CONTRACTOR NAME: _____

Transylvania County, NC

Table of Prices

Item	Description	Estimated Quantity	Unit	Unit Price (\$)	Subtotal Cost (\$)
General Site Work					
1	Mobilization and Demobilization	LS	1		
2	Site Preparation	LS	1		
3	Field Engineering, Surveying, and Record Documents	LS	1		
4	Locating Edge of Existing Liner	LS	1		
5	Construction Quality Control (CQC)	LS	1		
6	Facilitation/Coordination of Cell Tower Power Line and Fiber Optic Cables Relocation	LS	1		
7	Underdrain Pipes	LS	1		
Earthwork					
8	Earthwork (Unclassified Excavation & Structural Fill)	LS	1		
9	Over Excavation and Backfill (Contingency):	CY	2,000		
10	Waste Removal (Contingency)	CY	500		
11	Rock Removal – Mechanical Method (Contingency)	CY	500		
12	Geogrid with Vegetative Stabilization	LS	1		
Liner System					
13	Low Permeability Compacted Soil Liner (Offsite Soils)	LS	1		
14	Reinforced Geosynthetic Clay Liner (GCL)	LS	1		
15	60-mil Textured White HDPE Geomembrane Liner	LS	1		
16	16 oz Non-woven Geotextile Cushion Fabric	LS	1		
17	Anchor Trench Excavating and Backfilling	LS	1		
Leachate Collection & Removal System					
18	HDPE (DR17) 10-inch Diameter Pipe and Fittings	LS	1		
19	Sump Riser and Concrete Sump Headwall	LS	1		

CONTRACTOR NAME: _____

Table of Prices

Item	Description	Estimated Quantity	Unit	Unit Price (\$)	Subtotal Cost (\$)
20	HDPE (DR11) 4"/8" Dual Cont. Leachate Force Main	LS	1		
21	Washed Coarse Drainage Aggregates (No. 6M or 67 stone)	LS	1		
22	20-mil White Geosynthetic Rain Cover	LS	1		
23	Stormwater Diversion Berm and Rain Flap	LS	1		
24	Leachate Pump and Electrical Work	LS	1		
Access Roads					
25	Landfill Perimeter Road, Cell Tower Access Road, SB-7E Access Road, and Temporary Gravel Construction Entrances/Exits	LS	1		
Erosion and Sediment Control					
26	Diversion Berms, Slope Drains, Silt Socks, Drop Inlets, and Inlet/Outlet Protection Structures	LS	1		
27	Perimeter Stormwater Conveyance Channels, Culverts and Drop Inlets	LS	1		
28	Revegetation (Including Borrow Areas)	LS	1		
29	Dewatering Pump and Appurtenances	LS	1		
30	Sediment Basins	LS	1		
31	Sediment Basins Cleanup	LS	1		
32	Miscellaneous Erosion and Sediment Control Features	LS	1		
TOTAL BASE BID (ITEMS 1 - 32)					
ALTERNATE BID ITEMS					
33	ABC Stone	Ton	100		
34	#57 Stone	Ton	100		
TOTAL BASE BID (ITEMS 1 - 34)					

**SECTION 00430
 BID BOND (PENAL SUM FORM)**

Bidder Name: Address <i>(principal place of business)</i> :	Surety Name: Address <i>(principal place of business)</i> :
Owner Name: Transylvania County, NC Address <i>(principal place of business)</i> : 500 Howell Road Brevard, NC 28712	Bid Project <i>(name and location)</i> : Woodruff Landfill Phase 7 Expansion Construction Transylvania County Project No.: 10002 500 Howell Road Brevard, NC 28712 Bid Due Date: March 18, 2025, by 5:00 P.M.
Bond Penal Sum: \$ Date of Bond:	
Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth in this Bid Bond, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.	
Bidder	Surety
_____ <i>(Full formal name of Bidder)</i>	_____ <i>(Full formal name of Surety) (corporate seal)</i>
By: _____ <i>(Signature)</i>	By: _____ <i>(Signature) (Attach Power of Attorney)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
Attest: _____ <i>(Signature)</i>	Attest: _____ <i>(Signature)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
<i>Notes: (1) Note: Addresses are to be used for giving any required notice. (2) Provide execution by any additional parties, such as joint venturers, if necessary.</i>	

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond will be Owner's sole and exclusive remedy upon default of Bidder.
2. Default of Bidder occurs upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.
3. This obligation will be null and void if:
 - 3.1. Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or
 - 3.2. All Bids are rejected by Owner, or
 - 3.3. Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project, and including a statement of the amount due.
5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions does not in the aggregate exceed 120 days from the Bid due date without Surety's written consent.
6. No suit or action will be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety, and in no case later than one year after the Bid due date.
7. Any suit or action under this Bond will be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder must be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Postal Service registered or certified mail, return receipt requested, postage pre-paid, and will be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.
10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond will be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute governs and the remainder of this Bond that is not in conflict therewith continues in full force and effect.
11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

**SECTION 00440
LIST OF SUBCONTRACTORS**

PROJECT: _____

CONTRACTOR: _____

SUBCONTRACTORS:

(1)

Name: _____

Address: _____

Telephone: _____

Contact Person: _____

Type of Work: _____

Percentage of Total Contract: _____

(2)

Name: _____

Address: _____

Telephone: _____

Contact Person: _____

Type of Work: _____

Percentage of Total Contract: _____

(3)

Name: _____

Address: _____

Telephone: _____

Contact Person: _____

Type of Work: _____

Percentage of Total Contract: _____

(4)

Name: _____

Address: _____

Telephone: _____

Contact Person: _____

Type of Work: _____

Percentage of Total Contract: _____

(5)

Name: _____

Address: _____

Telephone: _____

Contact Person: _____

Type of Work: _____

Percentage of Total Contract: _____

(6)

Name: _____

Address: _____

Telephone: _____

Contact Person: _____

Type of Work: _____

Percentage of Total Contract: _____

**SECTION 00450
NON-COLLUSION AFFIDAVIT**

This form must be completed, signed, notarized, and returned with Bid. Failure to do so will be considered justification for the rejection of your Bid. A separate form must be submitted by each principal of a joint venture Bid.

Project: Woodruff Landfill: Phase 7 Expansion Construction
Transylvania County, North Carolina

Date: _____

STATE OF: _____ COUNTY (CITY) OF: _____

This day personally appeared before the undersigned, a Notary Public in and for the City/County and State aforesaid,

_____, who have been first duly sworn according to law, did
depose and aver as follows:

1. That he is _____
(owner, partner, president, etc.)
of _____
(insert name of Bidder)

2. That he is personally familiar with the Bid of
_____ submitted in connection with
(Name of Bidder)
the above-captioned project.

3. That the Bid of said _____
(insert name of Bidder)
was formulated and submitted in good faith as the true
Bid of said _____
(insert name of Bidder)

4. That in the preparation and submission of this Bid, said Bidder did not, either directly or indirectly, enter into any combination or arrangement with any person, firm or corporation or enter into any agreement, participate in any collusion, or otherwise take any action in the restraint of free, competitive bidding in violation of the Sherman Act (15 USC Section 1).

And further this deponent saith not.

Affiant

Subscribed and sworn to before me this _____ day of

_____ 20 _____.

My commission expires _____

Notary Public

Note: This Affidavit must be submitted with the Bid. Failure to submit will be considered justification for rejection of the Bid.

**SECTION 00451
QUALIFICATIONS STATEMENT**

ARTICLE 1—GENERAL INFORMATION

1.01 Provide contact information for the Business:

Legal Name of Business:			
Corporate Office			
Name:		Phone number:	
Title:		Email address:	
Business address of corporate office:			
Local Office			
Name:		Phone number:	
Title:		Email address:	
Business address of local office:			

1.02 Provide information on the Business's organizational structure:

Form of Business:	<input type="checkbox"/> Sole Proprietorship <input type="checkbox"/> Partnership <input type="checkbox"/> Corporation		
<input type="checkbox"/> Limited Liability Company <input type="checkbox"/> Joint Venture comprised of the following companies:			
1.			
2.			
3.			
Provide a separate Qualification Statement for each Joint Venturer.			
Date Business was formed:		State in which Business was formed:	
Is this Business authorized to operate in the Project location?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Pending	

1.03 Identify all businesses that own Business in whole or in part (25% or greater), or that are wholly or partly (25% or greater) owned by Business:

Name of business:		Affiliation:	
Address:			
Name of business:		Affiliation:	
Address:			
Name of business:		Affiliation:	
Address:			

1.04 Provide information regarding the Business's officers, partners, and limits of authority.

Name:		Title:	
Authorized to sign contracts: <input type="checkbox"/> Yes <input type="checkbox"/> No		Limit of Authority:	\$
Name:		Title:	
Authorized to sign contracts: <input type="checkbox"/> Yes <input type="checkbox"/> No		Limit of Authority:	\$
Name:		Title:	
Authorized to sign contracts: <input type="checkbox"/> Yes <input type="checkbox"/> No		Limit of Authority:	\$
Name:		Title:	

ARTICLE 2—LICENSING

2.01 Provide information regarding licensure for Business:

Name of License:			
Licensing Agency:			
License No:		Expiration Date:	
Name of License:			
Licensing Agency:			
License No:		Expiration Date:	

ARTICLE 3—DIVERSE BUSINESS CERTIFICATIONS

3.01 Provide information regarding Business's Diverse Business Certification, if any. Provide evidence of current certification.

Certification	Certifying Agency	Certification Date
<input type="checkbox"/> Disadvantaged Business Enterprise		
<input type="checkbox"/> Minority Business Enterprise		
<input type="checkbox"/> Woman-Owned Business Enterprise		
<input type="checkbox"/> Small Business Enterprise		
<input type="checkbox"/> Disabled Business Enterprise		
<input type="checkbox"/> Veteran-Owned Business Enterprise		
<input type="checkbox"/> Service-Disabled Veteran-Owned		
<input type="checkbox"/> HUBZone Business (Historically Underutilized) Business		
<input type="checkbox"/> Other		
<input type="checkbox"/> None		

ARTICLE 4—SAFETY

4.01 Provide information regarding Business’s safety organization and safety performance.

Name of Business’s Safety Officer:		
Safety Certifications		
Certification Name	Issuing Agency	Expiration

4.02 Provide Worker’s Compensation Insurance Experience Modification Rate (EMR), Total Recordable Frequency Rate (TRFR) for incidents, and Total Number of Recorded Manhours (MH) for the last 3 years and the EMR, TRFR, and MH history for the last 3 years of any proposed Subcontractor(s) that will provide Work valued at 10% or more of the Contract Price. Provide documentation of the EMR history for Business and Subcontractor(s).

Year									
Company	EMR	TRFR	MH	EMR	TRFR	MH	EMR	TRFR	MH

ARTICLE 5—FINANCIAL

5.01 Provide information regarding the Business’s financial stability. Provide the most recent audited financial statement, and if such audited financial statement is not current, also provide the most current financial statement.

Financial Institution:			
Business address:			
Date of Business’s most recent financial statement:		<input type="checkbox"/> Attached	
Date of Business’s most recent audited financial statement:		<input type="checkbox"/> Attached	
Financial indicators from the most recent financial statement			
Contractor’s Current Ratio (Current Assets ÷ Current Liabilities)			
Contractor’s Quick Ratio ((Cash and Cash Equivalents + Accounts Receivable + Short Term Investments) ÷ Current Liabilities)			

ARTICLE 6—SURETY INFORMATION

6.01 Provide information regarding the surety company that will issue required bonds on behalf of the Business, including but not limited to performance and payment bonds.

Surety Name:			
Surety is a corporation organized and existing under the laws of the state of:			
Is surety authorized to provide surety bonds in the Project location?	<input type="checkbox"/> Yes <input type="checkbox"/> No		
Is surety listed in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" published in Department Circular 570 (as amended) by the Bureau of the Fiscal Service, U.S. Department of the Treasury?			
<input type="checkbox"/> Yes <input type="checkbox"/> No			
Mailing Address (principal place of business):			
Physical Address (principal place of business):			
Phone (main):		Phone (claims):	

ARTICLE 7—INSURANCE

7.01 Provide information regarding Business’s insurance company(s), including but not limited to its Commercial General Liability carrier. Provide information for each provider.

Name of insurance provider, and type of policy (CLE, auto, etc.):			
Insurance Provider		Type of Policy (Coverage Provided)	
Are providers licensed or authorized to issue policies in the Project location?		<input type="checkbox"/> Yes <input type="checkbox"/> No	
Does provider have an A.M. Best Rating of A-VII or better?		<input type="checkbox"/> Yes <input type="checkbox"/> No	
Mailing Address (principal place of business):			
Physical Address (principal place of business):			
Phone (main):		Phone (claims):	

ARTICLE 8—CONSTRUCTION EXPERIENCE

8.01 Provide information that will identify the overall size and capacity of the Business.

Average number of current full-time employees:	
Estimate of revenue for the current year:	

Estimate of revenue for the previous year:	
--	--

8.02 Provide information regarding the Business’s previous contracting experience.

Years of experience with projects like the proposed project:		
As a general contractor:		As a joint venturer:
Has Business, or a predecessor in interest, or an affiliate identified in Paragraph 1.03:		
Been disqualified as a bidder by any local, state, or federal agency within the last 5 years? <input type="checkbox"/> Yes <input type="checkbox"/> No		
Been barred from contracting by any local, state, or federal agency within the last 5 years? <input type="checkbox"/> Yes <input type="checkbox"/> No		
Been released from a bid in the past 5 years? <input type="checkbox"/> Yes <input type="checkbox"/> No		
Defaulted on a project or failed to complete any contract awarded to it? <input type="checkbox"/> Yes <input type="checkbox"/> No		
Refused to construct or refused to provide materials defined in the contract documents or in a change order? <input type="checkbox"/> Yes <input type="checkbox"/> No		
Been a party to any currently pending litigation or arbitration? <input type="checkbox"/> Yes <input type="checkbox"/> No		
Provide full details in a separate attachment if the response to any of these questions is Yes.		

8.03 List all projects currently under contract in Schedule A and provide indicated information.

8.04 List a minimum of three and a maximum of six projects completed in the last 5 years in Schedule B and provide indicated information to demonstrate the Business’s experience with projects similar in type and cost of construction.

8.05 In Schedule C, provide information on key individuals whom Business intends to assign to the Project. Provide resumes for those individuals included in Schedule C. Key individuals include the Project Manager, Project Superintendent, Quality Manager, and Safety Manager. Resumes may be provided for Business’s key leaders as well.

ARTICLE 9—REQUIRED ATTACHMENTS

9.01 Provide the following information with the Statement of Qualifications:

- A. If Business is a Joint Venture, separate Qualifications Statements for each Joint Venturer, as required in Paragraph 1.02.
- B. Diverse Business Certifications if required by Paragraph 3.01.
- C. Certification of Business’s safety performance if required by Paragraph 4.02.
- D. Financial statements as required by Paragraph 5.01.
- E. Attachments providing additional information as required by Paragraph 8.02.
- F. Schedule A (Current Projects) as required by Paragraph 8.03.
- G. Schedule B (Previous Experience with Similar Projects) as required by Paragraph 8.04.
- H. Schedule C (Key Individuals) and resumes for the key individuals listed, as required by Paragraph 8.05.
- I. Additional items as pertinent.

This Statement of Qualifications is offered by:

Business: _____
(typed or printed name of organization)

By: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Date: _____
(date signed)

(If Business is a corporation (add seal), a partnership, or a joint venture, attach evidence of authority to sign.)

Attest: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address for giving notices:

Designated Representative:
Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address: _____

Phone: _____

Email: _____

Schedule A—Current Projects

Name of Organization					
Project Owner			Project		
General Description of					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project		
General Description of					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project		
General Description of					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Schedule B—Previous Experience with Similar Projects

Name of Organization					
Project Owner			Project		
General Description of					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project		
General Description of					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project		
General Description of					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Schedule B—Previous Experience with Similar Projects

Name of Organization					
Project Owner			Project		
General Description of					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project		
General Description of					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project		
General Description of					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Schedule C—Key Individuals

Project Manager			
Name of individual			
Years of experience as project manager			
Years of experience with this organization			
Number of similar projects as project manager			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	
Project Superintendent			
Name of individual			
Years of experience as project superintendent			
Years of experience with this organization			
Number of similar projects as project superintendent			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	

Safety Manager			
Name of individual			
Years of experience as project manager			
Years of experience with this organization			
Number of similar projects as project manager			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	
Quality Control Manager			
Name of individual			
Years of experience as project superintendent			
Years of experience with this organization			
Number of similar projects as project superintendent			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	

PART II – CONTRACT FORMS

**SECTION 00510
NOTICE OF AWARD**

Date of **[date]**
Owner: Transylvania County, NC Owner's Project No.: 10002
Engineer: LaBella Associates Engineer's Project No.: 2250798 Phase 02
Project: Woodruff Landfill: Phase 7 Expansion Construction
Contract Name:
Bidder:
Bidder's

You are notified that Owner has accepted your Bid dated **[date]** for the above Contract, and that you are the Successful Bidder and are awarded a Contract for:

[Describe Work, alternates, or sections of Work awarded]

The Contract Price of the awarded Contract is **\$(Contract Price)**. Contract Price is subject to adjustment based on the provisions of the Contract, including but not limited to those governing changes, Unit Price Work, and Work performed on a cost-plus-fee basis, as applicable.

[Number of copies sent] unexecuted counterparts of the Agreement accompany this Notice of Award, and one copy of the Contract Documents accompanies this Notice of Award or has been transmitted or made available to Bidder electronically.

Drawings will be delivered separately from the other Contract Documents.

You must comply with the following conditions precedent within 15 days of the date of receipt of this Notice of Award:

1. Deliver to Owner **[number of copies sent]** counterparts of the Agreement, signed by Bidder (as Contractor).
2. Deliver with the signed Agreement(s) the Contract security (such as required performance and payment bonds) and insurance documentation, as specified in the Instructions to Bidders and in the General Conditions, Articles 2 and 6.
3. Other conditions precedent (if any): **[Describe other conditions that require Successful Bidder's compliance]**

Failure to comply with these conditions within the time specified will entitle Owner to consider you in default, annul this Notice of Award, and declare your Bid security forfeited.

Within 10 days after you comply with the above conditions, Owner will return to you one fully signed counterpart of the Agreement, together with any additional copies of the Contract Documents as indicated in Paragraph 2.02 of the General Conditions.

Owner: Transylvania County, NC
By (*signature*): _____
Name (*printed*): _____
Title: _____

Copy: LaBella Associates, P.C.

**SECTION 00520
SUGGESTED AGREEMENT BETWEEN OWNER AND CONTRACTOR
FOR CONSTRUCTION CONTRACT (STIPULATED PRICE)**

This Agreement is by and between Transylvania County, NC (“Owner”) and [name of contracting entity] (“Contractor”).

Terms used in this Agreement have the meanings stated in the General Conditions and the Supplementary Conditions.

Owner and Contractor hereby agree as follows:

ARTICLE 1—WORK

1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows: Construct Phase 7 Expansion (approximately 6.0 acres) to expand the landfill horizontally.

ARTICLE 2—THE PROJECT

2.01 The Project, of which the Work under the Contract Documents is a part, is generally described as follows: This project includes relocation of power and fiber optic, construction of erosion and sediment control features, earthwork and grading of base grades and perimeter road, construction of the low-permeability soil liner and geosynthetic materials installation for the Woodruff landfill, construction of the drainage layer, and installation of the leachate collection system, pumps, sump headwalls, rain cover and dual contained force main.

ARTICLE 3—ENGINEER

3.01 The Owner has retained LaBella Associates, P.C. (“Engineer”) to act as Owner’s representative, assume all duties and responsibilities of Engineer, and have the rights and authority assigned to Engineer in the Contract.

3.02 The part of the Project that pertains to the Work has been designed by the Engineer.

ARTICLE 4—CONTRACT TIMES

4.01 *Time is of the Essence*

A. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

4.02 *Contract Times: Days*

A. The Work will be substantially complete within 240 days after the date when the Contract Times commence to run as provided in Paragraph 4.01 of the General Conditions and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within 270 days after the date when the Contract Times commence to run.

4.03 *Liquidated Damages*

A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial and other losses if the Work is not completed and Milestones not achieved, plus extensions within the Contract Times, as duly modified. The parties also recognize the delays, expense, and difficulties involved in proving, in a legal or arbitration proceeding, the actual loss suffered by Owner if the Work is not completed on time. Accordingly,

instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):

1. *Substantial Completion:* Contractor shall pay Owner \$1,000.00 for each day that expires after the time (as duly adjusted pursuant to the Contract) specified above for Substantial Completion, for 30 days until the Work is substantially complete. After 30 days past Substantial Completion, Contractor shall pay Owner \$5,000.00 for each day that expires until the Work is substantially complete.
2. *Completion of Remaining Work:* After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner \$1,000.00 for each day that expires after such time until the Work is completed and ready for final payment. After 30 days past Completion, Contractor shall pay Owner \$5,000.00 for each day that expires until the Work is complete.
3. Liquidated damages for failing to timely attain Milestones, Substantial Completion, and final completion are not additive, and will not be imposed concurrently.
4. Contractor agrees that except for delays caused by acts of intentional interference of the Owner, the Owner shall not in any event be liable to the Contractor for the costs or expenses of delays of any kind whatsoever, and the Contractor shall be fully responsible for making up lost time for all delays except to the extent that the Contractor is entitled to an extension of the contract time.
5. To the extent there is a delay beyond the Contractor's control occasioned by an Act of God, such delay may entitle to the Contractor to an extension of contract time in which to complete the work as agreed by the Owner; provided, however, that the Contractor shall immediately give written notice to the Owner of the cause of delay. Act of God shall have the same definition as is included in the General Conditions.

ARTICLE 5—CONTRACT PRICE

5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents, the amounts that follow, subject to adjustment under the Contract:

- A. For all Work, at the prices stated in Contractor's Bid, attached hereto as an exhibit.

ARTICLE 6—PAYMENT PROCEDURES

6.01 *Submittal and Processing of Payments*

- A. Contractor shall submit Applications for Payment in accordance with Article 15 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.

6.02 *Progress Payments; Retainage*

- A. Owner shall make progress payments on the basis of Contractor's Applications for Payment within 21 days of receiving written recommendation of payment from the Engineer during performance of the Work as provided in Paragraph 6.02.A.1 below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. Taxes must be reviewed and approved by County Finance Department before issuance of written recommendation of payment by Engineer. All such payments will be measured by the Schedule of Values established as provided in the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no Schedule of Values, as provided elsewhere in the Contract.

1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Owner may withhold, including but not limited to liquidated damages, in accordance with the Contract.
 - a. 95% of the value of the work completed minus geosynthetic installation (with the balance being retainage);
 - b. 75% of the payment for work related to the installation of all geosynthetic materials, with the balance being retained, until all quality control testing results, daily logs, certifications, and as-built panel layouts are submitted and determined to be complete by the Owner; and,
 - c. 50% of cost of materials and equipment not incorporated in the Work, invoices and documentary evidence required (with the balance being retainage).
- B. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 95 percent of the Work completed, less such amounts set off by Owner pursuant to Paragraph 15.01.E of the General Conditions, and less 75 percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the punch list of items to be completed or corrected prior to final payment.

6.03 *Final Payment*

- A. Upon final completion and acceptance of the Work, Owner shall pay the remainder of the Contract Price in accordance with Paragraph 15.06 of the General Conditions.

6.04 *Consent of Surety*

- A. Owner will not make final payment or return or release retainage at Substantial Completion or any other time, unless Contractor submits written consent of the surety to such payment, return, or release.

ARTICLE 7—CONTRACT DOCUMENTS

7.01 *Contents*

- A. The Contract Documents consist of all of the following:
 1. Advertisements for Bid.
 2. Bid Submittal Checklist.
 3. Instructions to Bidders for Construction Contract.
 4. Bid Form for Construction Contractor.
 5. Bid Bond.
 6. This Agreement.
 7. Bonds:
 - a. Performance bond (together with power of attorney).
 - b. Payment bond (together with power of attorney).
 8. General Conditions.
 9. Supplementary Conditions.
 10. Specifications as listed in the table of contents of the project manual (copy of list attached).
 11. Drawings listed on the attached sheet index.

12. Addenda (numbers [number] to [number], inclusive).
 13. Exhibits to this Agreement (enumerated as follows):
 - a. Notice to Proceed.
 - b. Contractor's Bid.
 - c. Documentation submitted by Contractor prior to Notice of Award.
 - d. Contractor's List of Subcontractors.
 - e. Contractor's Affidavit.
 14. The following, which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:
 - a. Written Amendments.
 - b. Work Change Directives.
 - c. Change Orders.
 - d. Field Orders.
- B. The Contract Documents listed in Paragraph 7.01.A are attached to this Agreement (except as expressly noted otherwise above).
- C. The Contract Documents may only be amended, modified, or supplemented as provided in the Contract.

ARTICLE 8—REPRESENTATIONS, CERTIFICATIONS, AND STIPULATIONS

8.01 Contractor's Representations

- A. In order to induce Owner to enter into this Contract, Contractor makes the following representations:
1. Contractor has examined and carefully studied the Contract Documents, including Addenda.
 2. That the Contractor and its subcontractors are properly and appropriately licensed for their respective work.
 3. That it is financially solvent and experienced in and competent to perform the work and to furnish the labor, plant, materials, supplies or equipment, to be so performed or furnished by it.
 4. Contractor has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
 5. Contractor is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.
 6. Contractor has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.
 7. Contractor has carefully studied the reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, with respect to Technical Data in such reports and drawings.
 8. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations

obtained from visits to the Site; the Contract Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (c) Contractor's safety precautions and programs.

9. Based on the information and observations referred to in the preceding paragraph, Contractor agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
10. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.
11. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
12. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
13. Contractor's entry into this Contract constitutes an incontrovertible representation by Contractor that without exception all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

8.02 *Contractor's Certifications*

- A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 8.02:
 1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process or in the Contract execution;
 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
 3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and
 4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

8.03 *Standard General Conditions*

- A. Owner stipulates that if the General Conditions that are made a part of this Contract are EJCDC® C-700, Standard General Conditions for the Construction Contract (2018), published by the Engineers Joint Contract Documents Committee, and if Owner is the party that has furnished said General Conditions, then Owner has plainly shown all modifications to the standard wording of such published document to the Contractor, through a process such as highlighting or "track changes" (redline/strikeout), or in the Supplementary Conditions.

ARTICLE 9—MISCELLANEOUS

9.01 *Terms*

- A. Terms used in this Agreement will have the meanings indicated in the General Conditions.

9.02 *Assignment of Contract*

- A. No assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

9.03 *Successors and Assigns*

- A. Owner and Contractor each bind itself, its partners, successors, assigns, and legal representatives to the other party hereto, its partners, successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

9.04 *Severability*

- A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon OWNER and CONTRACTOR, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement in duplicate. One counterpart each has been delivered to Owner and Contractor. All portions of the Contract Documents have been signed or identified by Owner and Contractor or on their behalf.

This Agreement will be effective on **[indicate date on which Contract becomes effective]** (which is the Effective Date of the Contract).

Owner:	Transylvania County, NC <i>(typed or printed name of organization)</i>	Contractor:	 <i>(typed or printed name of organization)</i>
By:	 <i>(individual's signature)</i>	By:	 <i>(individual's signature)</i>
Date:	 <i>(date signed)</i>	Date:	 <i>(date signed)</i>
Name:	Jaime Laughter <i>(typed or printed)</i>	Name:	 <i>(typed or printed)</i>
Title:	County Manager <i>(typed or printed)</i>	Title:	 <i>(typed or printed)</i>
			<i>(If [Type of Entity] is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)</i>
Attest:	 <i>(individual's signature)</i>	Attest:	 <i>(individual's signature)</i>
Title:	 <i>(typed or printed)</i>	Title:	 <i>(typed or printed)</i>
Address for giving notices:	101 South Board Street Brevard, NC 28712	Address for giving notices:	
Designated Representative:		Designated Representative:	
Name:	 <i>(typed or printed)</i>	Name:	 <i>(typed or printed)</i>
Title:	 <i>(typed or printed)</i>	Title:	 <i>(typed or printed)</i>
Address:		Address:	
Phone:		Phone:	
Email:		Email:	
	<i>(If [Type of Entity] is a corporation, attach evidence of authority to sign. If [Type of Entity] is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of this Agreement.)</i>	License No.:	 <i>(where applicable)</i>
		State:	

**SECTION 00550
NOTICE TO PROCEED**

Owner: Transylvania County, NC Owner's Project No.: 10002
Engineer: LaBella Associates Engineer's Project No.: 2250798 Phase 02
Contractor: _____ Contractor's Project No.: _____
Project: Woodruff Landfill: Phase 7 Expansion Construction
Contract Name: _____
Effective Date of Contract: _____

Owner hereby notifies Contractor that the Contract Times under the above Contract will commence to run on **[date Contract Times are to start]** pursuant to Paragraph 4.01 of the General Conditions.

On that date, Contractor shall start performing its obligations under the Contract Documents. No Work will be done at the Site prior to such date.

In accordance with the Agreement:

The number of days to achieve **Substantial Completion is 240** from the date stated above for the commencement of the Contract Times, resulting in a date for Substantial Completion of **[date, calculated from commencement date above]**; and the number of days to achieve readiness for **final payment is 270** from the commencement date of the Contract Times, resulting in a date for readiness for final payment of **[date, calculated from commencement date above]**.

Before starting any Work at the Site, Contractor must comply with the following:

[Note any access limitations, security procedures, or other restrictions]

Owner: Transylvania County, NC
By (signature): _____
Name (printed): Jaime Laughter
Title: County Manager
Date Issued: _____

Copy: LaBella Associates

**SECTION 00610
PERFORMANCE BOND**

<p>Contractor Name: Address (<i>principal place of business</i>):</p>	<p>Surety Name: Address (<i>principal place of business</i>):</p>
<p>Owner Name: Transylvania County, NC Address (<i>principal place of business</i>): 500 Howell Road Brevard, NC 28712</p>	<p>Contract Description (<i>name and location</i>): Woodruff Landfill: Phase 7 Expansion Construction Contract No. 10002 500 Howell Road Brevard, NC 28712 Contract Price: \$ Effective Date of Contract: [Date from Contract]</p>
<p>Bond Bond Amount: \$ Date of Bond: <i>(Date of Bond cannot be earlier than Effective Date of Contract)</i> Modifications to this Bond form: <input type="checkbox"/> None <input type="checkbox"/> See Paragraph 16</p>	
<p>Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth in this Performance Bond, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.</p>	
Contractor as Principal	Surety
_____ <i>(Full formal name of Contractor)</i>	_____ <i>(Full formal name of Surety) (corporate seal)</i>
By: _____ <i>(Signature)</i>	By: _____ <i>(Signature)(Attach Power of Attorney)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
Attest: _____ <i>(Signature)</i>	Attest: _____ <i>(Signature)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
<p><i>Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.</i></p>	

The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

1. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.
2. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond will arise after:
 - 2.1. The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice may indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 will be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement does not waive the Owner's right, if any, subsequently to declare a Contractor Default;
 - 2.2. The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and
 - 2.3. The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.
3. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 does not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.
4. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:
 - 4.1. Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;
 - 4.2. Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;
 - 4.3. Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owners concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or
 - 4.4. Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:
 - 5.4.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or
 - 5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.
5. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the

Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment, or the Surety has denied liability, in whole or in part, without further notice, the Owner shall be entitled to enforce any remedy available to the Owner.

6. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner will not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety will not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:
 - 6.1. the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;
 - 6.2. additional legal, design professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 5; and
 - 6.3. liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.
7. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.
8. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price will not be reduced or set off on account of any such unrelated obligations. No right of action will accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.
9. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
10. Any proceeding, legal or equitable, under this Bond must be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and must be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit will be applicable.
11. Notice to the Surety, the Owner, or the Contractor must be mailed or delivered to the address shown on the page on which their signature appears.
12. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement will be deemed deleted therefrom and provisions conforming to such statutory or other legal requirement will be deemed incorporated herein. When so furnished, the intent is that this Bond will be construed as a statutory bond and not as a common law bond.
13. Definitions
 - 13.1. *Balance of the Contract Price*—The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.
 - 13.2. *Construction Contract*—The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

- 13.3. *Contractor Default*—Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.
- 13.4. *Owner Default*—Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.
- 13.5. *Contract Documents*—All the documents that comprise the agreement between the Owner and Contractor.
14. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.
15. Modifications to this Bond are as follows: **[Describe modification or enter “None”]**

**SECTION 00615
PAYMENT BOND**

Contractor Name: Address <i>(principal place of business)</i> :	Surety Name: Address <i>(principal place of business)</i> :
Owner Name: Transylvania County, NC Address <i>(principal place of business)</i> : 500 Howell Road Brevard, NC 28712	Contract Description <i>(name and location)</i> : Woodruff Landfill: Phase 7 Expansion Construction Contract No. 10002 500 Howell Road Brevard, NC 28712 Contract Price: \$ Effective Date of Contract:
Bond Bond Amount: \$ Date of Bond: <i>(Date of Bond cannot be earlier than Effective Date of Contract)</i> Modifications to this Bond form: <input type="checkbox"/> None <input type="checkbox"/> See Paragraph 18	
Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth in this Payment Bond, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.	
Contractor as Principal	Surety
_____ <i>(Full formal name of Contractor)</i>	_____ <i>(Full formal name of Surety) (corporate seal)</i>
By: _____ <i>(Signature)</i>	By: _____ <i>(Signature)(Attach Power of Attorney)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
Attest: _____ <i>(Signature)</i>	Attest: _____ <i>(Signature)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
<i>Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.</i>	

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.
2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond will arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety.
4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety's expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.
5. The Surety's obligations to a Claimant under this Bond will arise after the following:
 - 5.1. Claimants who do not have a direct contract with the Contractor
 - 5.1.1. have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
 - 5.1.2. have sent a Claim to the Surety (at the address described in Paragraph 13).
 - 5.2. Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to the Surety (at the address described in Paragraph 13).
6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.
7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:
 - 7.1. Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and
 - 7.2. Pay or arrange for payment of any undisputed amounts.
 - 7.3. The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 will not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.
8. The Surety's total obligation will not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond will be credited for any payments made in good faith by the Surety.

9. Amounts owed by the Owner to the Contractor under the Construction Contract will be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfying obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.
10. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to or give notice on behalf of Claimants, or otherwise have any obligations to Claimants under this Bond.
11. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
12. No suit or action will be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit will be applicable.
13. Notice and Claims to the Surety, the Owner, or the Contractor must be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, will be sufficient compliance as of the date received.
14. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement will be deemed deleted here from and provisions conforming to such statutory or other legal requirement will be deemed incorporated herein. When so furnished, the intent is that this Bond will be construed as a statutory bond and not as a common law bond.
15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.
16. Definitions
 - 16.1. *Claim*—A written statement by the Claimant including at a minimum:
 - 16.1.1. The name of the Claimant;
 - 16.1.2. The name of the person for whom the labor was done, or materials or equipment furnished;
 - 16.1.3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;
 - 16.1.4. A brief description of the labor, materials, or equipment furnished;
 - 16.1.5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
 - 16.1.6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
 - 16.1.7. The total amount of previous payments received by the Claimant; and
 - 16.1.8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.

- 16.2. *Claimant*—An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic’s lien or similar statute against the real property upon which the Project is located. The intent of this Bond is to include without limitation in the terms of “labor, materials, or equipment” that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor’s subcontractors, and all other items for which a mechanic’s lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.
- 16.3. *Construction Contract*—The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.
- 16.4. *Owner Default*—Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.
- 16.5. *Contract Documents*—All the documents that comprise the agreement between the Owner and Contractor.
17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.
18. Modifications to this Bond are as follows: **[Describe modification or enter “None”]**

Contractor's Application for Payment

Owner: <u>Transylvania County, NC</u>	Owner's Project No.: <u>10002</u>
Engineer: <u>LaBella Associates</u>	Engineer's Project No.: <u>2250798 Phase 02</u>
Contractor: _____	Contractor's Project No.: _____
Project: <u>Woodruff Landfill: Phase 7 Expansion Construction</u>	
Contract: _____	
Application No.: _____	Application Date: _____
Application Period: From _____ to _____	

1. Original Contract Price	
2. Net change by Change Orders	
3. Current Contract Price (Line 1 + Line 2)	
4. Total Work completed and materials stored to date (Sum of Column G Lump Sum Total and Column J Unit Price Total)	
5. Retainage	
a. _____ X _____ Work Completed	
b. _____ X _____ Stored Materials	
c. Total Retainage (Line 5.a + Line 5.b)	
6. Amount eligible to date (Line 4 - Line 5.c)	
7. Less previous payments (Line 6 from prior application)	
8. Amount due this application	
9. Balance to finish, including retainage (Line 3 - Line 4)	

Contractor's Certification

The undersigned Contractor certifies, to the best of its knowledge, the following:

(1) All previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with the Work covered by prior Applications for Payment;

(2) Title to all Work, materials and equipment incorporated in said Work, or otherwise listed in or covered by this Application for Payment, will pass to Owner at time of payment free and clear of all liens, security interests, and encumbrances (except such as are covered by a bond acceptable to Owner indemnifying Owner against any such liens, security interest, or encumbrances); and

(3) All the Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

Contractor: _____

Signature: _____ **Date:** _____

Recommended by Engineer	Approved by Owner
By: _____	By: <u>Jaime Laughter</u>
Title: _____	Title: <u>County Manager</u>
Date: _____	Date: _____
Approved by Funding Agency	
By: _____	By: _____
Title: _____	Title: _____
Date: _____	Date: _____

Progress Estimate - Unit Price Work

Contractor's Application for Payment

Owner: Transylvania County, NC
 Engineer: LaBella Associates
 Contractor: _____
 Project: Woodruff Landfill: Phase 7 Expansion Construction
 Contract: _____

Owner's Project No.: 10002
 Engineer's Project No.: 2250798 Phase 02
 Contractor's Project No.: _____

Application No.: _____ Application Period: From _____ to _____ Application Date: _____

A	B	C	D	E	F	G	H	I	J	K	L
Bid Item No.	Description	Contract Information				Work Completed		Materials Currently Stored (not in G) (\$)	Work Completed and Materials Stored to Date (H + I) (\$)	% of Value of Item (J / F) (%)	Balance to Finish (F - J) (\$)
		Item Quantity	Units	Unit Price (\$)	Value of Bid Item (C X E) (\$)	Estimated Quantity Incorporated in the Work	Value of Work Completed to Date (E X G) (\$)				
Original Contract											
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
Original Contract Totals					\$ -		\$ -	\$ -	\$ -		\$ -

Progress Estimate - Unit Price Work

Contractor's Application for Payment

Owner: Transylvania County, NC
 Engineer: LaBella Associates
 Contractor: _____
 Project: Woodruff Landfill: Phase 7 Expansion Construction
 Contract: _____

Owner's Project No.: 10002
 Engineer's Project No.: 2250798 Phase 02
 Contractor's Project No.: _____

Application No.: _____ Application Period: From _____ to _____ Application Date: _____

A	B	C	D	E	F	G	H	I	J	K	L
Bid Item No.	Description	Contract Information				Work Completed		Materials Currently Stored (not in G) (\$)	Work Completed and Materials Stored to Date (H + I) (\$)	% of Value of Item (J / F) (%)	Balance to Finish (F - J) (\$)
		Item Quantity	Units	Unit Price (\$)	Value of Bid Item (C X E) (\$)	Estimated Quantity Incorporated in the Work	Value of Work Completed to Date (E X G) (\$)				
Change Orders											
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
Change Order Totals					\$	-		\$	-	\$	-
Original Contract and Change Orders											
Project Totals					\$	-		\$	-	\$	-

Stored Materials Summary

Contractor's Application for Payment

Owner: Transylvania County, NC	Owner's Project No.: 10002
Engineer: LaBella Associates	Engineer's Project No.: 2250798 Phase 02
Contractor:	Contractor's Project No.:
Project: Woodruff Landfill: Phase 7 Expansion Construction	
Contract:	

Application No.:			Application Period:		From	to			Application Date:				
A	B	C	D	E	F	G	H	I	J	K	L	M	
Item No. (Lump Sum Tab or Bid Item No. (Unit Price Tab)	Supplier Invoice No.	Submittal No. (with Specification Section No.)	Description of Materials or Equipment Stored	Storage Location	Application No. When Materials Placed in Storage	Materials Stored			Incorporated in Work			Materials Remaining in Storage (I-L) (\$)	
						Previous Amount Stored (\$)	Amount Stored this Period (\$)	Amount Stored to Date (G+H) (\$)	Amount Previously Incorporated in the Work (\$)	Amount Incorporated in the Work this Period (\$)	Total Amount Incorporated in the Work (J+K) (\$)		
Totals						\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -

**SECTION 00626
NOTICE OF ACCEPTABILITY OF WORK**

Owner:	Transylvania County, NC	Owner's Project No.:	10002
Engineer:	LaBella Associates	Engineer's Project No.:	2250798 Phase 02
Contractor:		Contractor's Project No.:	
Project:	Woodruff Landfill: Phase 7 Expansion Construction		
Contract Name:			
Notice Date:		Effective Date of the Construction Contract:	

The Engineer hereby gives notice to the Owner and Contractor that Engineer recommends final payment to Contractor, and that the Work furnished and performed by Contractor under the Construction Contract is acceptable, expressly subject to the provisions of the Construction Contract's Contract Documents ("Contract Documents") and of the Agreement between Owner and Engineer for Professional Services dated [date of professional services agreement] ("Owner-Engineer Agreement"). This Notice of Acceptability of Work (Notice) is made expressly subject to the following terms and conditions to which all who receive and rely on said Notice agree:

1. This Notice has been prepared with the skill and care ordinarily used by members of the engineering profession practicing under similar conditions at the same time and in the same locality.
2. This Notice reflects and is an expression of the Engineer's professional opinion.
3. This Notice has been prepared to the best of Engineer's knowledge, information, and belief as of the Notice Date.
4. This Notice is based entirely on and expressly limited by the scope of services Engineer has been employed by Owner to perform or furnish during construction of the Project (including observation of the Contractor's Work and CQA field and laboratory testing) under the Owner-Engineer Agreement, and applies only to facts that are within Engineer's knowledge or could reasonably have been ascertained by Engineer as a result of carrying out the responsibilities specifically assigned to Engineer under such Owner-Engineer Agreement.
5. This Notice is not a guarantee or warranty of Contractor's performance under the Construction Contract, an acceptance of Work that is not in accordance with the Contract Documents, including but not limited to defective Work discovered after final inspection, nor an assumption of responsibility for any failure of Contractor to furnish and perform the Work thereunder in accordance with the Contract Documents, or to otherwise comply with the Contract Documents or the terms of any special guarantees specified therein.
6. This Notice does not relieve Contractor of any surviving obligations under the Construction Contract and is subject to Owner's reservations of rights with respect to completion and final payment.

Engineer

By (signature): _____
Name (printed): Rohit Garg, P.E.
Title: Senior Project Engineer

**SECTION 00940
WORK CHANGE DIRECTIVE NO.: [Number of Work Change Directive]**

Owner: Transylvania County, NC	Owner's Project No.: 10002
Engineer: LaBella Associates	Engineer's Project No.: 2250798 Phase 02
Contractor:	Contractor's Project No.:
Project: Woodruff Landfill: Phase 7 Expansion Construction	
Contract Name:	
Date Issued:	Effective Date of Work Change Directive:

Contractor is directed to proceed promptly with the following change(s):

Description:

[Description of the change to the Work]

Attachments:

[List documents related to the change to the Work]

Purpose for the Work Change Directive:

[Describe the purpose for the change to the Work]

Directive to proceed promptly with the Work described herein, prior to agreeing to change in Contract Price and Contract Time, is issued due to:

Notes to User—Check one or both of the following

Non-agreement on pricing of proposed change. Necessity to proceed for schedule or other reasons.

Estimated Change in Contract Price and Contract Times (non-binding, preliminary):

Contract Price:	\$ _____	[increase] [decrease] [not yet estimated].
Contract Time:	_____ days	[increase] [decrease] [not yet estimated].

Basis of estimated change in Contract Price:

Lump Sum Unit Price Cost of the Work Other

	Recommended by Engineer	Authorized by Owner
By:	Rohit Garg, P.E.	Jaime Laughter
Title:	Senior Project Engineer	County Manager
Date:	_____	_____

SECTION 00941
CHANGE ORDER NO.: [Number of Change Order]

Owner: Transylvania County, NC
 Engineer: LaBella Associates
 Contractor: Contractor's Project No.:
 Project: Woodruff Landfill: Phase 7 Expansion Construction
 Contract Name: Contractor's Project No.:
 Date Issued: Effective Date of Change Order:
 Order:

The Contract is modified as follows upon execution of this Change Order:

Description:

[Description of the change]

Attachments:

[List documents related to the change]

Change in Contract Times
[State Contract Times as either a specific date or a number of days]

Change in Contract Price	Change in Contract Times [State Contract Times as either a specific date or a number of days]
Original Contract Price: \$ _____	Original Contract Times: Substantial Completion: _____ Ready for final payment: _____
[Increase] [Decrease] from previously approved Change Orders No. 1 to No. [Number of previous Change Order] : \$ _____	[Increase] [Decrease] from previously approved Change Orders No.1 to No. [Number of previous Change Order] : Substantial Completion: _____ Ready for final payment: _____
Contract Price prior to this Change Order: \$ _____	Contract Times prior to this Change Order: Substantial Completion: _____ Ready for final payment: _____
[Increase] [Decrease] this Change Order: \$ _____	[Increase] [Decrease] this Change Order: Substantial Completion: _____ Ready for final payment: _____
Contract Price incorporating this Change Order: \$ _____	Contract Times with all approved Change Orders: Substantial Completion: _____ Ready for final payment: _____

Recommended by Engineer (if required)

By: Rohit Garg, P.E.
 Title: Senior Project Engineer
 Date: _____
 Signature: _____

Authorized by Owner

Jaime Laughter
 County Manager

SECTION 00942
FIELD ORDER NO.: [Number of Field Order]

Owner:	Transylvania County, NC	Owner's Project No.:	10002
Engineer:	LaBella Associates	Engineer's Project No.:	2250798 Phase 02
Contractor:		Contractor's Project No.:	
Project:	Woodruff Landfill: Phase 7 Expansion Construction		
Contract Name:			
Date Issued:	Effective Date of Field Order:		

Contractor is hereby directed to promptly perform the Work described in this Field Order, issued in accordance with Paragraph 11.04 of the General Conditions, for minor changes in the Work without changes in Contract Price or Contract Times. If Contractor considers that a change in Contract Price or Contract Times is required, submit a Change Proposal before proceeding with this Work.

Reference:

Specification Section(s):
Drawing(s) / Details (s):

Description:

[Description of the change to the Work]

Attachments:

[List documents supporting change]

Issued by Engineer

By: Rohit Garg, P.E.
Title: Senior Project Engineer
Date: _____

PART III – CONTRACT CONDITIONS

**SECTION 00700
STANDARD GENERAL CONDITIONS
OF THE CONSTRUCTION CONTRACT**

TABLE OF CONTENTS

	Page
Article 1—Definitions and Terminology.....	1
1.01 Defined Terms.....	1
1.02 Terminology.....	5
Article 2—Preliminary Matters.....	7
2.01 Delivery of Performance and Payment Bonds; Evidence of Insurance.....	7
2.02 Copies of Documents	7
2.03 Before Starting Construction	7
2.04 Preconstruction Conference; Designation of Authorized Representatives.....	7
2.05 Acceptance of Schedules.....	8
2.06 Electronic Transmittals.....	8
Article 3—Contract Documents: Intent, Requirements, Reuse.....	8
3.01 Intent	8
3.02 Reference Standards	9
3.03 Reporting and Resolving Discrepancies	9
3.04 Requirements of the Contract Documents.....	10
3.05 Reuse of Documents.....	11
Article 4—Commencement and Progress of the Work.....	11
4.01 Commencement of Contract Times; Notice to Proceed	11
4.02 Starting the Work	11
4.03 Reference Points.....	11
4.04 Progress Schedule	11
4.05 Delays in Contractor’s Progress	12
Article 5—Site; Subsurface and Physical Conditions; Hazardous Environmental Conditions	13
5.01 Availability of Lands	13
5.02 Use of Site and Other Areas	13
5.03 Subsurface and Physical Conditions.....	14
5.04 Differing Subsurface or Physical Conditions	15
5.05 Underground Facilities.....	17
5.06 Hazardous Environmental Conditions at Site.....	19

Article 6—Bonds and Insurance	21
6.01 Performance, Payment, and Other Bonds	21
6.02 Insurance—General Provisions	21
6.03 Contractor’s Insurance.....	23
6.04 Builder’s Risk and Other Property Insurance	24
6.05 Property Losses; Subrogation.....	25
6.06 Receipt and Application of Property Insurance Proceeds	26
Article 7—Contractor’s Responsibilities	26
7.01 Contractor’s Means and Methods of Construction	26
7.02 Supervision and Superintendence.....	26
7.03 Labor; Working Hours	27
7.04 Services, Materials, and Equipment	27
7.05 “Or Equals”	27
7.06 Substitutes.....	28
7.07 Concerning Subcontractors and Suppliers.....	30
7.08 Patent Fees and Royalties	31
7.09 Permits	31
7.10 Taxes	32
7.11 Laws and Regulations.....	32
7.12 Record Documents.....	32
7.13 Safety and Protection.....	32
7.14 Hazard Communication Programs	34
7.15 Emergencies	34
7.16 Submittals.....	34
7.17 Contractor’s General Warranty and Guarantee	37
7.18 Indemnification.....	37
7.19 Delegation of Professional Design Services.....	38
Article 8—Other Work at the Site	39
8.01 Other Work.....	39
8.02 Coordination	39
8.03 Legal Relationships.....	40
Article 9—Owner’s Responsibilities	41
9.01 Communications to Contractor	41
9.02 Replacement of Engineer	41
9.03 Furnish Data	41

9.04	Pay When Due	41
9.05	Lands and Easements; Reports, Tests, and Drawings	41
9.06	Insurance	41
9.07	Change Orders.....	41
9.08	Inspections, Tests, and Approvals.....	41
9.09	Limitations on Owner’s Responsibilities.....	42
9.10	Undisclosed Hazardous Environmental Condition	42
9.11	Evidence of Financial Arrangements	42
9.12	Safety Programs	42
Article 10—Engineer’s Status During Construction.....		42
10.01	Owner’s Representative.....	42
10.02	Visits to Site	42
10.03	Resident Project Representative.....	43
10.04	Engineer’s Authority	43
10.05	Determinations for Unit Price Work	43
10.06	Decisions on Requirements of Contract Documents and Acceptability of Work.....	43
10.07	Limitations on Engineer’s Authority and Responsibilities	43
10.08	Compliance with Safety Program	44
Article 11—Changes to the Contract		44
11.01	Amending and Supplementing the Contract	44
11.02	Change Orders.....	44
11.03	Work Change Directives.....	45
11.04	Field Orders	45
11.05	Owner-Authorized Changes in the Work	45
11.06	Unauthorized Changes in the Work	46
11.07	Change of Contract Price	46
11.08	Change of Contract Times	47
11.09	Change Proposals	47
11.10	Notification to Surety	48
Article 12—Claims.....		48
12.01	Claims	48
Article 13—Cost of the Work; Allowances; Unit Price Work		50
13.01	Cost of the Work	50
13.02	Allowances	53
13.03	Unit Price Work	53

Article 14—Tests and Inspections; Correction, Removal, or Acceptance of Defective Work	54
14.01 Access to Work	54
14.02 Tests, Inspections, and Approvals.....	54
14.03 Defective Work	55
14.04 Acceptance of Defective Work	56
14.05 Uncovering Work	56
14.06 Owner May Stop the Work	56
14.07 Owner May Correct Defective Work	57
Article 15—Payments to Contractor; Set-Offs; Completion; Correction Period.....	57
15.01 Progress Payments	57
15.02 Contractor’s Warranty of Title.....	60
15.03 Substantial Completion	60
15.04 Partial Use or Occupancy.....	61
15.05 Final Inspection	62
15.06 Final Payment.....	62
15.07 Waiver of Claims.....	63
15.08 Correction Period.....	63
Article 16—Suspension of Work and Termination.....	64
16.01 Owner May Suspend Work.....	64
16.02 Owner May Terminate for Cause.....	64
16.03 Owner May Terminate for Convenience.....	65
16.04 Contractor May Stop Work or Terminate	66
Article 17—Final Resolution of Disputes.....	66
17.01 Methods and Procedures	66
Article 18—Miscellaneous.....	67
18.01 Giving Notice.....	67
18.02 Computation of Times.....	67
18.03 Cumulative Remedies	67
18.04 Limitation of Damages.....	67
18.05 No Waiver.....	67
18.06 Survival of Obligations	67
18.07 Controlling Law	67
18.08 Assignment of Contract.....	68
18.09 Successors and Assigns	68
18.10 Headings.....	68

**STANDARD GENERAL CONDITIONS
OF THE CONSTRUCTION CONTRACT**

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. *Agreement*—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.
 3. *Application for Payment*—The document prepared by Contractor, in a form acceptable to Engineer, to request progress or final payments, and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *Bid*—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 5. *Bidder*—An individual or entity that submits a Bid to Owner.
 6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.
 7. *Bidding Requirements*—The Advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.
 8. *Change Order*—A document 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, or other revision to the Contract, issued on or after the Effective Date of the Contract.
 9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.
10. *Claim*
- a. A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment of Contract Price or Contract Times; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract.

- b. A demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal, or seeking resolution of a contractual issue that Engineer has declined to address.
 - c. A demand or assertion by Owner or Contractor, duly submitted in compliance with the procedural requirements set forth herein, made pursuant to Paragraph 12.01.A.4, concerning disputes arising after Engineer has issued a recommendation of final payment.
 - d. A demand for money or services by a third party is not a Claim.
11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), lead-based paint (as defined by the HUD/EPA standard), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to Laws and Regulations regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.
 12. *Contract*—The entire and integrated written contract between Owner and Contractor concerning the Work.
 13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.
 14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents.
 15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.
 16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.
 17. *Cost of the Work*—See Paragraph 13.01 for definition.
 18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.
 19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.
 20. *Electronic Document*—Any Project-related correspondence, attachments to correspondence, data, documents, drawings, information, or graphics, including but not limited to Shop Drawings and other Submittals, that are in an electronic or digital format.
 21. *Electronic Means*—Electronic mail (email), upload/download from a secure Project website, or other communications methods that allow: (a) the transmission or communication of Electronic Documents; (b) the documentation of transmissions, including sending and receipt; (c) printing of the transmitted Electronic Document by the recipient; (d) the storage and archiving of the Electronic Document by sender and recipient; and (e) the use by recipient of the Electronic Document for purposes permitted by this Contract. Electronic Means does not include the use of text messaging, or of Facebook, Twitter, Instagram, or similar social media services for transmission of Electronic Documents.
 22. *Engineer*—The individual or entity named as such in the Agreement.

23. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.
24. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto.
 - a. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated into the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, is not a Hazardous Environmental Condition.
 - b. The presence of Constituents of Concern that are to be removed or remediated as part of the Work is not a Hazardous Environmental Condition.
 - c. The presence of Constituents of Concern as part of the routine, anticipated, and obvious working conditions at the Site, is not a Hazardous Environmental Condition.
25. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and binding decrees, resolutions, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
26. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.
27. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date, or by a time prior to Substantial Completion of all the Work.
28. *Notice of Award*—The written notice by Owner to a Bidder of Owner’s acceptance of the Bid.
29. *Notice to Proceed*—A written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.
30. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.
31. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising Contractor’s plan to accomplish the Work within the Contract Times.
32. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.
33. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative (RPR) includes any assistants or field staff of Resident Project Representative.
34. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.

35. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer’s review of the submittals.
36. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor’s Applications for Payment.
37. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.
38. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements, and such other lands or areas furnished by Owner which are designated for the use of Contractor.
39. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.
40. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work.
41. *Submittal*—A written or graphic document, prepared by or for Contractor, which the Contract Documents require Contractor to submit to Engineer, or that is indicated as a Submittal in the Schedule of Submittals accepted by Engineer. Submittals may include Shop Drawings and Samples; schedules; product data; Owner-delegated designs; sustainable design information; information on special procedures; testing plans; results of tests and evaluations, source quality-control testing and inspections, and field or Site quality-control testing and inspections; warranties and certifications; Suppliers’ instructions and reports; records of delivery of spare parts and tools; operations and maintenance data; Project photographic documentation; record documents; and other such documents required by the Contract Documents. Submittals, whether or not approved or accepted by Engineer, are not Contract Documents. Change Proposals, Change Orders, Claims, notices, Applications for Payment, and requests for interpretation or clarification are not Submittals.
42. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion of such Work.
43. *Successful Bidder*—The Bidder to which the Owner makes an award of contract.
44. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.
45. *Supplier*—A manufacturer, fabricator, supplier, distributor, 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 a Subcontractor.

46. *Technical Data*

- a. Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (1) existing subsurface conditions at or adjacent to the Site, or existing physical conditions at or adjacent to the Site including existing surface or subsurface structures (except Underground Facilities) or (2) Hazardous Environmental Conditions at the Site.
- b. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then Technical Data is defined, with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06, as the data contained in boring logs, recorded measurements of subsurface water levels, assessments of the condition of subsurface facilities, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical, environmental, or other Site or facilities conditions report prepared for the Project and made available to Contractor.
- c. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data, and instead Underground Facilities are shown or indicated on the Drawings.

47. *Underground Facilities*—All active or not-in-service underground lines, pipelines, conduits, ducts, encasements, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or systems at the Site, including but not limited to those facilities or systems that produce, transmit, distribute, or convey telephone or other communications, cable television, fiber optic transmissions, power, electricity, light, heat, gases, oil, crude oil products, liquid petroleum products, water, steam, waste, wastewater, storm water, other liquids or chemicals, or traffic or other control systems. An abandoned facility or system is not an Underground Facility.

48. *Unit Price Work*—Work to be paid for on the basis of unit prices.

49. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.

50. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

[See SC-1.01]

1.02 *Terminology*

- A. The words and terms discussed in Paragraphs 1.02.B, C, D, and E are not defined terms that require initial capital letters, but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.
- B. *Intent of Certain Terms or Adjectives*: The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be

solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.

- C. *Day*: The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.
- D. *Defective*: The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - 1. does not conform to the Contract Documents;
 - 2. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - 3. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or Paragraph 15.04).
- E. *Furnish, Install, Perform, Provide*
 - 1. The word “furnish,” when used in connection with services, materials, or equipment, means to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
 - 2. The word “install,” when used in connection with services, materials, or equipment, means to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
 - 3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, means to furnish and install said services, materials, or equipment complete and ready for intended use.
 - 4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words “furnish,” “install,” “perform,” or “provide,” then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.
- F. *Contract Price or Contract Times*: References to a change in “Contract Price or Contract Times” or “Contract Times or Contract Price” or similar, indicate that such change applies to (1) Contract Price, (2) Contract Times, or (3) both Contract Price and Contract Times, as warranted, even if the term “or both” is not expressed.
- G. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2—PRELIMINARY MATTERS

2.01 *Delivery of Performance and Payment Bonds; Evidence of Insurance*

- A. *Performance and Payment Bonds*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner the performance bond and payment bond (if the Contract requires Contractor to furnish such bonds).
- B. *Evidence of Contractor's Insurance*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each additional insured (as identified in the Contract), the certificates, endorsements, and other evidence of insurance required to be provided by Contractor in accordance with Article 6, except to the extent the Supplementary Conditions expressly establish other dates for delivery of specific insurance policies.
- C. *Evidence of Owner's Insurance*: After receipt of the signed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each additional insured (as identified in the Contract), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

[See SC-2.01]

2.02 *Copies of Documents*

- A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully signed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.
- B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.03 *Before Starting Construction*

- A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise required by the Contract Documents), Contractor shall submit to Engineer for timely review:
 - 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract;
 - 2. a preliminary Schedule of Submittals; and
 - 3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work, and to discuss the schedules referred to in

Paragraph 2.03.A, procedures for handling Shop Drawings, Samples, and other Submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.

- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.05 *Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review the schedules submitted in accordance with Paragraph 2.03.A. No progress payment will be made to Contractor until acceptable schedules are submitted to Engineer.
 - 1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
 - 2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
 - 3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.
 - 4. If a schedule is not acceptable, Contractor will have an additional 10 days to revise and resubmit the schedule.

2.06 *Electronic Transmittals*

- A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may send, and shall accept, Electronic Documents transmitted by Electronic Means.
- B. If the Contract does not establish protocols for Electronic Means, then Owner, Engineer, and Contractor shall jointly develop such protocols.
- C. Subject to any governing protocols for Electronic Means, when transmitting Electronic Documents by Electronic Means, the transmitting party makes no representations as to long-term compatibility, usability, or readability of the Electronic Documents resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the Electronic Documents.

[See SC-2.07 and SC-2.08]

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one Contract Document is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents.

- C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic versions of the Contract Documents (including any printed copies derived from such electronic versions) and the printed record version, the printed record version will govern.
- D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.
- E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.
- F. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation will be deemed stricken, and all remaining provisions will continue to be valid and binding upon Owner and Contractor, which agree that the Contract Documents will be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.
- G. Nothing in the Contract Documents creates:
 - 1. any contractual relationship between Owner or Engineer and any Subcontractor, Supplier, or other individual or entity performing or furnishing any of the Work, for the benefit of such Subcontractor, Supplier, or other individual or entity; or
 - 2. any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity, except as may otherwise be required by Laws and Regulations.

3.02 *Reference Standards*

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

- 1. Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, means the standard specification, manual, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
- 2. No provision of any such standard specification, manual, reference standard, or code, and no instruction of a Supplier, will be effective to change the duties or responsibilities of Owner, Contractor, or Engineer from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner or Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*

- 1. *Contractor's Verification of Figures and Field Measurements:* Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual

knowledge of, and shall not proceed with any Work affected thereby until the conflict, error, ambiguity, or discrepancy is resolved by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.

2. *Contractor's Review of Contract Documents:* If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. Resolving Discrepancies

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Engineer take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:
 - a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); or
 - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 Requirements of the Contract Documents

- A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer in writing all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work.
- B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.
- C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly notify Owner and Contractor in writing that Engineer is unable to provide a decision or

interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

- A. Contractor and its Subcontractors and Suppliers shall not:
 - 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media versions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or
 - 2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein precludes Contractor from retaining copies of the Contract Documents for record purposes.

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run on the 30th day after the Effective Date of the Contract or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Contract. In no event will the Contract Times commence to run later than the 60th day after the day of Bid opening or the 30th day after the Effective Date of the Contract, whichever date is earlier.

4.02 *Starting the Work*

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work may be done at the Site prior to such date.

4.03 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 as it may be adjusted from time to time as provided below.
 - 1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times must be submitted in accordance with the requirements of Article 11.
- B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work will be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *Delays in Contractor's Progress*

- A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times.
- B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.
- C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Such an adjustment will be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:
1. Severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;
 2. Abnormal weather conditions;
 3. Acts or failures to act of third-party utility owners or other third-party entities (other than those third-party utility owners or other third-party entities performing other work at or adjacent to the Site as arranged by or under contract with Owner, as contemplated in Article 8); and
 4. Acts of war or terrorism.
- [See SC-4.05]
- D. Contractor's entitlement to an adjustment of Contract Times or Contract Price is limited as follows:
1. Contractor's entitlement to an adjustment of the Contract Times is conditioned on the delay, disruption, or interference adversely affecting an activity on the critical path to completion of the Work, as of the time of the delay, disruption, or interference.
 2. Contractor shall not be entitled to an adjustment in Contract Price for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor. Such a concurrent delay by Contractor shall not preclude an adjustment of Contract Times to which Contractor is otherwise entitled.
 3. Adjustments of Contract Times or Contract Price are subject to the provisions of Article 11.

- E. Each Contractor request or Change Proposal seeking an increase in Contract Times or Contract Price must be supplemented by supporting data that sets forth in detail the following:
1. The circumstances that form the basis for the requested adjustment;
 2. The date upon which each cause of delay, disruption, or interference began to affect the progress of the Work;
 3. The date upon which each cause of delay, disruption, or interference ceased to affect the progress of the Work;
 4. The number of days' increase in Contract Times claimed as a consequence of each such cause of delay, disruption, or interference; and
 5. The impact on Contract Price, in accordance with the provisions of Paragraph 11.07.

Contractor shall also furnish such additional supporting documentation as Owner or Engineer may require including, where appropriate, a revised progress schedule indicating all the activities affected by the delay, disruption, or interference, and an explanation of the effect of the delay, disruption, or interference on the critical path to completion of the Work.

- F. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5, together with the provisions of Paragraphs 4.05.D and 4.05.E.
- G. Paragraph 8.03 addresses delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.

ARTICLE 5—SITE; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 Availability of Lands

- A. Owner shall furnish the Site. Owner shall notify Contractor in writing of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.
- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which permanent improvements are to be made and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

5.02 Use of Site and Other Areas

- A. *Limitation on Use of Site and Other Areas*
1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall

not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas, or to improvements, structures, utilities, or similar facilities located at such adjacent lands or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.

2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.13, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or in a court of competent jurisdiction; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.
- B. *Removal of Debris During Performance of the Work:* During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris will conform to applicable Laws and Regulations.
 - C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.
 - D. *Loading of Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent structures or land to stresses or pressures that will endanger them.

5.03 *Subsurface and Physical Conditions*

- A. *Reports and Drawings:* The Supplementary Conditions identify:
 1. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data;
 2. Those drawings of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data; and

3. Technical Data contained in such reports and drawings.
- B. *Underground Facilities*: Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 5.05, and not in the drawings referred to in Paragraph 5.03.A. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.
- C. *Reliance by Contractor on Technical Data*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b.
- D. *Limitations of Other Data and Documents*: Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:
 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto;
 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings;
 3. the contents of other Site-related documents made available to Contractor, such as record drawings from other projects at or adjacent to the Site, or Owner's archival documents concerning the Site; or
 4. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

[See SC-5.03]

5.04 *Differing Subsurface or Physical Conditions*

- A. *Notice by Contractor*: If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site:
 1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate;
 2. is of such a nature as to require a change in the Drawings or Specifications;
 3. differs materially from that shown or indicated in the Contract Documents; or
 4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

- B. *Engineer's Review*: After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine

- whether it is necessary for Owner to obtain additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.
- C. *Owner's Statement to Contractor Regarding Site Condition:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.
- D. *Early Resumption of Work:* If at any time Engineer determines that Work in connection with the subsurface or physical condition in question may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the condition in question has been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.
- E. *Possible Price and Times Adjustments*
1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. Such condition must fall within any one or more of the categories described in Paragraph 5.04.A;
 - b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,
 - c. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E.
 2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:
 - a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise;
 - b. The existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or
 - c. Contractor failed to give the written notice required by Paragraph 5.04.A.
 3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.

4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.
- F. *Underground Facilities; Hazardous Environmental Conditions:* Paragraph 5.05 governs rights and responsibilities regarding the presence or location of Underground Facilities. Paragraph 5.06 governs rights and responsibilities regarding Hazardous Environmental Conditions. The provisions of Paragraphs 5.03 and 5.04 are not applicable to the presence or location of Underground Facilities, or to Hazardous Environmental Conditions.

5.05 *Underground Facilities*

- A. *Contractor's Responsibilities:* Unless it is otherwise expressly provided in the Supplementary Conditions, the cost of all of the following are included in the Contract Price, and Contractor shall have full responsibility for:
 1. reviewing and checking all information and data regarding existing Underground Facilities at the Site;
 2. complying with applicable state and local utility damage prevention Laws and Regulations;
 3. verifying the actual location of those Underground Facilities shown or indicated in the Contract Documents as being within the area affected by the Work, by exposing such Underground Facilities during the course of construction;
 4. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
 5. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.
- B. *Notice by Contractor:* If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated on the Drawings, or was not shown or indicated on the Drawings with reasonable accuracy, then Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing regarding such Underground Facility.
- C. *Engineer's Review:* Engineer will:
 1. promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated on the Drawings, or was not shown or indicated with reasonable accuracy;
 2. identify and communicate with the owner of the Underground Facility; prepare recommendations to Owner (and if necessary, issue any preliminary instructions to Contractor) regarding the Contractor's resumption of Work in connection with the Underground Facility in question;
 3. obtain any pertinent cost or schedule information from Contractor; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and
 4. advise Owner in writing of Engineer's findings, conclusions, and recommendations.

During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

- D. *Owner's Statement to Contractor Regarding Underground Facility:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.
- E. *Early Resumption of Work:* If at any time Engineer determines that Work in connection with the Underground Facility may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the Underground Facility in question and conditions affected by its presence have been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.
- F. *Possible Price and Times Adjustments*
 - 1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, to the extent that any existing Underground Facility at the Site that was not shown or indicated on the Drawings, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;
 - b. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E; and
 - c. Contractor gave the notice required in Paragraph 5.05.B.
 - 2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.
 - 3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.
 - 4. The information and data shown or indicated on the Drawings with respect to existing Underground Facilities at the Site is based on information and data (a) furnished by the owners of such Underground Facilities, or by others, (b) obtained from available records, or (c) gathered in an investigation conducted in accordance with the current edition of ASCE 38, Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data, by the American Society of Civil Engineers. If such information or data is incorrect or incomplete, Contractor's remedies are limited to those set forth in this Paragraph 5.05.F.

5.06 *Hazardous Environmental Conditions at Site*

- A. *Reports and Drawings*: The Supplementary Conditions identify:
1. those reports known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site;
 2. drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and
 3. Technical Data contained in such reports and drawings.
- B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:
1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto;
 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.
- D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.
- E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in

question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.

- F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.
- G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, as a result of such Work stoppage, such special conditions under which Work is agreed to be resumed by Contractor, or any costs or expenses incurred in response to the Hazardous Environmental Condition, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off. Entitlement to any such adjustment is subject to the provisions of Paragraphs 4.05.D, 4.05.E, 11.07, and 11.08.
- H. If, after receipt of such written notice, Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.
- I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court, arbitration, or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.I obligates Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J obligates Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6—BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of Contractor's obligations under the Contract. These bonds must remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the terms of a prescribed bond form, the Supplementary Conditions, or other provisions of the Contract.

[See SC-6.01]

- B. Contractor shall also furnish such other bonds (if any) as are required by the Supplementary Conditions or other provisions of the Contract.
- C. All bonds must be in the form included in the Bidding Documents or otherwise specified by Owner prior to execution of the Contract, except as provided otherwise by Laws or Regulations, and must be issued and signed by a surety named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Department Circular 570 (as amended and supplemented) by the Bureau of the Fiscal Service, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority must show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.
- D. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue bonds in the required amounts.
- E. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer in writing and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which must comply with the bond and surety requirements above.
- F. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner's termination rights under Article 16.
- G. Upon request to Owner from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Owner shall provide a copy of the payment bond to such person or entity.
- H. Upon request to Contractor from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Contractor shall provide a copy of the payment bond to such person or entity.

6.02 *Insurance—General Provisions*

- A. Owner and Contractor shall obtain and maintain insurance as required in this article and in the Supplementary Conditions.
- B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized in the state or jurisdiction in which the Project is located to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in

the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.

- C. Alternative forms of insurance coverage, including but not limited to self-insurance and “Occupational Accident and Excess Employer’s Indemnity Policies,” are not sufficient to meet the insurance requirements of this Contract, unless expressly allowed in the Supplementary Conditions.
- D. Contractor shall deliver to Owner, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Contractor has obtained and is maintaining the policies and coverages required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, full disclosure of all relevant exclusions, and evidence of insurance required to be purchased and maintained by Subcontractors or Suppliers. In any documentation furnished under this provision, Contractor, Subcontractors, and Suppliers may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those applicable to this Contract.
- E. Owner shall deliver to Contractor, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Owner has obtained and is maintaining the policies and coverages required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, and full disclosure of all relevant exclusions. In any documentation furnished under this provision, Owner may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those relevant to this Contract.
- F. Failure of Owner or Contractor to demand such certificates or other evidence of the other party’s full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, will not be construed as a waiver of the other party’s obligation to obtain and maintain such insurance.
- G. In addition to the liability insurance required to be provided by Contractor, the Owner, at Owner’s option, may purchase and maintain Owner’s own liability insurance. Owner’s liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner’s liability policies for any of Contractor’s obligations to the Owner, Engineer, or third parties.
- H. Contractor shall require:
 - 1. Subcontractors to purchase and maintain worker’s compensation, commercial general liability, and other insurance that is appropriate for their participation in the Project, and to name as additional insureds Owner and Engineer (and any other individuals or entities identified in the Supplementary Conditions as additional insureds on Contractor’s liability policies) on each Subcontractor’s commercial general liability insurance policy; and
 - 2. Suppliers to purchase and maintain insurance that is appropriate for their participation in the Project.
- I. If either party does not purchase or maintain the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior

to the start of the Work, or of such failure to maintain prior to any change in the required coverage.

- J. If Contractor has failed to obtain and maintain required insurance, Contractor's entitlement to enter or remain at the Site will end immediately, and Owner may impose an appropriate set-off against payment for any associated costs (including but not limited to the cost of purchasing necessary insurance coverage), and exercise Owner's termination rights under Article 16.
- K. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect (but is in no way obligated) to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price will be adjusted accordingly.
- L. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests. Contractor is responsible for determining whether such coverage and limits are adequate to protect its interests, and for obtaining and maintaining any additional insurance that Contractor deems necessary.
- M. The insurance and insurance limits required herein will not be deemed as a limitation on Contractor's liability, or that of its Subcontractors or Suppliers, under the indemnities granted to Owner and other individuals and entities in the Contract or otherwise.
- N. All the policies of insurance required to be purchased and maintained under this Contract will contain a provision or endorsement that the coverage afforded will not be canceled, or renewal refused, until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured and Engineer.

6.03 Contractor's Insurance

- A. *Required Insurance:* Contractor shall purchase and maintain Worker's Compensation, Commercial General Liability, and other insurance pursuant to the specific requirements of the Supplementary Conditions.
- B. *General Provisions:* The policies of insurance required by this Paragraph 6.03 as supplemented must:
 - 1. include at least the specific coverages required;
 - 2. be written for not less than the limits provided, or those required by Laws or Regulations, whichever is greater;
 - 3. remain in effect at least until the Work is complete (as set forth in Paragraph 15.06.D), and longer if expressly required elsewhere in this Contract, and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract;
 - 4. apply with respect to the performance of the Work, whether such performance is by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable; and
 - 5. include all necessary endorsements to support the stated requirements.

[See SC-6.03.B]

- C. *Additional Insureds*: The Contractor's commercial general liability, automobile liability, employer's liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies, if required by this Contract, must:
1. include and list as additional insureds Owner and Engineer, and any individuals or entities identified as additional insureds in the Supplementary Conditions;
 2. include coverage for the respective officers, directors, members, partners, employees, and consultants of all such additional insureds;
 3. afford primary coverage to these additional insureds for all claims covered thereby (including as applicable those arising from both ongoing and completed operations);
 4. not seek contribution from insurance maintained by the additional insured; and
 5. as to commercial general liability insurance, apply to additional insureds with respect to liability caused in whole or in part by Contractor's acts or omissions, or the acts and omissions of those working on Contractor's behalf, in the performance of Contractor's operations.

[See SC-6.03.D]

6.04 *Builder's Risk and Other Property Insurance*

- A. *Builder's Risk*: Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the Work's full insurable replacement cost (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). The specific requirements applicable to the builder's risk insurance are set forth in the Supplementary Conditions.
- B. *Property Insurance for Facilities of Owner Where Work Will Occur*: Owner is responsible for obtaining and maintaining property insurance covering each existing structure, building, or facility in which any part of the Work will occur, or to which any part of the Work will attach or be adjoined. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, providing coverage consistent with that required for the builder's risk insurance, and will be maintained until the Work is complete, as set forth in Paragraph 15.06.D.
- C. *Property Insurance for Substantially Complete Facilities*: Promptly after Substantial Completion, and before actual occupancy or use of the substantially completed Work, Owner will obtain property insurance for such substantially completed Work, and maintain such property insurance at least until the Work is complete, as set forth in Paragraph 15.06.D. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, and provide coverage consistent with that required for the builder's risk insurance. The builder's risk insurance may terminate upon written confirmation of Owner's procurement of such property insurance.
- D. *Partial Occupancy or Use by Owner*: If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work, as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide advance notice of such occupancy or use to the builder's risk insurer, and obtain an endorsement consenting to the continuation of coverage prior to commencing such partial occupancy or use.
- E. *Insurance of Other Property; Additional Insurance*: If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, then the entity or individual owning such property item will be responsible for insuring it. If

Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.04, it may do so at Contractor's expense.

6.05 *Property Losses; Subrogation*

- A. The builder's risk insurance policy purchased and maintained in accordance with Paragraph 6.04 (or an installation floater policy if authorized by the Supplementary Conditions), will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors.
1. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils, risks, or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all individuals or entities identified in the Supplementary Conditions as builder's risk or installation floater insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused.
 2. None of the above waivers extends to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.
- B. Any property insurance policy maintained by Owner covering any loss, damage, or consequential loss to Owner's existing structures, buildings, or facilities in which any part of the Work will occur, or to which any part of the Work will attach or adjoin; to adjacent structures, buildings, or facilities of Owner; or to part or all of the completed or substantially completed Work, during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06, will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them, and that the insured is allowed to waive the insurer's rights of subrogation in a written contract executed prior to the loss, damage, or consequential loss.
1. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from fire or any of the perils, risks, or causes of loss covered by such policies.
- C. The waivers in this Paragraph 6.05 include the waiver of rights due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other insured peril, risk, or cause of loss.
- D. Contractor shall be responsible for assuring that each Subcontract contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents,

consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from fire or other peril, risk, or cause of loss covered by builder's risk insurance, installation floater, and any other property insurance applicable to the Work.

6.06 *Receipt and Application of Property Insurance Proceeds*

- A. Any insured loss under the builder's risk and other policies of property insurance required by Paragraph 6.04 will be adjusted and settled with the named insured that purchased the policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.
- B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.04 shall maintain such proceeds in a segregated account, and distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.
- C. If no other special agreement is reached, Contractor shall repair or replace the damaged Work, using allocated insurance proceeds.

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

7.01 *Contractor's Means and Methods of Construction*

- A. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.
- B. If the Contract Documents note, or Contractor determines, that professional engineering or other design services are needed to carry out Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures, or for Site safety, then Contractor shall cause such services to be provided by a properly licensed design professional, at Contractor's expense. Such services are not Owner-delegated professional design services under this Contract, and neither Owner nor Engineer has any responsibility with respect to (1) Contractor's determination of the need for such services, (2) the qualifications or licensing of the design professionals retained or employed by Contractor, (3) the performance of such services, or (4) any errors, omissions, or defects in such services.

7.02 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who will not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.03 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall maintain good discipline and order at the Site.
- B. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of Contractor's employees; of Suppliers and Subcontractors, and their employees; and of any other individuals or entities performing or furnishing any of the Work, just as Contractor is responsible for Contractor's own acts and omissions.
- C. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site will be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.04 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.
- B. All materials and equipment incorporated into the Work must be new and of good quality, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications will expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment must be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

[See SC-7.04]

7.05 *"Or Equals"*

- A. *Contractor's Request; Governing Criteria:* Whenever an item of equipment or material is specified or described in the Contract Documents by using the names of one or more proprietary items or specific Suppliers, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material, or items from other proposed Suppliers, under the circumstances described below.
 - 1. If Engineer in its sole discretion determines that an item of equipment or material proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer will deem it an "or equal" item. For the purposes of this paragraph, a proposed item of equipment or material will be considered functionally equal to an item so named if:

- a. in the exercise of reasonable judgment Engineer determines that the proposed item:
 - 1) is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
 - 2) will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;
 - 3) has a proven record of performance and availability of responsive service; and
 - 4) is not objectionable to Owner.
- b. Contractor certifies that if the proposed item is approved and incorporated into the Work:
 - 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) the item will conform substantially to the detailed requirements of the item named in the Contract Documents.
- B. *Contractor's Expense*: Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.
- C. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal," which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.
- D. *Effect of Engineer's Determination*: Neither approval nor denial of an "or-equal" request will result in any change in Contract Price. The Engineer's denial of an "or-equal" request will be final and binding, and may not be reversed through an appeal under any provision of the Contract.
- E. *Treatment as a Substitution Request*: If Engineer determines that an item of equipment or material proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer consider the item a proposed substitute pursuant to Paragraph 7.06.

7.06 Substitutes

- A. *Contractor's Request; Governing Criteria*: Unless the specification or description of an item of equipment or material required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material under the circumstances described below. To the extent possible such requests must be made before commencement of related construction at the Site.
 - 1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of equipment or material from anyone other than Contractor.

2. The requirements for review by Engineer will be as set forth in Paragraph 7.06.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.
3. Contractor shall make written application to Engineer for review of a proposed substitute item of equipment or material that Contractor seeks to furnish or use. The application:
 - a. will certify that the proposed substitute item will:
 - 1) perform adequately the functions and achieve the results called for by the general design;
 - 2) be similar in substance to the item specified; and
 - 3) be suited to the same use as the item specified.
 - b. will state:
 - 1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times;
 - 2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item; and
 - 3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.
 - c. will identify:
 - 1) all variations of the proposed substitute item from the item specified; and
 - 2) available engineering, sales, maintenance, repair, and replacement services.
 - d. will contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.
- B. *Engineer's Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.
- C. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- D. *Reimbursement of Engineer's Cost:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making

changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

- E. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute at Contractor's expense.
- F. *Effect of Engineer's Determination*: If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request will be final and binding, and may not be reversed through an appeal under any provision of the Contract. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.06.D, by timely submittal of a Change Proposal.

7.07 *Concerning Subcontractors and Suppliers*

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner. The Contractor's retention of a Subcontractor or Supplier for the performance of parts of the Work will not relieve Contractor's obligation to Owner to perform and complete the Work in accordance with the Contract Documents.
- B. Contractor shall retain specific Subcontractors and Suppliers for the performance of designated parts of the Work if required by the Contract to do so.
- C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor or Supplier to furnish or perform any of the Work against which Contractor has reasonable objection.
- D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within 5 days.
- E. Owner may require the replacement of any Subcontractor or Supplier. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors or Suppliers for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor or Supplier so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor or Supplier.
- F. If Owner requires the replacement of any Subcontractor or Supplier retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.
- G. No acceptance by Owner of any such Subcontractor or Supplier, whether initially or as a replacement, will constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.
- H. On a monthly basis, Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.

- I. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors and Suppliers.
- J. The divisions and sections of the Specifications and the identifications of any Drawings do not control Contractor in dividing the Work among Subcontractors or Suppliers, or in delineating the Work to be performed by any specific trade.
- K. All Work performed for Contractor by a Subcontractor or Supplier must be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract for the benefit of Owner and Engineer.

[See SC-7.07]

- L. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor for Work performed for Contractor by the Subcontractor or Supplier.
- M. Contractor shall restrict all Subcontractors and Suppliers from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed in this Contract.

7.08 *Patent Fees and Royalties*

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

7.09 *Permits*

- A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits, licenses, and certificates of occupancy. Owner shall assist

Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of the submission of Contractor's Bid (or when Contractor became bound under a negotiated contract). Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

7.10 Taxes

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

[See SC-7.10]

7.11 Laws and Regulations

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other action. It is not Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this does not relieve Contractor of its obligations under Paragraph 3.03.
- C. Owner or Contractor may give written notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such written notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.12 Record Documents

- A. Contractor shall maintain in a safe place at the Site one printed record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, written interpretations and clarifications, and approved Shop Drawings. Contractor shall keep such record documents in good order and annotate them to show changes made during construction. These record documents, together with all approved Samples, will be available to Engineer for reference. Upon completion of the Work, Contractor shall deliver these record documents to Engineer.

7.13 Safety and Protection

- A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the

performance of their work, nor for compliance with applicable safety Laws and Regulations.

- B. Contractor shall designate a qualified and experienced safety representative whose duties and responsibilities are the prevention of Work-related accidents and the maintenance and supervision of safety precautions and programs.
- C. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:
 - 1. all persons on the Site or who may be affected by the Work;
 - 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 - 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- D. All damage, injury, or loss to any property referred to in Paragraph 7.13.C.2 or 7.13.C.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
- E. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection.
- F. Contractor shall notify Owner; the owners of adjacent property; the owners of Underground Facilities and other utilities (if the identity of such owners is known to Contractor); and other contractors and utility owners performing work at or adjacent to the Site, in writing, when Contractor knows that prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.
- G. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. Any Owner's safety programs that are applicable to the Work are identified or included in the Supplementary Conditions or Specifications.

[See SC-7.13]

- H. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
- I. Contractor's duties and responsibilities for safety and protection will continue until all the Work is completed, Engineer has issued a written notice to Owner and Contractor in accordance with Paragraph 15.06.C that the Work is acceptable, and Contractor has left the Site (except as otherwise expressly provided in connection with Substantial Completion).

- J. Contractor's duties and responsibilities for safety and protection will resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.14 *Hazard Communication Programs*

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

7.15 *Emergencies*

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

7.16 *Submittals*

A. *Shop Drawing and Sample Requirements*

1. Before submitting a Shop Drawing or Sample, Contractor shall:

- a. review and coordinate the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
- b. determine and verify:
 - 1) all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect to the Submittal;
 - 2) the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - 3) all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto;
- c. confirm that the Submittal is complete with respect to all related data included in the Submittal.

2. Each Shop Drawing or Sample must bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that Submittal, and that Contractor approves the Submittal.

3. With each Shop Drawing or Sample, Contractor shall give Engineer specific written notice of any variations that the Submittal may have from the requirements of the Contract Documents. This notice must be set forth in a written communication separate from the Submittal; and, in addition, in the case of a Shop Drawing by a specific notation made on the Shop Drawing itself.

- B. *Submittal Procedures for Shop Drawings and Samples:* Contractor shall label and submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals.
1. *Shop Drawings*
 - a. Contractor shall submit the number of copies required in the Specifications.
 - b. Data shown on the Shop Drawings must be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide, and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.C.
 2. *Samples*
 - a. Contractor shall submit the number of Samples required in the Specifications.
 - b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the Submittal for the limited purposes required by Paragraph 7.16.C.
 3. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.
- C. *Engineer's Review of Shop Drawings and Samples*
1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the accepted Schedule of Submittals. Engineer's review and approval will be only to determine if the items covered by the Submittals will, after installation or incorporation in the Work, comply with the requirements of the Contract Documents, and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
 2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction, or to safety precautions or programs incident thereto.
 3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
 4. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will document any such approved variation from the requirements of the Contract Documents in a Field Order or other appropriate Contract modification.
 5. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for complying with the requirements of Paragraphs 7.16.A and B.
 6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, will not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.

7. Neither Engineer's receipt, review, acceptance, or approval of a Shop Drawing or Sample will result in such item becoming a Contract Document.
 8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.C.4.
- D. *Resubmittal Procedures for Shop Drawings and Samples*
1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous Submittals.
 2. Contractor shall furnish required Shop Drawing and Sample submittals with sufficient information and accuracy to obtain required approval of an item with no more than two resubmittals. Engineer will record Engineer's time for reviewing a third or subsequent resubmittal of a Shop Drawing or Sample, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges.
 3. If Contractor requests a change of a previously approved Shop Drawing or Sample, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.
- E. *Submittals Other than Shop Drawings, Samples, and Owner-Delegated Designs*
1. The following provisions apply to all Submittals other than Shop Drawings, Samples, and Owner-delegated designs:
 - a. Contractor shall submit all such Submittals to the Engineer in accordance with the Schedule of Submittals and pursuant to the applicable terms of the Contract Documents.
 - b. Engineer will provide timely review of all such Submittals in accordance with the Schedule of Submittals and return such Submittals with a notation of either Accepted or Not Accepted. Any such Submittal that is not returned within the time established in the Schedule of Submittals will be deemed accepted.
 - c. Engineer's review will be only to determine if the Submittal is acceptable under the requirements of the Contract Documents as to general form and content of the Submittal.
 - d. If any such Submittal is not accepted, Contractor shall confer with Engineer regarding the reason for the non-acceptance, and resubmit an acceptable document.
 2. Procedures for the submittal and acceptance of the Progress Schedule, the Schedule of Submittals, and the Schedule of Values are set forth in Paragraphs 2.03, 2.04, and 2.05.
- F. Owner-delegated Designs: Submittals pursuant to Owner-delegated designs are governed by the provisions of Paragraph 7.19.

7.17 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer is entitled to rely on Contractor's warranty and guarantee.
- B. Owner's rights under this warranty and guarantee are in addition to, and are not limited by, Owner's rights under the correction period provisions of Paragraph 15.08. The time in which Owner may enforce its warranty and guarantee rights under this Paragraph 7.17 is limited only by applicable Laws and Regulations restricting actions to enforce such rights; provided, however, that after the end of the correction period under Paragraph 15.08:
 - 1. Owner shall give Contractor written notice of any defective Work within 60 days of the discovery that such Work is defective; and
 - 2. Such notice will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the notice.
- C. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 - 1. abuse, or improper modification, maintenance, or operation, by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 - 2. normal wear and tear under normal usage.
- D. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents is absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents, a release of Contractor's obligation to perform the Work in accordance with the Contract Documents, or a release of Owner's warranty and guarantee rights under this Paragraph 7.17:
 - 1. Observations by Engineer;
 - 2. Recommendation by Engineer or payment by Owner of any progress or final payment;
 - 3. The issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 - 4. Use or occupancy of the Work or any part thereof by Owner;
 - 5. Any review and approval of a Shop Drawing or Sample submittal;
 - 6. The issuance of a notice of acceptability by Engineer;
 - 7. The end of the correction period established in Paragraph 15.08;
 - 8. Any inspection, test, or approval by others; or
 - 9. Any correction of defective Work by Owner.
- E. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract will govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

7.18 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners,

employees, agents, consultants and subcontractors of each and any of them, from losses, damages, costs, and judgments (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising from third-party claims or actions relating to or resulting from the performance or furnishing of the Work, provided that any such claim, action, loss, cost, judgment or damage is attributable to bodily injury, sickness, disease, or death, or to damage to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom, but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable.

- B. In any and all claims against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A will not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

7.19 *Delegation of Professional Design Services*

- A. Owner may require Contractor to provide professional design services for a portion of the Work by express delegation in the Contract Documents. Such delegation will specify the performance and design criteria that such services must satisfy, and the Submittals that Contractor must furnish to Engineer with respect to the Owner-delegated design.
- B. Contractor shall cause such Owner-delegated professional design services to be provided pursuant to the professional standard of care by a properly licensed design professional, whose signature and seal must appear on all drawings, calculations, specifications, certifications, and Submittals prepared by such design professional. Such design professional must issue all certifications of design required by Laws and Regulations.
- C. If a Shop Drawing or other Submittal related to the Owner-delegated design is prepared by Contractor, a Subcontractor, or others for submittal to Engineer, then such Shop Drawing or other Submittal must bear the written approval of Contractor's design professional when submitted by Contractor to Engineer.
- D. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, and approvals performed or provided by the design professionals retained or employed by Contractor under an Owner-delegated design, subject to the professional standard of care and the performance and design criteria stated in the Contract Documents.
- E. Pursuant to this Paragraph 7.19, Engineer's review, approval, and other determinations regarding design drawings, calculations, specifications, certifications, and other Submittals furnished by Contractor pursuant to an Owner-delegated design will be only for the following limited purposes:
 - 1. Checking for conformance with the requirements of this Paragraph 7.19;
 - 2. Confirming that Contractor (through its design professionals) has used the performance and design criteria specified in the Contract Documents; and

3. Establishing that the design furnished by Contractor is consistent with the design concept expressed in the Contract Documents.
- F. Contractor shall not be responsible for the adequacy of performance or design criteria specified by Owner or Engineer.
- G. Contractor is not required to provide professional services in violation of applicable Laws and Regulations.

ARTICLE 8—OTHER WORK AT THE SITE

8.01 *Other Work*

- A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.
- B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any third-party utility work that Owner has arranged to take place at or adjacent to the Site, Owner shall provide such information to Contractor.
- C. Contractor shall afford proper and safe access to the Site to each contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work.
- D. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.
- E. If the proper execution or results of any part of Contractor's Work depends upon work performed by others, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.
- F. The provisions of this article are not applicable to work that is performed by third-party utilities or other third-party entities without a contract with Owner, or that is performed without having been arranged by Owner. If such work occurs, then any related delay, disruption, or interference incurred by Contractor is governed by the provisions of Paragraph 4.05.C.3.

8.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be

set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:

1. The identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;
 2. An itemization of the specific matters to be covered by such authority and responsibility; and
 3. The extent of such authority and responsibilities.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

8.03 *Legal Relationships*

- A. If, in the course of performing other work for Owner at or adjacent to the Site, the Owner's employees, any other contractor working for Owner, or any utility owner that Owner has arranged to perform work, causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment will take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract, and any remedies available to Contractor under Laws or Regulations concerning utility action or inaction. When applicable, any such equitable adjustment in Contract Price will be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times or Contract Price is subject to the provisions of Paragraphs 4.05.D and 4.05.E.
- B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site.
1. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this Paragraph 8.03.B.
 2. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due Contractor.
- C. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against

Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

ARTICLE 9—OWNER’S RESPONSIBILITIES

9.01 *Communications to Contractor*

A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

[See SC-9.01]

9.02 *Replacement of Engineer*

A. Owner may at its discretion appoint an engineer to replace Engineer, provided Contractor makes no reasonable objection to the replacement engineer. The replacement engineer’s status under the Contract Documents will be that of the former Engineer.

9.03 *Furnish Data*

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

9.04 *Pay When Due*

A. Owner shall make payments to Contractor when they are due as provided in the Agreement.

9.05 *Lands and Easements; Reports, Tests, and Drawings*

A. Owner’s duties with respect to providing lands and easements are set forth in Paragraph 5.01.

B. Owner’s duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.

C. Article 5 refers to Owner’s identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

9.06 *Insurance*

A. Owner’s responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.

9.07 *Change Orders*

A. Owner’s responsibilities with respect to Change Orders are set forth in Article 11.

9.08 *Inspections, Tests, and Approvals*

A. Owner’s responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.

9.09 *Limitations on Owner's Responsibilities*

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

9.10 *Undisclosed Hazardous Environmental Condition*

- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.

9.11 *Evidence of Financial Arrangements*

- A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract (including obligations under proposed changes in the Work).

9.12 *Safety Programs*

- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.
- B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

- A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract.

10.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe, as an experienced and qualified design professional, the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.07. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 *Resident Project Representative*

- A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in the Supplementary Conditions and in Paragraph 10.07.
- B. If Owner designates an individual or entity who is not Engineer's consultant, agent, or employee to represent Owner at the Site, then the responsibilities and authority of such individual or entity will be as provided in the Supplementary Conditions.

[See SC-10.03]

10.04 *Engineer's Authority*

- A. Engineer has the authority to reject Work in accordance with Article 14.
- B. Engineer's authority as to Submittals is set forth in Paragraph 7.16.
- C. Engineer's authority as to design drawings, calculations, specifications, certifications and other Submittals from Contractor in response to Owner's delegation (if any) to Contractor of professional design services, is set forth in Paragraph 7.19.
- D. Engineer's authority as to changes in the Work is set forth in Article 11.
- E. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.05 *Determinations for Unit Price Work*

- A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor as set forth in Paragraph 13.03.

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

- A. Engineer will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work, pursuant to the specific procedures set forth herein for initial interpretations, Change Proposals, and acceptance of the Work. In rendering such decisions and judgments, Engineer will not show partiality to Owner or Contractor, and will not be liable to Owner, Contractor, or others in connection with any proceedings, interpretations, decisions, or judgments conducted or rendered in good faith.

10.07 *Limitations on Engineer's Authority and Responsibilities*

- A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, will create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.
- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Engineer's review of the final Application for Payment and accompanying documentation, and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Contractor under Paragraph 15.06.A, will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.
- E. The limitations upon authority and responsibility set forth in this Paragraph 10.07 also apply to the Resident Project Representative, if any.

10.08 *Compliance with Safety Program*

- A. While at the Site, Engineer's employees and representatives will comply with the specific applicable requirements of Owner's and Contractor's safety programs of which Engineer has been informed.

ARTICLE 11—CHANGES TO THE CONTRACT

11.01 *Amending and Supplementing the Contract*

- A. The Contract may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.
- B. If an amendment or supplement to the Contract includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order.
- C. All changes to the Contract that involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, must be supported by Engineer's recommendation. Owner and Contractor may amend other terms and conditions of the Contract without the recommendation of the Engineer.

11.02 *Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders covering:
 - 1. Changes in Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;
 - 2. Changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;
 - 3. Changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.05, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters; and
 - 4. Changes that embody the substance of any final and binding results under: Paragraph 11.03.B, resolving the impact of a Work Change Directive; Paragraph 11.09, concerning Change Proposals; Article 12, Claims; Paragraph 13.02.D, final adjustments resulting from allowances; Paragraph 13.03.D,

final adjustments relating to determination of quantities for Unit Price Work; and similar provisions.

- B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of Paragraph 11.02.A, it will be deemed to be of full force and effect, as if fully executed.

11.03 *Work Change Directives*

- A. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.07 regarding change of Contract Price.
- B. If Owner has issued a Work Change Directive and:
 - 1. Contractor believes that an adjustment in Contract Times or Contract Price is necessary, then Contractor shall submit any Change Proposal seeking such an adjustment no later than 30 days after the completion of the Work set out in the Work Change Directive.
 - 2. Owner believes that an adjustment in Contract Times or Contract Price is necessary, then Owner shall submit any Claim seeking such an adjustment no later than 60 days after issuance of the Work Change Directive.

11.04 *Field Orders*

- A. Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly.
- B. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.05 *Owner-Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Changes involving the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters will be supported by Engineer's recommendation.
- B. Such changes in the Work may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work must be performed under the applicable conditions of the Contract Documents.
- C. Nothing in this Paragraph 11.05 obligates Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.06 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents, as amended, modified, or supplemented, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.C.2.

11.07 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment of Contract Price must comply with the provisions of Article 12.
- B. An adjustment in the Contract Price will be determined as follows:
 - 1. Where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03);
 - 2. Where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.07.C.2); or
 - 3. Where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.07.C).
- C. *Contractor's Fee*: When applicable, the Contractor's fee for overhead and profit will be determined as follows:
 - 1. A mutually acceptable fixed fee; or
 - 2. If a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. For costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee will be 15 percent;
 - b. For costs incurred under Paragraph 13.01.B.3, the Contractor's fee will be 5 percent;
 - c. Where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.07.C.2.a and 11.07.C.2.b is that the Contractor's fee will be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of 5 percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted Work the maximum total fee to be paid by Owner will be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the Work;
 - d. No fee will be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;

- e. The amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in Cost of the Work will be the amount of the actual net decrease in Cost of the Work and a deduction of an additional amount equal to 5 percent of such actual net decrease in Cost of the Work; and
- f. When both additions and credits are involved in any one change or Change Proposal, the adjustment in Contractor's fee will be computed by determining the sum of the costs in each of the cost categories in Paragraph 13.01.B (specifically, payroll costs, Paragraph 13.01.B.1; incorporated materials and equipment costs, Paragraph 13.01.B.2; Subcontract costs, Paragraph 13.01.B.3; special consultants costs, Paragraph 13.01.B.4; and other costs, Paragraph 13.01.B.5) and applying to each such cost category sum the appropriate fee from Paragraphs 11.07.C.2.a through 11.07.C.2.e, inclusive.

[See SC-11.07]

11.08 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment in the Contract Times must comply with the provisions of Article 12.
- B. Delay, disruption, and interference in the Work, and any related changes in Contract Times, are addressed in and governed by Paragraph 4.05.

11.09 *Change Proposals*

- A. *Purpose and Content:* Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; contest an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; challenge a set-off against payment due; or seek other relief under the Contract. The Change Proposal will specify any proposed change in Contract Times or Contract Price, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents. Each Change Proposal will address only one issue, or a set of closely related issues.
- B. *Change Proposal Procedures*
 - 1. *Submittal:* Contractor shall submit each Change Proposal to Engineer within 30 days after the start of the event giving rise thereto, or after such initial decision.
 - 2. *Supporting Data:* The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal.
 - a. Change Proposals based on or related to delay, interruption, or interference must comply with the provisions of Paragraphs 4.05.D and 4.05.E.
 - b. Change proposals related to a change of Contract Price must include full and detailed accounts of materials incorporated into the Work and labor and equipment used for the subject Work.

The supporting data must be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event.

3. *Engineer's Initial Review:* Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal. If in its discretion Engineer concludes that additional supporting data is needed before conducting a full review and making a decision regarding the Change Proposal, then Engineer may request that Contractor submit such additional supporting data by a date specified by Engineer, prior to Engineer beginning its full review of the Change Proposal.
 4. *Engineer's Full Review and Action on the Change Proposal:* Upon receipt of Contractor's supporting data (including any additional data requested by Engineer), Engineer will conduct a full review of each Change Proposal and, within 30 days after such receipt of the Contractor's supporting data, either approve the Change Proposal in whole, deny it in whole, or approve it in part and deny it in part. Such actions must be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.
 5. *Binding Decision:* Engineer's decision is final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.
- C. *Resolution of Certain Change Proposals:* If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties in writing that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice will be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.
- D. *Post-Completion:* Contractor shall not submit any Change Proposals after Engineer issues a written recommendation of final payment pursuant to Paragraph 15.06.B.

11.10 Notification to Surety

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

ARTICLE 12—CLAIMS

[See SC-12.01]

12.01 Claims

- A. *Claims Process:* The following disputes between Owner and Contractor are subject to the Claims process set forth in this article:
 1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;
 2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents;
 3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters; and

4. Subject to the waiver provisions of Paragraph 15.07, any dispute arising after Engineer has issued a written recommendation of final payment pursuant to Paragraph 15.06.B.
- B. *Submittal of Claim:* The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim rests with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.
 - C. *Review and Resolution:* The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim will be stated in writing and submitted to the other party, with a copy to Engineer.
 - D. *Mediation*
 1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate will stay the Claim submittal and response process.
 2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process will resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim submittal and decision process will resume as of the date of the conclusion of the mediation, as determined by the mediator.
 3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.
 - E. *Partial Approval:* If the party receiving a Claim approves the Claim in part and denies it in part, such action will be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.
 - F. *Denial of Claim:* If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim will be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.
 - G. *Final and Binding Results:* If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim will be incorporated in a Change Order or other written document to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

ARTICLE 13—COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

13.01 *Cost of the Work*

- A. *Purposes for Determination of Cost of the Work:* The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:
1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or
 2. When needed to determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.
- B. *Costs Included:* Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work will be in amounts no higher than those commonly incurred in the locality of the Project, will not include any of the costs itemized in Paragraph 13.01.C, and will include only the following items:
1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor in advance of the subject Work. Such employees include, without limitation, superintendents, foremen, safety managers, safety representatives, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work will be apportioned on the basis of their time spent on the Work. Payroll costs include, but are not limited to, salaries and wages plus the cost of fringe benefits, which include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, sick leave, and vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, will be included in the above to the extent authorized by Owner.
 2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts will accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment will accrue to Owner, and Contractor shall make provisions so that they may be obtained.
 3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, which will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee will be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.
 4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed or retained for services specifically related to the Work.

5. Other costs consisting of the following:
- a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
 - 1) In establishing included costs for materials such as scaffolding, plating, or sheeting, consideration will be given to the actual or the estimated life of the material for use on other projects; or rental rates may be established on the basis of purchase or salvage value of such items, whichever is less. Contractor will not be eligible for compensation for such items in an amount that exceeds the purchase cost of such item.
 - c. *Construction Equipment Rental*
 - 1) Rentals of all construction equipment and machinery, and the parts thereof, in accordance with rental agreements approved by Owner as to price (including any surcharge or special rates applicable to overtime use of the construction equipment or machinery), and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs will be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts must cease when the use thereof is no longer necessary for the Work.
 - 2) Costs for equipment and machinery owned by Contractor or a Contractor-related entity will be paid at a rate shown for such equipment in the equipment rental rate book specified in the Supplementary Conditions. An hourly rate will be computed by dividing the monthly rates by 176. These computed rates will include all operating costs.
 - 3) With respect to Work that is the result of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price ("changed Work"), included costs will be based on the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of any such equipment or machinery, or parts thereof, must cease to accrue when the use thereof is no longer necessary for the changed Work.
 - d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
 - e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
 - f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of builder's risk or other property insurance established in accordance with Paragraph 6.04), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of

them may be liable. Such losses include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses will be included in the Cost of the Work for the purpose of determining Contractor's fee.

- g. The cost of utilities, fuel, and sanitary facilities at the Site.
- h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.
- i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.

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

- 1. Payroll costs and other compensation of Contractor's officers, executives, principals, general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.
- 2. The cost of purchasing, renting, or furnishing small tools and hand tools.
- 3. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
- 4. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
- 5. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
- 6. Expenses incurred in preparing and advancing Claims.
- 7. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.

D. *Contractor's Fee*

- 1. When the Work as a whole is performed on the basis of cost-plus-a-fee, then:
 - a. Contractor's fee for the Work set forth in the Contract Documents as of the Effective Date of the Contract will be determined as set forth in the Agreement.
 - b. for any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work, Contractor's fee will be determined as follows:
 - 1) When the fee for the Work as a whole is a percentage of the Cost of the Work, the fee will automatically adjust as the Cost of the Work changes.
 - 2) When the fee for the Work as a whole is a fixed fee, the fee for any additions or deletions will be determined in accordance with Paragraph 11.07.C.2.
- 2. When the Work as a whole is performed on the basis of a stipulated sum, or any other basis other than cost-plus-a-fee, then Contractor's fee for any Work covered by a

Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work will be determined in accordance with Paragraph 11.07.C.2.

- E. *Documentation and Audit*: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor and pertinent Subcontractors will establish and maintain records of the costs in accordance with generally accepted accounting practices. Subject to prior written notice, Owner will be afforded reasonable access, during normal business hours, to all Contractor's accounts, records, books, correspondence, instructions, drawings, receipts, vouchers, memoranda, and similar data relating to the Cost of the Work and Contractor's fee. Contractor shall preserve all such documents for a period of three years after the final payment by Owner. Pertinent Subcontractors will afford such access to Owner, and preserve such documents, to the same extent required of Contractor.

[See SC-13.01]

13.02 Allowances

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.
- B. *Cash Allowances*: Contractor agrees that:
1. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
 2. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment for any of the foregoing will be valid.
- C. *Owner's Contingency Allowance*: Contractor agrees that an Owner's contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor for Work covered by allowances, and the Contract Price will be correspondingly adjusted.

13.03 Unit Price Work

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision

thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, and the final adjustment of Contract Price will be set forth in a Change Order, subject to the provisions of the following paragraph.

E. *Adjustments in Unit Price*

1. Contractor or Owner shall be entitled to an adjustment in the unit price with respect to an item of Unit Price Work if:
 - a. the quantity of the item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
 - b. Contractor's unit costs to perform the item of Unit Price Work have changed materially and significantly as a result of the quantity change.
2. The adjustment in unit price will account for and be coordinated with any related changes in quantities of other items of Work, and in Contractor's costs to perform such other Work, such that the resulting overall change in Contract Price is equitable to Owner and Contractor.
3. Adjusted unit prices will apply to all units of that item.

ARTICLE 14—TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFECTIVE WORK

14.01 *Access to Work*

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply with such procedures and programs as applicable.

14.02 *Tests, Inspections, and Approvals*

- A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.
- B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work will be governed by the provisions of Paragraph 14.05.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

- D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:
1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;
 2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;
 3. by manufacturers of equipment furnished under the Contract Documents;
 4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and
 5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

Such inspections and tests will be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner and Engineer.

- E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.
- F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering will be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 Defective Work

- A. *Contractor's Obligation:* It is Contractor's obligation to assure that the Work is not defective.
- B. *Engineer's Authority:* Engineer has the authority to determine whether Work is defective, and to reject defective Work.
- C. *Notice of Defects:* Prompt written notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.
- D. *Correction, or Removal and Replacement:* Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.
- E. *Preservation of Warranties:* When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.
- F. *Costs and Damages:* In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure

of such claims, costs, losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work will be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

14.05 *Uncovering Work*

- A. Engineer has the authority to require additional inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.
- B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.
- C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, and provide all necessary labor, material, and equipment.
 - 1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.
 - 2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work will not give rise to any duty on the part of

Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

14.07 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace defective Work as required by Engineer, then Owner may, after 7 days' written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.
- C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.
- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

ARTICLE 15—PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

15.01 *Progress Payments*

- A. *Basis for Progress Payments:* The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments for Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.
- B. *Applications for Payments*
 - 1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents.
 - 2. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment must also be accompanied by: (a) a bill of sale, invoice, copies of subcontract or purchase order payments, or other documentation establishing full payment by Contractor for the materials and equipment; (b) at Owner's request, documentation warranting that Owner has received the materials and equipment free and clear of all Liens; and (c) evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other

arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

3. Beginning with the second Application for Payment, each Application must include an affidavit of Contractor stating that all previous progress payments received by Contractor have been applied to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
4. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

C. *Review of Applications*

1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
 - a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
 - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or
 - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
 - a. to supervise, direct, or control the Work;
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto;

- c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work;
 - d. to make any examination to ascertain how or for what purposes Contractor has used the money paid by Owner; or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.
6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:
- a. the Work is defective, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or
 - e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. Payment Becomes Due

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.

E. Reductions in Payment by Owner

1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:
- a. Claims have been made against Owner based on Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages resulting from Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;
 - b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;
 - c. Contractor has failed to provide and maintain required bonds or insurance;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;
 - e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;

- f. The Work is defective, requiring correction or replacement;
 - g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - h. The Contract Price has been reduced by Change Orders;
 - i. An event has occurred that would constitute a default by Contractor and therefore justify a termination for cause;
 - j. Liquidated or other damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;
 - k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens; or
 - l. Other items entitle Owner to a set-off against the amount recommended.
2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed will be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.
 3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld will be treated as an amount due as determined by Paragraph 15.01.D.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than 7 days after the time of payment by Owner.

15.03 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.
- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.

[See SC-15.03]

- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which will fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have 7 days after receipt of the preliminary

certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.

- D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.
- E. After Substantial Completion, the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.
- F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:
 - 1. At any time, Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through 15.03.E for that part of the Work.
 - 2. At any time, Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
 - 3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of

that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.04 regarding builder's risk or other property insurance.

15.05 *Final Inspection*

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

15.06 *Final Payment*

A. *Application for Payment*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, annotated record documents (as provided in Paragraph 7.12), and other documents, Contractor may make application for final payment.
2. The final Application for Payment must be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents;
 - b. consent of the surety, if any, to final payment;
 - c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.
 - d. a list of all duly pending Change Proposals and Claims; and
 - e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.

- B. *Engineer's Review of Final Application and Recommendation of Payment:* If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled,

Engineer will, within 10 days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the final Application for Payment to Owner for payment. Such recommendation will account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

- C. *Notice of Acceptability:* In support of its recommendation of payment of the final Application for Payment, Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to stated limitations in the notice and to the provisions of Paragraph 15.07.
- D. *Completion of Work:* The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment and issuance of notice of the acceptability of the Work.
- E. *Final Payment Becomes Due:* Upon receipt from Engineer of the final Application for Payment and accompanying documentation, Owner shall set off against the amount recommended by Engineer for final payment any further sum to which Owner is entitled, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions of this Contract with respect to progress payments. Owner shall pay the resulting balance due to Contractor within 30 days of Owner's receipt of the final Application for Payment from Engineer.

15.07 *Waiver of Claims*

- A. By making final payment, Owner waives its claim or right to liquidated damages or other damages for late completion by Contractor, except as set forth in an outstanding Claim, appeal under the provisions of Article 17, set-off, or express reservation of rights by Owner. Owner reserves all other claims or rights after final payment.
- B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted as a Claim, or appealed under the provisions of Article 17.

15.08 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the Supplementary Conditions or the terms of any applicable special guarantee required by the Contract Documents), Owner gives Contractor written notice that any Work has been found to be defective, or that Contractor's repair of any damages to the Site or adjacent areas has been found to be defective, then after receipt of such notice of defect Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 1. correct the defective repairs to the Site or such adjacent areas;
 2. correct such defective Work;
 3. remove the defective Work from the Project and replace it with Work that is not defective, if the defective Work has been rejected by Owner, and
 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting from the corrective measures.

- B. Owner shall give any such notice of defect within 60 days of the discovery that such Work or repairs is defective. If such notice is given within such 60 days but after the end of the correction period, the notice will be deemed a notice of defective Work under Paragraph 7.17.B.
- C. If, after receipt of a notice of defect within 60 days and within the correction period, Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others). Contractor's failure to pay such costs, losses, and damages within 10 days of invoice from Owner will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the failure to pay.
- D. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so, provided in the Specifications.
- E. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.
- F. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph are not to be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times directly attributable to any such suspension. Any Change Proposal seeking such adjustments must be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:
 - 1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment, or failure to adhere to the Progress Schedule);
 - 2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;
 - 3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or

4. Contractor's repeated disregard of the authority of Owner or Engineer.
- B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) 10 days' written notice that Owner is considering a declaration that Contractor is in default and termination of the Contract, Owner may proceed to:
 1. declare Contractor to be in default, and give Contractor (and any surety) written notice that the Contract is terminated; and
 2. enforce the rights available to Owner under any applicable performance bond.
- C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.
- D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within 7 days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.
- E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.
- F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.
- G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond will govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate for Convenience*

- A. Upon 7 days' written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and

3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.
- B. Contractor shall not be paid for any loss of anticipated profits or revenue, post-termination overhead costs, or other economic loss arising out of or resulting from such termination.

16.04 Contractor May Stop Work or Terminate

- A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon 7 days' written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, 7 days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17—FINAL RESOLUTION OF DISPUTES

17.01 Methods and Procedures

- A. *Disputes Subject to Final Resolution:* The following disputed matters are subject to final resolution under the provisions of this article:
1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full, pursuant to Article 12; and
 2. Disputes between Owner and Contractor concerning the Work, or obligations under the Contract Documents, that arise after final payment has been made.
- B. *Final Resolution of Disputes:* For any dispute subject to resolution under this article, Owner or Contractor may:
1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions;
 2. agree with the other party to submit the dispute to another dispute resolution process; or
 3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

[See SC-17.01]

ARTICLE 18—MISCELLANEOUS

18.01 *Giving Notice*

- A. Whenever any provision of the Contract requires the giving of written notice to Owner, Engineer, or Contractor, it will be deemed to have been validly given only if delivered:
 - 1. in person, by a commercial courier service or otherwise, to the recipient's place of business;
 - 2. by registered or certified mail, postage prepaid, to the recipient's place of business; or
 - 3. by e-mail to the recipient, with the words "Formal Notice" or similar in the e-mail's subject line.

18.02 *Computation of Times*

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

18.03 *Cumulative Remedies*

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

18.04 *Limitation of Damages*

- A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.05 *No Waiver*

- A. A party's non-enforcement of any provision will not constitute a waiver of that provision, nor will it affect the enforceability of that provision or of the remainder of this Contract.

[See SC-18.05]

18.06 *Survival of Obligations*

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

18.07 *Controlling Law*

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

18.08 *Assignment of Contract*

- A. Unless expressly agreed to elsewhere in the Contract, no assignment by a party to this Contract of any rights under or interests in the Contract will be binding on the other party without the written consent of the party sought to be bound; and, specifically but without limitation, money that may become due and money that is due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract.

18.09 *Successors and Assigns*

- A. Owner and Contractor each binds itself, its successors, assigns, and legal representatives to the other party hereto, its successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

18.10 *Headings*

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

**SECTION 00800
SUPPLEMENTARY CONDITIONS OF THE CONSTRUCTION CONTRACT**

TABLE OF CONTENTS

	Page
ARTICLE 1— DEFINITIONS AND TERMINOLOGY.....	1
ARTICLE 2— PRELIMINARY MATTERS	2
ARTICLE 3— CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE	2
ARTICLE 4— COMMENCEMENT AND PROGRESS OF THE WORK.....	3
ARTICLE 5— SITE, SUBSURFACE AND PHYSICAL CONDITIONS, HAZARDOUS ENVIRONMENTAL CONDITIONS.....	4
ARTICLE 6— BONDS AND INSURANCE.....	5
ARTICLE 7— CONTRACTOR’S RESPONSIBILITIES.....	8
ARTICLE 8— OTHER WORK AT THE SITE	10
ARTICLE 9— OWNER’S RESPONSIBILITIES	10
ARTICLE 10— ENGINEER’S STATUS DURING CONSTRUCTION.....	10
ARTICLE 11— CHANGES TO THE CONTRACT	11
ARTICLE 12— CLAIMS	11
ARTICLE 13— COST OF WORK; ALLOWANCES, UNIT PRICE WORK	11
ARTICLE 14— TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFECTIVE WORK	12
ARTICLE 15— PAYMENTS TO CONTRACTOR, SET OFFS; COMPLETIONS; CORRECTION PERIOD.....	12
ARTICLE 16— SUSPENSION OF WORK AND TERMINATION.....	12
ARTICLE 17— FINAL RESOLUTIONS OF DISPUTES	12
ARTICLE 18— MISCELLANEOUS	14

SUPPLEMENTARY CONDITIONS OF THE CONSTRUCTION CONTRACT

These Supplementary Conditions amend or supplement Section 00700: Standard General Conditions of the Construction Contract (2018). The General Conditions remain in full force and effect except as amended.

The terms used in these Supplementary Conditions have the meanings stated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof.

The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix "SC" added—for example, "Paragraph SC-4.05."

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

The terms used in these Supplementary Conditions will have the meanings indicated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings indicated below, which are applicable to both the singular and plural thereof.

SC-1.01 Add the following paragraphs immediately after paragraph 1.01.A.50:

51. *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.
52. *Bonds*—Performance and payment bonds and other instruments of security.
53. *ENGINEER's Consultant*—An individual or entity having a contract with ENGINEER to furnish services as ENGINEER's independent professional associate or consultant with respect to the Project and who is identified as such in the Supplementary Conditions.
54. *General Requirements*—Sections of Division 1 of the Specifications. The General Requirements pertain to all sections of the Specifications.
55. *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.
56. *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.
57. *PCBs* – Polychlorinated biphenyls.
58. *Petroleum* – Petroleum including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.
59. *Project Manual* – The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.
60. *Radioactive Material* – Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.
61. *Written Amendment* – A written statement modifying the Contract Documents, signed by OWNER and CONTRACTOR on or after the Effective Date of the Agreement and normally dealing with the non-engineering or non-technical rather than strictly construction related aspects of the Contract Documents.

62. Complete in place –The work to be performed by the Contractor includes the purchase of the materials, fabrication of any parts to complete the task, supply of all manpower and equipment and the proper installation of the materials.
63. Compensable Time Extension – A change in Contract Time requested or otherwise caused by the OWNER that is not concurrent with a delay caused by or attributable to the Contractor and extends the original time for performance of the contract and during which time the Contractor was required to remain on standby.

ARTICLE 2—PRELIMINARY MATTERS

2.01 *Delivery of Performance, and Payment Bonds, and Evidence of Insurance*

SC-2.01 Delete Paragraphs 2.01.B. and C. in their entirety and insert the following in their place:

- B. *Evidence of Contractor's Insurance:* When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner copies of the policies (including all endorsements, and identification of applicable self-insured retentions and deductibles) of insurance required to be provided by Contractor in this Contract. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.
- C. *Evidence of Owner's Insurance:* After receipt from Contractor of the signed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor copies of the policies of insurance to be provided by Owner in this Contract (if any). Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

SC-2.07 and SC-2.08 Add the following paragraphs immediately after paragraph 2.06:

SC-2.07 *Legal Address of Contractor*

- A. The Contractor's business address is hereby designated as the place to which communications may be delivered. The depositing of any letter, notice or other communication in a postpaid wrapper directed to the Contractor's business address in a post office box regularly maintained by the U. S. Postal Service or the delivery of any letter, notice, or other communication by mail or otherwise shall be deemed sufficient service thereof upon the Contractor, and the date of such service shall be the date of receipt. The business address may be changed at any time by an instrument in writing, executed and acknowledged by the Contractor and delivered to the Engineer. Service of any notice, letter or other communication upon the Contractor personally shall likewise be deemed sufficient service.

SC-2.08 *Traffic Control*

- A. The Contractor shall be fully responsible for traffic control, signage, and marking of temporary hazards incident to or resulting from the landfill construction operations specified herein. When work on landfill perimeter roads, the Contractor shall use temporary signage and flagmen as needed. Access to all landfill customers must be maintained throughout construction through detour or flagging operations.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

No suggested Supplementary Conditions in this Article.

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

4.05 *Delays in Contractor’s Progress*

SC-4.05 Add the following subparagraphs immediately after Paragraph 4.05.C.4:

5. *Weather-Related Delays*

- a. If “abnormal weather conditions” as set forth in Paragraph 4.05.C.2 of the General Conditions are the basis for a request for an equitable adjustment in the Contract Times, such request must be documented by data substantiating each of the following: 1) that weather conditions were abnormal for the period of time in which the delay occurred, 2) that such weather conditions could not have been reasonably anticipated, and 3) that such weather conditions had an adverse effect on the Work as scheduled.
- b. The existence of abnormal weather conditions will be determined on a month-by-month basis in accordance with the following:
 - 1) Every workday on which one or more of the following conditions exist will be considered a “bad weather day”:
 - i) Total precipitation (as rain equivalent) occurring between 7:00 p.m. on the preceding day (regardless of whether such preceding day is a workday) through 7:00 p.m. on the workday in question equals or exceeds 0.25 inches of rainfall or more of precipitation (as rain equivalent, based on the snow/rain conversion indicated in the table entitled Foreseeable Bad Weather Days; such table is hereby incorporated in this SC-4.05.C by reference.
 - 2) Contractor shall anticipate the number of foreseeable bad weather days per month indicated in Table 1—Foreseeable Bad Weather Days.

Month	# of Bad Weather Days
January	7
February	6
March	6
April	5
May	5
June	6
July	12
August	9
September	6
Month	# of Bad Weather Days

October	4
November	4
December	6

- 3) In each month, every bad weather day exceeding the number of foreseeable bad weather days established in Table 1—Foreseeable Bad Weather Days will be considered as “abnormal weather conditions.” The existence of abnormal weather conditions will not relieve Contractor of the obligation to demonstrate and document that delays caused by abnormal weather are specific to the planned work activities or that such activities thus delayed were on Contractor’s then-current Progress Schedule’s critical path for the Project.
- 4) When the number of actual bad weather days exceeds the foreseeable number of bad weather days, subsequent days on which rainfall occurred may be used as a basis to determine whether the CONTRACTOR is entitled to a time extension. The bad weather must have resulted in rainfall of 0.25 inches or greater in a 24-hour period and must have prevented work critical to the timely completion of the project for 50% or more of the CONTRACTOR’S workday.
- 5) The CONTRACTOR’S schedule should indicate the critical path work and must reflect the above anticipated bad weather days for all weather-dependent activities.

ARTICLE 5—SITE, SUBSURFACE AND PHYSICAL CONDITIONS, HAZARDOUS ENVIRONMENTAL CONDITIONS

5.03 *Subsurface and Physical Conditions*

SC-5.03 Add the following paragraphs immediately after Paragraph 5.03.D:

- E. The following table lists the reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data, and specifically identifies the Technical Data in the report upon which Contractor may rely:

Report Title	Date of Report	Technical Data
Phase 7 Site/Design Hydrogeologic [‡] Report	6/6/2023	Subsurface data
Borrow Study Report prepared by LaBella	03/14/2024	Low-permeability soils and fill materials
Borrow Study Report prepared by BLE	January – February 2025	Fill materials

[‡] A copy of the Phase 7 Site/Design Hydrogeologic Report can be found here: <https://ftp.labellapc.com>. The following credentials should be used to access the report (login: TransylvaniaCounty; password: yh44246F). The Site/Design Hydrogeologic Report also contains a Seismic Refraction Survey Report (Appendix H-7) that made determinations about the rippability of the shallow rock encountered in the Phase 7 Expansion area.

- F. The following table lists the drawings of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data, and specifically identifies the Technical Data upon which Contractor may rely:

Drawings Title	Date of Drawings	Technical Data
C-1 – Existing Conditions	10/25/2024	Existing structures

- G. Contractor may examine copies of reports and drawings identified in SC-5.03.E and SC-5.03.F that were not included with the Bidding Documents from Engineer.

ARTICLE 6—BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

SC-6.01 Add the following paragraphs immediately after Paragraph 6.01.A:

1. *Required Performance Bond Form:* The performance bond that Contractor furnishes will be in the form of Section 00610: Performance Bond (2018 edition).
2. *Required Payment Bond Form:* The payment bond that Contractor furnishes will be in the form of Section 00615: Payment Bond (2018 edition).
3. If a Performance Bond, Payment Bond, or other Bond is submitted from a non-North Carolina firm, it is required to be countersigned by a North Carolina resident agent with North Carolina address stated on bond.

6.03 *Contractor’s Insurance*

SC-6.03.D Add the following paragraph immediately after Paragraph 6.03.D:

- D. *Workers’ Compensation and Employer’s Liability:* Contractor shall purchase and maintain workers’ compensation and employer’s liability insurance, including insurance in compliance with, as applicable, United States Longshoreman and Harbor Workers’ Compensation Act, Jones Act, stop-gap employer’s liability coverage for monopolistic states, and foreign voluntary workers’ compensation (from available sources, notwithstanding the jurisdictional requirement of Paragraph 6.02.B of the General Conditions).

Workers’ Compensation and Related Policies	Policy limits of not less than:
Workers’ Compensation	
State	Statutory with a limit of at least \$500,000
Applicable Federal (e.g., Longshoreman’s)	Statutory with a limit of at least \$500,000
Foreign voluntary workers’ compensation (employer’s responsibility coverage), if applicable	Statutory with a limit of at least \$500,000
Employer’s Liability	
Each accident	\$1,000,000
Each employee	\$1,000,000
Policy limit	\$1,000,000

- E. *Commercial General Liability—Claims Covered:* Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against claims for:
1. damages because of bodily injury, sickness or disease, or death of any person other than Contractor’s employees,
 2. damages insured by reasonably available personal injury liability coverage, and
 3. damages because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.
- F. *Commercial General Liability—Form and Content:* Contractor’s commercial liability policy must be written on a 1996 (or later) Insurance Services Organization, Inc. (ISO) commercial general liability form (occurrence form) and include the following coverages and endorsements:
1. Products and completed operations coverage.

- a. Such insurance must be maintained for two years after acceptance of final payment by Contractor.
 - b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance after acceptance of final payment by Contractor and two years thereafter.
2. Blanket contractual liability coverage, including but not limited to coverage of Contractor’s contractual indemnity obligations in Paragraph 7.18.
 3. Severability of interests and no insured-versus-insured or cross-liability exclusions.
 4. Underground, explosion, and collapse coverage.
 5. Personal injury coverage.
 6. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together). If Contractor demonstrates to Owner that the specified ISO endorsements are not commercially available, then Contractor may satisfy this requirement by providing equivalent endorsements.
 7. For design professional additional insureds, ISO Endorsement CG 20 32 07 04 “Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured” or its equivalent.
- G. *Commercial General Liability—Excluded Content:* The commercial general liability insurance policy, including its coverages, endorsements, and incorporated provisions, must not include any of the following:
1. Any modification of the standard definition of “insured contract” (except to delete the railroad protective liability exclusion if Contractor is required to indemnify a railroad or others with respect to Work within 50 feet of railroad property).
 2. Any exclusion for water intrusion or water damage.
 3. Any provisions resulting in the erosion of insurance limits by defense costs other than those already incorporated in ISO form CG 00 01.
 4. Any exclusion of coverage relating to earth subsidence or movement.
 5. Any exclusion for the insured’s vicarious liability, strict liability, or statutory liability (other than worker’s compensation).
 6. Any limitation or exclusion based on the nature of Contractor’s work.
 7. Any professional liability exclusion broader in effect than the most recent edition of ISO form CG 22 79.
- H. *Commercial General Liability—Minimum Policy Limits*

Commercial General Liability	Policy limits of not less than:
General Aggregate	\$3,000,000
Products—Completed Operations Aggregate	\$3,000,000
Personal and Advertising Injury	\$3,000,000
Bodily Injury and Property Damage—Each Occurrence	\$3,000,000

- I. *Automobile Liability:* Contractor shall purchase and maintain automobile liability insurance for damages because of bodily injury or death of any person or property damage arising out

of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy shall be written on an occurrence basis.

Automobile Liability	Policy limits of not less than:
Bodily Injury	
Each Person	\$1,000,000
Each Accident	\$1,000,000
Property Damage	
Each Accident	\$250,000
[or]	
Combined Single Limit	
Combined Single Limit (Bodily Injury and Property Damage)	\$2,000,000

- J. *Umbrella or Excess Liability:* Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer’s liability, commercial general liability, and automobile liability insurance described in the Paragraphs above. The coverage afforded must be at least as broad as that of each and every one of the underlying policies.

Excess or Umbrella Liability	Policy limits of not less than:
Each Occurrence	\$3,000,000
General Aggregate	\$3,000,000

- K. *Using Umbrella or Excess Liability Insurance to Meet CGL and Other Policy Limit Requirements:* Contractor may meet the policy limits specified for employer’s liability, commercial general liability, and automobile liability through the primary policies alone, or through combinations of the primary insurance policy’s policy limits and partial attribution of the policy limits of an umbrella or excess liability policy that is at least as broad in coverage as that of the underlying policy, as specified herein. If such umbrella or excess liability policy was required under this Contract, at a specified minimum policy limit, such umbrella or excess policy must retain a minimum limit of **[\$specify amount]** after accounting for partial attribution of its limits to underlying policies, as allowed above.
- L. *Contractor’s Pollution Liability Insurance:* Contractor shall purchase and maintain a policy covering third-party injury and property damage, including cleanup costs, as a result of pollution conditions arising from Contractor’s operations and completed operations. This insurance must be maintained for no less than three years after acceptance of final payment by Contractor.

Contractor’s Pollution Liability	Policy limits of not less than:
Each Occurrence/Claim	\$5,000,000
General Aggregate	\$7,500,000

- M. *Contractor’s Professional Liability Insurance:* If Contractor will provide or furnish professional services under this *Contract*, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance must cover negligent acts, errors, or omissions in the performance of professional design or related services by the insured or others for whom the insured is legally liable. The insurance shall be maintained throughout the duration of the Contract and for a minimum of two years after the date of Substantial Completion. The

retroactive date on the policy must pre-date the commencement of furnishing services on the Project.

Contractor's Professional Liability	Policy limits of not less than:
Each Claim	\$5,000,000
Annual Aggregate	\$7,500,000

Contractor shall name Transylvania County and LaBella Associates, P.C. as additional insureds in all policies provided by the Contractor for his own protection and that of his Subcontractors. All certificates must state Bid Number and Project Title.

ARTICLE 7—CONTRACTOR’S RESPONSIBILITIES

7.04 Services, Materials, and Equipment

SC-7.04 Add the following paragraph immediately after Paragraph 7.04.C:

- D. Right to Materials: Nothing in the Contract shall be construed as vesting in the Contractor any right of property in the materials, equipment, apparatus and other items furnished after they have been installed or incorporated in or attached or affixed to the work or the site, but all such materials, equipment, apparatus and other items shall, upon being so installed, incorporated, attached or affixed, become the property of the Owner.
- E. Chemical Usage: All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant or of other classification, shall show approval of either EPA or U.S.D.A. The use of all such chemicals and disposal of residues shall be in strict conformance with manufacturer and U.S.D.A. instructions. Material Safety Data Sheets shall be supplied to the owner.

7.07 Concerning Subcontractors and Suppliers

SC-7.07 Add the following paragraphs immediately after Paragraph 7.07.K:

The Contractor shall be fully responsible to the Owner for the acts and omissions of their Subcontractors, and of persons either directly or indirectly employed by them, as they are for the acts and omissions of persons directly employed by the Contractor. The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the Work to bind Subcontractors to the Contractor by the terms of the Contract Documents insofar as applicable to the Work of Subcontractors and to give the Contractor the same power as regards terminating any subcontract that the Owner may exercise over the Contractor under any provisions of the Contract Documents.

If any other contractor or any subcontractor of any such other contractor shall suffer or claim to have suffered loss, damage, or delay by reason of the acts or omissions of the Contractor or of any of their subcontractors, the Contractor agrees to assume the defense against any such claim and to reimburse such other contractor or subcontractor for such loss or damage. The Contractor agrees to and does hereby indemnify and save harmless the Owner from and against any and all claims by such other contractors or subcontractors alleging such loss, damage or delay and from and against any and all claims, demands, costs and expenses, including attorney's fees, arising out of, relating to or resulting from such claims.

The Contractor shall be responsible for the coordination of the trades, subcontractors, and material providers engaged upon their work. The Owner or Engineer will not undertake to settle any differences between the Contractor and their subcontractors or between subcontractors. If any subcontractor on the project, in the opinion of the Engineer, proves to be incompetent or otherwise unsatisfactory, they shall be replaced if and when directed in writing.

Nothing contained in this Contract shall create any contractual relation between any Subcontractor and the Owner.

7.10 Taxes

SC-7.10 Add the following paragraph immediately after Paragraph 7.10.A:

- B. The following procedure in handling the 4.75% North Carolina Sales Tax and any additional Sales Tax collected by Transylvania County or other special taxing districts is applicable to this project. The Contractor or Contractors shall comply fully with the requirements outlined hereinafter, in order that the Owner may recover the amount of the tax permitted under the law.
1. It shall be the Contractor's responsibility to furnish the Owner documentary evidence showing the materials used and sales and/or use taxes paid by the Contractor and each of his subcontractors.
 2. The documentary evidence shall consist of a certified statement, by the Contractor and each of his subcontractors individually, showing total purchases of materials from each separate vendor and total sales taxes paid by each vendor. Certified statements must show the invoice number, or numbers, covered and inclusive dates of such invoices.
 3. Materials used from Contractor's or subcontractor's warehouse stock shall be shown in a certified statement at warehouse stock prices.
 4. The Contractor shall not be required to certify the subcontractor's statements.
 5. The documentary evidence to be furnished to owners eligible for sales or use tax refunds covers sales and/or use taxes paid on building materials used by the Contractor and subcontractors in the performance of contracts with public projects.
 6. The Contractor's statements must not contain sales and/or use taxes paid on purchases of tangible personal property purchased by such Contractor for use in performing the contract which does not annex to, affix to or in some manner become a part of the building or structure being erected, altered, or repaired for the governmental units or agencies referred to in this Regulation.
 7. The Contractor or Contractors to whom award is made for this project will be required to follow the procedure outlined above.
 8. This statement shall state the vendor's name, invoice number, total amounts of invoice, dates of invoices, the amount of the special tax paid and the County in which the purchase was made. In the event that the Contractor wishes to file a combined certified statement showing the 4.75% State tax and the special tax separately, this will be acceptable provided the documentation clearly identifies the county in which the special tax was paid. Taxes must be reviewed and approved by County Finance Department.

7.13 Safety and Protection

SC-7.13 Add the following paragraph immediately after Paragraph 7.13.G:

In the performance of the contract the Contractor shall comply with the most current applicable provisions of the regulations issued by the Secretary of Labor pursuant to section 107 of the Contract Work Hours and Safety Standards Act entitled "Safety and Health Regulations for Construction" (29 CFR Part 1518, renumbered as Part 1926). Occupational Safety and Health Standards (29 CFR Part 1910) issued by the Secretary of Labor pursuant to the Williams-Steiger Occupational Safety and Health Act of 1970 are applicable to work performed by the contractor subject to the provisions of the Act.

ARTICLE 8—OTHER WORK AT THE SITE

No suggested Supplementary Conditions in this Article.

ARTICLE 9—OWNER'S RESPONSIBILITIES

9.01 Communications to Contractor

SC-9.01 Add the following paragraph immediately after Paragraph 9.01.A:

The Contractor shall forward all communications to the Owner through the Engineer. The appropriate Owner representative to be copied in all communications is disclosed in the Advertisement for Rebid.

ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

SC-10.03 Add the following paragraphs immediately after Paragraph 10.03.B:

- C. The Resident Project Representative (RPR) will be Engineer's representative at the Site. RPR's dealings in matters pertaining to the Work in general will be with Engineer and Contractor. RPR's dealings with Subcontractors will only be through or with the full knowledge or approval of Contractor. The RPR will:
1. *Conferences and Meetings:* Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings (but not including Contractor's safety meetings), and as appropriate prepare and circulate copies of meeting notes thereof.
 2. *Safety Compliance:* Comply with Site safety programs, as they apply to RPR, and if required to do so by such safety programs, receive safety training specifically related to RPR's own personal safety while at the Site.
 3. *Liaison*
 - a. Serve as Engineer's liaison with Contractor. Working principally through Contractor's authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.
 - b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.
 - c. Assist in obtaining from Owner additional details or information, when required for Contractor's proper execution of the Work.
 4. *Review of Work; Defective Work*
 - a. Conduct on-Site observations of the Work to assist Engineer in determining, to the extent set forth in Paragraph 10.02, if the Work is in general proceeding in accordance with the Contract Documents.
 - b. Observe whether any Work in place appears to be defective.
 - c. Observe whether any Work in place should be uncovered for observation, or requires special testing, inspection, or approval.
 5. *Inspections and Tests*
 - a. Observe Contractor-arranged inspections required by Laws and Regulations, including but not limited to those performed by public or other agencies having jurisdiction over the Work.

- b. Accompany visiting inspectors representing public or other agencies having jurisdiction over the Work.
 - 6. *Payment Requests*: Review Applications for Payment with Contractor.
 - 7. *Completion*
 - a. Participate in Engineer’s visits regarding Substantial Completion.
 - b. Assist in the preparation of a list of items to be completed or corrected.
 - c. Participate in Engineer’s visit to the Site in the company of Owner and Contractor regarding completion of the Work and prepare a final list of items to be completed or corrected by Contractor.
 - d. Observe whether items on the final list have been completed or corrected.
- D. The RPR will not:
 - 1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including “or-equal” items).
 - 2. Exceed limitations of Engineer’s authority as set forth in the Contract Documents.
 - 3. Undertake any of the responsibilities of Contractor, Subcontractors, or Suppliers.
 - 4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences, or procedures of construction.
 - 5. Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.
 - 6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.
 - 7. Authorize Owner to occupy the Project in whole or in part.

ARTICLE 11—CHANGES TO THE CONTRACT

SC-11.07 Delete Paragraph 11.07.C.1 in its entirety and insert the following in its place:

SC-11.07.C.1 1. A mutually acceptable fixed fee not to exceed 5 percent (5%).

SC-11.07.C.2 Delete Paragraph 11.07.C.2 in its entirety.

ARTICLE 12—CLAIMS

SC-12.01 Delete Paragraph 12.01.D in its entirety and insert the following in its place:

SC-12.01.D Any disputes that are subject to the Claims process outlined in this Article will be resolved via arbitration.

ARTICLE 13—COST OF WORK; ALLOWANCES, UNIT PRICE WORK

13.01 *Cost of the Work*

SC-13.01 Supplement Paragraph 13.01.C.5.c.2) by adding the following sentence:

The equipment rental rate book that governs the included costs for the rental of machinery and equipment owned by Contractor (or a related entity) under the Cost of the Work provisions of this Contract is the most current edition of Rental Rate Blue Book or AED Green Book.

SC-13.01 Add the following subparagraph immediately after Paragraph 13.01.D.2:

- a. For purposes of this paragraph, “small tools and hand tools” means any tool or equipment whose current retail price if it were purchased new would be less than \$500.

SC-13.01 Add the following paragraph immediately after Paragraph 13.01.E:

- F. Contractor’s Title to Materials: No materials or supplies for the Work shall be purchased by the Contractor or by any subcontractor subject to any chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller. The Contractor warrants they have good title to all materials and supplies used by them, in the Work, free from all liens, claims or encumbrances.

13.03 Unit Price Work

SC-13.03 Add the following paragraph immediately after Paragraph 13.03.E.3:

4. Following adjustments, Unit Price will remain valid for the duration of the project.

ARTICLE 14—TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFECTIVE WORK

No suggested Supplementary Conditions in this Article.

ARTICLE 15—PAYMENTS TO CONTRACTOR, SET OFFS; COMPLETIONS; CORRECTION PERIOD

15.03 Substantial Completion

SC-15.03 Add the following subparagraph immediately after to Paragraph 15.03.B:

1. If some or all of the Work has been determined not to be at a point of Substantial Completion and will require re-inspection or re-testing by Engineer, the cost of such re-inspection or re-testing, including the cost of time, travel, lodging, materials, equipment, and other typical or incidental expenses, will be paid by Contractor to Owner. If Contractor does not pay, or the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under this Article 15.

ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

No suggested Supplementary Conditions in this Article.

ARTICLE 17—FINAL RESOLUTIONS OF DISPUTES

SC-17.01 Add the following paragraphs immediately after Paragraph 17.01.

17.02 Arbitration

- A. All matters subject to final resolution under this Article will be settled by arbitration administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules (subject to the conditions and limitations of this Paragraph SC-17.02). Any controversy or claim in the amount of \$100,000 or less will be settled in accordance with the American Arbitration Association’s supplemental rules for Fixed Time and Cost Construction Arbitration. This agreement to arbitrate will be specifically enforceable under the prevailing law of any court having jurisdiction.
- B. The demand for arbitration will be filed in writing with the other party to the Contract and with the selected arbitration administrator, and a copy will be sent to Engineer for information. The

demand for arbitration will be made within the specific time required in Article 17, or if no specified time is applicable within a reasonable time after the matter in question has arisen, and in no event will any such demand be made after the date when institution of legal or equitable proceedings based on such matter in question would be barred by the applicable statute of limitations.

- C. The arbitrator(s) must be licensed engineers, contractors, attorneys, or construction managers. Hearings will take place pursuant to the standard procedures of the Construction Arbitration Rules that contemplate in-person hearings. The arbitrators will have no authority to award punitive or other damages not measured by the prevailing party's actual damages, except as may be required by statute or the Contract. Any award in an arbitration initiated under this clause will be limited to monetary damages and include no injunction or direction to any party other than the direction to pay a monetary amount.
- D. The Arbitrators will have the authority to allocate the costs of the arbitration process among the parties but will only have the authority to allocate attorneys' fees if a specific Law or Regulation or this Contract permits them to do so.
- E. The award of the arbitrators must be accompanied by a reasoned written opinion and a concise breakdown of the award. The written opinion will cite the Contract provisions deemed applicable and relied on in making the award.
- F. The parties agree that failure or refusal of a party to pay its required share of the deposits for arbitrator compensation or administrative charges will constitute a waiver by that party to present evidence or cross-examine witness. In such event, the other party shall be required to present evidence and legal argument as the arbitrator(s) may require for the making of an award. Such waiver will not allow for a default judgment against the non-paying party in the absence of evidence presented as provided for above.
- G. No arbitration arising out of or relating to the Contract will include by consolidation, joinder, or in any other manner any other individual or entity (including Engineer, and Engineer's consultants and the officers, directors, partners, agents, employees, or consultants of any of them) who is not a party to this Contract unless:
 - 1. the inclusion of such other individual or entity will allow complete relief to be afforded among those who are already parties to the arbitration;
 - 2. such other individual or entity is substantially involved in a question of law or fact which is common to those who are already parties to the arbitration, and which will arise in such proceedings;
 - 3. such other individual or entity is subject to arbitration under a contract with either Owner or Contractor, or consents to being joined in the arbitration; and
 - 4. the consolidation or joinder is in compliance with the arbitration administrator's procedural rules.
- H. The decision of the arbitrator will be final. Judgment may be entered upon it in any court having jurisdiction thereof, and it will not be subject to modification or appeal, subject to provisions of the Laws and Regulations relating to vacating or modifying an arbitral award.
- I. Except as may be required by Laws or Regulations, neither party nor an arbitrator may disclose the existence, content, or results of any arbitration hereunder without the prior written consent of both parties, with the exception of any disclosure required by Laws and Regulations or the Contract. To the extent any disclosure is allowed pursuant to the exception, the disclosure must be strictly and narrowly limited to maintain confidentiality to the extent possible.

17.04 Attorneys' Fees

- A. For any matter subject to final resolution under this Article, the prevailing party shall be entitled to an award of its attorneys' fees incurred in the final resolution proceedings, in an equitable amount to be determined in the discretion of the court, arbitrator, arbitration panel, or other arbiter of the matter subject to final resolution, taking into account the parties' initial demand or defense positions in comparison with the final result.
- B. For any matter subject to final resolution, for which the decision does not favor one party over another, the attorney's fees may be borne by the party who incurred them, or some other division as may be determined at the discretion of the court, arbitrator, arbitration panel, or other arbiter, or as may be jointly agreed by the parties to the arbitration.

ARTICLE 18—MISCELLANEOUS

SC-18.05 Add the following paragraphs immediately after Paragraph 18.05.

Neither the inspection by the Owner or the Engineer, nor any order, measurement, approval, determination, decision or certificate by the Engineer, nor any order by the Owner for the payment of money, nor any payment for or use, occupancy, possession or acceptance of the whole or any part of the work by the Owner, nor the extension of time, nor any other act or omission of the Owner or of the Engineer shall constitute or be deemed to be an acceptance of any defective or improper work, materials, or equipment nor operate as a waiver of any requirement or provision of the Contract, nor of any remedy, power or right of or herein reserved to the Owner, nor of any right to damages for breach of contract. Any and all rights and/or remedies provided for in the Contract are intended and shall be construed to be cumulative; and, in addition to each and every other right and remedy provided for herein or by law, the Owner shall be entitled as a right to a writ of injunction against any breach or threatened breach of the Contract by the Contractor, by their Subcontractors or by any other person or persons.

**SECTION 00900
LIST OF DRAWINGS**

PROJECT NAME: WOODRUFF LANDFILL: PHASE 7 EXPANSION CONSTRUCTION
TRANSYLVANIA COUNTY, NORTH CAROLINA
FEBRUARY 2025

<u>DRAWING NO.</u>	<u>DRAWING TITLE</u>
CP - T	TITLE SHEET
CP - L	LEGEND AND GENERAL NOTES
CP - 01	EXISTING CONDITIONS
CP - 02A	PHASE 7 EROSION AND SEDIMENT CONTROL PLAN PHASE 1
CP - 02B	BORROW AREAS EROSION AND SEDIMENT CONTROL PLAN PHASE 1
CP - 03A	PHASE 7 EROSION AND SEDIMENT CONTROL PLAN PHASE 2
CP - 03B	BORROW AREAS EROSION AND SEDIMENT CONTROL PLAN PHASE 2
CP - 04	PHASE 7 BASE GRADING PLAN
CP - 05	PHASE 7 TOP OF LINER GRADING PLAN
CP - 06	PHASE 7 TOP OF DRAINAGE LAYER GRADING PLAN
CP - 07	ACCESS ROADS PLAN VIEW AND PROFILE
CP - 07A	LEACHATE FORCEMAIN PLAN AND PROFILE
CP - 07B	LEACHATE FORCEMAIN PLAN AND PROFILE
CP - 08	GENERAL DETAILS
CP - 09	GENERAL DETAILS
CP - 09A	GENERAL DETAILS
CP - 10	GENERAL DETAILS
CP - 11	GENERAL DETAILS
CP - 12	EROSION AND SEDIMENT CONTROL DETAILS
CP - 13	EROSION AND SEDIMENT CONTROL DETAILS
CP - 14	EROSION AND SEDIMENT CONTROL DETAILS
CP - 15	EROSION AND SEDIMENT CONTROL DETAILS
CP - 16	SEEDING SPECIFICATIONS
CP - 17	GROUND STABILIZATION AND MATERIAL HANDLING
CP - 18	INSPECTION, RECORDKEEPING, AND REPORTING

S - 01	GENERAL NOTES
S - 02	FOUNDATION PLAN AND DETAILS
E - 101	ELECTRICAL DETAILS
E - 102	ELECTRICAL DETAILS
E - 103	ELECTRICAL DETAILS

**SECTION 00909
SUBMITTAL FORM**

General Information

Project Name: Woodruff Landfill: Phase 7 Expansion Construction Submittal Number: _____
Transylvania County, North Carolina

Project Number: _____ Date: _____

Submittal Description: _____

Contractor's Certification

Technical Specification No.:

This Submittal has been reviewed for accuracy of content. It is my opinion that the material and/or equipment are following the Contract Drawings and Technical Specifications. The information contained herein has been fully coordinated with all involved subcontractors.

Contractor: _____

Signed: _____

Date: _____

Engineer's Review

No Exceptions Taken Engineer: LaBella Associates

Make Corrections Noted Signed: _____

Amend and Resubmit Date: _____

Rejected - See Remarks

Review is for general compliance with the design concept and the contract documents. Corrections or comments made on the shop drawings during this review do not relieve the contractor from compliance with the requirements of the plans and specifications. No responsibility is assumed for the correctness of dimensions or details.

PART IV – SPECIFICATIONS

DIVISION 1 – GENERAL REQUIREMENTS

DIVISION 2 – SITE WORK

DIVISION 3 - CONCRETE

DIVISION 13 – SPECIAL CONSTRUCTION

DIVISION 15 - MECHANICAL

DIVISION 1

GENERAL REQUIREMENTS

SECTION 01010
SUMMARY OF WORK

PART 1 GENERAL

1.01 SUMMARY

A. Project Identification: Woodruff Landfill: Phase 7 Expansion Construction
Transylvania County, North Carolina

B. Project Summary: The work includes, but is not limited to:

- Erosion and sediment controls;
- Modification of existing sediment basin and construction of sediment basin;
- Construction of access roads;
- Site preparation;
- Facilitation of relocation of existing cell tower power lines and fiber optic cables;
- Earthwork associated with site grading, including preparation of the subgrade for construction of the low-permeability soil liner;
- Earthwork associated with construction of a low-permeability soil liner, including amending onsite materials, if necessary, to meet the specified permeability criteria;
- Installation of a geosynthetic liner system, including placement of geosynthetic clay liner (GCL), geomembrane liner, and geotextile cushion;
- Installation of leachate collection system and force main;
- Construction of a landfill drainage layer;
- Installation of rain cover system;
- Construction of a concrete sump headwall;
- Installation of a leachate force main; and,
- Restoration and revegetation.

C. Project Requirements

1. Existing Site Conditions and Restrictions: The proposed construction is adjacent to an active landfill. The OWNER will occupy the premises during the entire period of construction to conduct normal landfill operations. The CONTRACTOR is responsible for conducting construction activities in such a manner as to avoid interfering with the operations of the landfill. Any damage to existing site structures, including monitoring wells and gas probes, by the CONTRACTOR shall be repaired to original condition at no additional cost to the OWNER.
2. Control Leachate: The CONTRACTOR shall be solely responsible for controlling leachate from the existing landfill, i.e. Phase 5, such that there is zero discharge of leachate into the surface water and stormwater management

system and zero discharge into off-site waters during the course of construction.

3. Requirements for Scheduling: The construction activities will be limited to the operating hours of the facility, unless otherwise authorized by the OWNER.
 4. Placement of Stockpiles: The OWNER will direct stockpile locations. The general location for surplus soil stockpiles is shown on the Drawings. CONTRACTOR is responsible for installing silt fence around soil stockpiles and stabilizing stockpiles in accordance with project specifications.
 5. Prior to any land disturbance, the CONTRACTOR is responsible to flag all protected areas as designated on the Construction Drawings.
 6. Prior to land disturbance, the CONTRACTOR is responsible to locate the facility property line when work will be within 25 feet of the property line.
 7. CONTRACTOR must:
 - a. Complete erosion and sediment control features prior to starting any other earth disturbing work.
 - b. Advise the OWNER well in advance of any anticipated work that is expected to be hazardous to the OWNER'S employees or users of the facility, or that is expected to impact operations at the facility.
 - c. Post Safety Data Sheets (SDS) sheets of all products used during construction. Post the sheets in an area conspicuous for viewing by CONTRACTOR'S and OWNER'S employees.
 8. The CONTRACTOR is responsible for adhering to Transylvania County's safety guidelines and to state and federal safety guidelines.
- D. Contractor Experience: The CONTRACTOR shall have experience constructing subtitle D low permeability soil liners, geosynthetic liners, and leachate collection systems and is familiar with the particular requirements of landfill construction, including but not limited to, handling leachate, moving waste, and working in conditions where landfill gas is present.
- E. Permits: CONTRACTOR shall apply for, obtain, and pay for all permits and bonds required to perform the Work. All permits shall be displayed at the project site and a copy shall be submitted to the OWNER.
- F. Codes: CONTRACTOR shall obtain all necessary Town, County, and State licenses and permits and comply with all applicable codes and regulations of authorities having jurisdiction. Submit copies of inspection reports, notices, and similar communications to ENGINEER.
- G. Dimensions: Verify dimensions indicated on Drawings with field dimensions before fabrication or ordering of materials. Do not scale Drawings.

- H. Existing Conditions: Notify OWNER and ENGINEER immediately of existing conditions differing from those indicated on the Drawings.
- I. Intent: Drawings and Specifications are intended to provide the basis for proper completion of the Work suitable for the intended use of the OWNER. Anything not expressly set forth, but which is reasonably implied or necessary for the intended use shall be included.

1.02 DEFINITIONS OF PARTIES

- A. OWNER: Transylvania County owns the site and shall be responsible for all project management related decision making.
- B. CONTRACTOR: Individual, firm or corporation who has entered contract with OWNER.
- C. SUBCONTRACTOR: Individual, firm or corporation to supply Work or material at site pursuant to separate agreement with CONTRACTOR.
- D. ENGINEER: LaBella Associates (LaBella), which prepared the Specifications and Drawings for this project.
- E. CONSTRUCTION QUALITY ASSURANCE CONSULTANT (CQA Firm): Firm(s) independent from CONTRACTOR responsible for observing and documenting activities related to quality assurance of production and installation of the project. CQA firm will appoint a CQA Engineer who will act as authorized representative of CQA firm.

1.03 FORMAT OF SPECIFICATIONS

- A. These Specifications are written in the Construction Specifications Institute (CSI) three-part format in an imperative and abbreviated form. This imperative language is directed at the CONTRACTOR, unless specifically noted otherwise. Incomplete sentences in the Specifications shall be completed by inserting "shall", "CONTRACTOR shall", and similar mandatory phrases by inference in the same manner as they are applied to notes on Drawings. Except as worded contrary, CONTRACTOR shall fulfill (perform) indicated requirements whether stated imperatively or otherwise.

1.04 COORDINATION

- A. Coordinating Work:
 - 1. CONTRACTOR shall coordinate Work with CQA Firm, subcontractors, and other contractors. Ensure that subcontractors carefully familiarize themselves with Construction Drawings and that they consult with other trades so that Work may be properly coordinated.

1.05 CODES AND REGULATIONS

- A. Prior to the CONTRACTOR undertaking additional Work due to the enactment of new, or the amendment of existing, statues, ordinances, and regulations dealing with the performance of the successful bid, OWNER will issue a Work directive Change requesting CONTRACTOR to prepare a Change Order and setting forth the additional

Work to be undertaken. The Change Order shall be prepared and executed as set forth in the General Conditions.

1.06 INSPECTION AND TESTING

- A. Tests called for in Specifications will be performed by the CONTRACTOR. Tests deemed necessary by CQA Firm will be performed by OWNER or its authorized representative except when indicated otherwise in Specifications.

1.07 REFERENCES

- A. Conform to reference standards current as of date of bid, unless otherwise noted in Contract Documents.
- B. Should specified reference standards conflict with Contract Documents, request clarification from ENGINEER before proceeding.
- C. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise to any reference document.

1.08 SITE CONDITIONS

- A. CONTRACTOR's Staging Area:
 - 1. CONTRACTOR will be responsible for establishing his staging area for personnel, equipment, and materials, with approval of the location by OWNER.
 - 2. CONTRACTOR will be responsible for providing security for his personnel, equipment, and materials.
- B. Disposal of Waste Material:
 - 1. CONTRACTOR shall be responsible for properly disposing land clearing debris from the project as directed by the OWNER. Transportation to the landfill tipping area and coordination of the timing of disposal with site operators shall be the CONTRACTOR's responsibility. Burning will be allowed pursuant to Contractor obtaining necessary NCDEQ approval for open burn activities. No burning will be allowed during any period of local, regional or statewide burn bans. If Contractor chooses to grind material on site, mulch may be left for use by Solid Waste Department. The Contractor will be responsible for checking and monitoring daily atmospheric conditions under NCDEQ, and NCDA&CS / NCFS open burning conditions and bans. Open Burning Permits are available online under NCFS burning permits. If a State Burn Ban has been implemented, a local ban will also be implemented by the County Fire Marshal.
 - 2. CONTRACTOR shall be responsible for properly disposing of all waste material from the project. Transylvania County will allow the CONTRACTOR to dispose of wastes generated on-site during construction activity in the on-site landfills without charge. Transportation to the landfill tipping area and coordination of

the timing of disposal with site operators shall be the CONTRACTOR's responsibility.

- C. Information on Site Conditions: Information regarding site conditions, subsurface information, groundwater elevations, existing construction of site facilities as applicable, and similar data will be available for inspection at Engineer's office upon request. Such information is offered as supplemental information only.
- D. Fire Prevention and Protection: Perform all Work in a fire-safe manner. Comply with applicable local, State, and Federal fire prevention regulations.
- E. Temporary Electric Power: Make arrangements for electric power for use during construction period until final acceptance of the work by OWNER and pay all costs for same.
- F. Sanitary Facilities: Provide and maintain sanitary facilities for employees and subcontractor's employees.

1.09 GENERAL CONSTRUCTION RESPONSIBILITIES AND PROCEDURES

- A. CONTRACTOR shall be held responsible for correctness of Work and shall report errors or inconsistencies in the established lines and grades to the OWNER before start of Work.
- B. Responsibility for Damage to Existing Structures: Repair or replace structures or facilities damaged by CONTRACTOR at no additional cost to OWNER.
- C. Haul and Access Roads and Maintenance:
 - 1. Abide by prevailing legal load limit regulations when hauling over pavements or structures.
 - 2. Construct temporary haul and access roads only at locations specifically approved by OWNER.
 - 3. At conclusion of construction, perform necessary maintenance of haul and access routes during construction to restore routes used by CONTRACTOR's equipment to their original condition.
 - 4. At conclusion of construction, regrade haul and access roads designated by OWNER. Regrade areas to original conditions.
 - 5. Patch or overlay existing roadways as necessary to restore them to original condition at no cost to OWNER.

1.10 OTHER REQUIREMENTS

- A. Dimensions and Measurements:

1. Locations and elements of Work are approximate only and are not to be scaled from the Drawings. Locations of Work will be defined by the CONTRACTOR's construction staking.
 2. Figures on Drawings are subject, in every case, to measurements of adjacent or incorporated Work. Make such measurements before undertaking Work dependent upon such data.
 3. Verify dimensions shown and notify ENGINEER of discrepancies prior to proceeding with Work.
- B. Number of Specified Items Required: Whenever a piece of equipment, an article, or a device is referred to in a singular number, such reference applies to as many such items as are shown on Drawings or required to complete the Work.

1.11 INCIDENTAL ITEMS

Items that are considered incidental to work and shall be included in the lump sum or unit prices as appropriate, include, but are not limited to:

- Provision of all required insurance, performance and payment bonds, permits with associated fees with documentation, and warranties
- Compliance with all applicable Health and Safety regulations
- Qualified field supervision and layout
- Qualified and experienced job site administration
- Construction surveying
- Protection of existing utilities and structures, including repair, extension, and relocation, if applicable
- Collection and disposal of all water, including dewatering fluids, unless otherwise noted
- Maintenance of haul roads, including dust control
- Equipment decontamination and disposal of material used to perform decontamination
- Management of temporary hazardous materials/waste storage areas, including soil pile covers and maintenance, if necessary
- Restoration of disrupted areas not designed or described by the Contract Documents
- Cooperation with local code enforcement officers, fire marshal, other Contractors, and others
- Maintenance of project record documents
- Odor control
- Environmental protection in accordance with all state, federal, and local regulations
- Maintenance of perimeter fencing
- Soil erosion and sedimentation control, as detailed in the facilities Stormwater Pollution Prevention Plan (SWPPP) and approved Erosion and Sediment Control Plan
- Performance of work in compliance with the facility's permit, operating license, surface water discharge permit, spill plan, emergency response plan, and wetland permit(s)

PART 2 PRODUCTS

2.01 MATERIALS

- A. All products used in the Work shall be new, unused and of first quality.

PART 3 EXECUTION

3.01 INSTALLATION

- A. All Work is to be performed by properly trained and qualified personnel under the supervision of the Contractor.

END OF SECTION 01010

**SECTION 01025
MEASUREMENT AND PAYMENT**

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. All Work completed under the Contract will be measured using United States Units of Measurement.
- B. All items not specifically listed in the approved Schedule of Values for which there is no instructions as to where the price shall be included shall be covered by distributing the price within the listed items. No additional payment will be allowed.
- C. All Work shall meet the applicable requirements of the CQA Plan for this project before payment will be approved.

1.02 AUTHORITY

- A. Measurement methods delineated in the individual specification sections are intended to complement the criteria of this section.
- B. Take all measurements and compute quantities. ENGINEER will verify measurements and quantities.

1.03 UNIT QUANTITIES SPECIFIED

- A. Quantities and measurements indicated in the Bid Form are for bidding and contract purposes only. Quantities and measurements supplied or placed in the Work and verified by ENGINEER shall determine payment.
- B. If the actual Work requires more or fewer quantities than those quantities indicated, provide the required quantities at the Unit Price provided in the Contract.

1.04 MEASUREMENT OF QUANTITIES

- A. Measurement of quantities expressed as volume shall be based upon topographic surveys of the area prior to and after the Work is completed. Survey will be within the Work limits shown on the Drawings for each item with no additional allowances for shrinkage, swelling, or creep.
 - 1. In computing volumes of excavation and fill, topographic surveys, or other methods, acceptable to the ENGINEER, will be used.
- B. Measurement of quantities expressed as area shall be based upon horizontal survey of the Work limits.
- C. Measurement of linear items such as piping will be for quantities actually installed to the specified Work limits, based upon horizontal surveyed stations recorded along the straight or curved centerline of each respective item.
- D. "Lump Sum," when used as an item of payment, shall mean complete functioning item for the Work described by the Contract Documents. When a complete structure or structural unit is specified as the unit of measurement the unit shall be construed to include all necessary fittings, accessories, and appurtenances.

- E. Tonnage measurements shall be based upon the actual weight of material brought to the site and placed. Tonnage material must be placed according to the dimensions shown on the Drawings.
- F. Item measurements “each” shall be complete functional items as described in the Specifications and as shown on the Drawings and shall be construed to include all necessary fittings, accessories, and appurtenances.
- G. Attach copy of surveyor’s calculations and supporting documentation to applications for payment verifying the total quantity of each completed unit cost work item.

1.05 PAYMENT

- A. Payment for each Lump Sum Price stated in the approved Schedule of Values shall constitute full compensation for all required labor, products, tools, equipment, plant, transportation, services and incidentals; erection, application or installation of an item of the Work required to complete all Work specified under that particular item including cleanup, and all costs for doing related Work as set forth in these Specifications and/or on the Drawings or implied in carrying out their intent. The Lump Sum stated in the approved Schedule of Values shall be deemed to include an allowance for overhead and profit.
- B. Final payment for Work governed by Unit Prices will be made on the basis of the actual measurements and quantities accepted by ENGINEER multiplied by the Unit Sum/Price for Work which is incorporated in or made necessary by the Work.
- C. Requests for payment shall be in accordance with the requirements provided within this Project manual.
- 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 prepared by a surveyor licensed in the State of North Carolina. Payment for quantities that exceed the specified contract limits will only be made with the approval of the ENGINEER. The payment for quantities that exceed the contract quantities can only be obtained through an approved change order before contract quantities are exceeded.
- E. No partial payments shall be made for the installation of items which have not been tested and approved.
- F. Upon installation and acceptance by the OWNER or ENGINEER, the unit cost for the item is eligible to be paid and shall be made in payment to account for the quantity of materials actually installed in the Work. The OWNER will not pay for material in excess of what is actually installed in the Work.
- G. Payment for Unit Price items will be made monthly until completion of each unit price item based on quantity estimates by CONTRACTOR and verified by the ENGINEER. Final payment will be based on quantity calculated from Record Drawings.

1.06 VARIATIONS IN ESTIMATED QUANTITIES

- A. The quantities given in the Bid Form are approximate only and are given as a basis for the uniform comparison of bids, and 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 Price will be deemed to include an amount for overhead, profit, and indirect costs for each separately defined item.

- C. An increase or decrease in the quantity for any Unit Price item shall not be regarded as sufficient grounds for an increase or decrease in the price of the items except as provided herein.
- D. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by CONTRACTOR will be made by the CONTRACTOR subject to the provisions of the General Conditions Article 13.

1.07 DEFECT ASSESSMENT

- A. Replace the Work, or portions of the Work, not conforming to specified requirements.
- B. If, in the opinion of ENGINEER, it is not practical to remove and replace the Work, the ENGINEER will direct one of the following remedies:
 - 1. The defective Work may remain, but the Unit Sum/Price will be adjusted to a new Sum/Price at the discretion of the OWNER.
 - 2. The defective Work will be partially repaired to the instructions of the ENGINEER, and the unit Sum/Price will be adjusted to a new Sum/Price at the discretion of the OWNER.
- C. The individual specification sections may modify these options or may identify a specific formula or percentage Sum/Price reduction.
- D. The authority of the ENGINEER to assess the defect and identify payment adjustment is final.

1.08 NON-PAYMENT FOR REJECTED PRODUCTS

- A. Payment will not be made for any of the following:
 - 1. Products wasted or disposed of in a manner that is not acceptable.
 - 2. Products determined as unacceptable before or after placement.
 - 3. Products not completely unloaded from the transporting vehicle.
 - 4. Products placed beyond the lines and levels of the required Work.
 - 5. Products remaining on hand after completion of the Work.
 - 6. Loading, hauling, and disposing of rejected Products.

PART 2 PROCEDURE

2.01 CONTRACT ITEMS

- A. The following are more detailed descriptions of payment items as listed on the Table of Prices. The work includes, but is not necessarily limited to, what is described.

Item 1 – Mobilization and Demobilization:

- a. Scope: Work shall include the furnishing of all materials, and operations required for the assembling and setting up for the project and dismantling and removal at the conclusion of the project. Additionally, work includes but not limited to: initial movement of personnel to the project site, establishment of field office for the CONTRACTOR and ENGINEER, establishment of shops and plants, provision of sanitary and any other facilities or utilities required by the Contract Documents and State or Local regulations, moving on and off site all construction equipment, hauling units, mixers, compressors, and tools required to complete the work, establishment of storage yard area, all other work and operations which must be performed prior to beginning work on compensable items of work at the project site, the cost of required insurance and bonds and any other initial expense required by the OWNER or the State, removal of any excess materials, development and maintenance of a traffic control plan, removal and proper disposal of all construction related wastes and debris, and restoration of all disturbed areas.
- b. Payment: Twenty-five (25) percent of the Lump Sum Price bid will be paid with the first payment request following satisfactory evidence of mobilization of sufficient labor, equipment, and material to adequately progress the Work of this Contract. Twenty-five (25) percent of the Lump Sum Price bid will be paid with the payment request subsequent to the payment request in which the initial payment for this item is made. Fifty (50) percent of the Lump Sum Price bid will be paid with the Final Payment request. This item shall be limited to no more than 5% of the total extended price as indicated on the approved Table of Prices. The payment for this item shall be made at the Contract Price (lump sum) for Mobilization and Demobilization.

Item 2 – Site Preparation:

- a. Scope: Work shall include site preparation and restoration under Section 02100 consisting of any clearing and grubbing and removal of debris required to initiate and complete the work. Additionally, work shall include the installation of the silt fence to delineate the area of disturbance and the additional silt fence around the borrow area as shown on the Drawings.
- b. Payment: The Lump Sum Price for this item shall be payment in full for all materials, labor, and equipment necessary for Site preparation The payment for this item shall be made at the Contract Price (lump sum) for Site Preparation and Restoration.

Item 3 – Field Engineering, Surveying, and Record Documents:

- a. Scope: Work shall include record documents prepared in accordance with Section 01720, and construction progress documentation prepared in accordance with Section 01250. Survey of the construction area existing conditions prior to commencing construction activities shall be included. Ground elevations shall be surveyed and staked. Additionally, work for this item includes all field engineering services and meetings needed to accomplish the Work in accordance with Section 01050. The scope for this item does not include surveys for Item 13, Item 14, Item 18, and Item 20 of Measurement

and Payment.

- b. Payment: The Lump Sum Price for this item shall be payment in full for all materials, labor, and equipment necessary for Field Engineering in accordance with Section 01050 and record documents in accordance with Section 01250 and Section 01720. Payment for this item shall be made at the Contract Price (lump sum) for Field Engineering.

Item 4 – Locating Edge of Existing Liner

- a. Scope: Work shall include, but not be limited to, all activities needed to prepare the existing edge of liner on Phase 5 of the landfill for tie-in to the Phase 7 liner construction. These activities include, but are not limited to, locating the edge of liner, excavation of cover soil and/or waste material to expose the liner for tie-in, removal of the existing anchor trench material, and preparation of the soil liner and trimming/cleaning of the geomembrane liner for tie-in to the Phase 7 liner. Additionally, this line item also includes covering any exposed waste on Phase 5 along the tie-in area with one (1) foot of cover soil.
- b. Payment: The Lump Sum Price for this item shall be payment in full for all materials, labor, and equipment necessary for locating the edge of existing Phase 5 liner. Payment for this item shall be made at the Contract Price (lump sum) for Locating Edge of Existing Liner.

Item 5 – Construction Quality Control (CQC)

- a. Scope: Work shall include construction quality control (CQC) under Section 01400.
- b. Payment: The Lump Sum Price for this item shall be payment in full for all materials, labor, and equipment necessary for construction quality control (CQC). All Work conducted under Section 01400 and project specification shall be paid for at the Contract Price (lump sum) for Quality Control including, but not limited to, suppliers, manufacturers, products, services, site conditions, and workmanship.

Item 6 – Facilitation/Coordination of Cell Tower Power Line and Fiber Optic Cables Relocation

- a. Scope: Work shall include all facilitation/coordination efforts related to the relocation of the power line and fiber optic cables of the Cell Tower located northeast of Phase 7. The actual relocation of the utility lines will be performed by the appropriate local utility company. The facilitation/coordination efforts shall include provision of staging areas for local utility companies, marking proposed utility locations, and onsite meetings with local utility companies.
- b. Payment: The Lump Sum Price for this item shall be payment in full for all materials, labor, and equipment necessary to facilitate the relocation of the Cell Tower power line and fiber optic cables as described in the Project Specifications and the Drawings.

Item 7 – Underdrain Pipes

- a. Scope: Work shall include, but not be limited to, the installation of two (2) 8-inch perforated HDPE DR-17 underdrain pipes, #57 stone, 8 oz. non-woven geotextile, and incidentals such as excavation, disposal of the excavated material, backfill and proper compaction.
- b. Payment: The Lump Sum Price for this item shall be payment in full for all materials, labor, and equipment necessary to supply and install two (2) subsurface drain (i.e., underdrain) pipes in Phase 7 as described in the Project Specifications and the Drawings.

Item 8 – Earthwork (Unclassified Excavation & Structural Fill):

- a. Scope: Work shall include, but not be limited to, excavating and grading borrow areas and Phase 7 Expansion, hauling, stockpiling, placement and compaction of excess soils, watering, haul road construction and maintenance, and maintenance of the excavation and the stockpile areas as required to comply with the Drawings. Erosion and sediment control features and adequate drainage shall be provided in the borrow areas and Phase 7 Expansion construction area as shown on the Drawings by the CONTRACTOR. Work shall also include the placement of structural fill to achieve the lines and grades shown on the Drawings, consisting of excavation, hauling, spreading, compaction, and testing.
- b. Payment: The Lump Sum Price for this item shall be payment in full for all materials, labor, and equipment necessary for earthwork (unclassified excavation and structural fill), with accompanying erosion and sediment control features, as described in the Specifications to the lines and grades specified on the Drawings. Included in this line item are costs associated with the construction and maintenance of borrow areas required for the construction of Phase 7 as shown on the Drawings.

Item 9 – Over Excavation and Backfill (Contingency):

- a. Scope: Work shall include, but not be limited to, the limits of excavation which shall be agreed to by both the CONTRACTOR and OWNER at the time of excavation. The use of truck load counts to estimate materials removed or placed will not be accepted as a basis for payment. The limits of the excavation shall be determined by the ENGINEER and agreed by both the CONTRACTOR and OWNER or ENGINEER at the time of excavation.
- b. Payment: The quantity for this line item will be the in-place volume of unsuitable materials estimated from the limits of excavation. The contingency allowance shall be exercised only with the approval of the ENGINEER and the OWNER. The Contract Unit Price per cubic yard shall be full compensation for removal of unsuitable materials and backfill prior to any structural fill placement or gravity line placement, including excavation, disposition of excavated materials, backfill, and compaction. The quantity of work to be paid for under this item will be per measured cubic yard of the excavation.

Item 10 – Waste Removal (Contingency):

- a. Scope: Work shall include, but not be limited to, the removal of waste and disposal of waste at the active area of the landfill and is contingent based on the direction of the ENGINEER and OWNER.
- b. Payment: The Contract Unit Price per cubic yard shall be full compensation for removal of waste and disposal of waste at the active area of the landfill as directed by Transylvania County, as defined in the Contract Documents. The quantity of work to be paid for under this item will be per measured cubic yard of the excavation. The work under this item will be performed on a contingency basis at the direction of the ENGINEER and OWNER.

Item 11 – Rock Removal – Mechanical Method (Contingency):

- a. Scope: Work shall include the rock removal that cannot be removed by mechanical means, as defined in the Specifications, and backfill prior to any structural fill placement. The limits of rock removal shall be agreed to by both the CONTRACTOR and OWNER upon completion of rock removal. The price for this item shall be paid for at the Contract Unit Price per cubic yard of rock removed and shall include the cost of all work associated with removing, loading, hauling, and disposing rock, and excavation, backfill and compaction.
- b. Payment: The Contract Unit Price per cubic yard shall be full compensation for providing materials, labor, and equipment necessary for the removal of rock. No payment will be made for unauthorized rock removal. The work under this item will be performed on a contingency basis at the direction of the OWNER. Excavated rock material may be stockpiled onsite with approval from the OWNER.

Item 12 – Geogrid with Vegetative Stabilization:

- a. Scope: Work shall include, but not be limited to, furnishing and installation of the geogrid to stabilize and reinforce the slopes shown on the Drawings. All materials used and work performed shall meet the requirements of this specification and the Contract Documents, or the manufacturer's installation and handling instructions, whichever are more stringent.
- b. Payment: The Lump Sum Price for this item shall be payment in full for all materials, labor, and equipment necessary to supply and install the geogrid and stabilize the reinforced slopes required for this project as shown on the Drawings.

Item 13 – Low Permeability Compacted Soil Liner (Offsite Soils):

- a. Scope: Work shall include, but not be limited to, the ground surveys before and after placement of the low permeability compacted soil liner, placement, and compaction of suitable soils to construct the low permeability compacted soil liner, and the construction of test pads.
- b. Payment: The Lump Sum Price for this item shall be payment in full for all materials, labor, and equipment necessary for the procurement and hauling

from offsite borrow sources, placement and compaction of suitable soils to construct the low permeability compacted soil liner, including excavation, construction of test pad(s), testing, hauling, spreading, moisture modification and compaction. The CONTRACTOR's surveyor shall perform surveys of the ground surface before and after placement and compaction of soil liner within the required construction limits that will be used by the OWNER and the ENGINEER to verify the thickness of compacted, in-place soil liner. These surveys will be provided to the OWNER as a condition for payment. Payment for this item shall be at the Contract Price (lump sum) for the Compacted Soil Liner.

Item 14 – Reinforced Geosynthetic Clay Liner (GCL)

- a. Scope: Work shall include, but not be limited to, materials, labor, and equipment necessary to install the reinforced geosynthetic clay liner (GCL). The CONTRACTOR's surveyor shall perform construction surveys that will show the total area of GCL installed. These surveys will be provided to the OWNER as a condition for payment.
- b. Payment: The Lump Sum Price for this item shall be payment in full for all materials, labor, and equipment necessary for the supply and installation of the reinforced GCL including all labor, material, equipment, and other incidentals, such as transportation, unloading, stockpiling, protecting, placing, and quality control testing as required to comply with the Drawings and Project Specifications. Ten percent (10%) of this line item will be retained until all quality control testing results, daily logs, certifications, and as-built layouts are submitted to and determined to be complete by the OWNER.

Item 15 – 60-mil Textured White HDPE Geomembrane Liner:

- a. Scope: Work shall include, but not be limited to, materials, labor, and equipment necessary to install the textured (WHITE side up) 60-mil HDPE geomembrane liner, and any repairs needed to be made based on any leaks discovered from the exposed liner Electric Leak Location (ELL) survey.
- b. Payment: The Lump Sum Price for this item shall be payment in full for all materials, labor, and equipment necessary for the supply and installation of textured (WHITE side up) 60-mil HDPE geomembrane liner, including quality control testing, shipping, unloading, and placement. The price for this item shall include performing an exposed liner ELL survey by the CONTRACTOR, and the coordination and site preparation required for the covered geomembrane ELL survey (to be performed by the CQA consultant). Any leak repairs related to the ELL found by the ELL survey shall be repaired by the CONTRACTOR in accordance with Project Specifications. Ten percent (10%) of this line item will be retained until all quality control testing results, daily logs, certifications, and as-built panel layouts are submitted to and determined to be complete by the OWNER.

Item 16 – 16 oz Non-woven Geotextile Cushion Fabric:

- a. Scope: Work shall include, but not be limited to, materials, labor, and equipment necessary to install the 16 oz. non-woven geotextile cushion fabric.

- b. Payment: The Lump Sum Price for this item shall be payment in full for all materials, labor, and equipment necessary to supply and install 16 oz. non-woven geotextile cushion fabric, including but not limited to shipping, unloading, and placement. Ten percent (10%) of this line item will be retained until all quality control testing results, daily logs, and certifications are submitted to and determined to be complete by the OWNER.

Item 17 – Anchor Trench Excavating and Backfilling:

- a. Scope: Work shall include, but not be limited to, excavating and backfilling of anchor trenches for the liner system.
- b. Payment: The Lump Sum Price for this item shall be payment in full for all materials, labor, and equipment necessary for the excavation and backfilling of anchor trenches for the liner system, including any incidentals such as dewatering the anchor trench during construction. Work under this item includes furnishing and installing all plywood and liner markers as shown on the Drawings.

Item 18 – HDPE (DR17) 10-inch Diameter Pipe and Fittings:

- c. Scope: Work shall include, but not be limited to, the installation of leachate collection piping, connections, and cleanouts with stainless steel hardware. Additionally, work shall include testing, flushing and camera inspection of leachate lines at the completion of construction. The CONTRACTOR's surveyor shall survey all leachate pipes within the required construction limits.
- d. Payment: The Lump Sum Price for this item shall be payment in full for all materials, labor, and equipment necessary to supply and install the leachate collection and conveyance piping system in accordance with Specification Section 02618 and the Drawings, using HDPE (DR17) 10-inch diameter pipe. Payment for this item shall be made at the Contract Price (lump sum) for HDPE (DR17) 10-inch Diameter Pipe and Fittings.

Item 19 – Sump Riser and Concrete Sump Headwall

- a. Scope: Work shall include, but not be limited to, materials and labor for installing the HDPE riser (DR17), fast flange, stainless steel hardware and connection. This item also includes the concrete headwall at the sump riser, associated above ground piping, insulation, cladding, pipe support, and flow meter required for Phase 7 sump by Contract Documents.
- b. Payment: The Lump Sum Price for this item shall be payment in full for all materials, labor, and equipment necessary to furnish and install HDPE riser in accordance with Specification Section 02618. Payment for this item shall include all costs associated with delivery of the material, placement, joining, testing, camera inspection, flushing and surveying, and backfilling.

Item 20 – HDPE (DR11) 4"/8" Dual Containment Leachate Force Main

- a. Scope: Work shall include, but not be limited to, installation of leachate force main, air release valve and apparatus, manholes, connections, pipe markers/tracing, and testing of the carrier and containment pipes. Work shall

include testing, flushing of leachate force main at the completion of construction.

- b. Payment: The Lump Sum Price for this item shall be payment in full for all materials, labor, and equipment necessary to supply and install the HDPE (DR11) 4”/8” Dual Containment Leachate force main in accordance with Specification Section 02618 and the Drawings. Payment for this item shall be made at the Contract Price (lump sum) for HDPE (DR11) 4”/8-inch Diameter Pipe and Fittings. The CONTRACTOR’s surveyor shall survey all leachate pipes within the required construction limits.

Item 21 – Washed Coarse Drainage Aggregates (No. 6M or 67 stone)

- a. Scope: Work shall include, but not be limited to, materials and labor for installing the washed coarse drainage aggregates for the liner system. Additionally, the CONTRACTOR’s survey prior to and after placement of drainage aggregate material within the required construction limits will be used to verify the thickness of in-place drainage layer.
- b. Payment: The Lump Sum Price for this item shall be payment in full for all materials, labor, and equipment necessary to supply and place washed coarse drainage aggregate as shown on the Drawings, in accordance with Specification Section 02225, including quality control testing, hauling, and spreading. Payment for this item is contingent on the receipt and acceptance of survey drawings prepared in accordance with the Specifications and certified by a North Carolina licensed Land Surveyor.

Item 22 – 20-mil White Geosynthetic Rain Cover:

- a. Scope: Work shall include, but not be limited to, materials, labor, and equipment necessary to install the 20-mil white geosynthetic rain cover including anchor trench and sandbag ballast system as shown on the Drawings and Contract Documents. This item includes a concrete pad as shown on the Drawings for a dewatering pump.
- b. Payment: The Lump Sum Price for this item shall be payment in full for all materials, labor, and equipment necessary to the supply and install the rain cover including anchor trench and sandbag ballast system as shown on the Drawings and Contract Documents. The price shall include using Ultraviolet Resistant sandbags and ropes, and a minimum one-year warranty on labor and material.

Item 23 – Stormwater Diversion Berm and Rain Flap:

- a. Scope: Work shall include, but not be limited to, materials, labor, and equipment necessary to construct the temporary stormwater diversion berm and rain flap shown on the Drawings.
- b. Payment: The Lump Sum Price for this item shall be payment in full for all materials, labor, and equipment necessary to the construction of the stormwater diversion berm and supply and installation of the additional drainage layer, rain flap, and sandbag ballast system as shown on the Drawings and Documents. The price shall include using Ultraviolet Resistant

sandbags and ropes, and a minimum one-year warranty on labor and material.

Item 24 – Leachate Pump and Electrical Work:

- a. Scope: Work shall include, but not be limited to, cost associated with pump startup by the pump manufacturer. The installation includes complete electrical installations and inspections required by local, State, and Federal codes for the electrical work. Included in this bid item is the coordination with local utility to provide electric service to the pump control panel and the sump pumps.
- b. Payment: The Lump Sum Price bid for this item shall be payment in full for all materials, labor, and equipment required to provide and install the electric meter, pump control panel, leachate pump, flow meter, and all electrical connections will be at Contract Price (Lump Sum) and shall be full compensation for the materials and work completed, inspected, and accepted. The payment shall be full compensation for the materials and work completed and inspected.

Item 25 – Landfill Perimeter Road, Cell Tower Access Road, SB-7E Access Road, and Temporary Gravel Construction Entrances/Exits:

- a. Scope: Work shall include, but not be limited to, grading and installation of the RCP culverts, woven filter fabric, 8-inch base course which includes 4-inch of AASTHO #1 Surge Stone and 4-inch of ABC stone, and guardrails.
- b. Payment: The Lump Sum Price for this item shall be payment in full for all materials, labor, and equipment necessary to supply and construct the perimeter access road encompassing Phase 7 and SB-7E, the cell tower access road, and the temporary gravel construction entrances/exits for Phase 7 and the borrow areas as shown on the Drawings.

Item 26 – Diversion Berms, Slope Drains, Silt Socks, Drop Inlets, and Inlet/Outlet Protection Structures

- a. Scope: Work shall include, but not be limited to, grading of berms and installation of HDPE slope drains, silt socks, drop inlets, and proposed inlet and outlet protection structures. Work shall include stabilizing the berms with erosion control blankets (ECBs) in accordance with the Contract Drawings.
- b. Payment: The Lump Sum Price for this item shall be payment in full for all materials, labor, and equipment necessary to supply of materials and construct/install the diversion berms, slope drains, silt socks, drop inlets, and inlet, and outlet protection structures in Phase 7 as shown on the Drawings.

Item 27 – Perimeter Stormwater Conveyance Channels, Culverts and Drop Inlets:

- a. Scope: Work shall include, but not be limited to, grading, installation of erosion control blanket, turf reinforcement matting (TRM) or Rip-Rap with 10 oz. non-woven geotextile, proposed culverts and drop inlets, proposed inlet and outlet protection structures, and riprap channel lining.
- b. Payment: The Lump Sum Price for this item shall be payment in full for all

materials, labor, and equipment necessary to construct the stormwater conveyance channels, culverts and drop inlets of Phase 7 as shown on the Drawings.

Item 28 – Revegetation (Including Borrow Areas):

- a. Scope: The work includes, but is not limited to, grading to drain, eliminating ponding, maintaining design slopes, of disturbance areas related to the Phase 7 construction work and any borrow areas disturbed during construction. The work also includes permanent seeding (and matting of all areas as shown on drawings) not covered with aggregate or concrete in accordance with the Contract Documents.
- b. Payment: The Lump Sum Price for this item shall be payment in full for all materials, labor, and equipment necessary to grade, mat, and revegetate areas disturbed by construction activities. The payment shall be full compensation for the materials and work completed and accepted.

Bid Item 29 – Dewatering Pump and Appurtenances

- a. Scope: Work includes, but is not limited to, dewatering ponded water on Phase 7 (e.g., from rain cover) during the construction as required.
- b. Payment: The Lump Sum Price bid for this item shall be payment in full for all materials, labor, and equipment required to provide dewatering of ponded areas. The payment shall be full compensation for the materials and work completed and accepted.

Bid Item 30 – Sediment Basins

- c. Scope: Work includes, but is not limited to, grading, forebay berms, outlet barrels, baffles, riser boxes, skimmers, anti-seep collars, emergency spillways, and incidentals such as excavation, backfill and proper compaction for one (1) proposed sediment basin and one (1) modified sediment basin.
- d. Payment: The Lump Sum Price bid for this item shall be payment in full for all materials, labor, and equipment required to construct one (1) proposed sediment basin and to modify one (1) existing sediment basin. The payment shall be full compensation for the materials and work completed and accepted.

Bid Item 31 – Sediment Basins Cleanup

- a. Scope: Work includes, but is not limited to, excavation, hauling and disposal of sediments, restoring sediment basin to design grades, re-installing baffles, filter stone, permanent seeding and matting of disturbed areas in accordance with the Contract Documents.
- b. Payment: The Lump Sum Price bid for this item shall be payment in full for all materials, labor, and equipment required for dewatering and cleanup of the two (2) sediment basins associated with this project at the completion of construction. The payment shall be full compensation for the materials and work completed and accepted. A final record drawing sealed by a North Carolina licensed Land Surveyor for the two (2) sediment basins shall be provided to the ENGINEER to review and approve before payment is made for this line item.

Bid Item 32 – Miscellaneous Erosion and Sediment Control Features

- a. Scope: Work shall include, but not be limited to, providing materials, labor, and equipment necessary for installation of erosion and sediment control features such as sediment fence, removal of sediment deposit as necessary, inspection, and maintenance.
- b. Payment: The Lump Sum Price for this item shall be payment in full for all materials, labor, and equipment necessary to install the erosion and sediment control features as shown on the Drawings.

Alternate Bid Items

Bid Item 33 – ABC Stone

- a. Scope: Work shall include, but not limited to, the supply and stockpiling of ABC stone as directed by the OWNER.
- b. Payment: The Contract Unit Price per ton shall be full compensation for all materials, labor, and equipment necessary to supply and stockpile ABC stone. The quantity of work to be paid for under this item will be per measured ton of the ABC stone. The work under this item will be performed on a contingency basis at the direction of the ENGINEER and OWNER.

Bid Item 34 – #57 Stone

- a. Scope: Work shall include but not limited to, the supply and stockpiling of #57 stone as directed by the OWNER.
- b. Payment: The Contract Unit Price per ton shall be full compensation for all materials, labor, and equipment necessary to supply and stockpile the #57 stone. The quantity of work to be paid for under this item will be per measured ton of the #57 stone. The work under this item will be performed on a contingency basis at the direction of the ENGINEER and OWNER.

PART 3 EXECUTION

- 3.01 The CONTRACTOR shall be responsible to make all measurement and calculations to determine volumes and quantities for all applications for payment submittals and final record drawings prepared by a surveyor licensed in the State of North Carolina.

END OF SECTION 01025

**SECTION 01050
FIELD ENGINEERING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General requirements
- B. Surveys for Measurement and Payment
- C. Submittals

1.02 GENERAL REQUIREMENTS

- A. Provide all field engineering services needed to accomplish the Work. Use recognized engineering survey practices.
- B. Employ properly qualified personnel to conduct the Work described. Employ a Land Surveyor registered in North Carolina and acceptable to the ENGINEER.
- C. CONTRACTOR is responsible for locating and protecting survey control and reference points prior to starting Work.
- D. Promptly notify ENGINEER of any discrepancies discovered.
- E. All elevations indicated or specified refer to site datum. Control benchmarks are at the elevations and locations shown on the Drawings.
- F. From established benchmarks, run lines and levels, furnish and set grade stakes, and do all other work necessary to layout work in accordance with the Contract Documents.
- G. Provide all necessary templates and batter boards.
- H. Replace disturbed reference points, stakes or marks based on original survey control at no additional cost to OWNER.
- I. Preserve all stakes and marks established by the ENGINEER. If any stakes or marks are disturbed, the cost of replacement will be charged against the CONTRACTOR.
- J. Verify property boundary information as needed to ensure that all work is conducted on the OWNER's property.
- K. Provide record documents throughout construction of the project at the request of the Engineer. Provide final record drawings in accordance with Section 01720.
- L. At CONTRACTOR'S request, ENGINEER will provide construction drawings in electronic format for use by the land surveyor.

1.03 SURVEYS FOR MEASUREMENT AND PAYMENT

- A. Conduct surveys to determine quantities of unit cost work, including control surveys to establish measurement reference lines.
- B. CONTRACTOR'S surveyor shall sign surveyor's field notes or keep duplicate field notes and shall calculate and certify quantities for payment purposes.

1.04 SUBMITTALS

- A. Submit name, address and telephone number of Surveyor before starting survey work.
- B. Submit five (5) copies of each survey drawing, signed, and sealed by Surveyor, demonstrating that elevations and locations of the Work are in conformance with the Contract Documents.
- C. Submit electronic copies of each survey drawing in AutoCAD format.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01050

**SECTION 01060
LICENSES AND PERMITS**

PART 1 GENERAL

1.01 RESPONSIBILITY FOR OBTAINING LICENSES AND PERMITS

- A. Prior to beginning construction, CONTRACTOR shall obtain and display all applicable licenses required by law in the operation of his business and obtain and pay for all permits required to complete the Work.

- B. The CONTRACTOR is required to obtain, at no additional cost to the OWNER, erosion and sediment control permits for any land disturbance activities not already permitted under the approved erosion and sediment control permit(s) for the site.

1.02 APPLICABLE CODES

- A. Provide personnel, equipment, and materials to construct the project in accordance with all applicable codes.

- B. As a minimum standard of quality and workmanship, construction is to comply with the following:
 - 1. North Carolina Department of Health and Human Services Rules and Regulations
 - 2. North Carolina Solid Waste Management Rules
 - 3. North Carolina Erosion and Sediment Control Planning and Design Manual
 - 4. North Carolina Department of Transportation Regulations
 - 5. North Carolina Air Quality Rules
 - 6. American Society for Testing and Materials Standards
 - 7. Occupational Safety and Health Act
 - 8. North Carolina Department of Health
 - 9. US Department of Environmental Protection (US EPA)

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01060

**SECTION 01153
CHANGE ORDER PROCEDURES**

PART 1 GENERAL

1.01 REQUIREMENTS

- A. Promptly implement change order procedures.
 - 1. Provide full written data required for OWNER and ENGINEER to evaluate changes.

1.02 DEFINITIONS

- A. Change Order: See Section 00700 - Standard General Conditions of the Construction Contract
- B. Work Change Directive: See Section 00700 - Standard General Conditions of the Construction Contract.

1.03 PRELIMINARY PROCEDURES

- A. OWNER or ENGINEER may initiate changes by submitting a Work Change Directive to the CONTRACTOR. Request will include:
 - 1. Detailed description of the Change.
 - 2. Supplementary or revised Drawings and Specifications.
 - 3. Such request is for information only, and is not an instruction to execute the changes, nor stop Work in progress.
 - 4. CONTRACTOR shall prepare and submit a Change Proposal within 30 days.
- B. CONTRACTOR may recommend changes by submitting a Change Proposal to OWNER or ENGINEER, containing:
 - 1. Description of the proposed changes.
 - 2. Statement of the reason for making the changes.
 - 3. Statement of the effect on the Contract Price and the Contract Time.
 - 4. Statement of the effect of the Work on subcontractors.
 - 5. Documentation supporting any change in Contract Price or Contract Time, as appropriate.

1.04 WORK CHANGE DIRECTIVE

- A. OWNER may issue a Work Change Directive for CONTRACTOR to proceed with a change for subsequent inclusion in a Change Order.
- B. The Work Change Directive will describe changes in the Work, both additions and deletions, with attachments of revised Contract Documents to define details of the change and will designate the method of determining any change in the Contract Price and any change in Contract Time.
- C. OWNER will sign and date the Work Change Directive (Section 00940) as authorization for the CONTRACTOR to proceed with the changes.
- D. CONTRACTOR shall sign and date the Work Change Directive to indicate agreement with the terms therein.

1.05 DOCUMENTATION OF PROPOSALS AND CLAIMS

- A. Support each quotation for a lump-sum proposal or unit price that has not been established previously with sufficient data to allow evaluation of the quotation.
- B. On request, provide additional data to support time and cost computations:
 - 1. Labor required.
 - 2. Equipment required.
 - 3. Products required.
 - a. Recommended source of purchase and unit cost.
 - b. Quantities required.
 - 4. Taxes, insurance, and bonds.
 - 5. Credit for Work deleted from Contract, similarly documented.
 - 6. Overhead and profit.
 - 7. Justification for any change in Contract Time.

1.06 PREPARATION OF CHANGE ORDERS

- A. ENGINEER will prepare each Change Order.
- B. Form: Section 00941.
- C. Change Order will describe changes in the Work, both additions and deletions, with attachments of revised Contract Documents to define details of the change.
- D. Change Order will provide an accounting of the adjustment in the Contract Price and Contract Time.

1.07 LUMP-SUM/FIXED PRICE CHANGE ORDER

- A. Content of Change Orders shall be based on either:
 - 1. OWNER'S or ENGINEER'S Work Change Directive and CONTRACTOR'S Change Proposal as mutually accepted by OWNER and CONTRACTOR, or
 - 2. CONTRACTOR'S Change Proposal as mutually accepted by OWNER and CONTRACTOR.
- B. OWNER will sign and date Change Order as authorization for the changes.
- C. CONTRACTOR shall sign and date the Change Order to indicate agreement with the terms therein.

1.08 UNIT PRICE CHANGE ORDER

- A. The Change Order will be executed on a fixed unit price basis for pre-determined unit prices and quantities. For unit costs or quantities of units of work that are not pre-determined, execute Work under a Work Directive Change. Changes in Contract Price or Contract Time will be computed as specified for Time and Material Change Order.

1.09 TIME AND MATERIAL CHANGE ORDER

- A. Time and Material Change Order: Submit itemized account and supporting data after completion of the change within time limits indicated in the Conditions of the Contract. ENGINEER will determine the change allowable in Contract Price and Contract Time as provided in the Contract Documents.
- B. Maintain detailed records of work done on Time and Material basis. Provide full information required for evaluation of proposed changes and to substantiate costs for changes in the Work. On request, provide additional data to support time and cost computations:
 - 1. Labor required
 - 2. Equipment required
 - 3. Products required, including quantities, source of purchase and unit cost
 - 4. Taxes, insurance, and bonds
 - 5. Credit for Work deleted from Contract, similarly, documented
 - 6. Overhead and profit
 - 7. Justification for any change in contract time

1.10 CORRELATION WITH CONTRACTOR'S SUBMITTALS

- A. Revise Schedule of Values and Application for Payment forms to record each change as a separate item of Work, and to record the adjusted Contract Price.
- B. Revise the Construction Schedule to reflect each change in Contract Time.
 - 1. Revise sub-schedules to show changes for other items of work that are affected.

- C. Upon completion of work under a Change Order, enter pertinent changes in Record Documents.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01153

**SECTION 01250
CONSTRUCTION PROGRESS DOCUMENTATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Scope
- B. General Requirements
- C. Submittals

1.02 SCOPE

- A. The scope of the work consists of providing all labor and equipment necessary to prepare high-resolution photogrammetric and topographic mapping of the areas of work and any adjacent areas impacted by the work, to document construction progress.
- B. The Contractor shall prepare and submit construction progress monitoring reports for review and acceptance on a monthly basis, unless directed by the Owner or Engineer to perform more frequent mapping. The construction progress documentation shall document all critical phases of Phase 7 construction.

1.03 GENERAL REQUIREMENTS

- A. Mapping by Unmanned Aerial Vehicle (UAV) shall be conducted by, or under the supervision of, a licensed UAV pilot, if so, required by Federal, State, or local regulation.
- B. Digital mapping shall conform to American Society of Photogrammetry and Remote Sensing (ASPRS), Positional Accuracy Standards for Digital Geospatial Data (Edition 1, Version 1.0, dated November 2014) and Federal Geographic Data Committee (FGDC) Standards for large scale mapping.
- C. All digital mapping shall comply with North Carolina Administrative Code Title 21 Chapter 56, Section .1600.
- D. Photogrammetric mapping shall:
 - 1. Be prepared using cameras with a minimum resolution of 20 megapixel (MP).
 - 2. Produce photographic images with a uniform pixel density that are clear and sharp, and are free from, light streaks, snow, static, image noise, and other blemishes.
 - 3. Clearly illustrate all aspects of the project, including but not limited to:
 - a. Utility infrastructure, such as utility poles, guy wires, manholes, vaults, valves, monitoring wells, and drainage features.

- b. Extent of site disturbance, including all work within the limit of disturbance, and any impacts outside the limit of disturbance, such as downstream conveyance channels, sediment traps or basins, and contractor staging areas.
 - c. Definitive phases of construction, such as excavation of base grades, berm construction, soil liner construction, geomembrane installation, leachate collection and removal system, drainage layer, piping systems, buried infrastructure, and any work that may be hidden by subsequent construction.
 - d. Other features of interest, at the direction of the OWNER or ENGINEER.
 - 4. Be clearly labeled to indicate key site features and the progress of construction, especially changes or additions since the most recent mapping event.
 - 5. Be clearly labeled with:
 - a. Date of data collection.
 - b. Method of data collection.
 - c. North arrow and graphic scale.
 - d. Contact information for the entity that prepared the mapping.
 - e. Horizontal and Vertical datum, and coordinate plane.
 - 6. Processed and reviewed to verify that flight tracking and coverage is correct to the site and complete.
- E. Topographic mapping shall be:
- 1. Prepared using the same data as the photogrammetric survey.
 - 2. Prepared with two (2) foot interval contours.
 - 3. Labeled to indicate key site features and the progress of construction, especially changes or additions since the most recent mapping event.
 - 4. Clearly labeled with:
 - a. Date of data collection;
 - b. Method of data collection;
 - c. North arrow and graphic scale;
 - d. Contact information for the entity that prepared the mapping.
 - e. Horizontal and vertical datum, and coordinate plane.

1.04 SUBMITTALS

- A. Construction progress documentation shall be provided as:
 - 1. Digital images in a conventional file format, including .JPEG, .PNG, .TIFF, .PDF, or other formats as may be approved by the Owner and Engineer.
 - 2. Digital file or files in
 - a. Dwg file format, compatible with the currently available version of AutoCAD® Civil 3D® software; or,
 - b. An alternate file format approved by the OWNER and ENGINEER.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 GENERAL

- A. Ground Control Points (GCP) shall be:
 - 1. Distributed around the site to ensure complete coverage, at minimum, near all four corners and the center of the site.
 - 2. Large sites or sites with uneven or irregular terrain may require additional GCP.
 - 3. Placed in areas that are free from obstructions and shadow areas.
 - 4. An appropriate size visible to the specified ground sampling distance.
 - 5. Accurately surveyed in an appropriate coordinate system.
- B. An initial site mapping shall be completed prior to construction progress mapping to ensure that no potential obstacles or conflicts exist.
- C. Flight planning shall consider the following conditions, including, but not limited to:
 - 1. Airspace and air traffic safety.
 - 2. Time of day and lighting conditions shall match previous flights to the extent practicable.
 - 3. Weather and temperature.
 - 4. Obstructions.
 - 5. Suitable take-off and landing sites.
 - 6. Terrain.

END OF SECTION 01250

**SECTION 01300
PROJECT MANAGEMENT AND COORDINATION**

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project, including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Coordination drawings.
 - 3. RFIs.
 - 4. Digital project management procedures.
- B. Related Requirements:
 - 1. Section 01050 "Field Engineering" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 2. Section 01700 "Closeout Procedures" for coordinating closeout of the Contract.

1.03 DEFINITIONS

- A. RFI: Request for Information. Request from OWNER, ENGINEER, or CONTRACTOR seeking information required by or clarifications of the Contract Documents.

1.04 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 - 1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.

- B. Key Personnel Names: Within seven (7) calendar days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses, cellular telephone numbers, and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
 - 1. Post copies of list in Project meeting room, in temporary field office, and in prominent location in each built facility. Keep list current at all times.

1.05 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results, where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
 - 1. Prepare similar memoranda for OWNER and subcontractors if coordination of their Work is required.
- C. Administrative Procedures: CONTRACTOR shall coordinate scheduling and timing of required administrative procedures with other construction activities and site operations to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 - 1. Preparation of CONTRACTOR's construction schedule.
 - 2. Preparation of the schedule of values.
 - 3. Installation and removal of temporary facilities and controls.
 - 4. Delivery and processing of submittals.
 - 5. Progress meetings.
 - 6. Preinstallation conferences.
 - 7. Project closeout activities.

8. Startup and adjustment of systems.

1.06 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:

a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.

b. Coordinate the addition of trade-specific information to coordination drawings by subcontractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.

c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.

d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.

e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.

f. Indicate required installation sequences.

g. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements.

h. Provide alternative sketches to ENGINEER indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.

2. Plenum Space: Indicate sub-framing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within plenums to accommodate layout of light fixtures and other components indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms, showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:
 - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
 - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
 - c. Fire-rated enclosures around ductwork.
7. Electrical Work: Show the following:
 - a. Runs of vertical and horizontal conduit 1-1/4 inches (32 mm) in diameter and larger.
 - b. Light fixture, exit light, emergency battery pack, smoke detector, and fire-alarm locations.
 - c. Panel board, switchboard, switchgear, transformer, busway, generator, and motor-control center locations.
 - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
8. Fire-Protection System: Show the following:
 - a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
9. Review: ENGINEER will review coordination drawings to confirm that, in general, the Work is being coordinated, but not for the details of the coordination, which are CONTRACTOR's responsibility. If ENGINEER determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise

deficient, ENGINEER will so inform CONTRACTOR, who shall make suitable modifications and resubmit.

- C. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:
 - 1. File Preparation Format:
 - a. DWG or DXF file, operating in Microsoft Windows operating system.
 - b. Alternate format, as approved by ENGINEER.
 - 2. File Submittal Format: Submit or post coordination drawing files using PDF format.
 - 3. ENGINEER will furnish CONTRACTOR one (1) set of digital data files of Drawings for use in preparing coordination digital data files.
 - a. ENGINEER makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
 - b. Digital Data Software Program: Drawings are available in DWG or DXF file format operating in Microsoft Windows operating system.
 - c. CONTRACTOR shall execute a data licensing agreement in the form of an Agreement form acceptable to the OWNER and ENGINEER.

1.07 REQUEST FOR INFORMATION (RFI)

- A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, CONTRACTOR shall prepare and submit an RFI in the form specified.
 - 1. ENGINEER will return without response those RFIs submitted to ENGINEER by entities other than CONTRACTOR.
 - 2. Coordinate and submit RFIs in a prompt manner to avoid delays in CONTRACTOR's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
 - 1. Project name.
 - 2. OWNER name.
 - 3. OWNER's Project number.
 - 4. Name of ENGINEER.
 - 5. ENGINEER's Project number.

6. Date.
 7. Name of CONTRACTOR.
 8. RFI number, numbered sequentially.
 9. RFI subject.
 10. Specification Section number and title and related paragraphs, as appropriate.
 11. Drawing number and detail references, as appropriate.
 12. Field dimensions and conditions, as appropriate.
 13. CONTRACTOR's suggested resolution. If CONTRACTOR's suggested resolution impacts the Contract Time or the Contract Price, CONTRACTOR shall state impact in the RFI.
 14. CONTRACTOR's signature.
 15. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Form: Section 01305 included in Division 01 of the project manual.
1. Attachments shall be electronic files in PDF format.
- D. ENGINEER's Action: ENGINEER will review each RFI, determine action required, and respond. Allow seven (7) days for ENGINEER's response for each RFI. RFIs received by ENGINEER after 1:00 p.m. will be considered as received the following working day.
1. The following CONTRACTOR-generated RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of CONTRACTOR's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of ENGINEER's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.

2. ENGINEER's action may include a request for additional information, in which case ENGINEER's time for response will begin upon receipt by ENGINEER of Change Proposal additional information.
 3. ENGINEER's action on RFIs that may result in a change to the Contract Time, or the Contract Price may be eligible for CONTRACTOR to submit Work Change Directive according to the General Conditions.
 - a. If CONTRACTOR believes the RFI response warrants change in the Contract Time or the Contract Price, notify ENGINEER in writing within five (5) days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. The RFI log shall contain not less than the following information:
1. Project name.
 2. Name and address of CONTRACTOR.
 3. Name and address of ENGINEER.
 4. RFI number, including RFIs that were returned without action or withdrawn.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date ENGINEER's response was received.
 8. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.
- F. On receipt of ENGINEER's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify ENGINEER within three (3) days if CONTRACTOR disagrees with response.

1.08 DIGITAL PROJECT MANAGEMENT PROCEDURES

- A. Use of ENGINEER's Digital Data Files: Digital data files of ENGINEER's CAD drawings will be provided by ENGINEER for CONTRACTOR's use during construction.
1. ENGINEER makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
 2. Digital Drawing Software Program: Drawings are available in DWG or DXF file format operating in Microsoft Windows operating system.
 3. CONTRACTOR shall execute a data licensing agreement in the form of Agreement form acceptable to the OWNER and ENGINEER.

a. Subcontractors and other parties granted access by CONTRACTOR to ENGINEER's digital data files shall execute a data licensing agreement in the form of Agreement acceptable to OWNER and ENGINEER.

B. PDF Document Preparation: Where PDFs are required to be submitted to ENGINEER, prepare as follows:

1. Assemble complete submittal package into a single indexed file, incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.
3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01300

**SECTION 01305
REQUEST FOR INFORMATION**

Project Name: Requesting Contractor: Requested to:	Project No.: RFI No.:
Priority <input type="checkbox"/> Critical <input type="checkbox"/> Urgent <input type="checkbox"/> Routine	Date of Request:
RFI Subject.	
Reference Dwg:	Spec. Section:
It is the writer's opinion that this RFI could impact: <input type="checkbox"/> Contract Price <input type="checkbox"/> Contract Times	

Information Requested:	
Requested By:	Please Respond By:

Contractor's Suggested Solution: (If Any)

Answer:	
Answered By:	Company: Date:

**SECTION 01315
ADMINISTRATIVE REQUIREMENTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Coordination and Project conditions.
- B. Preconstruction meeting.
- C. Site mobilization meeting.
- D. Progress meetings.
- E. Preinstallation meetings.
- F. Closeout meeting.
- G. Alteration procedures.

1.02 COORDINATION AND PROJECT CONDITIONS

- A. Coordinate scheduling, submittals, and Work of various Sections of Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- B. Verify that utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate Work of various Sections having interdependent responsibilities for installing, connecting to, and placing operating equipment in service.
- C. Coordinate space requirements, supports, and installation of mechanical and electrical Work indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit as closely as practical; place runs parallel with lines of building. Use spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
 - 1. Coordination Drawings: Prepare as required to coordinate all portions of Work. Show relationship and integration of different construction elements that require coordination during fabrication or installation to fit in space provided or to function as intended. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are important.
- D. Coordination Meetings: In addition to other meetings specified in this Section, hold coordination meetings with personnel and SUBCONTRACTORS to ensure coordination of Work.

- E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within construction. Coordinate locations of fixtures and outlets with finish elements.
- F. Coordinate completion and clean-up of Work of separate Sections in preparation for Substantial Completion.
- G. After OWNER's occupancy of premises, coordinate access to Site for correction of defective Work and Work not complying with Contract Documents, to minimize disruption of OWNER's activities.

1.03 PRECONSTRUCTION CONFERENCE

- A. ENGINEER will schedule and preside over meeting after Notice of Award.
- B. Attendance Required: OWNER or OWNER's Representative, CQA Consultant, CONTRACTOR, significant SUBCONTRACTORS, and suppliers.
- C. Minimum Agenda:
 - 1. Execution of OWNER-CONTRACTOR Agreement.
 - 2. Submission of executed bonds and insurance certificates.
 - 3. Distribution of Contract Documents.
 - 4. Submission of list of SUBCONTRACTORS, list of products, schedule of values, and Progress Schedule.
 - 5. Designation of personnel representing parties to the Contract, and ENGINEER.
 - 6. Communication procedures.
 - 7. Procedures and processing of requests for information, field directives, submittals, substitutions, Applications for Payments, Change Proposal, Change Orders, and Contract closeout procedures.
 - 8. Scheduling.
 - 9. Critical Work sequencing.
- D. ENGINEER will record minutes and distribute to participants within five (5) days after meeting, to CONTRACTOR, OWNER, and those affected by decisions made.

1.04 SITE MOBILIZATION MEETING

- A. ENGINEER will schedule meeting at Project Site prior to CONTRACTOR occupancy. CONTRACTOR presides over meeting.
- B. Attendance Required: ENGINEER, OWNER, and CONTRACTOR.
- C. Minimum Agenda:
 - 1. Use of premises by OWNER and CONTRACTOR.
 - 2. OWNER's requirements.
 - 3. Construction facilities and controls.
 - 4. Temporary utilities.
 - 5. Survey and site layout.
 - 6. Site access and operating times.

7. Security and housekeeping procedures.
8. Schedules.
9. Procedures for testing.
10. Procedures for maintaining record documents.
11. Requirements for startup of equipment.
12. Inspection and acceptance of equipment put into service during construction period.

D. ENGINEER will record minutes and distribute to participants within five (5) days after meeting, to CONTRACTOR, OWNER, and those affected by decisions made.

1.05 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the Work bi-weekly intervals. Additional meetings may be scheduled by the ENGINEER as needed to address construction coordination, Work progress, or other issues as may arise.

B. ENGINEER will make arrangements for meetings, prepare agenda with copies for participants, and preside over meetings.

C. Attendance Required: OWNER or OWNER's Representative, CQA Consultant, CONTRACTOR, and representatives of parties actively involved in the construction as designated by the ENGINEER.

D. Minimum Agenda:

1. Review minutes of previous meetings.
2. Review of Work progress.
3. Field observations, problems, and decisions.
4. Identification of problems impeding planned progress.
5. Review of submittal schedule and status of submittals.
6. Review of off-site fabrication and delivery schedules.
7. Maintenance of progress schedule.
8. Corrective measures to regain projected schedules.
9. Planned progress during succeeding work period.
10. Coordination of projected progress.
11. Maintenance of quality and work standards.
12. Effect of proposed changes on Progress Schedule and coordination.
13. Other business relating to Work.

E. ENGINEER will record minutes and distribute to participants within five (5) days after meeting, to CONTRACTOR, OWNER, and those affected by decisions made.

1.06 PREINSTALLATION MEETINGS

A. When required in individual Specification Sections, CONTRACTOR will convene preinstallation meetings at Project Site before starting Work of specific Section.

B. Require attendance of parties directly affecting, or affected by, Work of specific Section.

- C. Notify ENGINEER four (4) days in advance of meeting date.
- D. Prepare agenda and preside over meeting:
 - 1. Review conditions of installation, preparation, and installation procedures.
 - 2. Review coordination with related Work.
- E. CONTRACTOR will record minutes and distribute to participants within five (5) days after meeting, to ENGINEER, OWNER, and those affected by decisions made.

1.07 CLOSEOUT MEETING

- A. ENGINEER will schedule Project closeout meeting with sufficient time to prepare for requesting Substantial Completion. Preside over meeting and be responsible for minutes.
- B. Attendance Required: CONTRACTOR, ENGINEER, OWNER, and others appropriate to agenda.
- C. Notify ENGINEER four (4) days in advance of meeting date.
- D. Minimum Agenda:
 - 1. Start-up of facilities and systems.
 - 2. Operations and maintenance manuals.
 - 3. Testing, adjusting, and balancing.
 - 4. System demonstration and observation.
 - 5. Operation and maintenance instructions for Owner's personnel.
 - 6. Temporary indoor-air-quality plan and procedures.
 - 7. CONTRACTOR's inspection of Work.
 - 8. CONTRACTOR's preparation of an initial "punch list."
 - 9. Procedure to request ENGINEER inspection to determine date of Substantial Completion.
 - 10. Completion time for correcting deficiencies.
 - 11. Inspections by authorities having jurisdiction.
 - 12. Certificate of Occupancy and transfer of insurance responsibilities.
 - 13. Partial release of retainage.
 - 14. Final cleaning.
 - 15. Preparation for final inspection.
 - 16. Closeout Submittals:
 - a. Project record documents.
 - b. Operating and maintenance documents.
 - c. Operating and maintenance materials.
 - d. Affidavits.
 - 17. Final Application for Payment.
 - 18. CONTRACTOR's demobilization of Site.
 - 19. Maintenance.

- E. ENGINEER will record minutes and distribute to participants within five (5) days after meeting, to CONTRACTOR, OWNER, and those affected by decisions made.

PART 2 PRODUCTS

Not Used

PART 2 EXECUTION

3.01 ALTERATION PROCEDURES

- A. Designated areas of existing facilities will be occupied for normal operations during progress of construction. Cooperate with OWNER in scheduling operations to minimize conflict and to permit continuous usage.
 - 1. Perform Work not to interfere with operations of occupied areas.
 - 2. Keep utility and service outages to a minimum and perform only after written approval of OWNER.
 - 3. Clean OWNER-occupied areas daily. Clean spillage, overspray, and heavy collection of dust in OWNER-occupied areas immediately.
- B. Materials: As specified in product Sections; match existing products with new products for patching and extending Work.
- C. Employ skilled and experienced installer to perform alteration and renovation Work.
- D. Cut, move, or remove items as necessary for access to alterations and renovation Work. Replace and restore at completion. Comply with Section 01700 – Project Closeout.
- E. Remove unsuitable material not marked for salvage, including rotted wood, corroded metals, and deteriorated masonry and concrete. Replace materials as specified for finished Work.
- F. Remove debris and abandoned items from area and from concealed spaces.
- G. Prepare surface and remove surface finishes to permit installation of new Work and finishes.
- H. Close openings in exterior surfaces to protect existing Work from weather and extremes of temperature and humidity.
- I. Remove, cut, and patch Work to minimize damage and to permit restoring products and finishes to original or specified condition.
- J. Refinish existing visible surfaces to remain in renovated rooms and spaces, to specified renewed condition for each material, with neat transition to adjacent finishes.
- K. Where new Work abuts or aligns with existing Work, provide smooth and even transition. Patch Work to match existing adjacent Work in texture and appearance.

- L. When finished surfaces are cut so that smooth transition with new Work is not possible, terminate existing surface along straight line at natural line of division and submit recommendation to ENGINEER for review.
- M. Where change of plane of 1/4 inch or more occurs, submit recommendation for providing smooth transition to ENGINEER for review.
- N. Trim existing doors to clear new floor finish. Refinish trim to original or specified condition.
- O. Patch or replace portions of existing surfaces that are damaged, lifted, discolored, or showing other imperfections.
- P. Finish surfaces as specified in individual product Sections.

END OF SECTION 01315

**SECTION 01320
SUBMITTALS**

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The General Provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 NUMBER OF SUBMITTALS

- A. One (1) for ENGINEER, one (1) for OWNER, one (1) for O&M Manual, and two (2) additional sets for CONTRACTOR, minimum five (5) sets total. Submittals of less than five (5) sets will be **RETURNED WITHOUT REVIEW**. Electronic submittals are preferred over hard copy submittals. Submittals will be reviewed only if approved by CONTRACTOR with his stamp.

1.03 DESCRIPTION OF REQUIREMENTS

- A. SUBMITTALS - Submittals controlled by these general requirements shall include shop drawings, product data, samples, and miscellaneous work-related submittals. The individual submittal requirements are specified in applicable sections for each unit of work. Equipment shall not be fabricated, nor materials ordered until the appropriate submittal has been approved.

- B. DEFINITIONS - The work-related submittals of this Section, in addition to the definitions of the General Conditions and elsewhere in the Contract Documents, are further categorized for convenience as follows:
 - 1. Shop drawings include specially-prepared technical data of all forms including drawings, diagrams, performance curves, data sheets, schedules, templates, patterns, reports, calculations, instructions, measurements and similar information not in standard printed form for application to more than one project.
 - 2. Product data include 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.
 - 3. Samples include both fabricated and non-fabricated 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.
 - 4. Mock-ups are a special form of samples, which are too large or otherwise inconvenient for handling in the specified manner for transmittal of sample submittals.
 - 5. Miscellaneous submittals related directly to the work include warranties, maintenance agreements, workmanship bonds, 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 and not processed as shop drawings, product data or samples.

1.04 GENERAL SUBMITTAL REQUIREMENTS

- A. SCHEDULING - Where appropriate in various required administrative submittals (listings of products, manufacturers, suppliers, 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.
- B. COORDINATION AND SEQUENCING - Coordinate preparation and processing of submittals with performance of the work so that work will not be delayed by submittals. Coordinate and sequence different categories of submittals for the same work, and for interfacing units of work, so that one will not be delayed for coordination with another. No extension of time will be allowed because of failure to properly coordinate and sequence submittals.
- C. PREPARATION OF SUBMITTALS - Provide permanent marking on each submittal to identify project, date, CONTRACTOR, subcontractor, submittal name and similar information to distinguish it from other submittals. Show CONTRACTOR'S executed review and approval marking and provide space for "ENGINEER'S Review" marking. Include a completed Submittal Form – Section 01350 with each submittal. Package each submittal appropriately for transmittal and handling. Submittals which are received from sources other than through CONTRACTOR'S office will be **RETURNED WITHOUT REVIEW.**

1.05 SPECIFIC CATEGORY SUBMITTAL REQUIREMENTS

- A. GENERAL - Except as otherwise indicated in individual work sections, comply with general requirements specified herein for each indicated category of submittal. Provide and process intermediate submittals (where required between initial and final) similar to initial submittals.
- B. SHOP DRAWINGS - Provide newly-prepared project specific information, with graphic information at accurate scale (except as otherwise indicated), with name of preparer indicated (firm name). Show dimensions and note which are based on field measurement. Identify materials and products in the work shown. Indicate measurement. Indicate compliance with standards, and special coordination requirements. Do not allow shop drawing copies without appropriate final "Action" markings by ENGINEER to be used in connection with the work.
- C. PRODUCT DATA - 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. Maintain one set of product data (for each submittal) at project site, available for reference by ENGINEER or others. Submittals shall be the same as for Shop Drawings.

- D. **SAMPLES** - Provide units identical with final condition of proposed materials or products for the work. Include "range" samples (not less than three (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 ENGINEER'S selection is required. Prepare samples to match the ENGINEER'S sample where so 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 ENGINEER. ENGINEER will not "test" samples (except as otherwise indicated) for other requirements, which are therefore the exclusive responsibility of the CONTRACTOR.
- E. **WARRANTIES** - In addition to copies desired for CONTRACTOR'S use, furnish two (2) executed copies, except furnish two (2) additional copies required for maintenance manuals. Furnish same number of copies of specified and coincidental product warranties, where specific execution for project application is not required. Warranties shall not limit the length of time for remedy of damages the OWNER may have by legal statute. Warranties shall be signed by Contractor, Supplier, or installer responsible for performance of the warranty.
- F. **GENERAL DISTRIBUTION** - Provide additional distribution of submittals (not included in the aforementioned copy submittal requirements) to subcontractors, suppliers, fabricators, installers, governing authorities and others as necessary for proper performance of the work. Include such additional copies in transmittal to ENGINEER where required to receive "Action" marking before final distribution.
- G. **ENGINEER'S ACTION** - Where action and return is required or requested, ENGINEER will review each submittal, mark with "Action", and where possible return within thirty (30) days of receipt. Where submittal must be held for coordination, CONTRACTOR will be so advised without delay.
- H. **Final Unrestricted Release** - Work may proceed, provided it complies with contract documents, when submittal is returned with the following markings:
- “No Exception Taken”**
- I. **Final-But-Restricted Release** - Work may proceed, provided it complies with notations and corrections on submittal and with contract documents, when submittal is returned with the following marking:
- “Make Corrections Noted”**
- J. **Returned for Resubmittal** - 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:
- “Amend and Resubmit”**
- K. **Returned for Non-Compliance** - Do not proceed with work. Product submitted does not comply with Contract Documents. Resubmit for product complying with the

requirements of the Contract Documents. Do not allow submittals with the following marking to be used in connection with performance of the work:

“Rejected – See Remarks”

- L. **OWNER’s Approval** – OWNER’s approval of CONTRACTOR submittals will be general and shall not relieve the CONTRACTOR from the responsibility for adherence to the Contract, nor shall it relieve him of the responsibility for any error that may exist. Where such errors or omissions are discovered later, they shall be made good by the CONTRACTOR irrespective of any approval review by the ENGINEER.

PART 2 PRODUCTS

2.01 OPERATION AND MAINTENANCE MANUALS

- A. After the shop drawings have been approved, the Operation & Maintenance Manuals are then to be submitted to the ENGINEER. At least two (2) copies of these Manuals shall be submitted.

PART 3 EXECUTION

- A. Repeated failure to present acceptable submittals or excessive services required of ENGINEER due to repeated presentation of unacceptable submittals will result in charges against CONTRACTOR for the costs of the additional engineering expenses. It will be considered excessive if more than one correction of any submittal is required. More than one submittal of a correction will result in a charge against the CONTRACTOR.

END OF SECTION 01320

**SECTION 01400
QUALITY CONTROL**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Quality control of installation
- B. References
- C. Manufacturer's Field Services and Reports

1.02 QUALITY CONTROL OF INSTALLATION

- A. Quality control refers to measures taken by the CONTRACTOR to achieve compliance with the requirements for materials and workmanship as stated in the Drawings and Specifications for the project.
- B. It is the responsibility of the CONTRACTOR to monitor the work continuously. The CONTRACTOR shall provide quality control personnel and shall provide and pay for all tests needed to achieve Work of specified quality. To supplement the CONTRACTOR'S own quality control program, test results obtained by the CQA Consultant on behalf of the OWNER may be made available to the CONTRACTOR. However, it is not the responsibility of the CQA Consultant to conduct tests of any kind on behalf of the CONTRACTOR, and the use of the CQA firm's test results does not diminish the CONTRACTOR'S responsibility to provide comprehensive quality control and conduct all Work required by the Contract Documents.
- C. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship. The CONTRACTOR is required to provide at his own expense a qualified soils technician on-site at all times during construction of the low-permeability soil liner. The CONTRACTOR'S soils technician must have experience in the successful construction of low-permeability soil liners for landfills, and the skills necessary to confirm that the specified requirements for the low-permeability soil liner for this project are achieved. During placement of structural fill material, the CONTRACTOR is to provide at his own expense a qualified soils technician as needed to ensure placement of structural fill material in accordance with the Contract Documents. Provide and pay for all tests needed to achieve work of specified quality.
- D. Submit field reports and daily quality control test results to the CQA Consultant at the end of each workday. Submit a summary and copies of all test results of quality control testing to the ENGINEER monthly in a Quality Control Report. All documents and test results shall bear the seal and signature of a Professional Engineer registered in North Carolina.
- E. The CONTRACTOR shall designate a Quality Control Manager who will be the point of contact between the ENGINEER and the CONTRACTOR on all issues related to Quality Control. The Quality Control Manager will be responsible for verifying that the Work, including all submittals and as-built information, including surveys, complies with the project plans and specifications. The Quality Control Manager shall verify that the materials and Work covered by a submittal are in compliance with the Contract Documents before sending the submittal to the ENGINEER for approval. A submittal

form is provided that must accompany each submittal. The form is to be completed and signed by the Quality Control Manager, certifying that the materials and/or Work are in complete accordance with the Contract Documents. Identify the Quality Control Manager at the pre-construction conference.

- F. Comply fully with manufacturer's instructions, including each step-in sequence.
- G. Should manufacturer's instructions conflict with the Contract Documents, request clarification from ENGINEER before proceeding with Work.
- H. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- I. All work shall be conducted by personnel qualified to produce workmanship of specified quality.
- J. Cooperate with independent firm providing quality assurance services to OWNER. Provide continuous access to the Work to representatives of the CQA Consultant. Furnish samples of materials, design mix, equipment, tools, storage, and assistance as requested.

1.03 REFERENCES

- A. Conform to reference standard by date of issue current on date for receiving bids.
- B. Obtain copies of standards when required by Contract Documents.
- C. Should specified reference standards conflict with Contract Documents, request clarification from ENGINEER before proceeding with Work.
- D. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.04 MANUFACTURER'S FIELD SERVICES AND REPORTS

- A. When specified in individual specification sections, require material or product supplier or manufacturer to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, as applicable, and to initiate instructions when necessary.
- B. Individuals shall report within 24 hours to the ENGINEER all observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturer's written instructions.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01400

**SECTION 01410
QUALITY ASSURANCE**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Inspection and Testing Laboratory Services for Quality Assurance.

1.02 INSPECTION AND TESTING LABORATORY SERVICES FOR QUALITY ASSURANCE

- A. OWNER will appoint, employ, and pay for services of a CQA firm (CQA Consultant) to conduct inspection and testing for quality assurance purposes.
- B. Quality assurance refers to measures taken by the CQA Consultant on behalf of the OWNER to assess whether the Work is in compliance with the Contract Documents.
- C. On behalf of the OWNER, the CQA Consultant will conduct inspections, tests, and other services specified in individual specification subsections that address quality assurance requirements. No adjustments to the Contract Time will be granted for any quality assurance activities of the CQA Consultant, including testing.
- D. Reports will be submitted by the CQA firm to the ENGINEER, indicating observations and results of tests and indicating compliance or noncompliance with Contract Documents.
- E. Re-testing required because of non-conformance to specified requirements shall be conducted by the same CQA firm on instructions by the ENGINEER.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01410

**SECTION 01500
CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS**

PART 1 GENERAL

1.01 PROTECTION AND SAFETY

- A. Do not interfere with any landfill operations. Protect all on-site monitoring wells, liner systems, and existing leachate collection piping and appurtenances.
- B. Do not interfere with the use of, or access to, adjacent buildings. Maintain free and safe passage to and from all facilities.
- C. Protect trees, shrubs, lawns, areas to receive planting, rock outcropping, and other features remaining as part of final landscaping.
- D. Protect benchmarks and existing structures, property corners, roads, sidewalks, paving, and curbs against damage from equipment and vehicular or foot traffic.
- E. Cease operations and notify the ENGINEER immediately if safety of adjacent structure(s) appears to be endangered. Do not resume operations until safety is restored.
- F. Prevent movement, settlement, or collapse of adjacent services, utilities, structures, trees, etc. Assume liability for such movement, settlement, or collapse. Promptly repair damage at no cost to the OWNER.
- G. Provide, erect, and maintain street barriers, sidewalk sheds, barricades, lighting, and/or guard rails as required to protect public, workers, and adjoining property.
- H. Protect excavations by shoring, bracing, sheet piling, underpinning, or other methods, as required to prevent cave-ins or loose dirt from falling into excavations.
- I. Notify ENGINEER of unexpected sub-surface conditions and discontinue work in area until ENGINEER provides notification to resume work.
- J. Protect bottom of excavations and soil around and beneath foundations from frost.
- K. Make sure that all required environmental protection devices and procedures are in place, properly maintained, and operational.

1.02 TEMPORARY FIELD OFFICE

- A. The CONTRACTOR may provide (optional) and maintain a suitable temporary field office at the project for his own use and the use of representatives of the OWNER and the ENGINEER.
- B. CONTRACTOR shall maintain Drawings and Specifications on site and be accessible for communications via cell phone, at a minimum.
- C. The CONTRACTOR shall be responsible for electric and telephone service and monthly bills.

1.03 SECURITY

- A. Coordinate with OWNER'S security program.

1.04 ACCESS ROADS

- A. Construct and maintain temporary roads, including haul roads, as needed to serve construction area.
- B. Extend and relocate temporary roads as needed as Work progress requires.
- C. Provide means of removing mud from vehicle wheels before entering streets.
- D. Continuous access to existing cell tower, existing landfill facilities such as scale house, leachate impoundment, and the inactive (Phases 1-4) and active Landfill (Phases 5-6) must be always maintained.

1.05 PARKING

- A. Arrange for surface parking areas to accommodate construction personnel.

1.06 PROGRESS CLEANING

- A. Maintain site in a clean and orderly condition.
- B. Prior to final completion, thoroughly remove from construction area any debris remaining from construction activities and properly dispose. Leave premises in a clean, neat, orderly, and safe condition.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01500

**SECTION 01568
EROSION AND SEDIMENT CONTROL**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Conduct all construction related activities in accordance with the Contract Documents.
- B. Compliance with approved Erosion and Sediment Control Plan, regulations, and the North Carolina Erosion and Sediment Control Planning and Design Manual.
- C. Personnel, equipment, materials, and supplies to prevent erosion and to control sediment during construction.

1.02 REFERENCES

- A. North Carolina Best Management Practices Handbook, latest edition; North Carolina Department of Health & Environmental Control.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Materials used shall meet all applicable specifications and be in accordance with the North Carolina Best Management Practices Handbook.
- B. Provide all erosion and sediment control materials in accordance with the Contract Documents.

PART 3 EXECUTION

3.01 GENERAL

- A. Provide personnel, equipment, materials, and supplies to prevent erosion and to control sediment during construction.
- B. Implement temporary measures throughout the construction of the project to control erosion and to minimize siltation of drainage ditches, storm drains, and adjacent waterways.
- C. Limit the size of graded areas to minimize the exposure of unprotected areas. Implement appropriate conservation practices in sequence with the work.
- D. Protect stockpiled material with mulch or temporary vegetation, and a sediment barrier (silt fence) at its base.
- E. Stabilize all roads within 15 days of final grading with base course crushed stone.
- F. All erosion and sediment control practices shall be installed in accordance with the latest edition of the North Carolina Best Management Practices Handbook.

3.02 MANAGEMENT STRATEGIES

- A. Sequence construction so that erosion control operations can begin and end as quickly as possible.
- B. Provide temporary seeding or other stabilization in accordance with the recommendations of the North Carolina Best Management Practices Handbook.
- C. The CONTRACTOR is responsible for the installation and maintenance of all erosion and sediment control features.
- D. Areas disturbed by construction that are proposed to be grassed shall be stabilized by seeding immediately after final grading.
- E. Permanently seeded areas shall be protected with matting, or straw mulch or other acceptable material approved by the ENGINEER.

3.02 TEMPORARY SEDIMENT FENCE (SILT FENCE / SEDIMENT TUBES)

- A. North Carolina Best Management Practices Handbook: Construct at locations shown on the Drawings.

3.03 STORMWATER CONVEYANCE CHANNELS

- A. North Carolina Best Management Practices Handbook: Construct at locations shown on the Drawings.

3.04 OTHER APPROVED MEASURES

- A. Provide all other measures required by governing regulations.

3.03 MAINTENANCE

- A. In general, CONTRACTOR shall check all erosion and sediment control measures weekly, and after each significant rainfall. The following shall be checked in particular:
 - 1. All storm drain pipes for signs of clogging.
 - 2. All silt fence for signs of collapse or excessive accumulation of sediment.
 - 3. Sediment basins for storage capacity and proper functioning of discharge control structures.
 - 4. Diversion channels for signs of failure, erosion, or inadequacy.
 - 5. Brush barriers for signs of clogging.
- B. Reference: North Carolina Best Management Practices Handbook, latest edition.

3.04 FIELD QUALITY ASSURANCE

A. Field inspection will be performed under provisions of Section 01410.

3.05 PROTECTION

A. Protect finished installation under provisions of Section 01500.

3.06 REMOVAL

A. Remove all temporary control measures at the completion of the Work and restore site as required. Remove erosion and sediment control devices only after written approval of the ENGINEER.

END OF SECTION 01568

**SECTION 01570
TRAFFIC CONTROL**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Contractor's Responsibilities
- B. Warning Devices
- C. Construction Parking Control
- D. Flagmen
- E. Haul Routes
- F. Removal

1.02 CONTRACTOR'S RESPONSIBILITIES

- A. Keep roads and streets in the project area open to all traffic so that local and through traffic will be adequately and safely accommodated.
- B. Schedule construction operations to keep traffic delays to a minimum.
- C. Provide measures necessary to maintain and protect traffic, to protect the Work in progress, and to protect adjacent property from excessive dust generated by CONTRACTOR'S construction equipment on the public travel lane.
- D. Provide all labor, materials, and equipment necessary to keep the traveled road smooth, to construct temporary structures when required, apply water to reduce dust, and to erect and maintain warning devices.
- E. Provide all labor, materials, and equipment necessary to maintain facility roads used by the CONTRACTOR.
- F. Provide pilot trucks, drivers, and flaggers when needed.
- G. Final responsibility for the installation of adequate safety devices for the protection of the traveling public and workmen, as well as for safeguarding the Work in general, shall rest with the CONTRACTOR.

1.03 WARNING DEVICES

- A. Furnish, erect, and maintain warning devices such as signs, auxiliary barriers, channelizing devices, hazard warning lights, barricades, flares, or reflective devices for the protection and guidance of traffic.
- B. Devices shall be in place before Work begins.
- C. Install warning devices at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.

- D. Install and operate traffic control signals to direct and maintain orderly flow of traffic in areas under CONTRACTOR'S control.
- E. Relocate warning devices as Work progresses to maintain effective traffic control.
- F. If devices do not apply during an interim period, remove, or cover the face of the sign completely with an opaque weatherproof hood.
- G. All warning devices and equipment shall be approved as necessary for use by local jurisdictions.

1.04 CONSTRUCTION PARKING CONTROL

- A. Control construction vehicle parking to prevent interference with public traffic and parking, access by emergency vehicles, and OWNER'S operations.
- B. Monitor parking of construction personnel's vehicles. Maintain vehicular access to and through parking areas.
- C. Prevent parking on or adjacent to access roads and in non-designated areas.

1.05 FLAGGING

- A. Provide trained and equipped flaggers to regulate traffic where one-way traffic is required, where construction operations or traffic encroach on public traffic lanes, and at any other locations necessary.
- B. Furnish all necessary flagging appurtenances, included but not limited to, hand signaling devices, orange caps and vests for use by personnel assigned to traffic control responsibilities.

1.06 HAUL ROUTES

- A. Consult with authority having jurisdiction in establishing public thoroughfares to be used for haul routes and site access.

1.07 REMOVAL

- A. Remove equipment and devices when no longer required.
- B. Repair any damage caused by installation.

PART 2 MATERIALS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01570

**SECTION 01600
MATERIAL AND EQUIPMENT**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Products
- B. Transportation and Handling
- C. Storage and Protection
- D. Product Options
- E. Substitutions

1.02 PRODUCTS

- A. Products: Means new material, equipment, fixtures, and systems forming the Work.

1.03 TRANSPORTATION AND HANDLING

- A. Transport and handle products in accordance with the manufacturers' instructions.
- B. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.
- C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.04 STORAGE AND PROTECTION

- A. Store and protect products in accordance with the manufacturers' instructions with seals and labels intact and legible. Store sensitive products in weather tight and climate-controlled enclosures.
- B. For exterior storage of fabricated products, place on sloped supports, above ground.
- C. Cover products subject to deterioration with impervious sheet covering but provide ventilation to avoid condensation.
- D. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- E. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- F. Arrange storage of products to permit access for inspection. Periodically inspect to assure products are undamaged and well maintained.

1.05 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Products of manufacturers named and meeting specifications. No options or substitutions are allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

1.06 SUBSTITUTIONS

- A. ENGINEER will consider requests for substitutions only within 30 days after date of OWNER - CONTRACTOR agreement.
- B. Substitutions may be considered when a product becomes unavailable through no fault of the CONTRACTOR.
- C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.
- D. A request constitutes a representation that the CONTRACTOR:
 - 1. Has investigated the proposed product and determined that it meets or exceeds the quality level of the specified product.
 - 2. Will provide the same warranty for the substitution as for the specified product.
 - 3. Will coordinate installation and make changes to other Work that may be required for the Work to be complete at no additional cost to the OWNER.
 - 4. Waives claim for additional costs or time extension which may subsequently become apparent.
 - 5. Will reimburse OWNER for review or redesign services associated with re-approval by authorities.
- E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- F. Substitution Submittal Procedure:
 - 1. Submit electronic copies of request for substitution for consideration. Limit each request to one proposed substitution.
 - 2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence.
 - 3. The ENGINEER will notify CONTRACTOR in writing of decision to accept or reject request.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01600

**SECTION 01700
CONTRACT CLOSEOUT**

PART 1 GENERAL

1.01 REQUIREMENTS

A. Procedures:

1. Submit written certification that the Contract Documents have been reviewed, that the Work is in complete accordance with the Contract Documents, and ready for the ENGINEER'S inspection.
2. An inspection will be held at the site to determine completeness.
3. A final "punch list" of items to be completed will be prepared by ENGINEER, OWNER, and CONTRACTOR at this meeting.
4. Notify ENGINEER upon completion of all items on punch list.
5. Submit complete Record Documents as noted in Section 01720 to the ENGINEER prior to the Contract Date when the project is required to be complete and ready for final payment.
6. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.
7. OWNER'S payment of final application for payment shall terminate the Contract except as provided for Bonds and Warranties for the guarantee period.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01700

**SECTION 01720
PROJECT RECORD DOCUMENTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. The purpose of the record documents is to provide factual information regarding all aspects of the Work, both concealed and visible, to enable future modifications to proceed without lengthy and expensive site investigation.
- B. Throughout progress of Work, maintain an accurate record of all changes to the Work. Upon completion of Work, transfer the recorded changes to a set of record documents. This includes, but is not limited to, all modifications to piping, roads, utilities, grading, structures, limits of liner, leachate pipes, force mains, and monitoring devices.

1.02 SUBMITTALS

- A. Record documents shall be submitted to and deemed complete by the ENGINEER, for the OWNER, prior to the OWNER'S release of retainage and payment of final pay request.
- B. Accompany submittal with transmittal letter, containing:
 - 1. Date;
 - 2. Project title and number;
 - 3. CONTRACTOR'S name and address;
 - 4. Title and number of each Record Document; and
 - 5. Signature of CONTRACTOR or his authorized representative.
- C. Submit three (3) complete sets of record drawings and one (1) set of AutoCAD compatible files acceptable to the ENGINEER upon completion of the project.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 SURVEYOR

- A. Employ the services of a surveyor licensed in the State in which the project work is conducted to determine actual locations and elevations of installed items and to prepare the record drawings.

3.02 DOCUMENTS REQUIRED

- A. Maintain at the site for the OWNER one record copy of:
 - 1. Drawings;
 - 2. Specifications.

3. Addenda;
4. Change Orders and other Modifications to the Contract;
5. ENGINEER'S Field Orders or Written Instructions;
6. Approved Shop Drawings, Product Data, and Samples;
7. Field Test Records; and,
8. Construction Photographs.

3.03 ACCURACY OF RECORDS

- A. Thoroughly document all changes within the record documents, making adequate and proper entries on each page of the Specifications and each sheet of the Drawings and other documents where such entry is required to properly show the change. Record accuracy shall be such that future searches for the constructed features may reasonably rely on information obtained from record documents.

3.04 TIMING OF ENTRIES

- A. Make all entries within 24 hours after receipt of information.

3.05 SUBMITTAL

- A. The ENGINEER'S approval of the current record documents shall be a prerequisite to the ENGINEER'S approval of requests for progress payment and request for final payment under the Contract.

3.06 PROTECTION OF DOCUMENTS

- A. Maintain the job set of record documents completely protected from deterioration and from loss and damage until completion of Work and transfer of recorded data to the final record documents.

3.07 MAKING ENTRIES ON DOCUMENTS

- A. Use an erasable colored pencil (not ink or indelible pencil), or a digital layer clearly identified as surveyor notes, to clearly describe the change by note and by graphic line as required. Date all entries. Highlight the entry by drawing a "cloud" around the affected area or areas.

3.08 FORMAT OF FINAL RECORD DRAWINGS

- A. Prepare Record Drawings in an AutoCAD file format acceptable to the ENGINEER. Provide digital record drawing to ENGINEER only when no exceptions are taken by ENGINEER should paper copies be submitted.
- B. At a minimum, provide the following surveys showing spot elevations on a fifty-foot grid and one-foot contours for the layer of interest. The survey points shall include toe and top of slope, and all breaks in the slope. Spot elevations shall be measured to the nearest 0.01 foot. The required surveys shall be completed and stamped by a registered surveyor licensed in the State in which the project work is conducted. Prior to the placement of each layer of the work, the survey drawing shall be submitted to the ENGINEER for approval.

LANDFILL BOTTOM LINER

1. Top of prepared subgrade or bottom of soil liner,
 2. Top of soil liner (including limits of soil liner),
 3. Geosynthetic Clay Liner (GCL) panels and repairs locations,
 4. Geomembrane panels and seams, destructive test and repairs locations (including limits of geomembrane liner),
 5. Leachate collection and removal system components, and
 6. Top of drainage layer.
- C. Submit a spreadsheet, in digital format, which identifies the coordinates of the grid points, the spot elevations of the points for each layer, and the differential thicknesses for each successive layer.
- D. Provide record drawings of HDPE (base liner) and ~~LDPE (final cover system)~~ liner panel layout including panel numbers, limits of liner, destructive sample locations/numbers, and locations/numbers of all repairs. The digital copy of the drawings shall be provided in color with panel numbers labeled in black and in a format of P-##, destructive sample locations/numbers in red with locations marked with a triangle and labels in the format of DS-##, and locations/numbers of all repairs in blue with locations marked with a square and labels in the format of R-##. Paper copies may be provided in grayscale.
- E. Provide record drawings of GCL liner panel layout including panel numbers, and locations/numbers of all repairs.
- F. Provide a final topographic survey, with two-foot contours, of all areas disturbed by all construction activities. Information shall include vertical and horizontal locations of all improvements, including but not limited to, structural fill, access roads, utilities, permanent erosion and sediment control structures, manholes, and location and invert elevations for all risers, piping, underdrains and stormwater channels. The surveyed area shall be merged with the existing topographic survey. These drawings should highlight any changes from design drawings as described in section 3.07 of this specification. Record drawings should also be maintained for construction details. The drawings should be kept up to date during construction and be provided digitally, i.e. AutoCAD compatible and PDF formats, for the ENGINEER to review updates at progress meetings.

END OF SECTION 01720

**SECTION 01740
WARRANTIES AND BONDS**

PART 1 GENERAL

1.01 WORK INCLUDES

- A. Provide specified warranties and bonds.
- B. Provide specified service and maintenance contracts.
- C. Co-execute warranties and bonds when so specified.
- D. Review warranties and bonds to verify compliance with Contract Documents.
- E. Submit to ENGINEER for review and transmittal to OWNER.
- F. Related Requirements in other parts of the Project Manual may include:
 - 1. Bid or Proposal Bonds:
 - Section 00200 - Instructions to Bidders.
 - 2. Performance Bond and Labor and Material Payment Bond:
 - Section 00700 - General Conditions of the Construction Contract.
 - 3. General Warranty of Construction:
 - Section 00700 - General Conditions of the Construction Contract.
 - (a) Article 7.17 Contractor's General Warranty and Guarantee
 - (b) Article 15.06 Final Payment
 - (c) Article 15.08 Correction Period
- G. Related Requirements specified in other Sections of the Specifications:
 - 1. Warranties and Bonds Required for Specific Products.
 - 2. Provisions of Warranties and Bonds.

1.02 SUBMITTAL REQUIREMENTS

- A. Assemble warranties, bonds and service and maintenance contracts, executed by each of the respective manufacturers, suppliers, and subcontractors.
- B. Number of original signed copies required: Two (2) each.
- C. Table of Contents: Neatly typed, in orderly sequence. Provide complete information for each item.
 - 1. Product or work item;

2. Firm, with name of principal, address, and telephone number;
3. Scope;
4. Date of beginning of warranty, bond or service and maintenance contract;
5. Duration of warranty, bond, or service maintenance contract.
6. Provide information for OWNER'S personnel:
 - a. Proper procedure in case of failure;
 - b. Instances which might affect the validity of warranty or bond; and,
7. Name of CONTRACTOR, name of responsible principal, address, and telephone number.

1.03 FORMS OF SUBMITTALS

- A. Prepare in duplicate packets.
- B. Format:
 1. Size 8-1/2 in. x 11 in.
 - a. Fold larger sheets to fit into binders.
 2. Cover: Identify each packet with typed or printed title "WARRANTIES AND BONDS". List:
 - a. Title of Project.
 - b. Name of CONTRACTOR.
 - c. Binders: Commercial quality, durable and cleanable plastic covers.

1.04 TIME OF SUBMITTALS

- A. For equipment or component parts of equipment put into service during progress of construction:
 1. Submit documents within 10 days after inspection and acceptance.
- B. For equipment or component parts of equipment not put into service until substantial completion:
 1. Submit documents within 10 days after Date of Substantial Completion, prior to final request for payment.
- C. For items of work, where acceptance is delayed materially beyond the Date of Substantial Completion, provide updated submittal within ten days after acceptance, listing the date of acceptance as the start of the warranty period.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01740

DIVISION 2
SITE WORK

**SECTION 02100
SITE PREPARATION AND RESTORATION**

PART 1 GENERAL

1.01 SCOPE

- A. Provide personnel, equipment, materials, and supplies to clear and grub necessary areas of the project site.
- B. Provide protection as necessary to prevent damage to existing improvements not indicated to be removed, and improvements on adjoining properties.
- C. Restore all improvements damaged by this Work to their original condition, and acceptable to the OWNER or other parties or authorities having jurisdiction.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 UTILITIES

- A. Locate existing utilities, culverts, and structures above or below ground before any excavation starts. Coordinate Work with Owners of utilities. Protect, maintain service, and prevent damage to utilities not designated to be removed. When utilities are encountered and are not shown on the drawings, or when locations differ from those shown on the drawings, notify ENGINEER for instruction before proceeding.

3.02 SITE PROTECTION

- A. Protect benchmarks from damage or displacement.
- B. Protect OWNER'S property and adjoining properties from damage due to construction activities. Use barricades, coverings, and warning signs as appropriate.
- C. CONTRACTOR is responsible for correcting any damage caused by construction activities. Make repairs to the satisfaction of the OWNER or other parties having jurisdiction. All costs for repairs will be borne by the CONTRACTOR.
- D. The CONTRACTOR shall protect living trees designated to remain within the construction area and those outside the construction area. Cut or scarred surfaces of trees or shrubs shall be treated with a paint prepared especially for tree surgery.
- E. Conduct Work in accordance with the requirements of the Specifications.
- F. Prior to any land disturbance, the CONTRACTOR is responsible to flag all protection areas as designated on the Drawings, or as determined based on project site conditions.

3.03 CLEARING

- A. Clear and grade areas required for access to site and execution of Work.
- B. Remove from the site trees, brush, shrubs, downed timber, undergrowth, deadwood, rubbish, and other vegetation and incidental structures to allow for new construction.
- C. Remove all trees, stumps, and roots within 10 feet of any proposed structure or pipeline.
- D. Remove all stumps when such stumps will be less than five (5) feet below finished grade. Stumps of trees to be left in place shall be left no more than six (6) inches above original grade.
- E. CONTRACTOR shall clear for 20 feet on each side of the overhead electrical pole line.
- F. Clearing shall be limited to areas within the limits of construction that need to be cleared in order to execute the Work. Clearing may be required to obtain suitable materials in the borrow area. CONTRACTOR shall keep clearing to the minimum required to complete the Work. Any clearing performed in the borrow area shall be at no additional cost to the OWNER.
- G. Except for areas that are disturbed in accordance with an erosion and sediment control permit obtained under the provisions of the Specifications; do not disturb other areas outside the limits of construction shown on the Drawings.

3.04 GRUBBING

- A. Grub areas within a 10-foot zone bordering all proposed structures and pipelines.
- B. In areas to be cleared, remove all stumps, roots ½-inch or larger, organic material, and debris to a depth of approximately one (1) foot below existing grade, or one (1) foot below the proposed subgrade elevation, whichever is lower.
- C. Remove vegetation in a manner that maximizes the separation of vegetative cover and topsoil or subsoil. Unless otherwise noted, vegetation shall be removed from the site or disposed on-site as approved by landfill personnel.
- D. Use hand methods for grubbing inside the drip lines of trees that are to remain.
- E. Clean up debris resulting from site clearing operations continuously with the progress of the Work.
- F. Stockpile topsoil material on site in areas designated by the ENGINEER or the OWNER. Install silt fence around soil stockpiles. CONTRACTOR is responsible for stabilizing stockpiles in accordance with Specifications.
- G. Keep pavement and areas adjacent to site clean and free from mud, dirt, and debris.

3.05 REMOVAL AND DISPOSAL OF DEBRIS

- A. Unless otherwise noted, trees within the construction limits shall become the property of the CONTRACTOR and shall be removed from the site or disposed on-site as approved by the OWNER.
- B. Remove other debris, rock, and extracted plant life from the site or dispose on-site as approved by the OWNER.
- C. Removal and disposal of debris, rock and extracted plant life shall be accomplished at no additional cost to the OWNER.
- D. Open burning will be permitted if not in violation of local ordinance, or requirements of Rule .1626(5)(b) and after obtaining approvals from the Division of Air Quality and local fire department. No burning will be allowed within 100 feet of waste disposal areas or site access roads.
- E. CONTRACTOR shall obtain and comply with all required permits.

3.06 SITE RESTORATION

- A. At the end of the construction period, the CONTRACTOR shall restore to existing grade those areas disturbed by construction activities that lie beyond the limits of construction shown on the Drawings. CONTRACTOR is also responsible for restoration of the sections of the borrow area utilized for the construction at no addition cost to the Owner. Areas to be filled shall be nominally compacted as may be achieved with construction equipment, graded to prevent ponding, and permanently seeded in accordance with the requirements of the Specifications.

END OF SECTION 02100

**SECTION 02200
EARTHWORK**

PART 1 GENERAL

1.01 SCOPE

- A. The Work covered by this specification consists of furnishing all labor, equipment, and materials to perform general grading; excavation; and placement and compaction of structural fill for foundations, perimeter berms, embankments and structures, as indicated by the Documents.
- B. All excavation shall be unclassified regardless of material encountered, except for Rock as defined in this specification.
- C. A layer is defined as a compacted stratum composed of several lifts constructed without joints. A lift is defined as a segment of a layer composed of the maximum thickness of soil permitted to be placed and compacted at one time.
- D. All fill materials shall be subject to the approval of the CQA Consultant.
- E. The CONTRACTOR is solely responsible for the placement of all fill material and shall not rely on the CQA Consultant for recommendations and directions. It is recommended the CONTRACTOR employs his own geotechnical consultant to provide construction assistance and recommendations.
- F. The CQA Consultant will perform field and laboratory testing as required and in accordance with the CQA Plan.
- G. The use of explosives is prohibited.

1.02 CONSTRUCTION QUALITY CONTROL (CQC)

- A. The CONTRACTOR will provide a testing program to perform the following minimum laboratory tests on soil materials being used for construction. All testing will be performed by an independent qualified geotechnical consultant and testing laboratory and under the direction of a Registered Professional Engineer licensed in the State in which the project work is conducted.
- B. Laboratory Testing - Soils:
 - 1. Soil Classification
Soil classification by Unified Soil Classification System (ASTM D2487) shall be conducted at a frequency of one (1) test for each soil type.
 - 2. Particle Size Analysis
Sieve analysis without hydrometer (ASTM D422) shall be conducted at a frequency of one (1) test for each soil type.
 - 3. Atterberg Limits and Moisture Content
Atterberg limits (ASTM D4318) and moisture content test (ASTM 2216) shall be conducted at a frequency of one (1) test for each soil type.

4. Standard Proctor Compaction
Standard Proctor compaction characteristics (ASTM D698) shall be conducted at a frequency of one (1) test for each soil type.

PART 2 PRODUCTS

2.01 FILL MATERIAL

All fill material used to establish necessary grades as indicated by the Documents shall be free of debris, roots, stumps, brush, vegetation, frozen material, organic matter, rock, or gravel larger than two (2) inches in any dimension, or other harmful matter, unless allowed by the CQA Consultant. The fill material supplied shall be obtained from the Borrow Areas shown on the Drawings and as identified by the Borrow Study Reports provided in the Project Manual.

All fill materials shall be subject to the approval of the CQA Consultant. CONTRACTOR shall notify the CQA Consultant at least 10 working days in advance of intention to begin filling operations. Notification shall include designation of the proposed borrow source and all necessary laboratory testing data to demonstrate the adequacy of the material to perform its intended use. CONTRACTOR shall provide the CQA Consultant with 120 pounds of the proposed material in three (3), five-gallon, PVC, sample buckets with lids and handles at the time of notification. CONTRACTOR shall not initiate filling activities without the approval of the CQA Consultant to use the intended material for filling activities.

2.02 Structural Fill

NCDOT #57 stone or approved equal product.

2.03 ROCK

Rock shall be construed as solid mineral material with a volume in excess of $\frac{1}{3}$ cu yd or solid material or cannot be removed with $\frac{3}{4}$ cu yd capacity excavator and must be removed with a hoe-ram or other extraordinary means. Conventional earth moving equipment shall be defined as a CAT D8L or equivalent tractor with a single-shank ripper, or CAT 330 sized or equivalent hydraulic excavator.

2.04 UNSUITABLE MATERIAL

Material such as clay mass, frozen materials, cinders, ashes, refuse, vegetation, organic material, and muck shall be construed as unsuitable material for backfill or pipe bedding. All unsuitable material under access roads, structural fills and berms shall be removed from the area to be filled.

PART 3 EXECUTION

3.01 GENERAL

- A. Strip topsoil to full depth, and stockpile separate from other excavated materials and pile free of roots, stones, and other undesirable materials. Follow local erosion and sediment control guidelines to prevent erosion. Any depressions caused by removal of stumps of the clearing shall be excavated to firm subgrade.

- B. The CONTRACTOR shall perform all excavation described in whatever material encountered to dimensions and elevations indicated by the Documents.
- C. Existing utilities, structures, and fencing shall be protected during the construction period, and if damaged or removed by the CONTRACTOR in his operations, shall be repaired or replaced at the CONTRACTOR'S expense.
- D. Where unauthorized excavations have been carried below or beyond points required, restore these areas to the elevations and dimensions indicated by the Documents with material approved by CQA Consultant and compact as specified, at no additional cost to the OWNER.
- E. Material rendered not suitable for construction due to fault or negligence of the CONTRACTOR, shall be removed and replaced at no additional cost to the OWNER.

3.02 UTILITIES TO BE ABANDONED OR REMOVED

- A. When underground utilities are to be abandoned in place, plug, cap, or seal with concrete at the "Construction Limits" or at points designated by the CQA Consultant.
- B. Remove underground utilities indicated by the Documents to be removed and backfill resulting excavation with suitable material, compacted as specified. Plug, cap or seal utilities with concrete at the construction limits or at points designated by the CQA Consultant.

3.03 PROOFROLLING

- A. Prior to subgrade inspection, the OWNER shall notify NCDEQ Solid Waste Section via email no less than 24 hours as required by Rule .1624(b)(7)(C).
- B. Prior to the placement of any fill material, the subgrade, or bridge lift, shall be proofrolled.
- C. Prior to the placement of the liner system, the natural ground or excavated subgrade, shall be proofrolled.
- D. Prior to the placement of the liner system, the top of fill shall be proofrolled.
- E. Proofrolling shall be performed using a rubber-tired device having a static weight of at least 10 tons (such as a loaded tandem axle dump truck). This shall be performed during dry weather conditions and under the direction of the CQA Consultant. Areas that "pump" or otherwise exhibit instability shall be repaired as directed by the CQA Consultant.

3.04 WETLANDS PROTECTION

- A. Prior to the placement of any fill material, the Best Management Practices (BMPs), such as stormwater conveyance channels, sediment basins, outlet protection, and silt fence, shown on the Documents must be installed.

- B. The CONTRACTOR is responsible for flagging the maximum limits of disturbance prior to the start of on-site construction activities.
- C. At no time shall the CONTRACTOR impact any areas beyond the maximum limits of disturbance, without prior approval from the ENGINEER and CQA Consultant.

3.05 EXCAVATION

- A. Areas that receive permanent seeding shall be graded below finished grades shown, leaving space for the vegetative support layer.
- B. Stockpile excavated soil material satisfactory for backfill or fill until required. Place, grade, and shape stockpiles for proper drainage. Provide erosion and sediment control measures in conjunction with stockpile development.
- C. Remove existing pavement as required.
- D. Dispose of materials unsatisfactory for backfill or fill continuously with the progress of work.
- E. Dispose of trash and debris, and all excess material continuously with the progress of the work.
- F. All excavation shall be dewatered as necessary to provide proper protection. The CQA Consultant may require excavation to be continuously dewatered 24 hours per day by adequate pumping or well-points satisfactory to the CQA Consultant until backfilling has been completed.
- G. Where underground streams or springs are found, provide temporary drainage and notify ENGINEER and CQA Consultant.
- H. Extreme caution shall be taken when excavating in the vicinity of existing facilities. Any damage to the facilities will be repaired to original condition at no additional cost to the OWNER.
- I. Excavate unsuitable soil materials encountered that extend below required elevations. The limits of the unsuitable material and depth of removal shall be determined by the CONTRACTOR and agreed to by the ENGINEER and/or the CQA Consultant.
- J. Remove shoring and all form materials.
- K. Grade site to prevent surface water run-on into excavations.

3.06 EXCAVATION FOR STRUCTURES

- A. Conform to elevations and dimensions as indicated by the Documents. Extend excavation sufficient distance from footings and foundations to permit placing and removal of concrete form work, installation of services, and for other required construction. Foundation concrete shall not be placed until the bearing stratum has been examined and found satisfactory for the design bearing capacity.

- B. Where rock is encountered, notify ENGINEER. When the entire structure will bear on rock, it shall be used to support the foundation. Where only a part of the foundation would bear on rock, excavate 12 inches below the entire structure and backfill with aggregate fill and thoroughly compact.
- C. Provide a 12-inch minimum clearance between rock excavation and walls of structure when forming is not used. Provide a two (2) feet clearance when forming is used.

3.07 ROCK REMOVAL

- A. Rock removal will be by mechanical method only unless prior approval is received from the OWNER, ENGINEER, and CQA Consultant.
- B. If Rock is encountered as defined in this specification, The CONTRACTOR will:
 - 1. Demonstrate findings to the CQA Consultant;
 - 2. Determine limits of the rock above the excavation lines and grade; and
 - 3. Quantify the rock and provide information, including limits, to the CQA Consultant for assessment.
- C. Remove rock at bottom of excavations to form level bearings.
- D. In utility trenches, excavate to four (4) inches below invert elevation of pipe and to width indicated by the Drawings and Specifications.
- E. Remove rock loosened by mechanical method. Over-excavation of six (6) inches to one (1) foot will be allowed.
- F. Correct unauthorized rock removal in accordance with backfilling and compaction requirements of the project specifications.
- G. Excavated rock will be removed from the site or segregated and stockpiled on-site as directed by the OWNER.

3.08 COMPACTION OF FILL

- A. Compaction of each layer shall be continuous over the entire area and the compaction equipment shall make sufficient trips to assure that the specified compaction density has been obtained.
- B. Fill shall be placed and compacted in uniform lifts and shall not exceed six (6) inches in compacted thickness. All fill shall be compacted to within 95 percent of maximum density at $\pm 3\%$ optimum moisture content in accordance with standard proctor as determined by ASTM D698.
- C. This compaction method shall apply to all fills, berms, embankments, paved areas and for a distance of at least 25 feet beyond structures and at least five (5) feet beyond fills, berms, embankments, and paved areas.

- D. All other unpaved areas shall be compacted to within 90 percent of maximum density at $\pm 3\%$ optimum moisture content using standard proctor as determined by ASTM D698.
- E. Compaction equipment shall be of such design that it will be able to compact the fill to the specified density. Use power-driven hand tampers for compacting materials adjacent to structures.

3.09 FIELD DENSITY AND MOISTURE CONTENT TESTS

Field tests of the in-place density and moisture content of fill will be made by the CQA Consultant. If a test fails to meet the required compaction level or moisture content, then the area represented by that test shall be reworked and retested, at no additional cost to the OWNER, until a passing test results. The CONTRACTOR may elect at his own expense to remove the failing material.

3.10 SURFACE WATER

All excavations and fill areas shall be kept free of standing water. Grade surfaces and ditches to drain. Pumping of water shall be required to remove water from areas that cannot drain naturally.

3.11 FILL AND BACKFILL

- A. Remove vegetation, debris, unsatisfactory materials prior to placement of fill. Plow, strip or break up sloped surfaces steeper than four (4) to one (1) (4:1) so that fill material can bond with existing surface.
- B. Fill and backfill material shall be clean earth fill obtained from excavation or other approved sources. Fill and Backfill material shall be placed to obtain elevations as indicated by the Documents.
- C. All Fill and Backfill material shall be compacted in accordance with the requirements of this Section. When the existing ground surface has been disturbed and has a density of less than that specified for the area, scarify the ground surface, adjust moisture content, and compact to required depth and percentage of maximum density.
- D. Rock fragments and stones up to two (2) feet in its greatest dimension may be placed in an embankment fill to within 10 feet of the top of the earth fill. The remainder of the embankment to within two (2) feet of the top of the earth fill shall not contain rock more than six (6) inches in its greatest dimension. The top two (2) feet of the embankment shall not contain rock more than two (2) inches in its greatest dimension.
- E. Rock, fines, and earth shall be distributed throughout each lift so that voids are filled. Rock shall not be placed in the embankment where piling, borings, monitoring wells or boundary probes are to be driven, drilled, or constructed.
- F. Prevent nesting of large rocks and compact fill to prevent voids. Maximum rock size within 12 inches of footing elevations shall be 2-inch diameter.

- G. Provide borrow material when on-site excavation is not sufficient to grade site to contours and finished grade elevations as indicated by the Documents. All necessary costs shall be included in the unit price on the approved Schedule of Values.
- H. Remove and replace, or scarify and air dry, soil material that is too wet to allow compaction to specified percentage of maximum density.
- I. Do not backfill with or compact over frozen soil material.
- J. Soil material that has been removed as too wet to allow compaction may be stockpiled or spread to dry. When moisture content is reduced to a satisfactory value, soil material may be used as fill or backfill.
- K. Excavate depression caused by removed stumps or other clearing operations to firm subgrade, fill with clean earth and compact as specified.
- L. Place backfill and fill materials in layers which, when compacted, shall not exceed six (6) inches in lift thickness at depths less than four (4) feet below finished grade and 12 inches in lift thickness at depths greater than four (4) feet below finished grade. Each layer shall be spread evenly and shall be thoroughly bladed and mixed during the spreading to ensure uniformity of material in each layer. If required, the fill material shall be dried by aerating with a scarifier, disk harrow, blade, or other equipment or by such other means as may be necessary. If required, the fill material shall be wetted using water trucks. Dried or wetted fill material shall be thoroughly mixed to ensure uniform moisture distribution. Compact each layer to the required density.
- M. Place backfill and fill materials evenly adjacent to structures. Prevent wedging of the backfill against structures by carrying the material uniformly around the structure to approximately the same elevation in each lift.
- O. Place aggregate fill material under all structures as indicated by the Documents. Compact to density required for fill under buildings and structures.

3.12 GRADING

- A. Uniformly grade all areas within the limits indicated by the Drawings including adjacent transition areas. Finish surfaces within specified tolerances with uniform levels or slopes between points where elevations are shown and existing grades.
- B. Finish all surfaces free from irregular changes and grade to drain as indicated by the Documents.
- C. Finish areas to receive geosynthetic liner to within 0.10 feet of required subgrade elevations, unless approved in writing by ENGINEER.
- D. Shape subgrade under unpaved areas to line, grade, and cross-section to within 0.25 feet of required subgrade elevation.
- E. Shape subgrade under pavement to line, grade, and cross-section to within 0.05 feet of required subgrade elevations.

- F. Grade for structures to required elevation within tolerance of 0.05 feet.
- G. Protect newly graded areas from traffic, erosion, desiccation, or other damage. Repair and re-establish grade in settled, eroded, or rutted areas to the specified tolerances.
- H. Where compacted areas are disturbed by subsequent construction or adverse weather, scarify the surface, reshape, and compact to the required density. Use hand tamper for compaction over underground utilities. Portions of the fill damaged due to exposure shall be reworked to meet the project specifications or, at the discretion of the CQA Consultant, removed and replaced with conforming material at no additional cost to the OWNER.
- I. Place vegetative support layer to a minimum depth of six (6) inches. Where existing on-site supply of topsoil is inadequate to provide the required amount, supply additional topsoil, meeting the specification for Topsoil, from off-site sources. Source and quality of additional material shall be approved by ENGINEER. Cost of off-site material shall be at no additional cost to OWNER. Reference shall be made to the project specifications for requirements of topsoil testing and topsoil amendment options.

3.13 LANDFILL SUBGRADE

The landfill subgrade shall be surveyed in accordance with Section 01720 to demonstrate that the required grades are achieved. The survey of the subgrade will be reviewed and approved by the engineer/CQA consultant prior to construction of the landfill liner. The CQA consultant will provide a visual inspection of the subgrade and will notify ENGINEER if any unexpected conditions or deviations from the Documents are observed in the field or in review of the survey. Testing will be performed as outlined in Table 1 of the CQA Plan for "Fill".

3.14 UNFAVORABLE WEATHER CONDITIONS

No fill material shall be placed, spread, or rolled while the ground is frozen or thawing, or during unfavorable weather conditions. When the work is interrupted by inclement weather, fill operations shall not be resumed until approved by the CQA Consultant. Repairs from inclement weather must be corrected by the CONTRACTOR to the satisfaction of the CQA Consultant at no additional cost to OWNER.

END OF SECTION 02200

**SECTION 02202
ROCK REMOVAL**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Rock Removal – Mechanical Method

1.02 RELATED SECTIONS

- A. Section 02222 - Excavation

1.03 DEFINITIONS

- A. Rock: Solid mineral material with a volume in excess of ½ cu yd or solid material that cannot be removed with conventional excavating equipment such as a CAT D8L or equivalent tractor with a single-shank ripper, or CAT 330 sized or equivalent hydraulic excavator and must be removed with a hoe-ram or other extraordinary means. Material that can be removed by ripping constitutes removal by conventional excavating equipment.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify site conditions and note subsurface irregularities affecting Work of this Section.

3.02 PREPARATION

- A. Identify required lines, grades, contours, and datum.

3.03 ROCK REMOVAL – MECHANICAL METHOD

- A. Remove rock at bottom of excavations to form level bearings.
- B. In utility trenches, excavate to four (4) inches below invert elevation of pipe and to width indicated on Drawings.
- C. Remove rock loosened by mechanical method. Dispose rock in an approved off-site location or dispose on-site as directed by landfill personnel or the Engineer's on-site representative.
- D. Correct unauthorized rock removal in accordance with backfilling and compaction requirements of appropriate Section.

END OF SECTION 02202

**SECTION 02210
COMPACTED SOIL LINER**

PART 1 GENERAL

1.01 SCOPE

- A. The CONTRACTOR shall furnish all labor, materials, equipment, tools and appurtenances required to complete the work of furnishing, installing and compacting the low permeability soil layer of the liner system (compacted soil liner) as shown, specified, or required.
- B. The construction methods and the related material properties including, but not limited to: type of compaction equipment, method of operation, number of passes, operating frequency, moisture content of the material, compacted density, and permeability of the material, shall be determined by the results obtained from the Test Pad. Construct the compacted soil liner test pad in accordance with Section 02218.
- C. Acceptance by the CQA Consultant of the compacted soil liner shall be dependent on the CONTRACTOR satisfying the requirements imposed by the CQA plan during the course of the work, and test results showing that all requirements of the project specifications and results obtained from the Test Pad have been met. Such acceptance shall be based on the compacted soil liner meeting the required moisture content, density and permeability, in combination with approval of all CONTRACTOR operations, based on visual observation and tests conducted by the CQA Consultant.
- D. The cost of all sampling and testing associated with any reconstruction of the compacted soil liner shall be the responsibility of the CONTRACTOR.
- E. Field and laboratory testing conducted by the CQA Consultant under Paragraph 1.03 of this Section will be done at the OWNER'S expense.
- F. A separate test pad will be required for each borrow source, change in material or change in construction method.
- G. Placement of the compacted soil liner shall not start until the test pad and all associated testing have been completed and approved by the CQA Consultant in writing.

1.02 SUBMITTALS

The following submittals shall be furnished by the CONTRACTOR for the work of this Section as specified herein.

- A. All submittals as required by the Specification applicable to the work being performed, or as requested by the CQA Consultant.

1.03 CONSTRUCTION QUALITY ASSURANCE (CQA)

- A. The Construction Quality Assurance Plan will be administered by the CQA Consultant.

CQA testing by the CQA Consultant shall include, but not necessarily be limited to the following:

1. In-place moisture content and density;
 2. Standard proctor density test; and,
 3. Permeability testing.
- B. The CONTRACTOR shall provide time and space for the CQA tests to be conducted. The CONTRACTOR shall inform the CQA Consultant when an area is suitable for testing. The CQA Consultant reserves the right to test any area at any time at the CQA Consultants discretion.
- C. The CONTRACTOR shall prepare level areas on which testing or sampling shall be performed and shall repair any disturbances to the compacted soil liner generated through testing and sampling. All test and sample holes shall be backfilled with bentonite and recompacted by compaction equipment at the proper moisture content to achieve the minimum liner permeability.
- D. In all areas where permeability requirements are not achieved, as determined based on moisture content and density tests, and/or visual observations, the representative area, as determined by the CQA Consultant, shall be reconstructed by reworking and recompacting, or removal and replacement, at no additional cost to the OWNER, and retested until the quality requirements set forth in this Section are met. All additional CQA costs associated with any reconstruction, reworking or replacement of the compacted soil liner and associated laboratory testing fees will be included in a Change Order and deducted from the Contract Price.
- E. The compacted soil liner construction shall proceed in orderly manner to allow for CQA field and laboratory testing results prior to continuing with subsequent lifts. No lift shall be covered by new material until laboratory test results have been reviewed and found to meet the permeability requirement for the compacted soil liner.
- F. The CONTRACTOR is solely responsible for the construction of the compacted soil liner and shall not rely on the CQA Consultant for recommendations and directions. It is recommended the CONTRACTOR employs his own geotechnical consultant to provide construction assistance and recommendations.

PART 2 PRODUCTS

2.01 MATERIALS

Material supplied for use to construct the compacted soil liner shall be a mineral soil with cohesive characteristics, free of organic matter, shall not contain particles larger than two (2) inches in the bottom 15 inches and not larger than 3/8 inch in the upper three (3) inches, and shall have a hydraulic conductivity (permeability) as indicated by the Documents. The material supplied for use to construct the compacted soil liner shall be the same material used to construct the approved test pad. The material supplied to construct the compacted soil liner shall be obtained from suitable offsite sources.

PART 3 EXECUTION

3.01 SUBGRADE PREPARATION

Areas to receive compacted soil liner shall be cleared, grubbed, and stripped of topsoil in accordance with the requirements set forth in the project specifications. After stripping all topsoil and organic soil, proofroll the subgrade and any soft natural soil or soft existing fill shall be removed. Removed soils shall be replaced with compacted layers of fill. Any soil that softens due to precipitation, groundwater, disturbance, exposure, or any other cause shall be removed and replaced at no additional cost to the OWNER. The area shall then be observed and approved by the CQA Consultant before placement of the compacted soil liner.

The surface shall be free from ruts, hummocks, or other uneven features which would tend to prevent uniform compaction.

The CONTRACTOR shall employ a professional land surveyor licensed in the State in which the project work is conducted to obtain surveyed elevations, at 50-foot intervals on a grid pattern across the subgrade prior to placement of the compacted soil liner. From this survey, a contour plan showing contours at no more than one-foot intervals shall be generated. This survey information and contour plan shall become part of the Record Drawings.

3.02 SITE DRAINAGE

At all times, the CONTRACTOR shall maintain and operate proper and adequate surface and subsurface drainage to keep the construction site dry and in such condition that placement and compaction of the soil liner may proceed unhindered by saturation of the area.

Construction of the compacted soil liner material on a saturated subgrade is prohibited. After a rainfall, the subgrade shall be given sufficient time to drain and dry to the design moisture content before placing successive lifts.

3.03 INSTALLATION

A. PLACEMENT OF COMPACTED SOIL LINER

The soil shall be thoroughly mixed and spread immediately after dumping, by mechanical equipment above the approved subgrade, and shall be built up in even horizontal layers. Prior to compaction, the soil shall be mixed by disc-harrow or an equivalent method to a homogeneous consistency. Lift thickness shall be no greater than six (6) compacted inches. The loose lift thickness shall not exceed the effective depth of compaction for the equipment utilized.

The compacted soil liner shall be constructed in such a manner that bonding between lifts is achieved.

The final grades of the compacted soil liner shall result in a smooth, uniform surface through fine finishing with a road grader and a smooth drum roller. The final grades of the compacted soil liner shall be true to grade and shall not allow the ponding of water, with deviations of no more than 0.1 foot for soil liners, measured across any 10-foot

section. The minimum thickness, measured **perpendicularly** to slope, as shown on the Drawings, shall be achieved.

The CONTRACTOR shall employ a professional land surveyor licensed in the State in which the project work is conducted to obtain surveyed elevations of the top of the compacted soil liner, at the same 50-foot grid locations used to survey the subgrade. From this survey, a contour plan showing contours at no more than two-foot intervals shall be generated. This survey information and contour plan shall become part of the Record Drawings.

B. MOISTURE CONTROL

Material that is too wet shall be spread and permitted to dry, assisted by discing or harrowing, if necessary, and the work shall be delayed until the moisture is reduced to the required limits.

When the material is too dry, the CONTRACTOR shall add moisture to each layer. Water must be allowed to soak into the soil for a period sufficient to permit hydration of the soil. Harrowing, or other approved methods shall be required to work the moisture into the soil and break up any dry clods until a uniform distribution of moisture is obtained. The moisture content after compaction shall be uniform throughout any one (1) layer.

If it is impractical to obtain the required moisture/density by wetting or drying the soil at the site, the CONTRACTOR shall condition the material off the site.

C. COMPACTION

The soil liner shall be compacted to the moisture/density determined from the results of the Test Pad. The CONTRACTOR may be permitted to modify the compaction and moisture content to fit site conditions and material requirements if the CONTRACTOR can demonstrate that all design parameters can be satisfied as determined and approved by the CQA Consultant. The compaction procedures (e.g., equipment and methods, operating frequency, number of passes, etc.) shall be in accordance with the results determined by the Test Pad.

Successive lifts of compacted soil liner shall not be placed until the previous lift is accepted by the CQA Consultant.

To avoid damage to structures and pipes, hand-operated vibratory type plate compactor, jumping jack, or other suitable equipment shall be used in areas not accessible to larger roller or compactor. The compaction around penetrations shall be as specified and able to achieve the hydraulic conductivity requirements.

3.04 FROST

No compacted soil liner materials shall be placed when either the soil or the previous lift (or subgrade) on which it is to be placed is frozen. In the event that any installed compacted soil liner or subgrade becomes frozen, it shall be scarified, thawed and recompacted, or removed to the approval of the CQA Consultant before the next lift is placed. Any soft spots resulting

from frost shall be removed or recompacted to the satisfaction of the CQA Consultant before new soil lift material is placed. No frozen material shall be used as compacted soil liner.

3.05 GEOSYNTHETIC AREA PREPARATION

Surfaces to receive a geosynthetic material shall be kept smooth and free of debris, roots, sticks, bones and angular or sharp rocks larger than 3/8 inch in any dimension. The surface should provide a firm, unyielding foundation with no sudden, sharp, or abrupt changes or break in grade. No standing water or excessive moisture shall be allowed. Final compaction of any area to receive a geosynthetic material shall be with smooth steel drum roller. The CONTRACTOR shall certify in writing that the surface on which the material is to be installed is acceptable before commencing placement of geosynthetic materials.

3.06 PROTECTION OF WORK

The CONTRACTOR shall schedule his work to prevent the compacted soil liner from drying and/or cracking due to exposure, or from softening due to precipitation. This applies to every layer of compacted soil liner material placed. The CONTRACTOR shall develop a construction contingency plan for responding to construction deficiencies resulting from circumstances including, but not limited to: inclement weather, sediment deposits run-on, defective materials, or construction inconsistent with the project specifications as demonstrated by quality assurance testing and observations by the CQA Consultant. The plan shall provide a methodology for selecting and implementing the corrective action.

Any portion of the compacted soil liner damaged due to exposure shall be reworked, removed, or replaced with conforming material to meet the project specifications. Payment for the compacted soil liner will not be made until it has been covered with the overlying material and protected from damage.

3.07 MAINTENANCE

The CONTRACTOR shall maintain all compacted soil liner fill in an undisturbed and compacted state until covered and protected from damage. All work and materials required for maintenance shall be performed at no additional cost to the OWNER. In the event of slides, sloughing, or erosion in any part of the work, the CONTRACTOR shall remove the disturbed material from the damaged area and shall rebuild such portion as directed by the CQA Consultant. The removal of material and the rebuilding of any slide area shall be performed at no additional cost to the OWNER but will be subject to the same observation and testing requirements as any other soil layer, as well as approval by the CQA Consultant.

END OF SECTION 02210

**SECTION 02218
TEST PAD**

PART 1 GENERAL

1.01 SCOPE

- A. The work of this Section shall include all labor, equipment, and materials necessary to construct a test pad as specified herein.

- B. The test pad shall include, but not be limited, to:
 - 1. Preparation of subgrade in accordance with Section 02200 - Earthwork; and
 - 2. Construction of compacted soil liner test pad in accordance with Section 02210 or Section 02212.

- C. The purpose of the test pad is to develop and demonstrate construction methods to produce a compacted low permeability soil layer of the liner system (compacted soil liner) satisfying the requirements of the Specifications in all respects. Of particular concern are the construction methods to be adopted to construct a compacted soil liner to achieve the required permeability.

- D. The construction methods and the related material properties to be noted shall include but are not limited to: type of compaction equipment, method of construction, number of passes, moisture content of the material, compacted density, and the resulting permeability of the material.

- E. A separate test pad will be required for each borrow source, change in material, or change in construction method.

- F. Acceptance of the test pad by the CQA Consultant shall be dependent on the CONTRACTOR satisfying the requirements imposed by the CQA Plan during the work, and test results showing that all requirements of the Specifications have been met. Such acceptance shall be based on the test pad meeting the required permeability, in combination with approval of all CONTRACTOR operations, based on visual observation and tests conducted by the CQA Consultant.

- G. Testing of soil samples as required under Paragraph 1.03 of this Section shall be paid for by the CONTRACTOR. The cost of all sampling and retesting associated with additional or separate test pads, or any reconstruction of the test pad shall be borne by the CONTRACTOR.

- H. Field and laboratory testing conducted by the CQA Consultant under Paragraph 1.04 of this Section will be performed at the OWNER'S expense.

1.02 SUBMITTALS

- A. CONTRACTOR shall notify the CQA Consultant at least 10 working days in advance of intention to begin filling operations. Notification shall include designation of the proposed borrow source and all necessary laboratory testing data to demonstrate the

adequacy of the material to perform its intended use. CONTRACTOR shall provide the CQA Consultant with 120 pounds of the proposed material in three (3), five-gallon, PVC, sample buckets with lids and handles at the time of notification. CONTRACTOR shall not initiate filling activities without the approval of the CQA Consultant to use the intended material for filling activities.

- B. The results of analyses required under Paragraph 1.03 of this Section shall be submitted to the CQA Consultant at least two (2) weeks prior to beginning construction of the test pad.
- C. The equipment used for compacting the soil liner material shall be a sheepsfoot roller that can effectively compact the loose lift thickness to meet the Specifications.

1.03 CONSTRUCTION QUALITY CONTROL (CQC)

- A. The CONTRACTOR shall perform a borrow evaluation to determine the moisture content/dry density/permeability relationship for each soil material. These tests shall be run to develop an acceptable window of density and moisture to obtain the permeability criteria.
- B. Final criteria for construction of the compacted soil liner (including moisture content, compaction effort, and density) shall be determined based on the results of the Test Pad demonstration.
- C. For all soils to be used to construct each test pad, the CONTRACTOR shall perform:
 - 1. Sieve analyses in accordance with ASTM D 422. Frequency: A minimum of one (1) test per test pad.
 - 2. Atterberg Limits testing in accordance with ASTM D 4318. Frequency: A minimum of one (1) test per test pad.
 - 3. Standard Proctor testing in accordance with ASTM D 698. The test pad shall be compacted to 95 percent of maximum density at optimum moisture \pm 3 content or as otherwise approved by ENGINEER. Frequency: A minimum of one (1) test per test pad.
 - 4. Remolded permeability testing in accordance with ASTM D 5084. Frequency: One (1) test per test pad (composite sample). Conduct tests using a confining pressure of five (5) psi, and a hydraulic gradient of 10.
 - 5. Triaxial Compression Testing
Consolidated Undrained Triaxial with Pore Pressure Measurements Series (ASTM D4767), Three Point Series, Remolded, shall be conducted at a frequency of one (1) test for each soil type.

1.04 CONSTRUCTION QUALITY ASSURANCE (CQA)

- A. The Construction Quality Assurance (CQA) Plan will be administered by the CQA Consultant. CQA testing by the CQA Consultant shall include, but not necessarily be limited to the following:
 - 1. In-place moisture content and density; and,

2. Permeability testing (Two (2) tests per lift: one (1) taken on the cell floor and one (1) taken on the side slope).
- B. The CONTRACTOR shall provide time and space for the CQA tests to be conducted. The CONTRACTOR shall inform the CQA Consultant when an area is suitable for testing. The CQA Consultant reserves the right to test any area at any time at the CQA Consultants discretion.
 - C. The CONTRACTOR shall prepare a smooth compacted surface on which tests or sampling shall be performed and shall repair disturbances to the test pad generated through testing and sampling. If the test pad is intended to become part of the final subgrade or compacted soil liner, test and sample holes shall be backfilled with bentonite and recompacted to achieve the specified permeability.
 - D. The test pad construction shall proceed in orderly manner to allow for CQA field and laboratory testing. In all areas where permeability requirements are not achieved, as determined based on direct testing, moisture content and density tests, and/or visual observations, the representative area, as determined by the CQA Consultant, shall be reconstructed, such as by reworking and recompacting, or removal and replacement, at no additional cost to the OWNER, and retested until the quality requirements set forth in this Section are met. All additional CQA costs associated with any reconstruction, reworking or replacement of the test pad and associated laboratory testing fees will be included in a Change Order and deducted from the Contract Price.
 - E. The CONTRACTOR is solely responsible for the construction of the compacted soil layer test pad and shall not rely on the CQA Consultant for recommendations and directions. The CONTRACTOR shall employ his own geotechnical consultant to provide construction assistance and recommendations.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Borrow materials for the test pad shall be tested and approved in accordance with procedures as outlined in this Section and the CQA Plan.
- B. The material shall meet the internal and interface friction angles referenced in specification 13400 or greater unless otherwise approved by engineer.

PART 3 – EXECUTION

3.01 GENERAL

- A. The plan area for the test pad shall be a minimum of 50 by 150 feet. It shall be constructed and tested prior to the placement of the compacted soil liner. The location of the test pad shall be selected by the CONTRACTOR and approved by the CQA Consultant. The test pad shall be located at the toe of the slope to allow test pad construction on the slope and floor of the landfill bottom. The sampling location shall be on the cell floor and on the slope equal to the steepest slope proposed to receive the compacted soil liner.

- B. The test pad shall be constructed with the equipment and methods proposed for the compacted soil liner that can effectively compact the loose lift thickness to meet the requirements of this Section. The compacted lift thickness shall not exceed six (6) inches, unless otherwise approved in writing by the CQA Consultant.
- C. At four (4) locations in each material layer, as directed by the ENGINEER or CQA Consultant, a test pit shall be excavated to verify the consistency of the compacted materials and the bonding between layers. If the test pad is intended to become part of the final subgrade or compacted soil liner, the test pits shall be backfilled on completion of the inspection with bentonite, and in accordance with placement specifications for the layer.
- D. The test pad may be part of the landfill compacted soil liner. If the CONTRACTOR chooses to construct the test pad as part of the landfill liner, all component materials of the test pad and the associated testing must be in accordance with the Specifications. Unsuccessful trial or defective sections shall be replaced at no additional cost to the OWNER.
- E. Should the CONTRACTOR change the borrow source for the compacted soil liner material, or the properties of material at borrow source have significantly changed as determined by the CQA Consultant, a new test pad 50 feet by 150 feet shall be constructed from this material, and will be subject to the same construction and testing requirement as described in the preceding paragraphs, as well as approval by the CQA Consultant.
- F. The CONTRACTOR shall keep equipment used for the test pad construction on the test pad at all times to avoid contamination of the low-permeability soil with the adjacent soils.
- G. If in the opinion of the CQA Consultant, the construction methods, equipment or materials result in unsatisfactory placement, the CONTRACTOR shall make necessary modifications and reconstruct the appropriate sections or layer of the test pad. This will be done at no additional cost to the OWNER.
- H. Placement of the compacted soil liner shall not start until the test pad and all associated testing have been completed and approved by the CQA Consultant in writing.

PART 4 PAYMENT

- 4.01 The test pad shall be considered incidental to the soil liner and will not be measured for separate payment.

END OF SECTION 02218

**SECTION 02220
TRENCHING, BACKFILLING, AND COMPACTING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Excavating, backfilling, and compacting for installation of underground pipelines and related structures.
- B. Compacted Bedding

1.02 REFERENCES

- A. ASTM D698 - Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³))
- B. ASTM D2487 - Test Method for Clarification of Soils for Engineering Purposes
- C. ASTM D2937 - Test Method for Density of Soil in Place by the Drive Cylinder Method
- D. ASTM D2488 - Practice for Description and Identification of Soils (Visual-Manual Procedure)
- E. ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil Aggregate by Nuclear Methods (Shallow Depth)

1.03 SUBMITTALS

- A. Provide material product data or Laboratory test results necessary to verify conformance with this specification.

PART 2 PRODUCTS

2.01 BEDDING MATERIAL

- A. Bedding material for pipe shall consist of a minimum 4-inch-thick loose layer of:
 - 1. Clean, screened, native soils of uniform grain size, free of rocks, and meeting the requirements of 2.02; or
 - 2. Washed bank sand or mason's sand; or
 - 3. AASHTO #57 stone; or
 - 4. Approved equal material.
- B. If the subgrade is unsuitable for compaction as determined by the Construction Quality Assurance (CQA) Consultant, excavate, and remove the unsuitable material and replace with AASHTO #57 stone (minimum 4" thick).
- C. Provide NCDOT approved material test report.

2.02 BACKFILL MATERIAL

- A. Backfill shall consist of clean earth fill, substantially free of lumps, debris, organic matter or other putrescible matter, rock or gravel larger than one (1) inch in any dimension, pavement material, frozen soil, snow, and topsoil.
- B. Soil excavated from the trench that meets the above criteria will be considered suitable for use as trench backfill only after approval by the CQA Consultant.

PART 3 EXECUTION

3.01 GENERAL

- A. Conduct all construction operations in accordance with the U.S. "Occupational Safety and Health Act of 1970", the Standards of the U.S. Department of Labor, Occupational Safety and Health Administration, and the latest amendments thereto.
- B. Protect structures, utilities, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by trenching operations.

3.02 PREPARATION

- A. Identify required lines and grades.
- B. Maintain benchmarks, other control points, existing structures, and paving. If disturbed or destroyed, re-establish at no additional cost to OWNER.
- C. Locate existing utilities and structures above or below ground before excavation starts.
- D. Maintain and protect existing utilities not designated for removal. When utilities are encountered but are not shown on the Drawings, or when locations differ from those shown on the Drawings, notify ENGINEER for instructions before proceeding.

3.03 TRENCH EXCAVATION

- A. Remove topsoil or stone paving from trench lines and stockpile for later use.
- B. Accurately grade the trench bottom to provide uniform bearing for the utility.
- C. Trim and shape trench bottom and leave free of irregularities, lumps, and projections.
- D. The trench walls above the top of the pipe may be sloped or the trench above the top of the pipe may be widened as necessary for bracing, sheeting, and shoring. Conduct all trenching, bracing, shoring, and sheeting in accordance with OSHA requirements.
- E. Excavate trenches to elevations indicated by the Contract Documents.
- F. The width of the trench at and below the top of the pipe shall not exceed the outside diameter of the pipe plus 24 inches. Where this width is exceeded, the CONTRACTOR

shall not be compensated for additional trench excavation without the approval of the ENGINEER.

- G. If the subgrade is unsuitable for compaction as determined by the CQA Consultant, excavate, and remove the unsuitable material and replace with AASHTO #57 stone or approved equal material by the ENGINEER.
- H. Removal of materials beyond the indicated subgrade elevation without authorization by the ENGINEER shall be classified as unauthorized excavation and shall be backfilled and compacted at no additional cost to the OWNER.
- I. Where rock is encountered at the bottom of the trench, excavate to approximately six (6) inches below the depth indicated by the Contract Documents. Place and compact pipe bedding material as specified in paragraphs 2.01 and 3.05.
- J. Remove water from the excavation continuously throughout the progress of the Work and keep the excavation dry until the pipe installation and backfilling are completed.
- K. Provide trench depth to maintain the minimum cover below finished grade as indicated by the Contract Documents.
- L. Where rock is encountered so that a manhole, vault, or other structure will bear on rock, it shall be used to support the foundation. Where only a part of the foundation will be on rock, at least eight (8) inches of compacted granular material shall be provided below bottom of footings.
- M. Blasting for the excavation of trenches requires prior written approval by the ENGINEER.
- N. Provide a minimum of eight (8) inches between rock excavation and sides of structures.
- O. Where underground streams or springs are found, provide temporary drainage, and notify ENGINEER.
- P. Remove and dispose of excess material and material unsatisfactory for backfill as Work progresses.
- Q. Remove shoring and all form materials prior to backfilling.

3.04 SHEETING

- A. Maintain trench walls in a safe condition at all times. Provide sheeting, shoring, and bracing as necessary to prevent cave-in of excavation or damage to existing structures on or adjoining the site.
- B. Comply with local codes and authorities having jurisdiction.
- C. All costs of providing sheeting and shoring shall be borne by the CONTRACTOR.

3.05 BEDDING

- A. Provide bedding under all pipes.
- B. Place bedding material in the bottom of the prepared trench, in continuous loose layers, four (4) inches thick at minimum.
- C. Remove bedding material under pipe bell and spigot joints, if applicable, such that the pipe will be uniformly supported by the bedding.
- D. Place the pipe on the bedding, centered in the trench, and press down gently but firmly to ensure the pipe is in intimate contact with the bedding along entire length.

3.06 BACKFILLING AND COMPACTING (LEACHATE GRAVITY PIPE/FORCEMAIN)

- A. Backfill material shall meet the requirements of paragraph 2.01.
- B. Support pipe during placement and compaction of fill material.
- C. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.
- D. Backfill trench up to a compacted depth of one (1) foot above the pipe in accordance with the details provided in the Contract Documents. Place backfill material by hand, uniformly on each side of pipe and compact in layers not exceeding six (6) inches compacted thickness.
- E. Backfill trench from one (1) foot above the pipe to grade with clean earth fill free of stones not larger than five (5) inches or one-half the layer thickness, whichever is smaller. Layers shall not exceed 12 inches compacted thickness, except that under road shoulders and under existing or future paved areas, layers shall not exceed eight (8) inches compacted thickness.
- F. Excavate depressions caused by the removal of stumps or other cleaning operations to firm subgrade. Backfill with clean earth fill and compact as specified.
- G. Place backfill material on both sides of the pipe at the same time and to approximately the same elevation. Each layer shall be thoroughly compacted by hand-tamping or mechanical means being careful not to damage the pipe. Any pipe that is damaged shall be replaced at the CONTRACTOR's expense.
- H. Maintain optimum moisture content of backfill materials to attain required compaction density.
- I. Compact soil materials using equipment suitable for materials to be compacted and work area locations. Use power-driven hand tampers for compacting materials adjacent to structures.
- J. Backfill material shall be compacted to the 95% of the maximum density (Standard Proctor) at ± 3 of the optimum moisture content as determined by pre-construction soil testing (ASTM D 698).
- K. Spread stockpiled topsoil material over disturbed areas and lightly compact.

- L. Replace stone paving in disturbed areas and compact.
- M. The backfill shall extend to no less than 12 inches above the crown of the pipe unless otherwise approved by the ENGINEER.

3.08 TOLERANCES

- A. Top surface of backfilling: ± 1 inch from required elevations.

3.09 FIELD QUALITY CONTROL

- A. Testing of Trench Backfill Material
 - 1. Compaction/Density tests: minimum of one (1) test for every 100 feet of trench
- B. Materials not meeting density specification requirement shall be scarified, recompact, and retested at CONTRACTOR's expense.
- C. The ENGINEER may require additional tests to establish gradation, maximum density, and in-place density as working conditions dictate, at the CONTRACTOR's expense.

3.10 DISPOSAL OF MATERIAL

- A. Dispose excess and unsuitable materials on site at a location designated by the ENGINEER.

END OF SECTION 02220

**SECTION 02222
EXCAVATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Removal of topsoil material.
- B. Soil excavation for landfill cells and other project features.
- C. Undercutting and backfilling.
- D. Soil excavation for structures.
- E. Grading.
- F. Stockpiles.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 GENERAL

- A. Identify required lines, levels, contours, and datum.
- B. Locate existing utilities, culverts and structures, above or below ground, before excavation activities begin. Coordinate Work with owners of utilities. Protect, maintain in service, and prevent damage to utilities not designated to be removed. When utilities are encountered and are not shown on the Drawings, or when locations differ from those shown on the Drawings, notify ENGINEER for instructions before proceeding.
- C. Unauthorized excavation consists of the removal of material below or beyond indicated subgrade elevations or sides without approval of the ENGINEER. Unauthorized excavation shall be replaced at CONTRACTOR's expense.
- D. All fill materials used to restore unauthorized excavations shall be subject to the approval of the CQA Consultant.
- E. Depressions caused by the removal of stumps shall be excavated to firm subgrade.
- F. Existing utilities, structures, and fencing shall be protected during the construction period, and if damaged or removed by the CONTRACTOR, shall be repaired or replaced to the satisfaction of the OWNER at the CONTRACTOR's expense.
- G. Where excavations have been carried below or beyond points required, restore these areas to the elevations and dimensions shown on the Drawings with material approved by the ENGINEER and compacted as specified.

- H. Where the removal of unsatisfactory material is due to the fault or negligence of the CONTRACTOR, by inadequate shoring or bracing, or other failure to meet specified requirements, work shall be conducted at no additional cost to the OWNER.

3.02 REMOVAL OF TOPSOIL MATERIAL

- A. Excavate topsoil material from areas to be further excavated or regraded.
- B. Strip topsoil material to full depth, and stockpile separate from other excavated materials. Stockpile free of roots, stones, and other undesirable materials. Follow guidelines in the North Carolina Erosion and Sediment Control Planning and Design Manual to prevent erosion.
- C. Stockpile in area designated on-site.

3.03 EXCAVATION FOR LANDFILL CELLS AND OTHER PROJECT FEATURES

- A. Excavate to the lines and grades indicated by the Documents.
- B. Areas that receive permanent seeding shall be graded below finished grades shown, leaving space for topsoil material.
- C. Excavated soil not needed immediately for construction shall be stockpiled in an area designated by the OWNER. Implement erosion control practices as indicated by the Contract Documents and as required by the North Carolina Erosion and Sediment Control Planning and Design Manual.
- D. Stockpile or dispose at the active landfill facility continuously with the progress of the work and as directed by facility personnel all excess material, trash and debris, and materials that are unsatisfactory for backfill or fill.
- E. All excavations shall be dewatered as necessary to provide proper protection. The ENGINEER may require excavation to be continuously dewatered 24 hours per day until backfilling has been completed.
- F. Where underground streams or springs are found, provide temporary drainage and notify the ENGINEER immediately.
- G. Excavate so that banks of excavation will not be undercut and stratum for foundations will not be disturbed.
- H. Excavate unsatisfactory soil materials encountered to the additional depth as directed by the ENGINEER.
- I. Grade site to prevent introduction of surface water into excavations.

3.04 ANCHOR TRENCH EXCAVATION AND BACKFILLING

- A. Excavate trenches to the depth and dimension indicated by the Contract Documents, and trim and shape trench bottom and leave free of irregularities, lumps, and projections.

- B. Remove water from the excavation throughout the progress of the Work and keep the excavation dry until the geosynthetic materials installation and backfilling are completed.
- C. Place excavated soil as backfill evenly maintaining approximately the same elevation. Each layer shall be compacted by mechanical means being careful not to damage the geomembrane. Any damaged liner shall be replaced at the CONTRACTOR's expense.
- D. Maintain optimum moisture content of backfill materials to attain required compaction density.
- E. Compact backfill using equipment suitable for materials to be compacted and work area locations.
- F. Backfill material shall be compacted to 95% of the maximum density (Standard Proctor) at optimum moisture content \pm 3% as determined by ASTM D 698.
- G. Anchor trench backfill material Compaction/Density test frequency minimum of one (1) test for every 100 feet of trench.
- H. Materials not meeting density specification requirement shall be scarified, recompacted, and retested at CONTRACTOR's expense.
- I. The ENGINEER may require additional tests to establish gradation, maximum density, and in-place density as working conditions dictate, at the CONTRACTOR's expense.

3.05 UNDERCUTTING AND BACKFILLING

- A. Excavate muck or other unsuitable soils to a depth below grade as directed by CQA Consultant.
- B. Limit cut slopes to one (1) vertical to three (3) horizontal (3H:1V).
- C. Dispose excavated materials in the designated daily cover stockpile area.
- D. Backfill excavation with materials meeting the requirements of Section 02200.
- E. Prepare subgrade and backfill excavation in accordance with Section 02200.

3.06 EXCAVATION FOR STRUCTURES

- A. Conform to elevations and dimensions indicated by the Contract Documents. Extend the excavation a sufficient distance from footings and foundations to permit placement and removal of concrete forms and other construction required. Foundation concrete shall not be placed until the bearing stratum has been examined by ENGINEER and found satisfactory for the design bearing capacity.
- B. Where rock is encountered, notify the ENGINEER. When the entire structure will bear on rock, it shall be used to support the foundation. Where only a part of the foundation would bear on rock, excavate eight (8) inches below the entire structure and backfill with aggregate fill and thoroughly compact.

- C. Provide an 8-inch minimum clearance between rock excavation and walls of pipes and structures.

3.07 GRADING

- A. Uniformly grade all areas within the limits designated indicated by the Contract Documents, including adjacent transition areas. Finish surfaces within specified tolerances with uniform slopes between points where elevations are shown and existing grades.
- B. Finish all surfaces free from irregular changes, and grade to drain as indicated by the Contract Documents.
- C. Shape the subgrade under unpaved areas to the proposed line and grade so that the finished surface is within 0.20 feet of the required subgrade elevation.
- D. Protect newly graded areas from traffic and erosion. Repair and re-establish grade in settled, eroded, or rutted areas to the specified tolerances.
- E. Where compacted areas are disturbed by subsequent construction or adverse weather, scarify the surface, reshape and compact to the required density. Use hand tamper for re-compaction over underground utilities.
- F. Grade borrow area and conduct borrow activities in accordance with the approved Erosion and Sediment Control Plan for the borrow area.

3.08 STOCKPILES

- A. Construct stockpile slopes no steeper than three (3) horizontal to one (1) vertical (3H:1V).
- B. Install continuous silt fence around stockpiles as shown on the Drawings.
- C. Soil in stockpiles shall be compacted to a sufficient degree to minimize infiltration of rainfall. Compaction shall be to the satisfaction of the ENGINEER. Cover stockpile with plastic sheeting if necessary.
- D. Slopes of the stockpile shall be "tracked" by movement of a cleated dozer up and down the slope.
- E. Stabilize all stockpile surfaces that will be exposed for more than 30 days with grass or approved cover materials.
- F. Maintain adequate temporary erosion control until grass is well established.

END OF SECTION 02222

**SECTION 02225
DRAINAGE LAYER (AGGREGATE)**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Construction of the drainage layer for the landfill cell.

1.02 RELATED SECTIONS

- A. Section 01400 – Quality Control
- B. Section 01410 – Quality Assurance

1.03 REFERENCES

- A. North Carolina Department of Transportation Standard Specifications for Roads and Structures, latest edition.

1.04 SUBMITTALS

- A. Submit quarry certificates showing material compliance with specifications.
- B. Submit results of gradation analysis and laboratory testing of material proposed for use in the drainage layer.
- C. Submit quarry certificate for the hydraulic conductivity of the material in compliance with specifications.
- D. Submit a quarry certificate that the material is non-calcium carbonate.

PART 2 PRODUCTS

2.01 MATERIAL

- A. Material shall be washed granitic rock.
- B. The gradation of the material shall conform to North Carolina Department of Transportation (NCDOT) Specifications for No. 6M or 67 coarse aggregate (see Table 1), unless otherwise approved by the engineer.
- C. Material shall contain no greater than 5% calcium carbonate equivalent as determined by ASTM D3042 or approved equivalent test method. A quarry certificate is required to demonstrate that the material is non-calcium carbonate.
- D. The specific gravity of the material shall be 2.60 or greater unless otherwise approved by ENGINEER.

- E. The hydraulic conductivity of the material shall be 0.3 cm/sec or greater unless otherwise approved by ENGINEER.

Figure 1: NCDOT Aggregate Gradation – Coarse Aggregate

TABLE 1005-1 AGGREGATE GRADATION - COARSE AGGREGATE													
Percentage of Total by Weight Passing													
Std. Size #	2"	1 1/2"	1"	3/4"	1/2"	#4	#8	1/2"	#10	#16	#40	#200	Remarks
4	100	90-100	20-55	0-15	-	-	-	-	-	-	-	0-0.6 ^A	Asphalt Plant Mix
467M	100	95-100	-	35-70	-	0-5	-	-	-	-	-	0-0.6 ^A	Asphalt Plant Mix
5	-	100	90-100	20-55	0-10	-	-	0-10	-	-	-	0-0.6 ^A	AST Mat Coat, Sediment Control Stone
57	-	100	95-100	-	25-60	0-10	0-5	25-60	-	-	-	0-0.6 ^A	AST, Str. Conc., Shoulder Drain, Sediment Control Stone
57M	-	100	95-100	-	25-45	0-10	0-5	25-45	-	-	-	0-0.6 ^A	AST, Portland Cement
6M	-	-	100	90-100	20-55	0-8	-	20-55	-	-	-	-	AST, Concrete Pavement
67	-	-	100	90-100	-	0-10	0-5	-	-	-	-	0-0.6 ^A	AST
78M	-	-	-	100	98-100	20-45	0-15	98-100	-	-	-	0-0.6 ^A	AST, Str. Conc., Drilled Piers, Asphalt Plant Mix
14M	-	-	-	-	-	35-70	5-20	-	-	0-8	-	0-0.6 ^A	Asphalt Plant Mix, AST, Weep Hole Drains, Str. Concrete
9	-	-	-	-	-	85-100	10-40	-	-	0-10	-	0-0.6 ^A	AST
ABC	-	100	75-97	-	55-80	35-55	-	55-80	25-45	-	14-30	4-12 ^B	-
ABC (M)	-	-	-	-	100	5-40	0-20	100	-	0-10	-	0-2.5 ^B	Aggregate Stabilization, Aggregate/Base Course, Asphalt Plant Mix
Light-weight	-	100	75- 100	-	45-79	20- 40	-	45-79	0- 25	-	-	0-12	AST

A. See Subarticle 1005-4(A).

B. See Subarticle 1005-4(B).

PART 3 EXECUTION

3.01 CONSTRUCTION QUALITY CONTROL (CQC)

- A. The CONTRACTOR will provide a testing program to perform the following minimum laboratory tests on the drainage layer material (aggregate). All testing will be performed by an independent qualified geotechnical consultant and testing laboratory and under the direction of a Registered Professional ENGINEER licensed in the State in which the project work is conducted. Laboratory Testing includes:

1. Gradation Analysis
Gradation analysis (ASTM D422) shall be conducted at a frequency of one test for each material type or material source.
2. Specific Gravity
Specific gravity test (ASTM D854) shall be conducted at a frequency of one test for each material type or material source.

3. Hydraulic Conductivity
Laboratory Compacted Hydraulic Conductivity (ASTM D2434) shall be conducted at a frequency of one test for each material type or material source.
4. Calcium Content
Carbonate content test (ASTM D4373) shall be conducted at a frequency of one test for each material type or material source.

3.02 CONSTRUCTION

- A. Construct drainage layer to the lines and grades indicated by the Contract Documents.
- B. Place and spread drainage layer material in such a manner as to avoid operation of the equipment directly on underlying geosynthetic materials.
- C. Low ground pressure equipment (less than 15 psi), or other equipment approved by the ENGINEER, shall be used for spreading and grading the drainage layer material.
- D. Construct a 4-foot-thick traffic surface to support haul trucks delivering material to the area of work.
- E. Do not damage any underlying geosynthetic materials.
- F. Place drainage layer in one lift. Do not compact.
- G. When placing the drainage layer material on slopes, begin placement of the material at the bottom of the slope and work up.
- H. Do not push material down the slopes.

3.03 CONSTRUCTION QUALITY ASSURANCE (CQA)

- A. Field inspection will be performed under provisions of Section 01410.

END OF SECTION 02225

**SECTION 02274
RIPRAP**

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Providing and placing riprap.

1.02 SUBMITTALS

- A. Provide material product data or laboratory test results necessary to verify conformance with this specification.
 - 1. Subgrade Lining.
 - 2. Riprap.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Subgrade lining: Non-woven geotextile fabric equivalent to 10 oz. Thrace Linq GTF 300 or crusher run stone produced by secondary crushing of durable rock.
- B. Riprap
 - 1. Provide stone that is sound, tough, dense, angular, resistant to the action of air and water, and suitable in all other respects for the purpose intended.
 - 2. Provide stone meeting the criteria as indicated by the Contract Documents.
 - 3. Grade stone according to the NCDOT gradation specifications and tables.
 - 4. Stone used for riprap shall be hard, durable, angular in shape; resistant to weathering and to water action; free from overburden, spoil shale, and organic materials; and shall meet the gradation requirements specified (D₅₀ size).
 - 5. Shale and stone with shale seams are not acceptable. The minimum weight of the stone shall be 155 pounds per cubic foot (pcf) as computed by multiplying the specific gravity (bulk-saturated-surface-dry basis, AASHTO Test T 85) times 62.3 pcf.

PART 3 EXECUTION

3.01 PROCEDURE

- A. Line prepared subgrade with six (6) inches of crusher-run stone or geotextile fabric.
- B. Reject geotextile fabric having defects, rips, holes, flaws, deterioration or damage.
- C. Lay geotextile fabric smooth and free from tension, stress, folds, wrinkles, or creases.

Overlaps shall be a minimum of 12 inches with the upper fabric overlapping the lower fabric.

- D. The geotextile fabric shall be anchored a minimum six (6) inches into the subgrade on all sides.
- E. Remove fabric that is damaged or damaged during riprap placement and replace at no additional cost to the Owner.
- F. Protect geotextile fabric from damage due to placement of riprap by limiting the height of drop of the material.
- G. No more than 72 hours shall elapse from the time the fabric is unwrapped to the time the fabric is covered with riprap.
- H. Place riprap stone to the dimensions indicated by the Contract Documents.
- I. Stone may be placed by mechanical methods, augmented by hand placing where necessary.
- J. The minimum thickness of the riprap shall be as indicated by the Contract Documents. The completed riprap layer shall be properly graded, dense and neat. The minimum thickness of the riprap shall be installed throughout the channel slopes and floor.
- K. The final grades on the Contract Documents represent riprap final elevation.

END OF SECTION 02274

**SECTION 02420
RUN-ON AND RUN-OFF CONTROL SYSTEMS**

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

Provide personnel, equipment, and materials to construct a surface runoff collection and diversion system.

1.02 Reference Specifications are referred to by abbreviation as follows:

- A. American Association of State Highway and Transportation Officials.....AASHTO
- B. American Society for Testing and Materials.....ASTM
- C. North Carolina Department of TransportationNCDOT

1.03 Submit shop drawings of the following:

- A. Prefabricated drainage structures
- B. Riprap
- C. Erosion control blanket (ECB)
- D. Turf reinforcement matting (TRM)
- E. Reinforced concrete pipe
- F. Corrugated metal pipe
- G. Corrugated polyethylene pipe

PART 2 PRODUCTS

2.01 GENERAL

All construction and materials shall conform to the latest edition of NCDOT standards and specifications except where local standards are applicable.

2.02 STORMWATER CONVEYANCE CHANNELS

All stormwater conveyance channels not lined with riprap or concrete shall be promptly seeded following construction in accordance with construction details and Section 02936 – Seeding.

- A. Stormwater Conveyance Channels shall be constructed in accordance with the Contract Documents.
- B. Vegetated Stormwater Conveyance Channels, where applicable, shall conform to seeding schedule required in Specification Section 02936 – Seeding.

2.03 RIPRAP

- A. All stone used for riprap shall meet the requirements of Section 02274.
- B. The sources from which the riprap will be obtained shall be selected well in advance of the time when the riprap will be required in the work. The acceptability of the riprap shall be determined by service records and/or by suitable tests. If testing is required, suitable samples of riprap shall be taken in the presence of the ENGINEER at least 15

days in advance of the time when the placing of riprap is expected to begin. The approval of some material from a particular quarry site shall not be construed as constituting the approval of all material taken from that quarry.

2.04 TURF REINFORCEMENT MATTING (TRM) AND EROSION CONTROL BLANKET (ECB)

Any ditches that have been seeded shall immediately be lined with an erosion control blanket, as indicated on the Drawings. The erosion control blanket shall be North American Green SC150 (or approved equal) for temporary lining of ditches and matting of slopes steeper than 3:1. North American Green C350 Turf Reinforcement Matting (TRM) (or approved equal) shall be used for permanent lining of ditches as indicated on the Drawings.

2.05 REINFORCED CONCRETE PIPE

- A. Reinforced Concrete Pipe and Fittings shall meet requirements of ASTM C76, "Reinforced Concrete Culvert, Storm Drain and Sewer Pipe". All pipe and flared end sections shall be Class III unless otherwise indicated on the Drawings.
- B. All reinforced concrete pipe joints shall be fashioned watertight. Rubber gaskets for concrete pipe joints shall meet requirements of ASTM C443, "Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets."

2.06 CORRUGATED METAL PIPE

- A. All corrugated metal pipe furnished shall be galvanized steel, bituminous coated, minimum 16 gauge. Corrugations shall have a pitch of 2 2/3 inch and a depth of 1/2 inch.
- B. Corrugated metal pipe, coupling bands, and other special sections shall conform to the requirements of AASHTO M190. The pipe may be of riveted or non-riveted type. Special sections shall be of the same gauge as the conduit to which they are joined and shall conform to the applicable standards of AASHTO M36.
- C. All fittings, connecting bands, and special sections shall be from the same manufacturer as the pipe to which they are joined unless otherwise approved in writing by the ENGINEER.
- D. All corrugated metal pipe joints shall be fashioned watertight.

2.07 CORRUGATED POLYETHYLENE PIPE

- A. All corrugated polyethylene pipe shall be manufactured from high-density polyethylene in accordance with the requirements of ASTM F667 "Standard Specification for 3 through 24 in. Corrugated Polyethylene Pipe and Fittings", at minimum.
- B. Corrugated polyethylene pipe, coupling bands, and other special sections shall conform to the requirements of AASHTO M294 and ASTM F-667. All fittings, connecting bands, and special sections shall be from the same manufacturer as the pipe to which they are joined unless otherwise approved in writing by the ENGINEER.
- C. All corrugated polyethylene pipe joints shall be fashioned watertight.

PART 3 EXECUTION

3.01 GENERAL

- A. Maintain drainage on site to prevent erosion, water damage, and standing water during all phases of construction.
- B. Keep excavation clear of water while work is being installed. Control sub-surface water encountered and report to the ENGINEER.
- C. Construct inlets, end walls, and other storm drainage items as detailed in the latest edition of the NCDOT Standards or on the Drawings, as applicable.

3.02 STORMWATER CONVEYANCE CHANNELS

Stormwater conveyance channels shall be constructed in accordance with details and profiles as illustrated in the Drawings.

3.03 RIPRAP

Slopes to be protected by riprap shall be free of brush, trees, stumps, and other objectionable materials and be dressed to smooth surface. All soft or spongy material shall be removed to the depth directed by the ENGINEER and replaced with approved native material. All channels lined with riprap shall be installed with a subgrade lining in accordance with the requirements of Section 02274.

3.04 EROSION CONTROL STRUCTURES

Erosion control facilities shall be installed as shown and detailed on the Drawings. Silt fence shall be Mirafi Envirofence or equal.

3.05 EROSION CONTROL BLANKET

Erosion control blankets shall be installed according to manufacturer's recommendation and as outlined in the Contract Documents and the NCDEQ Stormwater Design Manual.

3.06 PIPE

- A. Lay pipe true to line and grade. Do not lay pipe when trench conditions or weather are unsuitable for such work. Keep pipe interior clean and free from dirt or waste materials.
- B. Pipe laying shall proceed upgrade with the spigot ends pointing in the direction of flow.
- C. Fashion concrete pipe joints for circular concrete sewer and culvert pipe using rubber gaskets in accordance with ASTM C443.
- D. As each joint is fashioned, visually inspect to be certain that no jointing compound, gasket, or trash is protruding from the joint or lying inside the pipe.

- E. Each pipe shall be laid true to line and grade and in such a manner as to form a close concentric joint with adjoining pipe and to prevent sudden offsets to flow line.
- F. A continuous and uniform bedding shall be provided in the trench for all buried pipes.
- G. As work progresses, the interior of the pipe shall be cleared of dirt and superfluous materials of every description.
- H. At all times when work is not in progress, all open ends of pipe and fittings shall be securely closed so that no water, earth, or other substance will enter the pipe or fittings.

END OF SECTION 02420

**SECTION 02500
STONE SURFACING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Providing aggregate base course (ABC), surge stone, and geotextile fabric for roadways.

1.02 REFERENCES

- A. ASTM D422 – Standard Test Method for Particle-Size Analysis of Soils.
- B. ASTM D698 – Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³))
- C. ASTM D3017 – Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
- D. North Carolina Department of Transportation Standard Specifications for Roads and Structures, latest edition.

1.03 SUBMITTALS

- A. Submit job mix formula of proposed material at least 40 days prior to placement of aggregate base course.
- B. Proposed job mix formula shall be approved by the ENGINEER prior to use.
- C. Testing of aggregate samples shall be paid for by CONTRACTOR.
- D. Identify proposed supplier with the job mix formula submission.

1.04 CONSTRUCTION QUALITY CONTROL AND CONSTRUCTION QUALITY ASSURANCE CQC/CQA)

- A. Acceptance by the ENGINEER of aggregate base course shall be dependent on the Soils CQA Consultant satisfying all requirements of the CQA Plan during the course of the work and the test results showing that all requirements of this Section have been met.
 - B. Supporting data for CQA purposes shall be obtained by field and laboratory testing to be conducted by the soils CQA Consultant.
- B. Field and laboratory testing conducted by the CQA Consultant will be done at the OWNER'S expense.

PART 2 PRODUCTS

2.01 AGGREGATE BASE COURSE

- A. Aggregate shall be NCDOT Type ABC aggregate furnished in accordance with the latest

edition of the NCDOT Standard Specifications for Roads and Structures.

2.02 SURGE STONE

- B. Surge stone shall be AASTHO #1 furnished in accordance with the latest edition of the NCDOT Standard Specifications for Roads and Structures.

2.02 GEOTEXTILE FABRIC

- A. Geotextile fabric shall be woven geotextile fabric, Mirafi 600X as manufactured by Tencate Geosynthetics of Pendergrass, GA, or approved equal.

PART 3 EXECUTION

3.01 SUBGRADE PREPARATION

- A. Prepare areas to receive aggregate base course in accordance with Section 02100, Site Preparation.
- B. Where subgrade requires undercutting, limit cut slopes to one (1) vertical to three (3) horizontal (3H:1V).
- C. Grade areas to receive aggregate base course to a uniform surface. Scarify surface if directed by the ENGINEER.
- D. Eliminate ruts, hummocks, or other uneven features.
- E. Proofroll the subgrade with a loaded tandem-axle dump truck having a minimum weight of 20 tons or other similar rubber-tired equipment.
- F. Make at least two (2) passes in each direction with the proofrolling equipment.
- G. Remove and replace any soft, saturated, or yielding areas indicated by pumping or rutting.
- H. Replace soil that has been removed with structural fill material in accordance with the requirements of Section 02200.
- I. Where unsuitable soil was removed, compact the structural fill material to at least 95% of the maximum dry density (Standard Proctor) at $\pm 3\%$ optimum moisture content as determined by ASTM D698 to a depth of at least 12 inches.
- J. Dry or wet the subgrade at the discretion of the ENGINEER to establish a subgrade with acceptable moisture content.
- K. Place geotextile fabric as shown on the Drawings. Place in strict accordance with manufacturer's recommendations.
- L. Do not construct structural fill layer until the subgrade has been approved by the ENGINEER.

3.02 CONSTRUCTION

- A. Construct project features to the lines and grades indicated by the Contract Documents.
- B. Place surge stone and aggregate base course in lifts no greater than four (4) inches compacted depth.
- C. Compact surge stone and aggregate base course to a minimum dry density of 100% of the maximum dry density determined from the Standard Proctor Test (ASTM D698).
- D. In-place surge stone and aggregate base course that does not meet the density requirements shall be recompactd or removed and reworked to meet density objectives.
- E. Do not place surge stone and aggregate base course during sustained period of temperatures below 32° F.

3.03 PROTECTION OF WORK

- A. Protect the finished surface from erosion, desiccation, or other damage.
- B. Portions of the surge stone and aggregate base course damaged due to exposure shall be reworked to meet the Specifications or, at the discretion of the ENGINEER, removed and replaced with conforming material at no additional cost to the OWNER.
- C. Portions of the surge stone and aggregate base course damaged due to CONTRACTOR construction traffic during the project shall be removed and replaced at the completion of the project with conforming material at no additional cost to the OWNER.

3.04 QUALITY ASSURANCE

- A. Field inspection and testing will be performed under provisions of Section 01410.
- B. Prior to material placement, testing for moisture-density relationship will be performed on proposed surge stone and aggregate base course material in accordance with ASTM D698. Frequency: A minimum of one test per 5,000 cubic yards of each material. CONTRACTOR is required to provide quantities of materials delivered to the site.
- C. Testing of the in-place aggregate base course will include density/moisture content tests in accordance with ASTM D2922/D3017. Frequency: One (1) test per 100 linear feet of roadbed per lift.
- D. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to OWNER.
- E. The horizontal and vertical location of all test locations will be recorded. A drawing will be prepared showing all test locations.

END OF SECTION 02500

**SECTION 02618
HIGH-DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS**

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Installation of HDPE piping and fittings.

1.02 REFERENCES

- A. ASTM F2620 – Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings.
- B. ASTM D3261 – Standard Practice for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
- C. ASTM D3350 – Standard Practice for Polyethylene Plastic Pipe and Fitting Materials.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Protect pipe from sun, elements, and weather changes.
- B. Store pipe in areas that are safe from normal daily plant operations and from construction activities.

1.04 SUBMITTALS

- A. Provide product technical data for pipe materials, pipe fittings, and accessories as necessary to verify conformance with this specification.
- B. Provide survey in accordance with Section 01050 for all pipe locations and invert elevations to the ENGINEER for review and acceptance.
- C. Provide pipe testing and flushing procedures to the ENGINEER for review and acceptance. Provide all gauges, pumps, pipe, connections, and all other necessary apparatus to conduct tests.
- D. Provide technical data for equipment and appurtenances proposed for fashioning butt joints and electrofusion joints, including but not limited to: Manufacturer, Model number, technical specifications, and complete instructions for fashioning joints using the submitted product.
- E. Video Inspection Report(s)
- F. Pipe Testing Report(s)

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Acceptable manufacturers of pipe include, but are not limited to:
1. Plexco
3240 N. Mannheim Road
Franklin Park, IL 60131
 2. Phillips Driscopipe, Inc.
2929 North Central Expressway
Richardson, TX 75083
 3. ISCO Industries
100 Witherspoon Street 2West
Louisville, KY 40202
 4. Equal product, subject to the review and approval of the ENGINEER.

2.02 MATERIALS

- A. HDPE Leachate Collection Pipe and Gravity Conveyance Carrier Pipe - SDR 17, Iron Pipe Size (IPS) PE 4710, minimum 2% carbon black, cell classification 445574C/E (or other classification approved by the ENGINEER), solid wall and perforated, in diameters as indicated on Contract Documents.
- B. HDPE Pipe - SDR 17, IPS, PE 4710, minimum 2% carbon black, cell classification 445574C/E (or other classification approved by the ENGINEER), in diameters as indicated on the Contract Documents.
- C. HDPE Manhole - 48-inch diameter SDR 32.5, meeting the requirements of ASTM F1759 - "Design of High-Density Polyethylene Manholes for Subsurface Applications" including calculations to demonstrate appropriate wall thickness for burial depths, and adequate ballast to prevent buoyancy.
- D. Joints: Butt, heat fusion process in accordance with submitted manufacturer instruction. Use of electrofusion type couplings shall be subject to the review and approval by the ENGINEER on a case-by-case basis. Saddle connection shall be by sidewall heat plate machine (not by extrusion).
- E. Fittings: Fittings may be molded or prefabricated by the manufacturer and shall have the same DR rating and shall be fashioned from the same resin as the pipe to which they will be joined.
- F. Above-ground Riser Termination: shall be ISCO Fast Flange or approved equal. All components shall be constructed of corrosion resistant materials and hardware (UV stabilized HDPE, 18-8 grade stainless steel or better).
- G. All blind flanges or leachate pipes cleanouts shall be installed with gasket and stainless-steel hardware.

PART 3 EXECUTION

3.01 INSPECTION

- A. Inspect pipe, fittings, and other appurtenances at least seven (7) days prior to installation and indicate any deficiencies in writing to the OWNER.
- B. Damaged or deficient materials, and any materials that are not in accordance with the specifications shall be promptly removed from the site at the expense of CONTRACTOR.

3.02 PREPARATION

- A. Ream pipe and tube ends. Remove burrs.
- B. Remove dirt and other contaminants, inside and outside, from pipe and fitting materials before assembly.
- C. Make straight field cuts without chipping or cracking pipe.

3.03 INSTALLATION

- A. Make heat fusion joints in accordance with manufacturer's recommended procedures.
- B. Install pipe and fittings to the line and grade indicated by the Contract Documents.
- C. The maximum allowable tolerance for grade is 0.10 foot.
- D. Flanged adaptors (as required) shall be attached to HDPE manhole inlets and outlet stubs during fabrication by butt fusion welding per ASTM F 2620.
- E. Flanged joints shall be fashioned using stainless steel backing rings, bolts, and nuts.
- F. All stainless-steel threads shall be coated with anti-seize compound prior to assembly.
- G. Above Ground Riser Termination:
 - 1. The lid shall be hinged so that it may be accessed without having to be completely removed from the riser.
 - 2. The bolts securing the hinged lid can be loosened by hand, without wrenches or other specialized tools.
 - 3. The hardware securing the lid shall be captive such that the lid may be opened without fully removing the associated hardware.
 - 4. The lid shall have sealing capabilities to minimize the intrusion of ambient air when vacuum is applied.
 - 5. The lid system seal shall consist of a minimum of a quarter inch thick nitrile rubber gasket, o-ring, or similar.
 - 6. The back up ring shall be made of corrosion resistant material compatible with the other components of the lid assembly.

7. The back up ring shall be “split” that it may be replaced, if needed, in the future.

3.04 FIELD QUALITY CONTROL

- A. ENGINEER to observe all pipe, joints and fittings prior to backfilling.
- B. Flush pipe with clean water when construction is completed. Submit details of flushing program to ENGINEER for approval. Provide detail of temporary flushing method that will allow free flow discharge of flush water from low end of pipe so that flush water may be observed by the ENGINEER. Flush until water runs clear. Flushing program is to remove all debris including HDPE cuttings, soil, gravel, and all contaminants from pipelines. CONTRACTOR to provide all water and equipment required to complete the flushing. Flushing water shall be collected by the CONTRACTOR and disposed in accordance with local and State requirements. The cost of flushing water disposal shall be the responsibility of the CONTRACTOR.
- C. Pneumatic testing or hydraulic testing: Submit detailed testing procedure to ENGINEER for approval. Test the system in accordance with the pipe manufacturer’s instructions and as follows and submit all test results to ENGINEER.
 1. For landfill gas pipes use pneumatic testing: Pressure-test all pipe, fittings, and appurtenances except piping below landfill gas well heads. Mechanically plug the ends of pipelines to be tested and close gate valves at all wells. Pressurize the line. Close the valve on the pressurizing unit and monitor the pressure.
 2. For dual contained leachate transmission pipes (exterior containment pipe) use pneumatic testing: Pressurize the containment pipe with air. Close the valve on the pressurizing unit and monitor the pressure in accordance with the detailed testing procedures as approved by the ENGINEER.
 3. For dual contained leachate transmission pipes (interior carrier pipe) use hydraulic testing in accordance with the requirements of Section 02716.
 4. Tests shall be performed in the presence of the ENGINEER or representative. Give 48-hour notice to ENGINEER prior to testing. A written report shall be prepared by the CONTRACTOR for each test and submitted to the ENGINEER.
 4. If results of tests performed do not conform to requirements as stated herein, CONTRACTOR shall make the necessary repairs and repeat tests, as required until satisfactory results are obtained.
- D. Provide video inspection of the flushed leachate collection pipe system upon completion. Provide video inspection report and video inspection records to the ENGINEER and OWNER at the completion of the camera inspection.

END OF SECTION 02618

**SECTION 02712
LEACHATE COLLECTION SYSTEM**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Furnishing and installing leachate collection pipes, fittings, and accessories.
- B. Furnishing and installing collection pipe cleanouts.

1.02 PROJECT RECORD DOCUMENTS

- A. Submit documents under provisions of Section 01720.
- B. Survey location of pipe runs, connections, and invert elevations.
- C. Submit video inspection report and records.

PART 2 PRODUCTS

2.01 PIPE

- A. HDPE pipe shall meet requirements of Section 02618 – HDPE Pipe & Fittings.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that the base is ready to receive work and excavations, and dimensions and elevations are as indicated on the Contract Drawings.

3.02 INSTALLATION

- A. Install pipe to the lines and grades shown on the Contract Drawings.
- B. Install pipe and pipe fittings in accordance with manufacturer's instructions.

3.03 FIELD QUALITY ASSURANCE

- A. Field inspection will be performed under provisions of Section 01410.
- B. Flush leachate collection pipe when construction is completed. Flush pipe to allow free flow of water from low end of pipe to remove shavings and other contaminants from the pipe. Flushing shall be observed by the ENGINEER's representative. CONTRACTOR shall provide all water and equipment required to perform the flushing.
- C. Provide video inspection of the flushed leachate collection pipe system upon completion. Provide video inspection report and video inspection records to the ENGINEER and OWNER at the completion of the camera inspection.

- D. The interior portion of welding joints, elbows, and bends of pipes and risers will be treated to ensure no obstruction for egress and ingress of tools and instruments

3.04 PROTECTION

- A. Protect finished installation under provisions of Section 01500.

END OF SECTION 02712

**SECTION 02714
LEACHATE FORCE MAIN**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Furnishing and installing the leachate force main and required fittings and accessories for a complete and operable system as indicated by the Contract Documents.

1.02 PROJECT RECORD DOCUMENTS

- A. Accurately record location of pipe runs, fittings, appurtenances, and connections and provide a surveyed Record Drawing of the leachate force main under provisions of Section 01720.

PART 2 PRODUCTS

2.01 PIPE

- A. Use HDPE pipe according to Specification 02618 with a nominal diameter indicated by the Contract Documents.
- B. All leachate force mains shall be dual contained, except at locations specifically identified by the Contract Documents.

2.02 DISCHARGE VALVES

- A. Check Valve: Ball type, constructed of solid PVC thermoplastic. Check valves shall be single ball design with Viton seat. Valves shall have a minimum pressure rating of 150 psi at 70 degrees F. Fittings shall be as required to allow connection with mating pipe and allow access to the valve for removal and service. Check valves shall be suitable for installed orientation.
- B. Ball Valve: Full port ball true union type constructed of PVC thermoplastic with Viton seals. Valves shall have a minimum working pressure of 150 psi at 70 degrees F. Fittings shall be as required to allow connection with mating pipe and allow access to the valve for removal or service.
- C. Air Release Valve: The air release valve shall be selected for the size of the piping system and application and be constructed of PVC with seals compatible with the application.
- D. Valves shall be provided with required suitable companion flanges/fittings and stainless-steel bolt kits with gaskets where required for installation in the system.

2.03 THRUST BLOCKS

- A. Thrust blocks shall be placed at locations indicated by the Contract Documents and shall be constructed of concrete meeting the requirements of ASTM C94 and having a compressive strength of 3,000 psi at 28 days.

2.04 PIPE INSULATION AT SUMP HEADWALL

- A. Pipe insulation shall be constructed in accordance with ASTM C585 and provide insulation for outdoor application in Transylvania County, NC.

2.05 PIPE CLADDING AT SUMP HEADWALL

- A. Pipe cladding shall be constructed in accordance with ASTM C1879 and provide durable noncorrosive insulation for outdoor application in Transylvania County, NC.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install pipe and pipe fittings in accordance with manufacturer's instructions and the requirements of Section 02618.
- B. Clean and flush pipe in accordance with approved procedures submitted under the requirements of Section 02618.

3.02 HYDROSTATIC TESTS

- A. Conduct hydrostatic tests on the leachate force main in the presence of the CQA Consultant and in accordance with the requirements of Section 02716.

3.03 FIELD QUALITY ASSURANCE

- A. Field inspection will be performed under provisions of Section 01410.
- B. Conduct video inspection in accordance with the requirements of Section 02618.

3.04 PROTECTION

- A. Protect finished installation under provisions of Section 01500.

END OF SECTION 02714

**SECTION 02716
HYDROSTATIC TESTING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements for conducting a hydrostatic pressure test on the interior carrier pipe of the dual-contained leachate transmission pipes.

1.02 RELATED SECTIONS

- A. Section 00909 – Submittal Form
- B. Section 02618 – HDPE Pipe & Fittings
- C. Section 02714 – Leachate Force Main

1.03 REFERENCES

- A. American Water Work Association (AWWA):
 - 1. AWWA Manual M55: PE Pipe – Design and Installation
 - 2. AWWA Standard C905 – PVC Pressure Pipe and Fabricated Fittings
- B. ASTM International:
 - 1. ASTM E1003 – Standard Practice for Hydrostatic Leak Testing
 - 2. ASTM F2164 – Field Leak Testing of PE and PEX Pressure Piping System using Hydrostatic Pressure

1.04 SUBMITTALS

- A. CONTRACTOR shall submit a hydrostatic test plan to ENGINEER for approval prior to the commencement of the hydrostatic testing. The testing plan shall be in accordance with the latest version of AWWA Manual M55 or AWWA Standard C905 and include the following:
 - 1. Testing procedures;
 - 2. List of test equipment;
 - 3. Testing sequence schedule;
 - 4. Provisions for disposal of flushing and test water; and,
 - 5. Certification of test gage calibration.
- B. Test and evaluation reports shall indicate the results of pipe testing.

1.05 CONSTRUCTION QUALITY ASSURANCE (CQA)

- A. The hydrostatic pressure test shall be observed by the CQA Consultant.

- B. The CQA Consultant shall record the test and test results in accordance with the CQA Plan in the Contract Documents.

PART 2 PRODUCTS

2.01 EQUIPMENT

- A. Pressure pump;
- B. Pressure hose;
- C. Water meter;
- D. Test connections;
- E. Pressure relief valve;
- F. Pressure alarm;
- G. Emergency pressure shut-off valve,
- H. Trapped air vent; and,
- I. Pressure Gage: Calibrated to 0.1 psi.

PART 3 EXECUTION

3.01 HYDROSTATIC TEST

- A. Furnish all labor, materials, water, and equipment required for conducting tests as specified, including pumps, gauges, temporary bulkheads and other miscellaneous items required. No piping shall be concealed until the hydrostatic tests are satisfactorily completed, except as may be necessary for anchoring the pipe prior to testing.
- B. Conduct tests in such a manner as to avoid injury to personnel, and damage to equipment, Work, and existing facilities.
- C. After the piping is in place and joints completed, partially backfill the trench, leaving the joints exposed for examination. Clean pipe section prior to test. Conduct a hydrostatic pressure test on the in-place pipe as described below.
 - 1. Slowly fill the section of pipe being tested with clean potable water. Expel any air from pipe and take precautions to ensure no air is trapped in the test section.
 - 2. Allow the test section of the pipe and the potable water to equalize to a common temperature.
 - 3. When the test section of the pipe is filled and purged of air, gradually increase the pressure until the required test pressure is reached. The pipe shall be tested in place at 150% of the maximum anticipated operating pressure of the system.

4. Devices that could be damaged by the test pressure shall be isolated or removed from the system during the testing periods. If the device cannot be removed or isolated, then the limiting section test pressure shall be the maximum allowable test pressure for that device.
 5. Add make-up water as necessary to maintain a maximum test pressure for four (4) hours.
 6. Reduce the test pressure by 10 psi (test phase pressure) and monitor the test phase pressure for one (1) hour. Do not increase pressure or add make-up water.
- D. If no visual leakage is observed, and the pressure during the test remains steady for one (1) hour, a passing test is indicated. The pressure change must be within 5% of the test phase pressure.
- E. If test pressure cannot be attained or if it takes an unreasonable amount of time to reach test pressure, visually inspect if there are leaks. If there are no visual leaks, then there may be faults such as in entrapped air, valve opening, or inadequate pressure equipment.
- F. If necessary, retest the test section as described below:
1. Depressurize the test section by reducing pressure or release test liquid at a controlled rate.
 2. Correct faults or repair leaks in the test section.
 3. Retest the test section in accordance with 3.01 C.

END OF SECTION 02716

**SECTION 02721
UNDERDRAIN PIPE SYSTEMS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Construction of the underdrain piping.

1.02 RELATED SECTIONS

- A. Section 01400 – Quality Control
- B. Section 01410 – Quality Assurance

1.03 REFERENCES

- A. North Carolina Department of Transportation (NCDOT) Standard Specifications for Roads and Structures, latest edition.

1.04 SUBMITTALS

- A. Submit shop drawings of the proposed drainage pipes under the provisions of Section 01300 and Section 01320.

1.05 PROJECT RECORD DOCUMENTS

- A. Submit documents under provisions of Section 01720.
- B. Accurately record location of pipe runs, connections, and invert elevations.

PART 2 PRODUCTS

2.01 UNDERDRAIN PIPING: Perforated type N-12 “Fine Slot” HDPE pipe as manufactured by Advanced Drainage Systems, Inc. (ADS), or approved equivalent.

2.02 BACKFILL MATERIAL FOR UNDERDRAIN PIPE

- A. Use No. 57 stone (minimum permeability = 0.1 cm/sec).
- B. Use material free of topsoil, roots, stumps, brush, vegetation, and other deleterious material.
- C. Backfill material in accordance with Section 02200. The aggregate material shall meet the requirements of NCDOT No. 57 stone.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that the excavation base is ready to receive work and excavations, dimensions, and elevations are as indicated on the Contract Documents.

3.02 PREPARATION

- A. Hand trim excavations to required elevations. Correct over-excavation with fill material of course aggregate.
- B. Remove stones or other hard matter that could impede consistent backfilling or compaction.

3.03 PIPE INSTALLATION

- A. Lay pipe true to line and grade as shown on the Drawings, and in such a manner as to form a close concentric joint with adjoining pipe and to prevent sudden offsets to flow line.
- B. Provide a continuous and uniform bedding for all buried pipe.
- C. Install pipe and pipe fittings in accordance with manufacturer's instructions. All underdrain pipe systems are to be constructed watertight.
- D. Do not lay pipe when trench conditions or weather are unsuitable for such work.
- E. As work progresses, clear pipe of dirt and other superfluous materials.
- F. Backfilling of soil in pipe trenches shall be in accordance with Section 02220, Trenching and Backfilling.
- G. Construct underdrain system and pipe in strict accordance with the Contract Documents.

3.04 FIELD QUALITY ASSURANCE

- A. Field inspection will be performed under provisions of Section 01410.

3.05 PROTECTION

- A. Protect finished installation under provisions of Section 01500.

END OF SECTION 02721

**SECTION 02725
PRECAST CONCRETE UTILITY STRUCTURES**

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Precast concrete utility structures.
2. Drainage system catch basins.
3. Drainage system inlets.
4. Drainage system junction boxes.
5. Drainage system sedimentation chambers.
6. Drainage system retention/diversion structures.
7. Valve pits.
8. Frames and covers.
9. Access hatches.

B. Related Requirements:

1. Section 03300 - Cast-in-Place Concrete: Concrete type for manhole and structure foundation slab construction.
2. Section 02420 - Run-on and Run-off Control Systems

1.02 REFERENCE STANDARDS

A. American Association of State Highway and Transportation Officials:

1. AASHTO HB-17 - Standard Specifications for Highway Bridges.
2. AASHTO M306 - Standard Specification for Drainage, Sewer, Utility, and Related Castings.

B. American Concrete Institute:

1. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
2. ACI 211.2 - Standard Practice for Selecting Proportions for Structural Lightweight Concrete.
3. ACI 318 - Building Code Requirements for Structural Concrete and Commentary.

C. ASTM International:

1. ASTM A36 - Standard Specification for Carbon Structural Steel.
2. ASTM A48 - Standard Specification for Gray Iron Castings.
3. ASTM A82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
4. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
5. ASTM A185 - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
6. ASTM A496 - Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement.

7. ASTM A497 - Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.
8. ASTM A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
9. ASTM A706 - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
10. ASTM A767 - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
11. ASTM A775 - Standard Specification for Epoxy-Coated Steel Reinforcing Bars.
12. ASTM A780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
13. ASTM A884 - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement.
14. ASTM A996 - Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement.
15. ASTM C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
16. ASTM C33 - Standard Specification for Concrete Aggregates.
17. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
18. ASTM C138 - Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.
19. ASTM C150 - Standard Specification for Portland Cement.
20. ASTM C173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
21. ASTM C192 - Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory.
22. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
23. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
24. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
25. ASTM C443 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
26. ASTM C494 - Standard Specification for Chemical Admixtures for Concrete.
27. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
28. ASTM C857 - Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures.
29. ASTM C890 - Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures.
30. ASTM C891 - Standard Practice for Installation of Underground Precast Concrete Utility Structures.
31. ASTM C913 - Standard Specification for Precast Concrete Water and Wastewater Structures.
32. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals.
33. ASTM C989 - Standard Specification for Slag Cement for Use in Concrete and Mortars.
34. ASTM C990 - Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.

35. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
 36. ASTM C1244 - Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill.
 37. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
 38. ASTM C1433 - Standard Specification for Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers.
 39. ASTM C1504 - Standard Specification for Manufacture of Precast Reinforced Concrete Three-Sided Structures for Culverts and Storm Drains.
- D. American Welding Society:
1. AWS D1.1 - Structural Welding Code - Steel.
 2. AWS D1.4 - Structural Welding Code - Reinforced Steel.
- E. National Precast Concrete Association:
1. NPCA Plant Certification Program.
 2. NPCA Quality Control Manual for Precast and Prestressed Concrete Plants.
- F. Association for Materials Protection and Performance
1. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).

1.03 SUBMITTALS

- A. Section 00909 - Submittal Procedures: Requirements for submittals.
- B. Product Data:
 1. Submit data for frames and covers, component construction, features, configuration, dimensions.
- C. Shop Drawings:
 1. Indicate structure locations, elevations, sections, equipment supports, piping, conduit, sizes and elevations of penetrations.
 2. Indicate design, construction and installation details, typical reinforcement and additional reinforcement at openings and for each type, size, and configuration.
- D. Submit concrete mix design for each different mix.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- F. Delegated Design Submittals: Submit signed and sealed Shop Drawings with design calculations and assumptions for custom fabrications.
- G. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.
- H. Source Quality-Control Submittals: Indicate results of factory tests and inspections.
- I. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

J. Qualifications Statements:

1. Submit qualifications for manufacturer, installer, and licensed professional.
2. Submit manufacturer's approval of installer.

1.04 SUSTAINABLE DESIGN SUBMITTALS

- A. Section 00909: Submittal Form. Section 01300 - Project Management and Coordination.
- B. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
 1. Provide cost data for following products:
 - a. Salvaged, refurbished, and reused products.
 - b. Products with recycled material content.
 - c. Regional products.
 - d. Certified wood products.

1.05 QUALITY ASSURANCE

- A. Obtain precast concrete utility structures from single source.
- B. Perform structural design according to ACI 318.
- C. Perform Work according to NPCA Quality Control Manual for Precast and Prestressed Concrete Plants.
- D. Conform to following material and fabrication requirements:
 1. Three Sided Structures: ASTM C1504.
 2. Other Structures: ASTM C913.
- E. Perform welding according to following:
 1. Structural Steel: AWS D1.1.
 2. Reinforcing Steel: AWS D1.4.

1.06 QUALIFICATIONS

- A. Manufacturer: Certified by NPCA Plant Certification Program prior to and during Work of this Section.
- B. Installer: Company specializing in performing Work of this Section with minimum three years' documented experience.
- C. Licensed Professional: Professional engineer experienced in design of specified Work and licensed in State of North Carolina.
- D. Welders and Welding Procedures: AWS qualified within previous 12 months for employed weld types.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Section 01600 - Material and Equipment: Requirements for transporting, handling, storing, and protecting products.

- B. Do not deliver products until concrete has cured 7 days or has attained minimum 75 percent of specified 28-day compressive strength.
- C. Inspection: Accept precast structures on Site in manufacturer's original packaging and inspect for damage.
- D. Comply with precast concrete manufacturer instructions for unloading, storing, and moving precast structures.
- E. Lift structures from designated lifting points.
- F. Storage:
 - 1. Store precast concrete manholes and drainage structures to prevent damage to Owner's property or other public or private property.
 - 2. Repair property damaged from materials storage.

PART 2 PRODUCTS

2.01 DESIGN REQUIREMENTS

- A. Design structures for minimum loads conforming to ASTM C857 and ASTM C890.
- B. Roof Live Load: Comply with following loading conditions, including impact load:
 - 1. Heavy Traffic:
 - a. ASTM C857, A-16 AASHTO HB-17, HS20-44.
 - b. Maximum 16,000 lb. each wheel.

2.02 PRECAST CONCRETE UTILITY STRUCTURES

- A. Precast Concrete Utility Structures: Reinforced precast concrete.
- B. Foundation Slab:
 - 1. Precast concrete of type as specified in Section 033000 - Cast-in-Place Concrete.

2.03 FRAMES AND COVERS

- A. Description:
 - 1. As indicated on the Drawings.

2.04 ACCESS HATCHES

- A. Access Hatch:
 - 1. Provide Access Hatches as indicated on the Drawings.

2.05 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150/C 150M, Type I or Type III, gray, unless otherwise indicated.
- B. Supplementary Cementitious Materials:
 - 1. Fly Ash: ASTM C 618, Class C or F, with maximum loss on ignition of 3 percent.

2. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- C. Normal-Weight Aggregates: Except as modified by PCI MNL 116, ASTM C 33/C 33M, with coarse aggregates complying with Class 4S. Stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for Project.
- D. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 116.
- E. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
- F. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and to not contain calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture.
 1. Water-Reducing Admixtures: ASTM C 494/C 494M, Type A.
 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 4. Water-Reducing and Accelerating Admixture: ASTM C 494/C 494M, Type E.
 5. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 6. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 7. Plasticizing Admixture: ASTM C 1017/C 1017M, Type I.
 8. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
 9. Corrosion-Inhibiting Admixture: ASTM C 1582/C 1582M.
 10. Fly Ash: Comply with ASTM C618, Class.
 11. Blast Furnace Slag: Comply with ASTM C989, Grade [100]. Other grades may be submitted for approval by ENGINEER.

2.06 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- B. Steel Bar Mats: ASTM A 184/A 184M, fabricated from ASTM A 615/A 615M, Grade 60 (Grade 420), deformed bars, assembled with clips.
- C. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, fabricated from as-drawn steel wire into flat sheets.
- D. Supports: Suspend reinforcement from back of mold or use bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place according to PCI MNL 116.

2.07 PRESTRESSING TENDONS

- A. Pretensioning Strand: ASTM A 416/A 416M, Grade 250 (Grade 1720) or Grade 270 (Grade 1860), uncoated, seven-wire, low-relaxation strand.
- B. Unbonded Post-Tensioning Strand: ASTM A 416/A 416M, Grade 270 (Grade 1860), uncoated, seven-wire, low-relaxation strand.

2.08 FABRICATION

- A. Fabricate precast concrete utility structures conforming to ACI 318 and NPCA Quality Control Manual for Precast and Prestressed Concrete Plants.
- B. Fabricate precast concrete utility structures, knock-out panels, and openings to size and configuration as indicated on the Drawings.

- C. Construct forms to provide uniform precast concrete units with consistent dimensions.
- D. Clean forms after each use.
- E. Reinforcing:
 - 1. Install reinforcement by tying or welding to form rigid assemblies.
 - 2. Position reinforcement to maintain minimum 2 inch cover.
 - 3. Secure reinforcement to prevent displacement while placing concrete.
- F. Position and secure embedded items to prevent displacement while placing concrete.
- G. Deposit concrete in forms and consolidate concrete without segregating aggregate.
- H. Provide initial curing by retaining moisture using one of following methods:
 - 1. Cover with polyethylene sheets.
 - 2. Cover with burlap or other absorptive material and keep continually moist.
 - 3. Apply curing compound according to manufacturer instructions.
- I. Provide final curing according to manufacturer's standard.
- J. Remove forms without damaging concrete.

2.09 CONCRETE MIXTURES

- A. Prepare design mixtures for each type of precast concrete required.
 - 1. Limit use of fly ash to 20 percent replacement of Portland cement by weight and ground granulated blast-furnace slag to 20 percent of Portland cement by weight.
- B. Design mixtures may be prepared by a qualified independent testing agency or by qualified precast plant personnel at precast structural concrete fabricator's option.
- C. Limit water-soluble chloride ions to maximum percentage by weight of cement permitted by ACI 318 (ACI 318M) or PCI MNL 116 when tested according to ASTM C 1218/C 1218M.
- D. Normal-Weight Concrete Mixtures: Proportion by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:
 - 1. Compressive Strength (28 Days): 5000 psi (34.5 MPa).
 - 2. Maximum Water-Cementitious Materials Ratio: 0.45.
- E. Water Absorption: For structural precast concrete with an architectural finish, limit water absorption to 6 percent by weight or 14 percent by volume, tested according to ASTM C 642, except for boiling requirement.
- F. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 116.
- G. When included in design mixtures, add other admixtures to concrete mixtures according to manufacturer's written instructions.
- H. Concrete Mix Adjustments: Concrete mix design adjustments may be proposed if characteristics of materials, Project conditions, weather, test results, or other circumstances warrant.

2.010 FINISHES

A. Concrete:

1. Formed Surfaces Not Exposed to View: As formed.
2. Unformed Surfaces:
 - a. Finish with vibrating screed or hand float.
 - b. Permitted: Color variations, minor indentations, chips, and spalls.
 - c. Not Permitted: Major imperfections, honeycomb, or other defects.
3. Exposed to View Finishes:
 - a. Troweled Light broom for following surfaces:
4. Buried surfaces:
 - a. All buried concrete surfaces shall receive two (2) coats of bitumastic.
 - b. Bitumastic 50, as manufactured by Carboline of St. Lois, MO, or approved equal.
 - c. Dry Film Thickness (DFT) shall be greater than 12 mil but shall not exceed 30 mil for the specified product; substitute products may vary.
 - d. Bitumastic coating shall be continuous, without holidays or bare spots.

2.011 ACCESSORIES

A. Membrane Curing Compound: ASTM C309, Type I, Class A.

B. Steps:

1. Formed steel-reinforced polypropylene rungs.
2. Diameter: 3/4 inch.
3. Width: 12 inches.
4. Spacing: As indicated on Drawings.

C. Inserted and Embedded Items:

1. Structural Steel Sections:
 - a. Comply with ASTM A36.
 - b. Finish: Galvanized.

D. Joint Sealants and Joint Gaskets:

1. Gasket Joints for Circular Concrete Pipe:
 - a. ASTM C443.
 - b. Gaskets: Standard rubber.
2. External Sealing Bands:
 - a. Comply with ASTM C877.
 - b. Material: Type I, rubber and mastic.

3. Preformed Joint Sealants for Concrete Pipe and Box Sections: Comply with ASTM C990.
4. Elastomeric Joint Sealants:
 - a. Comply with ASTM C920.
 - b. Material: Polyurethane.
 - c. Grade NS, Class 25.
- E. Pipe Entry Connectors: Comply with ASTM C923.
- F. Grout:
 1. Cement Grout: Portland cement, sand, and water mixture with stiff consistency to suit intended purpose.
 2. Non-Shrink Grout:
 - a. Description: Premixed compound consisting of non-metallic aggregate, cement, and water-reducing and plasticizing agents.
 - b. Conform to ASTM C1107.
 - c. Minimum Compressive Strength: 2,400 psi in 48 hours, and 7,000 psi in 28 days.
- G. Section 01400 - Quality Control Requirements: Requirements for testing, inspection, and analysis.
- H. Testing:
 1. Perform following tests for each 150 cu. yd. of concrete placed with minimum one set of tests each week:
 - a. Slump: Comply with ASTM C143.
 - b. Compressive Strength: ASTM C31 and ASTM C39.
 - c. Air Content: Comply with ASTM C231 or ASTM C173.
 - d. Unit Weight: Comply with ASTM C138.
 2. Make test results available to Architect/Engineer upon request.
- I. Inspection:
 1. Visually inspect completed precast structures for defects.
 2. Repair defects on surfaces exposed to view to achieve uniform appearance.
 3. Repair honeycomb by removing loose material and applying grout to produce smooth surface flush with adjacent surface.
 4. Repair major defects only if permitted by Architect/Engineer.
- J. Owner Witnessing:
 1. Allow witnessing of factory inspections and test at manufacturer's test facility.
 2. Notify Owner at least seven days before inspections and tests are scheduled.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that items provided by other Sections of Work are properly sized and located.

- B. Verify correct size and elevation of excavation.
- C. Verify that subgrade and bedding is properly prepared, compacted, and ready to receive Work of this Section.

3.02 PREPARATION

- A. Mark each precast structure by indentation or using waterproof paint showing date of manufacture, manufacturer, and identifying symbols and numbers shown on the Drawings to indicate its intended use.
- B. Coordinate placement of inlet and outlet pipe or duct sleeves required by other Sections.
- C. Do not install structures if Site conditions induce loads exceeding weight capacity of structures.
- D. Inspect precast concrete structures immediately prior to placement in excavation to verify that they are internally clean and free from damage; remove and replace damaged units.

3.03 INSTALLATION

- A. Install underground precast utility structures according to ASTM C891.
- B. Lift precast concrete structures at lifting points designated by manufacturer.
- C. When lowering structures into excavations and joining pipe to units, take precautions to ensure that interior of pipeline and structure remains clean.
- D. Install precast concrete base to elevation and alignment as indicated on the Drawings.
- E. Install precast concrete utility structures to elevation and alignment as indicated on the Drawings.
- F. Assembly of Multi-section Structures:
 - 1. Lower each section into excavation.
 - 2. Clean joint surfaces.
 - 3. Install watertight joint seals according to manufacturer instructions using gasket joints, external sealing bands, preformed joint sealants, elastomeric joint sealants or grout.
- G. Remove knockouts or cut structure to receive piping without creating openings larger than required to fit pipe; fill annular space with grout.
- H. Pipe Connections:
 - 1. Connect pipe to structure and seal watertight.
 - 2. Cut pipe flush with interior of structure.
- I. Base:
 - 1. Grout to achieve slope to exit piping.
 - 2. Trowel smooth.
 - 3. Contour as indicated on Drawings.
- J. Frame and Cover and Access Hatch:
 - 1. Set level, without tipping, to elevations as indicated on the Drawings.

2. Connect drain from access hatch frame to storm drainage system.
 3. Touch up damaged galvanized coatings.
- K. Backfill excavations for structures as specified in Section 02220 Trenching & Backfilling.

3.04 FIELD QUALITY CONTROL

- A. Section 01400 - Quality Requirements: Requirements for inspecting and testing.

END OF SECTION 02725

**SECTION 02936
SEEDING**

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Preparation of subsoil;
- B. Placing topsoil material;
- C. Fertilizing;
- D. Temporary seeding;
- E. Permanent seeding; and,
- F. Mulching.

1.02 QUALITY ASSURANCE

- A. Provide seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.

1.03 MAINTENANCE DATA

- A. Submit maintenance data for continuing Owner maintenance.
- B. Include maintenance instructions, cutting method and maximum grass height; types, application frequency, and recommended coverage of fertilizer.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Transport and handle products in accordance with manufacturer's instructions.
- B. Deliver grass seed mixture in sealed containers. Seed in damaged packaging will not be acceptable.
- C. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.
- D. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.
- E. Store and protect products in accordance with manufacturer's instructions, with seals and labels intact and legible.

1.05 GUARANTEE

Contractor shall be responsible for final ground cover. Any area that fails to develop a successful stand of grass up to one (1) year after final inspection shall be reseeded until a successful stand develops. Any significantly large (½ acre) area that requires reseeding shall be guaranteed for one year after the reseeding date.

PART 2 PRODUCTS

2.01 SOIL MATERIALS

- A. Topsoil Material: Excavated from onsite or offsite source and free of weeds.

2.02 ACCESSORIES

- A. General: Materials shall be delivered in unbroken containers, clearly marked by the manufacturer as to contents. Seed, limestone, and fertilizer shall be labeled as to proportions, analysis, and quality. Store all materials in a manner affording protection from damage by weather or vandalism.
- B. Mulching material: Oat or wheat straw, dry, free from weeds and other foreign matter detrimental to plant life.
- C. Lime: Lime shall comply with applicable North Carolina state laws and shall be delivered in unopened bags or other convenient standard containers, each fully labeled with the manufacturer's guaranteed analysis. Lime shall be ground limestone containing not less than 85 percent total carbonates and shall be ground to such fineness that 90 percent by weight will pass through a No. 20 sieve and 50 percent by weight will pass through a No. 100 sieve.
- D. Fertilizer: Fertilizer shall comply with applicable North Carolina state laws and shall be delivered in unopened bags or other convenient standard container, each fully labeled with the manufacturer's guaranteed analysis. Fertilizer shall contain not less than 10 percent nitrogen, 10 percent available phosphorus, and 10 percent water soluble potash (N-P-K, 10-10-10). Any fertilizer which becomes caked or otherwise damaged, making it unsuitable for use, will not be acceptable and shall be immediately removed from the job site.

PART 3 EXECUTION

3.01 GENERAL

- A. Areas where topsoil material is to be placed and areas to be seeded include all areas disturbed during construction beyond the limits of the proposed cell which are not to be paved.
- B. Verify that prepared soil base is ready to receive the work of this Section, and seed all areas disturbed as a result of construction activities.

3.02 PREPARATION OF SUBSOIL

- A. Prepare subsoil to eliminate uneven areas and low spots. Maintain lines, levels, profiles and contours. Make changes in grade gradual. Blend slopes into level areas.
- B. Remove deleterious materials, such as weeds, and undesirable plants and their roots. Remove contaminated subsoil.
- C. Scarify subsoil to a depth of three (3) inches where topsoil material is to be placed. Repeat cultivation in areas where equipment used for hauling and spreading topsoil has compacted subsoil.

3.03 PLACING TOPSOIL MATERIAL

- A. Place topsoil material during dry weather and on dry unfrozen subgrade two (2) to three (3) weeks prior to sowing seed.
- B. Spread topsoil material over area to be seeded. Finished thickness of topsoil material shall be three (3) inches minimum after settling and nominal compaction caused by spreading equipment.
- B. Grade to eliminate rough, low, or soft areas, and to ensure positive drainage.
- D. Rake topsoil material and remove roots, vegetable matter, rocks, clods, and other non-organic material.

3.04 FERTILIZER AND LIME

- A. Apply lime and fertilizer according to soil tests, or apply lime at the rate of 50 lb/1000 sq.ft. and fertilizer at the rate of 20 lbs./1000 sq.ft.
- B. Mix thoroughly into upper three (3) inches of topsoil.
- C. Lightly water to aid the dissipation of fertilizer and lime.

3.05 SEEDBED PREPARATION

- A. Prepare seedbed to a depth of four (4) to six (6) inches.
- B. Remove loose rocks, roots, and other obstructions to reduce interference with the establishment and maintenance of vegetation.

3.06 TEMPORARY SEEDING

- A. Provide temporary seeding on any cleared, unvegetated, or sparsely vegetated soil surface where vegetative cover is needed for less than one year or when seeding dates will prevent the establishment of vegetative cover if permanent seeding is attempted.
- B. Seed in accordance with the following schedule and application rates:

Season	Seeding Dates	Seeding Mixture	Rate (lbs./acre)
Late Winter and Early Spring	February 15 - May 15	Rye Grain	120
Summer	May 15 - August 15	German Millet	40
		Sudangrass	50
Fall	August 15 - December 15	Rye Grain	120

- C. To amend soil, follow recommendations of soil tests or apply 2,000 lb/acre ground agricultural limestone and 750 lb/acre 10-10-10 fertilizer.
- D. Mulch in accordance with the following schedule and application rates:
 - 1. Steep slopes (3:1): Apply 4,000 - 5,000 lb/acre grain straw or equivalent cover of another suitable mulching material. Anchor mulch by tacking with asphalt,

- 2. rolling, or netting. Netting is the preferred anchoring method on steep slopes. Low Maintenance areas and areas requiring cover less than 1 year: Apply 4,000 lbs/acre grain straw and anchor straw by stapling netting over the top.

E. Refertilize if growth is not fully adequate.

F. Reseed, refertilize, and mulch immediately following erosion or other damage.

3.07 PERMANENT SEEDING

A. Seed in accordance with the following schedule and application rates:

Species	Seeding Dates	Seeding Mixture	Rate (lbs./acre)
Nurse Crop (use for immediate stabilization)	November 1 – April 30	Rye Grain	40
	May 11 – September 30	German Millet	10
	November 1 – April 30	Wheat	30
Primary Crop: Native species	December 1 – April 15	Switchgrass	2.5 - 3.5
	December 1 – April 15	Big Bluestem	5.0 - 7.0
	December 1 – April 15	Sweet Woodreed	1.5 - 2.5
	May 1 – April 15	Deertongue	4.0 - 6.0
	February 15 – April 1; July 15 – August 15	Indian Woodoats	1.5 - 2.5
	December 1 – May 15; August 15 – October 15	Soft Rush	1.5 - 2.5
Primary Crop: Non-native species (only use for long-term stabilization if native species are unavailable)	March 15 – April 30	Crown Vetch	15
	August 1 – June 1	Hard Fescue	15
	August 15 – May 1	KY 31 Tall Fescue	100
	April 15 – June 30	Bermuda Grass	25

B. Lightly compact seeded areas by means of a roller or other approved equipment immediately after sowing.

C. To amend soil, apply lime and fertilize according to soil tests or apply 3,000 lb/acre ground agricultural limestone and 500 lbs/acre 10-10-10 fertilizer.

D. Mulch in accordance with the following schedule and application rates:

- 1. Steep slopes (3:1): Apply 4,000 - 5,000 lb/acre grain straw or equivalent cover of another suitable mulching material. Anchor mulch by tacking with asphalt, rolling, or netting. Netting is the preferred anchoring method on steep slopes.
- 2. Grassed Channels: Install turf reinforcement mat (TRM) in the channel to the top of the channel, and secure according to manufacturer’s specifications.
- 3. Low Maintenance areas: Apply 4,000 lb/acre grain straw and secure in place via rolling, netting, or by crimping with a mulch anchoring tool.

E. Re-fertilize in the second year unless growth is fully adequate. Reseed, re-fertilize, and mulch damaged areas immediately.

END OF SECTION 02936

DIVISION 3

CONCRETE

**SECTION 03300
CAST-IN-PLACE CONCRETE**

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

1.03 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.
- B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

1.05 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials.

2. Admixtures.
 3. Form materials and form-release agents.
 4. Steel reinforcement and accessories.
 5. Fiber reinforcement.
 6. Curing compounds.
 7. Bonding agents.
 8. Adhesives.
 9. Vapor Barriers.
 10. Semirigid joint filler.
 11. Joint-filler strips.
 12. Repair materials.
- C. Material Test Reports: For the following, from a qualified testing agency:
1. Aggregates: Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.
- D. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.
- E. Field quality-control reports.
- F. Minutes of preinstallation conference.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
1. Personnel conducting field tests shall be qualified as ACI Concrete Field-Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
 2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

1.08 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 - 1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301 (ACI 301M).
 - 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- B. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and as follows:
 - 1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 PRODUCTS

2.01 CONCRETE, GENERAL

- A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301 (ACI 301M).
 - 2. ACI 117 (ACI 117M).

2.02 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.
 2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
 3. Overlaid Finnish birch plywood.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation.
- D. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch minimum.
- E. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- F. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.
1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- G. Form Ties: Factory-fabricated, removable or snap-off glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
1. Furnish ties that, when removed, leave holes no larger than 1 inch in diameter in concrete surface.

2.03 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 deformed.

2.04 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 plain-steel bars, cut true to length with ends square and free of burrs.
- B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
1. For concrete surfaces exposed to view, where legs of wire bar support contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.05 CONCRETE MATERIALS

- A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- B. Cementitious Materials:
 - 1. Portland Cement: ASTM C 150/C 150M, Type I/II, gray.
 - 2. Fly Ash: ASTM C 618, Class F.
 - 3. Slag Cement: ASTM C 989/C 989M, Grade 100 or 120.
 - 4. Silica Fume: ASTM C 1240, amorphous silica.
- C. Normal-Weight Aggregates: ASTM C 33/C 33M, Class 4S coarse aggregate or better, graded. Provide aggregates from a single source.
 - 1. Maximum Coarse-Aggregate Size: 1-1/2 inches for slabs on grade, 1 inch for all other concrete nominal.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- D. Air-Entraining Admixture: ASTM C 260/C 260M.
- E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 - 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 - 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 - 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
- F. Water: ASTM C 94/C 94M and potable.

2.06 SEALED CONCRETE

- A. Sealer: Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces. For stained concrete areas to receive sealer contractor to provide sealer compatible with stain.
 - 1. Available Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ChemMasters; Chemisil Plus.

- b. ChemTec Int'l; ChemTec One.
- c. Conspec by Dayton Superior; Intraseal.
- d. Curecrete Distribution Inc.; Ashford Formula.
- e. Dayton Superior Corporation; Day-Chem Sure Hard (J-17).
- f. Edoco by Dayton Superior; Titan Hard.
- g. Euclid Chemical Company (The), an RPM company; Euco Diamond Hard.
- h. Kaufman Products, Inc.; SureHard.
- i. L&M Construction Chemicals, Inc.; Seal Hard.
- j. Meadows, W. R., Inc.; LIQUI-HARD.
- k. Metalcrete Industries; Floorsaver.
- l. Nox-Crete Products Group; Duro-Nox.
- m. Symons by Dayton Superior; Buff Hard.
- n. US SPEC, Division of US Mix Products Company; US SPEC Industraseal.
- o. Vexcon Chemicals, Inc.; Vexcon StarSeal PS Clear.

2.07 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, non-dissipating. Verify with manufacturer that retained products have been tested against interference with bonding of floor covering.
 - 1. Available Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. BASF Corporation-Construction Systems.
 - b. ChemMasters, Inc.
 - c. Dayton Superior.
 - d. Euclid Chemical Company (The); an RPM company.

2.08 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301 (ACI 301M).
 - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than Portland cement in concrete as follows:

1. Fly Ash: 25 percent.
 2. Combined Fly Ash and Pozzolan: 25 percent.
 3. Slag Cement: 50 percent.
 4. Combined Fly Ash or Pozzolan and Slag Cement: 50 percent Portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
 5. Silica Fume: 10 percent.
 6. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
 7. Combined Fly Ash or Pozzolans, Slag Cement, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.30 percent by weight of cement.
- D. Admixtures: Use admixtures according to manufacturer's written instructions.
1. Use high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
 2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.
 4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

2.09 CONCRETE MIXTURES

- A. Foundation footings and walls: Normal-weight concrete.
1. Minimum Compressive Strength: 4,000 psi at 28 days.
 2. Maximum W/C Ratio: 0.45.
 3. Minimum Cementitious Materials Content: 470 lb/cu. yd.
 4. Slump Limit: 8 inches for concrete with verified slump of 2- to 4-inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1-inch.
 5. Air Content: 4.5 percent, plus or minus 1.5 percent at point of delivery for 1-inch nominal maximum aggregate size.
- B. Slabs-on-Grade: Normal-weight concrete.
1. Minimum Compressive Strength: 4,000 psi at 28 days.
 2. Maximum W/C Ratio: 0.45.
 3. Minimum Cementitious Materials Content: 470 lb/cu. yd.
 4. Slump Limit: 4-inches, plus or minus 1-inch.
 5. Air Content: 4.5 percent, plus or minus 1.5 percent at point of delivery for 1-inch nominal maximum aggregate size.
 6. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

7. Synthetic Macro-Fiber: Uniformly disperse in concrete mixture, at concrete batch facility, at manufacturer's recommended rate, but not less than 3.0 lb/cu. yd.

2.010 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.011 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and furnish batch ticket information.
 1. When air temperature is between 85 and 90 deg F reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F reduce mixing and delivery time to 60 minutes.

PART 3 EXECUTION

3.01 FORMWORK INSTALLATION

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301 (ACI 301M), to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 (ACI 117M).
- C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
 1. Class A, 1/8 inch for smooth-formed finished surfaces.
 2. Class B, 1/4 inch for rough-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Construct forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 1. Install keyways, reglets, recesses, and the like, for easy removal.
 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete.
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.02 EMBEDDED ITEM INSTALLATION

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.

3.03 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.
 - 1. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
 - 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material are not acceptable for exposed surfaces. Apply new form-release agent.

- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by ENGINEER.

3.04 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded-wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.05 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by ENGINEER.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301 (ACI 301M).
 - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 - 1. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
 - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301 (ACI 301M).

3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 2. Maintain reinforcement in position on chairs during concrete placement.
 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 4. Slope surfaces uniformly to drains where required.
 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

3.06 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces exposed to public view.
- C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.07 MISCELLANEOUS CONCRETE ITEM INSTALLATION

- A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

- C. Equipment Bases and Foundations:
1. Coordinate sizes and locations of concrete bases with actual equipment provided.
 2. Construct concrete bases for equipment at depth indicated and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.
 3. Minimum Compressive Strength: 3500 psi at 28 days.
 4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
 5. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 6. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.

3.08 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 (ACI 301M) for hot-weather protection during curing.
- B. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.
- C. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.

- a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies does not interfere with bonding of floor covering used on Project.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
- a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project.
4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.09 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 - 1. Defer joint filling until concrete has aged at least one month(s). Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.010 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by ENGINEER. Remove and replace concrete that cannot be repaired and patched to ENGINEER's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part Portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 2. Repair defects on surfaces exposed to view by blending white Portland cement and standard Portland cement so that, when dry, patching mortar matches surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by ENGINEER.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 2. After concrete has cured at least 14 days, correct high areas by grinding.
 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply

bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

- E. Perform structural repairs of concrete, subject to ENGINEER's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to ENGINEER's approval.

END OF SECTION 03300

DIVISION 13
SPECIAL CONSTRUCTION

**SECTION 13310
GEOTEXTILE**

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

This specification covers the technical requirements for the furnishing and installation of the geotextile described herein. All materials used and work performed shall meet the requirements of this specification and the Contract Documents, or the manufacturer's installation instructions procedures, whichever are more stringent.

1.02 REFERENCES

- A. Geosynthetic Research Institute (GRI) standard specifications and guides, latest versions.

- B. The most recent versions of the following American Society for Testing and Materials (ASTM) standards.
 - 1. D3786 Mullen Burst
 - 2. D4354 Standard Practice for Sampling of Geosynthetics for Testing
 - 3. D4355 Standard Test Method for Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus)
 - 4. D4491 Standard Test Methods for Water Permeability of Geotextiles by Permittivity
 - 5. D4533 Standard Test Method for Trapezoid Tearing Strength of Geotextiles
 - 6. D4632 Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
 - 7. D4751 Standard Test Method for Determining Apparent Opening Size of a Geotextile
 - 8. D4759 Standard Practice for Determining the Specification Conformance of Geosynthetics
 - 9. D4833 Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
 - 10. D4873 Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls
 - 11. D4884 Standard Test Method for Strength of Sewn or Thermally Bonded Seams of Geotextiles
 - 12. D5199 Standard Test Method for Measuring Nominal Thickness of Geotextiles and Geomembranes
 - 13. D5261 Standard Test Method for Measuring Mass per Unit Area of Geotextiles

1.03 SUBMITTALS

- A. The following submittals shall be furnished by the CONTRACTOR for the work of this Section within 30 days prior to material delivery to the site, and as specified herein:
 - 1. A representative sample of all materials to be used on this Project.
 - 2. A list of similar completed projects in which the proposed materials have been successfully used.
 - 3. Manufacturer's instructions for installation and handling, and material data sheets giving full details of the material physical properties and test methods.
 - 4. Draft warranties and guarantees as described hereinafter.

- B. The following submittals shall be furnished by the CONTRACTOR for the work of this Section within seven (7) days prior to material delivery to the site, and as specified herein:
 - 1. The manufacturer's data and samples of the geotextile to be used, giving full details of the minimum physical properties and test methods, as specified herein, certified test reports indicating the physical properties of the materials to be used, and roll numbers and identification.
 - 2. The manufacturer's certificate shall state that the finished geotextile meets MARV requirements of this specification as evaluated under the manufacturer's quality control program. A person having legal authority to bind the manufacturer shall attest the certificate.
 - 3. "Needle-Free" statement for non-woven geotextile.

- C. The following submittals shall be furnished by the CONTRACTOR for the work of this Section prior to the issuance of a certificate of substantial completion for the Project:
 - 1. Signed subgrade Acceptance forms, if applicable.
 - 2. Final warranties and guarantees as described hereinafter.

1.04 WARRANTY AND GUARANTEE

The CONTRACTOR shall provide a written warranty relative to materials and installation certifying the geotextile materials provided and work performed under this project shall be free from any defects. Said warranty shall apply to normal use and service by the OWNER. Such written warranty shall provide for the repair or replacement of the defect or defective area of lining materials upon written notification and demonstration by the OWNER of the specific non-conformance of the lining material with the project specifications. Such defects or non-conformance shall be repaired or replaced within a reasonable period of time at no cost to the OWNER.

1.05 CONSTRUCTION QUALITY CONTROL

The CONTRACTOR shall have an individual experienced in the installation of geotextile on-site at all times during the installation. The designated individual shall be responsible for ensuring that the geotextile is installed according to this specification and the Contract Documents. The designated individual shall be subject to approval by the OWNER or CQA Consultant.

1.06 CONSTRUCTION QUALITY ASSURANCE

- A. The installation of the geotextile shall be monitored by the CQA Consultant as outlined in the CQA Plan.
- B. CONTRACTOR shall be aware of the activities outlined in the CQA Plan and shall account for these CQA activities in the installation schedule.

PART 2 PRODUCTS

2.01 MATERIALS

- A. All geotextile shall be manufactured of 100 percent polyester or polypropylene. The fabric shall be a continuous filament, non-woven, needle punched geotextile that is UV stabilized and is mildew, rot, insect, and rodent resistant. The fabric shall be guaranteed free of any treatment, coating, or deleterious elements, which might significantly alter its physical properties, or its proper functioning.
- B. All geotextile shall have a minimum mass per unit area of 16 oz/yd² as indicated by the Contract Documents.
- C. The geotextile properties shall meet the minimum average roll requirements stated in the most recent versions of GRI Test Method GT12(a) for geotextile cushions and GRI Test Method GT13(a) (moderate survivability) for geotextile separators.
- D. Manufacturer's Quality Control (MQC) testing (test methods and frequencies) shall be conducted in accordance with the most recent versions of GRI Test Method GT12(a) for geotextile cushions and GRI Test Method GT13(a) (moderate survivability) for geotextile separators, or the manufacturer quality control guide, whichever is more stringent.

2.02 ACCEPTANCE AND CONFORMANCE TESTING

- A. Conformance testing must be performed, prior to shipment to the site, at the manufacturer's facility. The CONTRACTOR shall notify the ENGINEER at least three (3) weeks prior to shipping in order to arrange for conformance testing. No material shall be shipped to the site until conformance sampling has been performed. When completed, the particular approved lot should be marked for the particular site under investigation. The expressed purpose of in-plant Material Conformance Test Sampling is to verify that geotextile material designated for the project is confirmed as meeting the project specifications prior to shipment to the site. The Manufacturer shall make available all necessary personnel and equipment to assist the CQA Consultant in retrieving conformance samples of the geotextile material.

- B. Procedures in the Event of a Conformance Test Failure

The following procedure shall apply whenever a sample fails a conformance test that is conducted by the CQA Laboratory:

1. The Manufacturer shall replace any roll of geotextile that is not in conformance with these Specifications with a roll that meets Specifications.

2. The CONTRACTOR shall remove conformance samples for testing by the CQA Laboratory from the closest numerical roll on both sides of the failed roll. These two samples must conform to these Specifications. If either of these samples fail, the two (2) numerically closest untested rolls on both sides of the failed sample shall be tested by the CQA Laboratory. These four samples must conform to the Specifications. If any of these samples fail, every roll of geotextile on site and every subsequently delivered roll that is from the same supplier must be tested by the CQA Laboratory for conformance to the Specifications. This additional conformance testing shall be at the expense of the CONTRACTOR.

2.03 HANDLING OF MATERIALS

- A. Protective Wrapping - All rolls of geotextile, irrespective of their type, must be enclosed in a protective wrapping that is opaque and waterproof. The following apply:
 1. The protective wrapping shall be wrapped around (or placed around) the geotextile in the manufacturing facility and shall be included as the final step in the manufacturing process.
 2. The packaging shall not interfere with the handling of the rolls either by slings or by the utilization of the central core upon which the geotextile is wound.
 3. The protective wrapping shall prevent exposure of the geotextile to ultraviolet light, prevent it from moisture uptake and limit minor damage to the roll.
 4. Every roll must be labeled with the manufacturers name, geotextile style and type, lot and roll numbers, and roll dimensions (length, width and gross weight).
- B. Shipment
 1. Each shipping document shall include a notation certifying that the material is in accordance with the manufacturer's quality control certificates.
 2. The method of loading the geotextile rolls, transporting them, and unloading them at the job site should not cause any damage to the geotextile, its core, nor its protective wrapping.
 3. The protective wrapping shall be maintained during periods of shipping and storage.
 4. All rolls, where the protective wrapping is damaged or stripped from the rolls, shall be moved to an enclosed facility until its repair can be made to the approval of the CQA Consultant.
- C. Storage at the Site
 1. Storage of geotextile shall be in accordance with the Manufacturer's recommendations, and all warranty conditions.
 2. The CONTRACTOR shall be responsible for the storage of the geotextile on site in an area that is well drained and remains dry during material storage, and is protected from sunlight, rain, theft, vandalism, passage of vehicles, etc.
 3. The rolls shall be stacked in such a way that cores are not crushed nor is the geotextile damaged.

4. Outdoor storage of rolls shall not exceed manufacturer's recommendations, or longer than six months, whichever is less. For storage periods longer than six months a temporary enclosure shall be placed over the rolls, or they shall be moved within an enclosed facility.
5. If any special handling of the geotextile is required, it shall be so marked on the top protective covering of the geotextile.

PART 3 EXECUTION

The work shall be executed according to manufacturer's installation and handling instructions, which shall be provided to engineer under provisions of Part 1.03 of this Section.

3.01 INSTALLATION

- A. Install geotextile as indicated by the Contract Documents.

3.02 PLACEMENT

- A. The CONTRACTOR shall remove the protective wrappings from the geotextile rolls to be deployed only after the substrate layer, soil, or other geosynthetic have been documented and approved by the CQA Consultant. The CONTRACTOR shall:
 1. Take the necessary precautions to protect the underlying layers upon which the geotextile shall be placed. If the substrate is soil, construction equipment can be used, provided that rutting is not created. If the substrate is a geosynthetic material, deployment must be by hand, or by use of low ground contact pressure all-terrain vehicles (ATVs).
 2. Take care during placement not to entrap sandbags, stones, moisture, or other materials that could damage a geomembrane, cause clogging of drains or filters, or hamper subsequent seaming.
 3. On side slopes, the geotextile shall be anchored at the top and then unrolled to keep the geotextile free of wrinkles and folds.
 4. Position the geotextile by hand after being unrolled, to be free of wrinkles.
 5. When the geotextile is placed on another geosynthetic, trimming should be performed using only an upward-cutting hook blade.
 6. The geotextile shall be weighted with sandbags, to provide resistance against wind uplift.
 7. A visual examination of the deployed geotextile shall be carried out to ensure that no potentially harmful objects are present, e.g., stones, sharp objects, small tools, sandbags, etc.

3.03 SEAMING/JOINING REQUIREMENTS

Seaming of geotextile may be performed by either sewing or heat bonding. The overlap shall be a minimum of six (6) inches for each method.

Polymeric thread, with chemical resistance properties equal to or exceeding those of the geotextile, shall be used for all sewing.

3.04 REPAIR PROCEDURES

Holes, or tears, in geotextile made during placement or any time before backfilling shall be repaired by patching. The following shall be observed:

1. The patch material used for repair of a hole or tear shall be the same type of polymeric material as the damaged geotextile, or as approved by the CQA Consultant.
2. The patch shall extend at least 12 inches beyond any portion of the damaged geotextile.
3. The patch shall be sewn in place by hand or machine, or heat bonded, so as not to accidentally shift out of position or be moved during backfilling or covering operations.
4. Geotextile sewing or heat bonding shall be performed in such a way that does not cause damage to any underlying geosynthetic materials; any such damage shall be repaired by the CONTRACTOR at no cost to the OWNER.

3.05 PROTECTION AND BACKFILLING OR COVERING

- A. If soil is to cover the geotextile, it shall be done such that the geotextile is not shifted from its intended position and underlying materials are not exposed or damaged.
- B. If a geosynthetic is to cover the geotextile, both the underlying geotextile and the newly deployed material shall not be damaged during the process.
- C. The overlying material shall not be deployed such that tensile stress is exerted in the geotextile. On side slopes, this requires soil backfill to proceed from the bottom of the slope upward.
- D. Equipment shall not be driven directly atop the geotextile layer. Placement of the cover material shall occur as soon as practicable and shall proceed from the base of the slope upwards. Unless otherwise specified by ENGINEER, all equipment operating on soil material overlying the geotextile layer shall be a D-5 class low Ground Pressure Dozer or smaller. No traffic by rubber-tired vehicles shall occur on the geotextile without a combined thickness of four (4) feet above the geotextile layer. Turning of all vehicles will be kept to a minimum and the speed of all vehicles will be limited to less than 10 miles per hour.
- E. Soil backfilling or covering by another geosynthetic shall be done within the period stipulated for the geotextile. Typical time frames for geotextile are within 14 days for polypropylene and 28 days for polyester geotextile.
- F. Anchor trenches shall be pumped or allowed to drain to prevent ponding and softening of the soils while the trench is open. Anchor trenches shall be backfilled and compacted by the CONTRACTOR. Care shall be taken when backfilling the trenches to prevent damage to the geotextile.

3.06 ACCEPTANCE

- A. The CONTRACTOR shall retain all responsibility for the geotextile in the landfill cell or cap until acceptance by the OWNER.
- B. The geotextile shall be accepted by the OWNER when:

1. The installation is finished;
2. The OWNER and CONTRACTOR have signed a certificate of Substantial Completion, and all conditions identified on the certificate have been met for the OWNER to assume responsibility for the geotextile. The signed certificate of Substantial Completion and acceptance of the geotextile will be part of the CQA Report.
3. All warranties have been provided to the OWNER.

END OF SECTION 13310

**SECTION 13315
GEOSYNTHETIC CLAY LINER (GCL)**

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Furnishing and installing the geosynthetic clay liner (GCL) for the composite liner.

1.02 SUBMITTALS

- A. The CONTRACTOR shall furnish prior to placement of the GCL:
1. Conceptual description of the proposed plan for placement of the GCL panels over the area of installation.
 2. GCL Manufacturer's Quality Control (MQC) Plan for documenting compliance with Part 2 of this Section.
 3. Manufacturer's recommended handling instructions and installation procedures.
 4. The GCL Manufacturer shall provide a statement that all GCL products are "Needle-Free" prior to GCL delivery to the site.
- B. At the ENGINEER'S request the CONTRACTOR shall furnish:
1. A representative sample of the GCL proposed for use on this project.
 2. A project reference list for the GCL(s) consisting of the principal details of at least 10 projects totaling at least 10 million square feet in size.
- C. Upon shipment, the CONTRACTOR shall furnish the GCL manufacturer's Quality Assurance/Quality Control (MQA/MQC) certifications that the materials supplied for the project are in accordance with the requirements of this specification.
- D. As installation proceeds, the CONTRACTOR shall submit certificates of subgrade acceptance signed by the CONTRACTOR and CQA Consultant for each area covered by the GCL.
- E. The following submittals shall be furnished by the CONTRACTOR prior to the issuance of the certificate of substantial completion for the Project:
1. CQC Daily field reports.
 2. Subgrade Acceptance.
 3. Panel Placement records.
 4. Inventory sheets/Bills of Lading.
 5. Record drawing showing and identifying all panels, locations, and all repairs to the GCL.

1.03 QUALIFICATIONS

- A. GCL Manufacturer must have produced at least 10 million square feet of GCL, with at least 8 million square feet installed.
- B. The GCL Installer must either have installed at least 1 million square feet 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 in a competent, professional manner.

1.04 CONSTRUCTION QUALITY ASSURANCE (CQA)

- A. Acceptance by the ENGINEER of the installed GCL shall be dependent on the CQA Consultant determining that all requirements of this Section (13315) have been met.
- B. Field observations conducted by the CQA Consultant will be done at the OWNER'S expense.
- C. ENGINEER will administer the CQA Plan.

PART 2 PRODUCTS

2.01 MATERIALS

- A. The Geosynthetic Clay Liner (GCL) shall be as noted on the Contract Documents and shall consist of a manufactured reinforced GCL product where a layer of natural sodium bentonite clay encapsulated between two geotextiles by needle-punching and shall comply with all the criteria listed in this Section. Prior to using an alternate GCL, the CONTRACTOR must furnish independent test results demonstrating that the proposed alternate material meets all requirements of this specification section. The CONTRACTOR must obtain prior approval of the alternative GCL by the ENGINEER.
- B. Acceptable GCL products are Bentomat manufactured by CETCO, 1350 West Shure Drive, Arlington Heights, Illinois 60004 USA (847-392-5800); Solmax Bentoliner manufactured by Solmax (2801 Rte, Marie-Victorin Varennes, Quebec, Canada); Bentofix manufactured by Fluid Systems, Inc., 1245 Corporate Boulevard, Aurora, Illinois 60504 USA (864-467-1495) or an Engineer approved equal.
- C. GCL products and their components shall have properties that meet or exceed the properties in the following table. In addition, the GCL used shall meet, at a minimum, the values specified in GRI GCL3 (latest version) and the standards included in the CQA Plan.

Material Property	Test Method	Test Frequency (ft ²)	Required Values
Bentonite Swell Index	ASTM D 5890	1 per 50 tons	24 mL/2g min.
Bentonite Fluid Loss	ASTM D 5891	1 per 50 tons	18 mL max.
Mass of Bentonite	ASTM D 5993	40,000 ft ²	0.75 lb/ft ² min.
GCL Grab Strength	ASTM D 4632	200,000 ft ²	90 lbs MARV
GCL Peel Strength	ASTM D 6496	40,000 ft ²	2.1 lbs/min.
GCL Index Flux *	ASTM D 5887	Weekly	1x10 ⁻⁸ m ³ /m ² /sec max.
GCL Permeability *	ASTM D 5887	Weekly	5x10 ⁻⁹ cm/sec max.
GCL Hydrated Internal Shear Strength	ASTM D 6243	Periodic	500 psf (24 kPa) typical

*For Bottom Liner: Index Flux and Permeability testing should be done utilizing a hydraulic gradient of 2 psi and confining pressure of 5 psi.

- D. The GCL shall meet the internal/interface friction angle test required by Specification 13400.
- E. The acceptable dimensions of full-size GCL panels shall be 150 feet in length and 15 feet in width.
- F. A 6-inch (150 mm) overlap guideline shall be imprinted on both edges of the upper geotextile component of the GCL as a means for providing quality assurance of the overlap dimension. Lines shall be printed in easily visible, permanent ink.

2.02 PRODUCT QUALITY DOCUMENTATION

- A. The GCL manufacturer shall provide the CONTRACTOR or other designated party with manufacturing QA/QC certifications for each shipment of GCL. The certifications shall be signed by a responsible party employed by the GCL manufacturer and shall include:
 - 1. Manufacturer's certification for the bentonite clay used in GCL production, demonstrating compliance with the parameters swell index, fluid loss and bentonite mass/area shown in the following table.

Property	Test	Standard	Unit	Value
Swell index	ASTM D5890	Minimum	mL/2g	24
Fluid loss	ASTM D5891	Maximum	mL	18
Mass of Bentonite	ASTM D5993	Minimum	lbs/ft ²	0.75

- 2. GCL lot and roll numbers supplied for the project (with corresponding shipping information).

2.03 PRODUCT LABELING

- A. Prior to shipment, the GCL manufacturer shall label each roll, identifying:
 - 1. Product identification information (manufacturer's name and address, brand name, product code).

2. Lot number and roll number.
3. Roll length, width, and weight.

2.04 PACKAGING

- A. The GCL shall be wound around a rigid core having a diameter sufficient to facilitate handling. The core should be sufficiently strong to prevent collapse during transit.
- B. All rolls shall be labeled and bagged in packaging that is resistant to moisture and photodegradation by ultraviolet (UV) light.

2.05 ACCESSORY BENTONITE

- A. The granular bentonite or bentonite sealing compound used for seaming, penetration sealing, and repairs shall be made from the same natural sodium bentonite as used in the GCL and shall be as recommended by the GCL manufacturer.

2.06 CONFORMANCE TESTING AND ACCEPTANCE

- A. Prior to shipment to the site, samples must be taken at the manufacturer's facility and conformance testing must be performed at the lab. The CONTRACTOR shall notify the ENGINEER at least four (4) weeks prior to shipping in order to arrange for conformance testing. No material shall be shipped to the site until conformance sampling and testing has been performed and the results have been accepted.
- B. When completed, the accepted lot should be marked for the particular site under investigation. The purpose of in-plant Material Conformance Test Sampling is to verify that the GCL material designated for the project meets the project specifications prior to shipment to the site. The Manufacturer shall make available all necessary personnel and equipment to assist the CQA Consultant in retrieving conformance samples of the GCL material.
- C. Procedures in the Event of a Conformance Test Failure

The following procedure shall apply whenever a sample fails a conformance test that is conducted by the CQA Laboratory:

1. The Manufacturer shall replace the roll of GCL that is not in conformance with these Specifications with a roll that meets Specifications.
2. The CONTRACTOR shall remove conformance samples for testing by the CQA Laboratory from the closest numerical roll on both sides of the failed roll. These two (2) samples must conform to these Specifications. If either of these samples fail, the two (2) numerically closest untested rolls on both sides of the failed sample shall be tested by the CQA Laboratory. These four (4) samples must conform to the Specifications. If any of these samples fail, every roll of GCL on site and every subsequently delivered roll that is from the same supplier must be tested by the CQA Laboratory for conformance to the Specifications. This additional conformance testing shall be at the expense of the CONTRACTOR.

PART 3 EXECUTION

The work shall be executed according to manufacturer's handling instructions and installation procedures, which shall be provided to engineer under provisions of Part 1 of this Section.

3.01 SHIPPING AND HANDLING

- A. Handling and storage of the GCL are the responsibility of the CONTRACTOR.
- B. A visual inspection of each roll shall be made during unloading to identify if any packaging has been damaged. Rolls with damaged packaging should be marked and set aside for further inspection. The packaging should be repaired prior to being placed in storage.
- C. The party responsible for unloading the GCL should contact the manufacturer prior to shipment to ascertain the appropriateness of proposed unloading methods and equipment.

3.02 STORAGE

Storage of GCL shall be in accordance with Manufacturer's recommendations, and all warranty conditions.

- A. Storage of the GCL rolls is the responsibility of the CONTRACTOR. Select a storage area at the job site that is away from high traffic areas and is level, dry, and well-drained.
- B. Store rolls in a manner that prevents sliding or rolling from the stacks. Stack rolls at a height no higher than the lifting apparatus can be safely operated (typically no higher than four).
- C. Cover all stored GCL materials and the accessory bentonite with a plastic sheet or tarpaulin until their installation.
- D. Preserve the integrity and legibility of the labels during storage.

3.03 EARTHWORK

Earthwork shall comply with Section 02200 and the CQA Plan.

- A. Earthen surface upon which the GCL is to be installed shall be prepared and compacted in accordance with the Contract Documents. The surface shall be smooth, firm, unyielding, and free of vegetation, construction debris, wood, rocks, void spaces, ice, abrupt elevation changes, standing water, cracks larger than one-quarter inch in width, and any other condition that could damage the GCL.
- B. Subgrade surfaces consisting of granular soils or gravel may not be acceptable due to their large void fraction and puncture potential. Subgrade soils should possess a particle size distribution such that at least 80 percent of the soil is finer than a #60 sieve (0.2 mm), or as approved by the ENGINEER.
- C. Immediately prior to GCL deployment, grade the subgrade to fill in all voids and cracks,

and then smooth-roll to provide the best practicable surface for the GCL. At the completion of this activity, no wheel ruts, footprints or other surface irregularities shall exist in the subgrade. All protrusions extending more than one-half inch from the surface shall either be removed, crushed, or pushed into the surface with a smooth-drum compactor.

- D. The Installer shall certify acceptance of the subgrade before GCL placement.
- E. It shall be the Installer's responsibility thereafter to indicate to the ENGINEER any change in condition of the subgrade to be out of compliance with any of the requirements of this Section.

3.04 GCL PLACEMENT

- A. Deliver GCL rolls to the working area of the site in their original packaging. Prior to deployment, carefully remove the packaging without damaging the GCL. The orientation of the GCL shall be in accordance with the manufacturer's recommendations.
- B. Equipment that could damage the GCL shall not be allowed to travel directly on the GCL. If the installation equipment causes rutting of the subgrade, the subgrade must be restored to its originally accepted condition before GCL placement continues.
- C. Care shall be taken to minimize the extent to which the GCL is dragged across the subgrade in order to avoid damage to the bottom surface of the GCL. A temporary slip sheet or rub sheet may be used to reduce friction damage during placement.
- D. The GCL shall be placed so that seams are parallel to the direction of the slope. Seams should be located at least 3 feet from the toe of slopes steeper than 4H:1V.
- E. All GCL panels should lie flat on the underlying surface, with no wrinkles or folds.
- F. Only as much GCL shall be deployed as can be covered at the end of the working day with soil, a geomembrane, or a temporary waterproof tarpaulin. The GCL shall not be left uncovered overnight. If the GCL is hydrated when no confining stress is present, it may be necessary to remove and replace the hydrated material. The project ENGINEER, CQA Consultant, or GCL supplier should be consulted for specific guidance if premature hydration occurs.
- G. GCL should be placed such that non-woven side will be on top.

3.05 ANCHORAGE

- A. In accordance with the Contract Documents, the end of the GCL roll shall be placed in an anchor trench at the top of the slope. The front edge of the trench should be rounded to eliminate sharp corners. Remove loose soil from the bottom of the trench.
- B. At the top of sloped areas of the job site, an anchor trench for the GCL shall be excavated in accordance with the Contract Documents. The trench shall be excavated and approved by the CQA Consultant prior to GCL placement. No loose soil shall be allowed at the bottom of the trench, and no sharp corners or protrusions shall exist anywhere within the trench. CONTRACTOR shall provide a temporarily path for stormwater to

drain from the excavated anchor trench to the perimeter ditch to avoid stormwater seeping from the anchor trench under the liner.

3.06 SEAMING

- A. The GCL seams are constructed by overlapping their adjacent edges. Care should be taken to ensure that the overlap zone is not contaminated with loose soil or other debris. Supplemental bentonite is required in accordance with paragraph 3.06.D if the GCL has one or more non-woven needle punched geotextiles.
- B. The minimum dimension of the longitudinal overlap shall be 6 inches. End-of-roll overlapped seams should be similarly constructed, but the minimum overlap shall measure 24 inches.
- C. Seams at the ends of the panels should be constructed such that they are shingled in the direction of the grade to prevent runoff from entering the overlap zone.
- D. The underlying edge of the longitudinal overlap shall be exposed, and a continuous bead of granular sodium bentonite applied along a zone defined by the edge of the underlying panel and the 6-inch line. A similar bead of granular sodium bentonite shall be applied at the end-of-roll overlap. The bentonite shall be applied at a minimum application rate of one quarter pound per linear foot.

3.07 DETAIL WORK

- A. The GCL shall be sealed around penetrations and embedded structures in accordance with the Contract Documents.
- B. Cut GCL using a sharp utility knife.

3.08 DAMAGE REPAIR

- A. Repair GCL damaged during installation. Cut a patch to fit over the damaged area. The patch shall be cut to overlap 12 inches around all the damaged area. Dry bentonite or bentonite mastic should be applied around the damaged area at a rate of .25 pounds per linear foot, or as specified by manufacturer, prior to placement of the patch. It may be desirable to use an adhesive to affix the patch in place to prevent displacement during cover placement.

3.09 COVER PLACEMENT

- A. Cover soils shall be free of stones or other matter that could damage the GCL. Cover soils shall be approved by the project ENGINEER with respect to particle size, uniformity, and chemical compatibility. Cover soils with high concentrations of calcium (e.g., limestone, dolomite) are not acceptable.
- B. Soil cover shall be placed over the GCL using construction equipment that minimizes stresses on the GCL. A minimum thickness of 1 foot of cover shall be maintained between the equipment tires/tracks and the GCL at all times during the covering process. For frequently traveled areas, a minimum thickness of 2 feet is required.
- C. Soil cover shall be placed in a manner that prevents the soil from entering the GCL

overlap zones. Cover soil shall be pushed up slopes, not down slopes, to minimize tensile forces on the GCL.

- D. Although direct vehicular contact with the GCL is to be avoided, lightweight, low ground pressure vehicles (such as 4-wheel all-terrain vehicles) may be used to facilitate the installation of geosynthetic material to be placed over the GCL. The GCL Supplier, CQA Consultant, or Engineer should be contacted for specific recommendations on appropriate procedures in this situation.
- E. When a textured geomembrane is to be installed over the GCL, a temporary slip-sheet or rub-sheet should be used to minimize friction during placement, and to enable the textured geomembrane to be more easily moved into final position.

3.10 RECORDS AND QUALITY ASSURANCE

- A. The installation of the GCL will be monitored by a CQA Consultant provided by the OWNER. The purpose of CQA activities is to document the installation of the GCL. Refer to the CQA Plan. The following records shall be kept:
 - 1. Roll Placement Checklist
 - 2. Repair Checklist
 - 3. General Photographic Record of installation
 - 4. Record Drawing indicating work progress each day of installation
- B. Do not cover GCL until all repairs have been properly documented.

END OF SECTION 13315

**SECTION 13318
GEOGRID**

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

This specification covers the technical requirements for the furnishing and installation of the geogrid described herein. All materials used and work performed shall meet the requirements of this specification and the Contract Documents, or the manufacturer's installation and handling instructions, whichever are more stringent.

1.02 GENERAL REQUIREMENTS

- A. Tensar Structural Geogrid UX1800HS standard specifications and guides, latest version.
- B. TenCate Geosynthetics America Miragrid 24XT's standard specifications and guides, latest version.
- C. The most recent versions of the following American Society for Testing and Materials (ASTM standards).
 - 1. D2216 Moisture Content
 - 2. C117 & C136 Soil Gradation without Hydrometer
 - 3. D1557 Modified Proctor
 - 4. D4318 Atterberg Limits

1.03 SUBMITTALS

- A. The following submittals shall be furnished by the CONTRACTOR for the work of this Section within 30 days prior to material delivery to the site, and as specified herein:
 - 1. A representative sample of all materials to be used to complete the work of this Section.
 - 2. A list of similar completed projects in which the proposed materials have been successfully used.
 - 3. Manufacturer's instructions for installation and handling, and material data sheets giving full details of the material physical properties and test methods.
 - 4. Draft warranties and guarantees as described hereinafter.

1.04 WARRANTY AND GUARANTEE

The CONTRACTOR shall provide a written warranty relative to materials and installation certifying the geogrid materials provided and work performed under this project shall be free from any defects. Said warranty shall apply to normal use and service by the OWNER. Such written warranty shall provide for the repair or replacement of the defect or defective area of lining materials upon written notification and demonstration by the OWNER of the specific non-conformance of the lining material with the project specifications. Such defects or non-conformance shall be repaired or replaced within a reasonable period of time at no cost to the OWNER.

1.05 CONSTRUCTION QUALITY CONTROL

The CONTRACTOR shall have an individual experienced in the installation of the geogrid onsite at all times during the installation. The designated individual shall be responsible for ensuring that the geogrid is installed according to the manufacturer recommendations. The designated individual shall be subject to approval by the OWNER or CQA Consultant.

1.06 CONSTRUCTION QUALITY ASSURANCE

- A. The installation of the geogrid shall be monitored by the CQA Consultant as outlined in the CQA Plan.
- B. CONTRACTOR shall be aware of the activities outlined in the CQA Plan and shall account for these CQA activities in the installation schedule.

PART 2 PRODUCTS

2.01 MATERIALS

- A. The structural geogrid and their components shall have properties that meet or exceed certified properties for Tensar International Corporation's (Tensar) Structural Geogrid UX1800HS and TenCate Geosynthetics Americas' (TenCate) Mirafi Miragrid 24XT.
- B. The Tensar Structural Geogrid UX1800HS material shall be composed of high-density polyethylene (HDPE) meeting the following strength specifications:
 - 1. Tensile Strength at 5% Strain: 6,510 lb/ft
 - 2. Ultimate Tensile Strength: 14,390 lb/ft
- C. The TenCate Mirafi Miragrid 24XT material shall be composed of high molecular weight, high tenacity polyester multifilament yarns woven in tension and finished with a PVC coating meeting the following strength specifications:
 - 1. Tensile Strength at 5% Strain: 7,000 lb/ft
 - 2. Ultimate Tensile Strength: 27,415 lb/ft

2.02 HANDLING OF MATERIALS

- A. Protective Wrapping – All rolls of geogrid, irrespective of their type, must be wrapped with a plastic covering and be identifiable with a durable gummed label showing the manufacturer's name, the style number, and roll number.
- B. Shipping – While unloading or transferring the geogrid roll from one location to another, prevent damage to the wrapping, core, label, or the geogrid itself.
- C. Storage at the site – Geogrid storage shall be placed in a manner that ensures the integrity of the wrapping, core, and label as well as the physical properties of the geosynthetic, Geogrid shall be elevated off the ground and ensuring that it is

adequately covered and protected from ultraviolet radiation including sunlight, temperature in excess of 60 degrees Celsius (140 degrees Fahrenheit), and human or animal damage.

PART 3 EXECUTION

The work shall be executed according to manufacturer's specifications which shall be provided to the ENGINEER under provisions of Part 1.03 of this Section.

3.01 INSTALLATION

- A. Install geogrid material as specified in the Contract Documents.

3.02 PLACEMENT

- A. The CONTRACTOR shall remove the protective wrappings from the geogrid rolls to be deployed only after the subgrade has been documented and approved by the CQA Consultant. The CONTRACTOR shall:
 1. Before unrolling the geogrid, the geogrid should be laid in the direction of main reinforcement from the anchorage area (top of slope).
 2. Anchoring shall be achieved by small piles of fill aggregate, washer pins, and U-staples driven in the subgrade capturing the apertures of the grid.
 3. Unroll geogrid on the subgrade and apply tension to minimize wrinkles.
 4. Geogrid panel overlap requirements, either side-by-side or end-to-end shall depend on the strength of subgrade.
 5. Fill placement shall proceed in the direction of the adjacent panel overlap (from the bottom of the slope upward)
 6. Anchor at the trench/run out area to prevent geogrid pullout during fill placement.
 7. Final spreading and compaction may be carried out by small dozers with low to moderate ground pressure and/or front-end loaders. A minimum cover of 12 inches shall be maintained between construction equipment and the geogrid.

3.03 SEAMING AND JOINING

- A. Geogrid shall be joined or sewn to prevent the loss of 100 percent coverage due to geogrid panel shifting during backfilling.

3.04 PROTECTION

- A. Equipment shall not be allowed on the exposed geogrid.
- B. Sheep foot rollers shall not be used for initial compaction.

- C. No splices are allowed in the principal strength direction.

3.05 ACCEPTANCE

- A. The CONTRACTOR shall retain all responsibility for the geogrid in the side slope until acceptance by the OWNER.
- B. The geogrid shall be accepted by the OWNER when:
 - 1. The installation is finished;
 - 2. The OWNER and CONTRACTOR have signed a Certificate of Substantial Completion, and all conditions identified on the certificate have been met for the OWNER to assume responsibility for the geogrid. The signed Certificate of Substantial Completion and acceptance of the geogrid will be part of the CQA Report;
 - 3. All warranties have been provided to the OWNER.

END OF SECTION 13318

**SECTION 13320
TEXTURED GEOMEMBRANE (WHITE)**

PART 1 GENERAL

1.01 SCOPE OF APPLICATION

This specification covers the technical requirements for the furnishing and installation of the geomembrane described herein. All materials used and work performed shall meet the requirements of this Section and the Contract Documents, or the manufacturer's installation and handling instructions, whichever are more stringent.

1.02 REFERENCES

- A. Geosynthetic Research Institute (GRI) standard specifications and guides, latest versions.
- B. The most recent versions of the following American Society for Testing and Materials (ASTM) standards:
 - 1. D4218 Standard Test Method for Determination of Carbon Black Content in Polyethylene Compounds by the Muffle-Furnace Technique.
 - 2. D1505 Standard Test Method for Density of Plastics by the Density-Gradient Technique.
 - 3. D1238 Standard Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer.
 - 4. D638 Standard Test Method for Tensile Properties of Plastics.
 - 5. D5199 Standard Test Method for Measuring Nominal Thickness of Geosynthetics.
 - 6. D5994 Standard Test Method for Measuring Core Thickness of Textured Geomembrane.
 - 7. D4833 Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.
 - 8. D1004 Standard Test Method for Initial Tear Resistance of Plastic Film and Sheeting.
 - 9. D3895 Standard Test Method for Oxidative-Induction Time of Polyolefins by Differential Scanning Calorimetry.
 - 10. D5885 Standard Test Method for Oxidative-Induction Time of Polyolefin Geosynthetics by High-Pressure Differential Scanning Calorimetry.

1.03 SUBMITTALS

- A. The following submittals shall be furnished by the CONTRACTOR for the work of this Section within 30 days prior to material delivery to the site, and as specified herein.
 - 1. A representative sample of the geomembrane material.
 - 2. Manufacturer's instructions for installation and handling, and material data sheets giving full details of the material physical properties and test methods.

3. A project reference list totaling at least 1 million square feet in size;
 4. Draft warranties and guarantees as described herein.
 5. Proposed panel layout drawing showing anchor trenches, seams, and panel numbering.
 6. List of proposed seaming personnel and their experience records.
 7. Current (within 12 months of the geomembrane installation) calibration certificates for all tensiometers to be used for field shear and peel strength testing.
 8. Provide documentation that the extrudate is from the same resin lot as the geomembrane.
- B. The following submittals shall be furnished by the CONTRACTOR prior to the issuance of the certificate of substantial completion for the Project:
1. Warranties and guarantees as described herein.
 2. QC Daily field reports.
 3. Subgrade Acceptance.
 4. Panel Placement records.
 5. Panel seaming records.
 6. Destructive test records.
 7. Non-destructive test records.
 8. Trial seam records.
 9. Repair records.
 10. Inventory sheets/Bills of Lading.
 11. Record drawing showing and identifying all panels, seams, seam types, destructive test locations, and all repairs to the geomembrane.

1.04 CONSTRUCTION QUALITY CONTROL

The CONTRACTOR shall have an individual experienced in the installation of geomembrane on-site at all times during the installation. The designated individual shall be responsible for ensuring that the geomembrane is installed according to this specification and the Contract Documents. The designated individual shall be subject to approval by the OWNER or CQA Consultant.

1.05 WARRANTY AND GUARANTEE

The CONTRACTOR shall provide a written warranty for a minimum 5 years pro-rated relative to materials and 1 year on installation certifying the geomembrane materials provided and work performed under this project shall be free from any defects. Said warranty shall apply to normal use and service by the OWNER. Such written warranty shall provide for the repair or replacement of the defect or defective area of lining materials upon written notification and demonstration by the OWNER of the specific non-conformance of the lining material with the project specifications. Such defects or non-conformance shall be repaired or replaced within a reasonable period of time at no cost to the OWNER.

1.06 CONSTRUCTION QUALITY ASSURANCE

- A. The installation of the geomembrane shall be monitored by the CQA Consultant as outlined in the CQA Plan.
- B. CONTRACTOR shall be aware of the activities outlined in the CQA Plan and shall account for these CQA activities in the installation schedule.

PART 2 PRODUCTS

2.01 RAW MATERIALS

- A. The raw material from which the HDPE geomembrane will be made shall be first quality polyethylene resin containing no more than 2 percent clean recycled polymer by weight, and meeting the following specifications:
 - 1. Density [ASTM D1505 or ASTM 792 Method B]: 0.932 g/ml or higher (without carbon black); and
 - 2. Melt Index [ASTM D1238]: <1.0 g/10 minutes

2.02 GEOMEMBRANE

- A. The materials supplied under this Section shall be first quality industrial grade products designed and manufactured specifically for the purposes of this work, and which have been satisfactorily demonstrated by prior use to be suitable and durable for use in sanitary landfills accepting municipal waste.
- B. The geomembrane shall be uniform in thickness and surface texture, and free of undispersed raw materials, streaks, gels, blisters, cracks, tears, or pinholes. Material shall be chemically and temperature stable under the intended conditions and shall contain no additives or filler that can leach out and cause deterioration over time.
- C. The geomembrane will incorporate a UV-resistant light-reflective white surface layer fully integrated with the primary black geomembrane liner. The white surface shall be installed upwards.
- D. The geomembrane properties shall meet the minimum average roll requirements stated in Tables 1 and 2 of GRI Test Method GM13 (latest version) for HDPE geomembrane.
- E. Manufacturer's Quality Control (MQC) testing (test methods and frequencies) shall be conducted in accordance with the most recent versions of Tables 1 and 2 of GRI Test Method GM13 for HDPE geomembrane, or the manufacturer quality control guide, whichever is more stringent.
- F. At least seven (7) days prior to the loading and shipment of any geomembrane material, the CONTRACTOR shall provide the CQA Consultant with the following information:
 - 1. The origin (resin supplier's name and resin production plant), identification (brand name, number) and production date of the resin;
 - 2. A copy of the quality control certificates issued by the resin supplier;

3. Reports on the tests conducted by the Manufacturer to verify the quality of the resin used to manufacture the geomembrane rolls assigned to the project. At a minimum, these tests should include density [ASTM D1505 or ASTM 792 method B], and melt index [ASTM D1238]; and
4. A statement that no reclaimed polymer is added to the resin (however, the use of polymer recycled during the manufacturing process may be permitted if done with appropriate cleanliness and if recycled polymer does not exceed 2 percent by weight).
5. The manufacturer's data and samples of the geomembrane to be used, giving full details of the minimum physical properties and test methods, as specified herein, certified test reports indicating the physical properties of the materials to be used, and roll numbers and identification.
6. The manufacturer's certificate shall state that the finished geomembrane meets MARV requirements of the specification as evaluated under the manufacturer's quality control program. A person having legal authority to bind the manufacturer shall attest the certificate.

2.03 CONFORMANCE TESTING

- A. Conformance testing sampling must be performed, prior to shipment to the site, at the manufacturer's facility. The CONTRACTOR shall notify the CQA Consultant at least three (3) weeks prior to shipment in order to arrange for conformance sampling. No material shall be shipped to the site until conformance sampling has been performed and reports reviewed by the CQA Consultant.
- B. When completed, the particular approved lot should be marked for the particular site under investigation. The expressed purpose of in-plant Material Conformance Test Sampling is to verify that geomembrane material designated for the project is confirmed as meeting the project specifications prior to shipment to the site. The Manufacturer shall make available all necessary personnel and equipment to assist the CQA Consultant in retrieving conformance samples of the geomembrane material.
- C. Procedures in the Event of a Conformance Test Failure

The following procedure shall apply whenever a sample fails a conformance test conducted by the CQA Laboratory:

1. The Manufacturer shall replace any roll of geomembrane that is not in conformance with the Specifications with a roll that meets Specifications.
2. The CONTRACTOR shall remove conformance samples for testing by the CQA Laboratory from the next numbered rolls on each side of the failed roll. These two samples must both conform to Specifications. If either of these samples fails, every roll of geomembrane on site and every roll delivered subsequently must be tested by the CQA Laboratory for conformance to the Specifications. This additional conformance testing shall be at the expense of the CONTRACTOR.

PART 3 EXECUTION

3.01 DELIVERY

Transportation and unloading of the geomembrane are the responsibility of the CONTRACTOR. The CONTRACTOR is responsible for the shipping manifests and all other relevant documents. Shipping manifests and all other relevant documents shall be submitted to the CQA Consultant, as the rolls are unloaded from the truck.

3.02 STORAGE

Storage of geomembrane shall be in accordance with the Manufacturer's recommendations, and all warranty conditions. The CONTRACTOR shall be responsible for the storage of the geomembrane on site in an area that is well drained and remains dry during material storage, and is protected from theft, vandalism, passage of vehicles, etc.

3.03 SUBGRADE PREPARATION

- A. The subgrade shall be unyielding, smoothly graded, with no abrupt changes or break in grade, and constructed to elevations indicated by the Contract Documents. Bridging of the subgrade shall be considered unacceptable. No standing water or excessive moisture shall be allowed. The surface shall be free of loose soil, rocks, roots, sticks, vegetation, sharp objects, debris, frost, or other materials. Final compaction shall be with a smooth steel wheel roller.
- B. The CONTRACTOR shall inspect the entire subgrade and certify in writing that the subgrade on which the geomembrane shall be installed is acceptable before commencing placement. This inspection shall be performed in the presence of the CQA Consultant. The CONTRACTOR shall repair any defects noted in the underlying material prior to the installation of the geomembrane.
- C. Placement of the geomembrane on a saturated subgrade is prohibited. After a rain event, the subgrade shall be given sufficient time to dry or drain to the design moisture content before placing the geomembrane.

3.04 INSTALLATION

The CONTRACTOR shall certify in writing that the surface on which the geomembrane shall be installed is acceptable. The CONTRACTOR shall give the certificate of acceptance to the CQA Consultant prior to commencement of geomembrane installation in the area under consideration.

- A. Geomembrane Placement
 - 1. A field panel is the unit area of geomembrane, which is to be seamed in the field, i.e., a field panel is a roll, or a portion of roll installed in the field.
 - 2. The CONTRACTOR shall submit to the CQA Consultant a panel layout plan at least 30 days prior to installation.
 - 3. It shall be the responsibility of the CONTRACTOR to ensure that each field panel is marked with the original roll number. The roll number shall be marked at a location agreed upon by the CQA Consultant.
- B. Field Panel Placement

1. The CQA Consultant shall verify that field panels installation follows the proposed CONTRACTOR's layout plan, or as approved or modified.
2. The CONTRACTOR shall be responsible for providing calculations verifying the required amount of compensation, that must be installed.
3. Field panels shall be placed one at a time, and each field panel shall be seamed immediately after its placement (in order to minimize the number of unseamed field panels exposed to wind).
4. It is usually beneficial to "shingle" overlaps in the down slope direction to facilitate drainage in the event of precipitation. It is also beneficial to proceed in the direction of prevailing winds. Scheduling decisions must be made during installation, in accordance with varying conditions. In any event, the CONTRACTOR shall be fully responsible for the decisions made regarding placement means and methods.
5. Geomembrane placement shall not proceed at ambient temperatures below 40 degrees Fahrenheit or above 104 degrees Fahrenheit unless otherwise authorized by the CQA Consultant. Geomembrane placement shall not be done during any precipitation, in an area of ponded water, or during excessive winds.
6. The CONTRACTOR shall ensure that:
 - a. Any equipment used does not damage the geomembrane or subgrade by handling, trafficking, heat, leakage of hydrocarbons or other means;
 - b. The prepared subgrade surface underlying the geomembrane has not deteriorated since previous acceptance, and is still acceptable immediately prior to geomembrane placement; any geosynthetic elements immediately underlying the geomembrane are of acceptable cleanliness and are free of debris;
 - c. Personnel working on the geomembrane do not smoke, wear shoes that may damage the geomembrane, or engage in other activities which could damage the geomembrane;
 - d. The method used to unroll the panels does not cause scratches or crimps in the geomembrane and does not damage the supporting soil;
 - e. The method used to place the panels minimizes wrinkles (especially differential wrinkles between adjacent panels);
 - f. Adequate temporary loading and/or anchoring using sandbags or other means not damaging the geomembrane, has been placed to prevent uplift by wind. The loading should be continuous along the edges of panels to minimize the risk of wind flow under the panels;
 - g. All field seaming and installation of appurtenances (sumps, etc.) are done in accordance with Section 3.04.C; and
 - h. Direct contact of equipment with the geomembrane is minimized, i.e., the geomembrane is protected by geotextile, additional geomembrane, or other suitable material, in areas where traffic may be expected. Any low-tire-pressure vehicle and machinery used for installing the liner components must stay inside the area that has been covered or will be covered and shall not be used for any other purposes outside the liner-covered area during the course of the liner placement. Prior to driving any rubber-tired vehicle on geosynthetic components, the CQA

representative must thoroughly examine the tires of the vehicle for any sharp objects that could damage the liner.

C. Field Seaming

1. The CONTRACTOR and CQA Consultant shall review the proposed panel layout and reach an agreement on any changes to accommodate field conditions.
2. In general:
 - a. Seams should be oriented parallel to the line of maximum slope, i.e., oriented with, not across, the slope.
 - b. In corners and other geometrically complex locations, the number of seams should be minimized.
 - c. No base seam or tee seam shall be less than 5 feet from the toe of slopes, or areas of potential stress concentrations, unless otherwise authorized by the CQA Consultant.
 - d. Panels of geomembrane have a finished overlap, sufficient to allow peel tests to be performed on the seam;
 - e. No solvent or adhesive is used unless the product is approved in writing by the CQA Consultant (samples shall be submitted to the CQA Consultant for testing and evaluation); and
 - f. The procedure used to temporarily bond adjacent panels together does not damage the geomembrane (in particular, the temperature of hot air at the nozzle of any spot seaming apparatus is controlled such that the geomembrane is not damaged. "Damage" includes a loss in durability).
3. The finished overlap of the seam shall be sufficient to allow peel tests to be performed.
4. Requirements of Personnel:
 - a. All personnel performing seaming operations shall be qualified by experience.
 - b. Seaming personnel must have seamed at least 2,000 feet of geomembrane seams using the same type of seaming apparatus to be used on this project.
 - c. At least one seamer shall have experience seaming a minimum of 20,000 feet of geomembrane seams using the same type of seaming apparatus to be used on this site-specific geomembrane.
 - d. The most experienced seamer, the "master seamer," shall provide direct supervision over less experienced seamers.
5. Seaming Equipment and Products
Approved methods for field seaming are extrusion seaming and fusion seaming. Proposed alternate methods shall be documented and submitted to the CQA Consultant for approval. Only apparatus that has been specifically approved by make and model shall be used. The CONTRACTOR shall use appropriate measuring equipment to ensure that accurate temperatures are being achieved.

6. Extrusion Process

- a. The extrusion-seaming apparatus shall be equipped with gauges giving the relevant temperatures of the apparatus such as preheat and operating temperature.
- b. The CONTRACTOR shall provide documentation regarding the extrudate to the CQA Consultant and shall verify that the extrudate is compatible with the Specifications, and is comprised of the same resin as the geomembrane sheeting.
- c. The CONTRACTOR shall perform his work so that:
 - Apparatus temperatures, extrudate temperatures, ambient temperatures, and geomembrane temperatures are verified at appropriate intervals;
 - Abrading is performed perpendicular to the seam and is completed no more than one hour prior to seaming;
 - Abrading of the seam area must not extend beyond either side of the extrusion weld;
 - The depth of the abrasion must not exceed 10 percent of the nominal material thickness;
 - The extruder is purged prior to beginning a seam until all heat-degraded extrudate has been removed from the barrel;
 - The electric generator is placed on a smooth base such that no damage occurs to the geomembrane;
 - A smooth insulating plate or fabric is placed beneath the hot seaming apparatus after usage; and
 - The geomembrane is protected from damage in heavily trafficked areas.

7. Fusion Process

- a. The fusion-seaming equipment must be an automated roller-mounted device and equipped with gauges giving the applicable temperatures. The CONTRACTOR shall establish the appropriate machine operating temperature and speed settings by trial seam testing prior to each seaming period.
- b. The CONTRACTOR shall perform his work so that:
 - For tee seam intersections, any flap on the cross seam is cut back to the edge of the outer track of the seam prior to seaming;
 - The electric generator is placed on a smooth base such that no damage occurs to the geomembrane;
 - A smooth insulating plate or fabric is placed beneath the hot seaming apparatus after usage;
 - The geomembrane is protected from damage in heavily trafficked areas; and

- Build-up of moisture between the sheets shall be prevented; any moisture shall be wiped dry prior to welding.

8. Weather Conditions for Seaming

- a. The following protocols shall be observed during seaming:
- Unless authorized in writing by the CQA Consultant, no seaming shall be attempted at ambient temperatures below 40°F or above 104°F.
 - If geomembrane temperature is below 50°F, pre-heating may be required.
 - The geomembrane seaming area shall be dry and protected from wind.
 - Ambient temperatures shall be measured 2 inches above the geomembrane surface.
- b. If the CONTRACTOR wishes to use methods which may allow seaming at ambient temperatures below 40°F or above 104°F, the CONTRACTOR shall demonstrate and certify that such methods produce seams that are equivalent to seams produced at geomembrane temperatures above 40°F and below 104°F, and that the overall quality and durability of the geomembrane is not adversely affected.
- c. In addition, an addendum to the contract between the OWNER and the CONTRACTOR is required to specifically state that the seaming procedure does not cause any physical or chemical modification to the geomembrane that shall generate any short or long-term damage to the geomembrane. Then, the temperatures in the above quality assurance procedure shall be modified.

9. Trial Seams

- a. Trial seams shall be made on same geomembrane material that will be used on the project installation to verify that seaming conditions are adequate. In general, trial seams shall be conducted as follows:

	Fusion Welding	Extrusion Welding
Equipment	Before each welding period (every shift)	Before each welding period (every shift)
Technicians	Before each welding period (one per day)	Before each welding period (every shift)

- b. A welding period or shift shall not exceed four (4) hours. An additional trial seam shall be made when the ambient temperature varies more than 20°F since the last passing trial seam. Trial seams shall be made under the same conditions as actual seams. If any seaming apparatus is turned off for any reason, regardless of the length of time, a new passing trial seam must be completed for that specific seaming apparatus.

- c. The trial seam sample shall be at least 2 feet long by 1 foot wide with the sample centered lengthwise.
- d. The CONTRACTOR shall cut six (6) specimens, each one (1) inch wide and a minimum of six (6) inches long from the trial seam sample. Three specimens shall be tested in shear and three in peel using a calibrated field tensiometer, and the test results shall meet or exceed the values given in Tables 1 and 2 of GRI Test Method GM19 (latest version). If any specimen fails, the entire operation shall be repeated. If the additional seam sample fails, the seaming apparatus and seamer shall not be accepted and shall not be used for seaming until the deficiencies are corrected and two consecutive successful full trial seams are achieved.

10. General Seaming Procedure

Unless otherwise specified, the general seaming procedure used by the CONTRACTOR shall be as follows:

- a. 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. If approved by the CQA Consultant, fishmouths or wrinkles may be repaired in the field by the CONTRACTOR.
- b. Seaming shall be performed during hours of adequate natural light. If approved by the CQA Consultant, seaming operations may be carried out at night, provided adequate illumination is supplied.
- c. Seaming shall extend entire length of panels including the portion placed in the anchor trench.

D. Nondestructive Seam Continuity Testing

- 1. The CONTRACTOR shall nondestructively test all field seams over their full-length using air pressure test (for double fusion seams only), or other approved method. Vacuum testing and air pressure testing are described in Sections 3.04.D.4 and 3.04.D.5, respectively. The purpose of nondestructive test is to verify the continuity of seams. It does not provide any information on seam strength. Continuity testing shall be carried out as the seaming work progresses, not at the completion of all field seaming. Nondestructive testing shall not be permitted before sunrise or after sunset unless there is, in the opinion of the CQA Consultant, adequate illumination.
- 2. The CONTRACTOR shall complete any required repairs in accordance with Section 3.04.F.
- 3. The following procedures applies to segments of seams that cannot be nondestructively tested:
 - a. All such seam segments shall be capped with the same geomembrane.
 - b. If the seam is accessible to testing equipment prior to final installation, the seam shall be nondestructively tested prior to final installation.

- c. The CQA Consultant and CONTRACTOR shall observe the seaming and cap-stripping operations for uniformity and completeness.
4. Vacuum testing equipment shall be comprised of the following:
 - a. A vacuum box assembly consisting of a rigid housing, a transparent viewing window, a soft neoprene gasket attached to the bottom, port hole, valve assembly, and a vacuum gauge;
 - b. A vacuum tank and pump assembly equipped with a pressure controller and pipe connections; and
 - c. A pressure/vacuum hose with fittings and connections.

The following procedure shall be followed:

- If vacuum testing a fusion seam, the seam flap must be cut off prior to exposing the seam for testing;
 - Energize the vacuum pump and reduce the tank pressure to approximately 5 psi gauge;
 - With a soapy solution, wet geomembrane few inches wider and longer than the vacuum box;
 - Place the box over the wetted area;
 - Close the bleed valve and open the vacuum valve;
 - Ensure that a leak-tight seal is created;
 - Examine the geomembrane seam through the viewing window for the presence of soap bubbles for a period of not less than 10 seconds;
 - If no bubbles or foam appears after 10 seconds, close the vacuum valve and open the bleed valve. Before moving the box over the next adjoining area, place a mark on the geomembrane at the leading edge of the viewing window, then move the box over the next adjoining area so that the last mark on the geomembrane is within the viewing window, and repeat the process; and
 - All areas where soap bubbles appear shall be marked and repaired in accordance with Section 3.02.F.
5. Air Pressure Testing (For Double Fusion Seam Only)
 - a. The equipment shall be comprised of the following:
 - An air pump equipped with a pressure gauge capable of generating and sustaining a pressure between 25 and 30 psi;
 - A pressure gauge display with one psi increments;
 - A hose with fittings and connections; and
 - A sharp hollow needle or other approved pressure-feed device.
 - b. The following procedures shall be followed:
 - Seal both ends of the seam to be tested;
 - Insert the needle or other approved pressure-feed device into the channel created by the fusion seam;

- Energize the air pump to a pressure between 25 and 30 psi and maintain the pressure for approximately 2 minutes to allow the temperature of the air in the channel to stabilize;
- Close the valve and verify that the pressure is between 25 and 30 psi and observe the pressure for a minimum of 5 minutes;
- If loss of pressure exceeds 3 psi or if the pressure does not stabilize, locate the faulty area and repair it in accordance with Section 3.04.F.
- To verify that there is airflow through the entire channel, the air pressure gauge shall be observed for a decrease in pressure when the technician removes the seal at the end of the channel away from the air pump. If it is found that there is a blockage in the channel, the entire seam must be capped and nondestructively tested; and
- Remove the needle or other approved pressure-feed device and seal the hole.

E. Destructive Testing

1. Destructive seam tests shall be performed at selected locations. The purpose of these tests is to evaluate field seam strength as the seaming work progresses not at the completion of all field seaming.
2. The CQA Consultant shall select locations where seam samples shall be cut out for laboratory testing. These locations shall be established as follows:
 - a. A minimum frequency of one sample for every 500 feet of seam.
 - b. Test locations shall be determined during seaming at the CQA Consultant's discretion. Selection of such locations may be prompted by suspicion of contamination, offset seams, or any other potential cause of imperfect seaming.
 - c. The CONTRACTOR shall not be informed in advance of the locations where the seam samples shall be taken.
3. Samples shall be cut by the CONTRACTOR as the seaming progresses in order to have laboratory test results before the geomembrane is covered by other material.
4. All holes in the geomembrane resulting from destructive seam sampling shall be immediately repaired in accordance with repair procedures described in Section 3.04.F. The continuity of the resulting extruded seams in the repaired area shall be non-destructively tested according to Section 3.04.D.
5. The destructive sample shall be 12 inches wide by 48 inches long with the seam centered lengthwise. The sample shall be cut into three parts and distributed as follows:
 - a. One portion, measuring 12 inches x 18 inches, to the CONTRACTOR for field testing;
 - b. One portion, measuring 12 inches x 12 inches, to the CQA Consultant for archive storage; and
 - c. One portion, measuring 12 inches x 18 inches, for CQA Laboratory testing.

6. Ten 1-inch-wide specimens shall be tested in the field, by calibrated gauged tensiometer, five in peel for adhesion and five in shear for shear strength. If any field test sample fails to pass the criteria stated in GRI Test Method GM19 (latest version), then the procedures outlined in Section 3.04.E. shall be followed.
7. Additionally, smooth edges (produced for welding) shall be tested in accordance with ASTM D5199. The thickness shall be measured at the smooth edge, not in the transition zone between the smooth welding zone and the textured area of the sample. A minimum of (5) thickness measurements on each of the weld shall be collected and be labeled as "welding zone thickness".
8. The following procedures shall apply whenever a sample fails a destructive test, whether that test is conducted by the CQA Laboratory, the CONTRACTOR's laboratory, or by field tensiometer. The CONTRACTOR has two options:
 - a. Reconstruct the seam between any two passed destructive seam test locations.
 - b. Trace the seaming path to an intermediate location (at 10 feet - maximum from the point of the failed test in each direction) and take a small sample for an additional field test at each location. If these additional samples pass tensiometer testing, then full destructive laboratory samples should be taken. If these destructive laboratory samples pass the tests, then the seam should be reconstructed between these locations by capping. If either sample fails, then the process is repeated to establish the zone in which the seam should be reconstructed.
9. If a fusion-type seam fails destructive testing and the CONTRACTOR chooses to cap the seam, the only acceptable capping method is as described in Section 3.04.F.4. Applying topping (bead of extrudate) is not an approved method of capping seams.
10. All acceptable reconstructed seams must be bounded by two locations from which destructive samples passing laboratory tests have been taken. In cases exceeding 150 feet of reconstructed seam, a sample shall be taken from the zone in which the seam has been reconstructed. This sample must pass destructive testing, or the procedure outlined in this section must be repeated.

F. Defects and Repairs

1. All seams and the geomembrane shall be examined by the CONTRACTOR and the CQA Consultant for identification of defects, penetrating stones, holes, blisters, undispersed raw materials, and any sign of contamination by foreign matter. Because light reflected by the geomembrane helps to detect defects, the surface of the geomembrane shall be clean at the time of examination. The geomembrane surface shall be swept or washed by the CONTRACTOR if the amount of dust or mud inhibits examination.
2. Each suspect location shall be nondestructively tested using the methods described in Section 3.02.D. Each location that fails the nondestructive testing shall be marked by the CQA Consultant and repaired by the CONTRACTOR. Work shall not proceed that would cover locations that have been repaired until laboratory results with passing values are available.

3. Any portion of the geomembrane exhibiting a flaw, or failing a destructive or nondestructive test, shall be repaired. Several procedures exist for the repair of these areas. The final decision as to the appropriate repair procedure shall be agreed upon between the CONTRACTOR, and CQA Consultant. The procedures available include:
 - a. Patching, used to repair all penetration holes, tears, undispersed raw materials, and contamination by other matter;
 - b. Spot seaming, used to repair small scratches, or other minor, localized flaws; and
 - c. Capping, used to repair large lengths of failed seams.
4. In addition, the following provisions shall be satisfied:
 - a. Surfaces of the geomembrane which are to be repaired shall be abraded no more than one hour prior to the repair;
 - b. All surfaces must be clean and dry at the time of the repair;
 - c. All seaming equipment used in repairing procedures must be approved;
 - d. The repair procedures, materials, and techniques shall be approved in advance of the specific repair by the CQA Consultant, and CONTRACTOR; and
 - e. Patches or caps shall extend at least 6 inches beyond the edge of the defect, and all corners of patches shall be rounded with a radius of at least 3 inches.
5. Each repair shall be logged. Each repair shall be nondestructively tested using the methods described in this specification. Repairs that pass the nondestructive test shall be considered acceptable. Failed tests shall require the repair to be redone and retested until a passing test is achieved.
6. When seaming of the geomembrane is completed (or when seaming of a large area of the geomembrane is completed) and prior to placing overlying materials, the CQA Consultant shall observe the geomembrane for wrinkles.
 - a. Bridging of the geomembrane shall be considered unacceptable. Compensating materials shall be installed at these locations.

G. Backfilling of Anchor Trench

Anchor trenches shall be pumped or allowed to drain to prevent ponding and softening of the soils while the trench is open. Anchor trenches shall be backfilled and compacted by the CONTRACTOR. Care shall be taken when backfilling the trenches to prevent damage to any component of the liner system.

H. Acceptance

1. The CONTRACTOR shall retain all responsibility for the geomembrane in the landfill cell or cap until acceptance by the OWNER.
2. The geomembrane shall be accepted by the OWNER when:
 - a. The installation is finished.
 - b. Verification of all seams and repairs, including testing, is complete.

- c. CONTRACTOR furnishes the CQA Consultant with written warranty in accordance with Section 1.05 of this specification.
- d. All documentation of installation required by the Contract Documents has been received by the CQA Consultant.
- e. The OWNER and CONTRACTOR have signed a certificate of Substantial Completion, and all conditions identified on the certificate have been met for the OWNER to assume responsibility for the geomembrane.

END OF SECTION 13320

**SECTION 13325
GEOMEMBRANE LEAK LOCATION SURVEY FOR EXPOSED GEOMEMBRANE**

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. The General Contractor is responsible for providing a leak location survey for the exposed geomembrane.
- B. Requirements for performance of a geomembrane electrical leak location survey using electrical methods for post-geomembrane installation for an exposed geomembrane.
- C. Method selection depends on many factors including site configuration, site conditions, site weather patterns, and geomembrane type. Sometimes multiple methods should be used on different areas of the containment system for maximum effectiveness. Method selection is to be performed by the Leak Location Contractor.

1.02 RELATED SECTIONS

- A. Section 00900 – Submittal Form
- B. Section 13320 - Geomembrane

1.03 REFERENCES

- A. ASTM D6747 – Standard Guide for Selection of Techniques for Electrical Detection of Potential Leak Paths in Geomembranes
- B. ASTM D7002 – Standard Practice for Leak Location on Exposed Geomembranes Using the Water Puddle System
- C. ASTM D7703 – Standard Practice for Electrical Leak Location on Exposed Geomembranes Using the Water Lance System
- D. ASTM D7953 – Standard Practice for Electrical Leak Location on Exposed Geomembranes Using the Arc Testing Method
- E. ASTM D7240 – Leak Location using Geomembranes with an Insulating Layer in Intimate Contact with a Conductive Layer via Electrical Capacitance Technique (Conductive Geomembrane Spark Test)

1.04 SUBMITTALS

Leak Location Contractor shall submit a Leak Location Survey Work Plan to Engineer for approval prior to commencement of the leak location survey. The Leak Location Survey Work Plan shall include:

1. Qualifications of Leak Location Contractor to include the number of years Leak Location Contractor has performed the survey method;
2. Resumes of on-site supervisors.
3. Description of the survey method(s), and procedures.
4. Required site preparations.
5. Estimated duration of survey.
6. Quality control and field calibration procedures.
7. A list of projects demonstrating the qualifications and experience where Leak Location Contractor and leak location supervisor have met the requirements of paragraph 2.1 of this section.
8. Sample of a final report (per selected ASTM Standard Practice) provided by Leak Location Contractor following the completion of the survey.

1.05 CONSTRUCTION QUALITY ASSURANCE

- A. The leak location survey shall be observed by the CQA Consultant.
- B. Contractor shall be aware of the leak detection activities outlined herein and shall account for these activities in the construction schedule.

PART 2 – PRODUCTS

2.01 LEAK LOCATION CONTRACTOR QUALIFICATIONS

- A. Leak Location Contractor shall be an independent third party unrelated by ownership or relation to the general contractor, CQA firm, engineer, or geomembrane installation contractor and have qualifications and experience in conducting the survey method, including having tested a minimum of 10,000,000 square feet of geomembrane liner within the previous three years for at least five similar projects. A qualified leak location contractor is TRI Environmental, Inc. tel. (512) 623-0511. The General Contractor is responsible for providing a leak location survey for the exposed geomembrane.

PART 3 – EXECUTION

3.01 INFORMATION REQUIRED

CQA Consultant shall provide Leak Location Contractor with drawings showing:

1. All layers constituting the lining system
2. Details of all geomembrane penetrations.
3. Peripheral details, including welds to adjacent lining systems

4. Structures and obstructions above the geomembrane.
5. Electrical equipment above the geomembrane.

3.2 SITE PREPARATION

- A. Leak Location Contractor will identify actions required by the Contractor to prepare the site for the leak location survey.
- B. Contractor shall ensure that the exposed geomembrane is generally clean and dry.
- C. Contractor shall provide support for the leak location survey as detailed in the submitted Work Plan. This may entail providing a water truck with hoses as well as labor support for the duration of the survey.
- D. An electrically conductive layer must be present underneath the geomembrane being tested. Examples of electrically conductive material include geosynthetic clay liners with adequate moisture, concrete with adequate moisture, and earth materials with adequate moisture.

3.03 EXECUTION

- A. Leak Location Contractor shall inspect the site prior to commencing the survey to ensure all site preparations are completed and the site conditions are appropriate for conducting the leak location survey.
- B. Any discrepancy in the required site preparations described in the Leak Location Survey Work Plan or site conditions shall be reported to Contractor for corrective or appropriate action.
- C. Conduct a leak location survey using the selected method(s) in accordance with the procedures described in the latest version of ASTM Standard.
- D. Leak Location Contractor shall inform site personnel and mark the locations of all identified or indicated leaks with flags, spray paint, or written coordinates.

3.04 REPORTING

Provide a written report within 14 calendar days of completion of the leak location survey field work that fulfills the requirements of the applicable ASTM standard(s).

END OF SECTION 13325

**SECTION 13330
GEOMEMBRANE LEAK LOCATION SURVEY FOR COVERED GEOMEMBRANES
USING THE DIPOLE METHOD**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements for performance of a geomembrane electrical leak location survey using electrical methods for post-geomembrane installation performance for a geomembrane covered with water and/or earth materials.

- B. Requirements for preparing a site for optimum performance. The optimum performance of a geomembrane leak location survey using electrical methods requires the conductive media above and below the geomembrane to be electrically isolated from each other except through the leaks located in the geomembrane. It is also necessary to have a continuous electrically conducting pathway through an electrically conducting material above the geomembrane, through the leaks, and through an electrically conducting media under the geomembrane.

1.02 RELATED SECTIONS

- A. Section 0900 – Submittal Form

- B. Section 13320 - Geomembrane

1.03 REFERENCES

- A. ASTM D6747 – Standard Guide for Selection of Techniques for Electrical Leak Location of Leaks in Geomembranes.

- B. ASTM D8265 – Standard Practices for Electrical Methods Mapping Leaks in Installed Geomembranes

1.04 SUBMITTALS

- A. Leak Location Contractor shall submit a Leak Location Survey Work Plan to Engineer for approval prior to commencement of the leak location survey. The Leak Location Survey Work Plan shall include:
 - 1. Qualifications of Leak Location Contractor to include the number of years Leak Location Contractor has performed the survey method;
 - 2. Resumes of on-site supervisors.
 - 3. Description of the survey method, and procedures.
 - 4. Required site preparations.
 - 5. Estimated duration of survey.
 - 6. Quality control and field calibration procedures.
 - 7. A list of projects demonstrating the qualifications and experience where Leak Location Contractor and leak location supervisor have met the requirements of paragraph 2.1 of this section.
 - 8. Sample of a final report (per ASTM D8265) provided by Leak Location Contractor following the completion of the survey.

- B. Submit a written report that fulfills the requirements of ASTM D8265, Section 9, within 14 calendar days of completion of the leak location survey field work.

1.05 CONSTRUCTION QUALITY ASSURANCE

- A. The leak location survey shall be observed by the CQA Consultant.
- B. Contractor shall be aware of the leak detection activities outlined herein and shall account for these activities in the construction schedule.

PART 2 PRODUCTS

2.01 LEAK LOCATION CONTRACTOR AND OVERSIGHT QUALIFICATIONS

- A. Leak Location Contractor shall be an independent third party unrelated by ownership or relation to the general contractor, CQA Consultant, Engineer, or Geomembrane Installer and, shall have qualifications and experience in conducting the survey method, including having tested a minimum of 10,000,000 square feet of geomembrane liner within the previous three years for at least five similar projects. In addition, the electrical map must be analyzed by a professional or technician with a minimum experience level of fifteen projects in the past three years where similar data analysis was used for the leak location survey method. A qualified leak location Contractor is TRI Environmental, Inc. tel. (512) 623-0511.
- B. Leak Location Contractor shall furnish equipment for performing the Work that automatically records and stores the leak location survey data in electronic format at the time of data collection and that can be post-processed for data mapping and analysis. Data acquisition shall be GPS-based with a minimum accuracy of six inches.

PART 3 EXECUTION

3.01 INFORMATION REQUIRED

CQA Consultant shall provide Leak Location Contractor with drawings showing:

1. All layers constituting the lining system
2. Details of all geomembrane penetrations.
3. Peripheral details, including welds to adjacent lining systems
4. Structures and obstructions above the geomembrane.
5. Electrical equipment above the geomembrane.

3.02 SITE PREPARATION – SOIL OR DRAINAGE STONE COVERED SURVEY AREA

- A. Leak Location Contractor will identify actions required by Contractor to prepare the site for the leak location survey.
- B. Contractor shall ensure that the material covering the geomembrane in the survey area contains moisture to provide sufficient electrical conductivity. It is critical that

the Contractor add as much moisture as practical to the cover material during material placement since inadequate moisture directly above the geomembrane may prevent the detection of leaks.

- C. Contractor shall provide a means of watering the surface of the survey area for the duration of the survey. In addition to moisture content of material covering the geomembrane which the Contractor must add during material placement, water may be added to the surface of the material during testing to address surface desiccation that prevents good electrical contact with the measurement probes. The requirement for additional surface moisture is determined during the initial functionality testing before beginning the survey.
- D. Contractor shall isolate the material covering the geomembrane in the survey area. The material covering the geomembrane must be isolated from the surrounding soil outside of the survey area and any grounded objects inside of the survey area. This is typically achieved by leaving a strip of geomembrane exposed along the entire perimeter of the survey area. Any access roads used to place cover material must be removed before performing the survey, or a geomembrane rub sheet can be used to bisect the road for electrical isolation while maintaining truck access. It is advisable that the CONTRACTOR place a rub sheet at the location of any access roads regardless before placement of cover material to facilitate removal for the electrical survey. Any inlet and outlet structures that are grounded (penetrating through the geomembrane) must not be allowed to touch the cover material in the survey area. The cover material can be placed just short of such features.
- E. An electrically conductive layer must be present underneath the geomembrane being tested. Examples of electrically conductive material include geosynthetic clay liners with adequate moisture, earth materials with adequate moisture, and most liquids.

3.03 EXECUTION

- A. Leak Location Contractor shall inspect the site prior to commencing the survey to ensure all site preparations are completed and the site conditions are appropriate for conducting the leak location survey.
- B. Any discrepancy in the required site preparations described in the Leak Location Survey Work Plan or site conditions shall be reported to Contractor for corrective or appropriate action.
- C. Conduct a leak location survey using the dipole method in accordance with the procedures described in the latest version of ASTM Standard D8265.
- D. Leak Location Contractor shall inform site personnel and mark the locations of all identified or indicated leaks with flags, spray paint, or written coordinates.
- E. NO EQUIPMENT shall be allowed on the final drainage layer following the completion of the covered geomembrane leak location survey.

3.04 REPORTING

- A. Prepare a written report that fulfills the requirements of ASTM D8265, Section 9, and submit to the ENGINEER within 14 calendar days of completion of the leak location survey field work.

END OF SECTION 13330

SECTION 13400
INTERFACE FRICTION AND SOIL STRENGTH TESTING

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDE

- A. Provide personnel, equipment, and materials to test materials proposed for use in constructing the facility to ensure the proposed materials are in accordance with applicable design parameters. The cost of all tests required under this Section shall be the responsibility of the CONTRACTOR.

1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 - 1. D5321-92 (1998) Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by the Direct Shear Method.
 - 2. D3080-98 Standard Test Method Direct Shear Test of Soils Under Consolidated Drained Conditions.

1.03 TESTING LABORATORY

- A. The testing laboratory shall be accredited to conduct ASTM D5321 in accordance with the Geosynthetic Accreditation Institute Laboratory Accreditation Program (GAI - LAP) at the time of testing. Verification of the accreditation shall be provided to the ENGINEER prior to testing.

PART 2 PRODUCTS

2.01 TEST SAMPLES

- A. Soil Materials - Soils used for interface friction and/or soil strength testing shall be representative of those that will be used for construction. If a variation is anticipated in soil characteristics that cannot be appropriately modeled as a composite sample, individual samples of each specific soil material shall be obtained. Obtain a minimum of 75 lbs of each soil for each test.
- B. Geosynthetic Materials - Geosynthetics used for interface friction testing shall be representative of those that will be used for construction. Samples shall be obtained from the same manufacturer and preferably off the same rolls or panels anticipated for use in the construction. Obtain a minimum of eight samples, specified as required by CQA testing lab, of each geosynthetic for each test. Take the longest dimension of the samples in the machine direction of the geosynthetic roll.

PART 3 EXECUTION

3.01 SAMPLE PREPARATION

- A. Samples to be used for interface friction and soil strength testing shall be collected, transported, stored, and prepared in accordance with all applicable ASTM standards.
- B. Prior to testing, all soil samples shall undergo index testing in accordance with the following:

TEST NAME	TEST METHOD
Moisture/density relationship	ASTM D698
Atterberg Limits	ASTM D4318
Gradation	ASTM D422 and D1140
USCS Classification	ASTM D2487
Triaxial Test	ASTM D4767
Direct Shear Test	ASTM D5321

- C. Prepare samples to appropriately model anticipated field conditions of moisture content and density at which the samples are to be tested.

3.02 LOADING

- A. Testing for each interface shall include a minimum of three (3) points corresponding to three (3) compressive loadings. The loadings shall be as specified in paragraph 3.03.A below.

3.03 REQUIRED TESTING

- A. The following tests are required for this project. Additional testing may be required by the ENGINEER based on material variability and unanticipated conditions.

1. LINER SYSTEM (ASTM D5321)

Initial Loading IFAT (Test 1)

- a. Interface friction angle testing between the nonwoven geosynthetic clay liner (GCL) and the low-permeability soil liner: Use normal loads of 500 psf, 2,500 psf, and 5,000 psf, and a shear rate of 0.04 in/min. Compact soil to 95% of the maximum dry density (standard effort) at a moisture content 5% above optimum. Conduct the test in the wet condition.
- b. Geosynthetic clay liner (GCL) (non-woven) vs 60-mil dual textured HDPE membrane. Normal loads: 500 psf, 2,500 psf, 5,000 psf. And a shear rate of 0.02 in/min.
- c. 60-mil dual textured HDPE membrane vs. nonwoven geotextile layer. Normal loads: 500 psf, 2,500 psf, 5,000 psf. And a shear rate of 0.02 in/min.

- d. Nonwoven geotextile layer vs NCDOT No. 6M or 67. Normal loads: 500 psf, 2,500 psf, 5,000 psf. And a shear rate of 0.04 in/min. Conduct the test in the wet condition.
- e. The geosynthetic clay liner specimen shall be a minimum of 12 inches square and shall be from the same run or lot number as the material to be placed.
- f. Prepare a test report that addresses complete test details, procedures, and results. Submit report to the ENGINEER at least 4 weeks prior to placement.

Maximum Loading IFAT (Test 2)

- a. Interface friction angle testing between the nonwoven geosynthetic clay liner (GCL) and the low-permeability soil liner: Use normal loads of 5,000 psf, 10,000 psf, and 20,000 psf, and a shear rate of 0.04 in/min. Compact soil to 95% of the maximum dry density (standard effort) at a moisture content 5% above optimum. Conduct the test in the wet condition.
- b. Geosynthetic clay liner (GCL) (non-woven) vs 60 mil dual textured HDPE membrane. Normal loads: 5,000 psf, 10,000 psf, 20,000 psf. And a shear rate of 0.02 in/min.
- c. 60-mil dual textured HDPE membrane vs. nonwoven geotextile layer. Normal loads: 5,000 psf, 10,000 psf, 20,000 psf. And a shear rate of 0.02 in/min.
- d. Nonwoven geotextile layer vs SCDOT No. 6M or 67 stone. Normal loads: 5,000 psf, 10,000 psf, 20,000 psf. And a shear rate of 0.04 in/min. Conduct the test in the wet condition.
- e. The geosynthetic clay liner specimen shall be a minimum of 12 inches square and shall be from the same run or lot number as the material to be placed.
- f. Prepare a test report that addresses complete test details, procedures, and results. Submit report to the ENGINEER at least 4 weeks prior to placement.

3.04 MATERIAL REQUIREMENTS

- A. The minimum interface friction angle for all the base liner system components for initial loading (Test 1) is 26.0 degrees for the materials to be considered as having acceptable friction characteristics unless otherwise allowed by the ENGINEER.
- B. The minimum interface friction angle for all the base liner system components for maximum loading (Test 2) is 21.5 degrees for the materials to be considered as having acceptable friction characteristics unless otherwise allowed by the ENGINEER.
- C. Structural Fill shall have a minimum internal friction angle of 30 degrees as determined by the triaxial test (ASTM D4767), or as otherwise approved by the ENGINEER. Normal loads: 5,000, 10,000, and 20,000 psf.

- D. Drainage layer material shall have a minimum internal friction angle of 30 degrees as determined by the triaxial test (ASTM D4767), or as otherwise approved by the ENGINEER. Normal loads: 5,000, 10,000, and 20,000 psf.

3.05 TEST RESULTS

- A. All test results shall be submitted to the ENGINEER prior to the delivery of the materials to the project.
- B. Test reports shall conform to all reporting requirements of ASTM D5321, including, but not limited to: data and results for peak and large-displacement friction angles, a plot of the failure envelopes showing friction angles and adhesion values, and notification of any departure from the test procedures of ASTM D5321.
- C. The ENGINEER shall review the test data for conformance with the specifications.
- D. The ENGINEER will either accept the test results or require additional testing. The ENGINEER may request up to 5 points per test to define a material property.
- E. Acceptance by the ENGINEER shall not relieve the CONTRACTOR from the responsibility of providing material and constructing it in such a way that the required frictional characteristics are obtained.

END OF SECTION 13400

**SECTION 13500
RAIN COVER (WHITE)**

PART 1 GENERAL

1.01 REQUIREMENTS

- A. The most recent versions of the following American Society for Testing and Materials (ASTM) standards: The CONTRACTOR shall furnish all labor, material, and equipment to install reinforced landfill cover (rain cover) including all necessary incidental items as detailed or required to complete the installation in accordance with the Contract Documents, or the manufacturer's manufacturing and installation procedures, whichever are more stringent.

1.02 REFERENCES

- A. The most recent versions of the following American Society for Testing and Materials (ASTM) standards:
1. D5199 Standard Test Method for Measuring the Nominal Thickness of Geosynthetics
 2. D751 Standard Test Methods for Coated Fabrics
 3. D7004 Standard Test Method for Grab Tensile Properties of Reinforced Geomembranes
 4. D5884 Standard Test Method for Determining Tearing Strength of Internally Reinforced Geomembranes
 5. D6241 Standard Test Method for Determining the Puncture Strength of Geotextiles

1.03 SUBMITTALS

- A. The following submittals shall be furnished by the CONTRACTOR for the work of this Section within 30 days prior to material delivery to the site, and as specified herein:
1. A representative sample of all materials to be used on this Project.
 2. A list of similar completed projects in which the proposed materials have been successfully used.
 3. Manufacturer's instructions for installation and handling, and material data sheets giving full details of the material physical properties and test methods. Manufacturer shall have previously demonstrated the ability to produce the required rain cover by having successfully manufactured a minimum of 20,000,000 square feet of reinforced rain cover and be ISO 9001 certified.
 4. Draft warranties and guarantees as described hereinafter.
- B. The following submittals shall be furnished by the CONTRACTOR for the work of this Section within seven (7) days prior to material delivery to the site, and as specified herein:
1. The manufacturer's data and samples of the rain cover to be used, giving full details of the minimum physical properties and test methods, as specified

herein, certified test reports indicating the physical properties of the materials to be used, and roll numbers and identification.

2. The manufacturer's certificate shall state that the finished rain cover meets MARV requirements of this specification as evaluated under the manufacturer's quality control program. A person having legal authority to bind the manufacturer shall attest the certificate.
- C. The following submittals shall be furnished by the CONTRACTOR for the work of this Section prior to the issuance of a certificate of substantial completion for the Project:
 1. Final warranties and guarantees as described hereinafter.

1.04 WARRANTY AND GUARANTEE

The CONTRACTOR shall provide a written two-year warranty relative to materials and installation certifying the rain cover materials provided and work performed under this project shall be free from any defects. Said warranty shall apply to normal use and service by the OWNER. Such written warranty shall provide for the repair or replacement of the defect or defective area upon written notification and demonstration by the OWNER of the specific non-conformance of the rain cover and also include but not be limited to defects related to workmanship and manufacturing. Such defects or non-conformance shall be repaired or replaced within a reasonable period of time at no cost to the OWNER.

PART 2 PRODUCTS

2.01 MATERIALS

- A. The rain cover shall be an impermeable flexible membrane liner (FML) capable of shedding rainwater. The FML shall be a woven coated polyethylene membrane. Other materials may be considered. The FML shall be resistant to ultraviolet rays, water infiltration and puncture, and shall be capable of being folded or rolled without damage for storage and reuse. The FML shall have a minimum two-year life expectancy when used continuously and exposed constantly to natural elements.
- B. The rain cover shall be supplied in panels which shall be of maximum size to provide the largest manageable sheet for the fewest seams (36,000 square feet). Labels on the panels shall identify the thickness, length, width, lot and panel numbers, and name of Manufacturer.
- C. Rain cover shall be manufactured to meet the following requirements:
 1. Provide finished product free from holes, pin holes, bubbles, blisters, excessive gels, undispersed resins and/or carbon black, or contamination by foreign matter.
 2. Rain cover shall be a geomembrane composed of a four (4) layer reinforced extrusion laminate, with the outer layers being a high-strength polyethylene film, with a minimum average thickness of 5.5 mils; which are laminated together using molten polyethylene incorporating a 1000 denier scrim. Rain cover shall have the physical properties as shown in Table 1.

Table 1: Required Rain Cover Properties

Property	Test Method	Units	Min. Roll Averages
Thickness	ASTM D5199	mils	20
Weight	ASTM D571	lbs/msf	74
Grab Tensile Strength	ASTM D7004	lbs/in	115
Grab Tensile Elongation	ASTM D7004	%	17
Tongue Tear	ASTM D5884	lbs	53
CBR Puncture Resistance	ASTM D6241	lbs	280

- D. Ballast System: CONTRACTOR shall use sandbags made from similar material as the rain cover with a guaranteed life of five (5) years or use Wind Defender in Section 13510.

2.02 ACCEPTABLE MANUFACTURERS

- A. Acceptable manufacturers of rain cover include, but are not limited to:
1. Dura-Skrim R20WWK manufactured by Viaflex
821 W Algonquin Street
Sioux Falls, SD 57104
 2. Equivalent material, as approved by the ENGINEER.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Rain Cover Placement:
1. Provide rain cover at the locations shown on the Drawings.
 2. Do not use the rain cover for any purpose prior to installing it in the completed cell.
 3. CONTRACTOR shall inspect each panel for damage/and or defects. Defective or damaged panels shall be replaced or repaired, as approved by the ENGINEER.
 4. Place rain cover panels in strict accordance with manufacturer's instructions.
 5. INSTALLER shall avoid dragging the rain cover on rough subgrade.
 6. Personnel working on the rain cover shall not smoke, wear damaging shoes, or involve themselves in any activity that may damage the rain cover.
 7. The rain cover shall be properly weighted to avoid uplift due to wind.
 8. Vehicular traffic across the rain cover shall not be allowed.

9. The rain cover shall be kept free of debris, unnecessary tools, and materials.
 10. Construct an anchor trench around the perimeter of the rain cover as shown on the Drawings.
 11. Do not install rain cover below 32°F or above 100°F. Rain cover placement shall not be performed during precipitation, excessive moisture, in an area of ponded water, or in excessive winds. Any portion of the rain cover damaged due to weather conditions shall be repaired at the CONTRACTOR's cost.
- B. Field Seams:
1. Field seams shall be made according to manufacturer's recommendations which shall include fusion welding, or other methods as appropriate for the selected material or approved by the ENGINEER.
- C. Repairs:
1. Any portion of the rain cover exhibiting signs of defect shall be repaired.
 2. Repairs shall be capped and patched.
 3. Repairs made in the sump area shall be double lined.
- D. Ballasting:
1. Sandbags: Provide supplemental anchoring on the interior of the rain cover with sandbags in accordance with the manufacturer's recommendations. At a minimum, provide anchoring over the entire surface area of the rain cover using grid spacing shown on the Construction Drawings. Tie anchors together in both directions as shown on the Construction Drawings. Bury sandbags in the anchor trench at the top of the slopes to provide support for the grid system. Use material recommended by the manufacturer for tying the anchors together.
 2. Wind Defender: Provide supplemental anchoring in accordance with Section 13510.

END OF SECTION 13500

DIVISION 15
MECHANICAL

**SECTION 15160
LEACHATE PUMPING SYSTEM (SIDE SLOPE PUMP)**

PART I GENERAL

1.01 SECTION INCLUDES

- A. Furnishing and installing the leachate pumping system at the side slope risers as indicated by the Contract Documents.

1.02 SCOPE OF WORK

- A. The leachate pumping system outlined in this Section shall perform to the design operating requirements within the conditions and dimensions as described and shall be complete and minimally consist of a pump and motor assembly with power cable, system controller and level sensor and cable with gages and meters as required; deployment and retrieval assembly to include pump carriage/sled (with shroud, if necessary); discharge hose/pipe assembly; appropriate exit fittings for gas-tight transition through the sump or riser wall and all appropriate fasteners, fittings and accessories necessary for operation in the service intended.
- B. System shall be designed for primary, secondary and or leakage detection service. Multiple systems shall ideally be identical and interchangeable, and if not identical, will share as many identical, similar, and interchangeable components and characteristics as practical.
- C. The CONTRACTOR is responsible for installing the complete leaching pumping system under the supervision of the manufacturer, and for furnishing, installing, and testing all wiring, conduit, fittings, etc. necessary to provide a fully integrated workable system. This includes providing the electrical connections between the existing on-site power service facilities and the pump control panel.
- D. All equipment within the leachate pumping system shall be provided by a single manufacturer who shall have sole and complete responsibility for the system without recourse to others. The manufacturer shall be a duly incorporated, licensed, and insured entity with a minimum of five (5) years of experience in providing complete leachate pumping systems for landfills and other wastewater applications.
- E. The supplier of the leachate pumping system shall provide all warranty and warranty services without regard for or dependence on pass through warranties, which may or may not be provided by the original equipment manufacturer (OEM) of various components of the system for a period of sixty (60) months from date of start-up by the manufacturer or authorized representative or eighteen (18) months if start-up services are performed by others.
- F. Any system manufacturer or supplier not specifically named as an approved manufacturer must provide a complete submittal package to the ENGINEER prior to the bid date for pre-approval as an equal system provider. To simplify comparison, the manufacturer seeking approval will provide references and documentation of experience and a thorough technical brief addressing each specifying paragraph as either "no exception taken" (acceptance of both the fact and spirit of the designer's intent) or "exception taken " with arguments for equality to the specification.

- G. It is the designer's purpose to ensure that the system is suitable, reliable, and maintainable for the end-user and OWNER in all short and long term respects.

1.03 WARRANTIES

- A. The complete pumping system as a whole, inclusive of all provided components, parts, equipment, controllers, instrumentation, assemblies and accessories shall be warranted to be free of defects in material and workmanship for a period of sixty (60) months from date of start-up by the manufacturer or authorized representative, or eighteen (18) months, if start-up services are performed by others.
- B. If any portion of the system fails due to either materials or workmanship during the applicable period, the manufacturer shall repair, substitute, or replace the item at no charge based on the item being returned freight prepaid, with a returned materials authorization (RMA) to the system manufacturer for evaluation. The repaired, substituted or replaced item shall be promptly returned to the OWNER freight prepaid by the manufacturer. The system manufacturer will not be liable for reasonable wear and tear through service, or damage to any item caused by abnormal operating conditions, accident, misuse, power surges, ungrounded equipment, acts of God, unauthorized alteration, or modification.
- C. The manufacturer shall provide reasonable assistance and troubleshooting by telephone at no cost to the OWNER. On-site technical assistance by an engineer or service technician shall be available with compensation to the manufacturer based on time, materials, and expenses with pro-rated credit to be issued if a warranty consideration is determined to be merited.

1.04 ANNUAL PUMP MAINTENANCE SERVICES

- A. Each submittal will have a proposed Annual Scheduled Maintenance Inspection Agreement for consideration as an optional purchase by the end-user or OWNER.
- B. The Agreement will include services to provide an annual inspection, adjustment, calibration and evaluation of the pumping systems for operability, performance, and serviceability, and to conduct routine maintenance as necessary for the pumps, motors and controllers by a complete and thorough electrical and mechanical inspection of the station(s), pump(s), motor(s), accessories and associated first tier (immediate) pump controllers, as well as first hand operator training on first echelon pump inspection and operation techniques.

1.05 SUBMITTALS

- A. The submittal package shall include a complete list of components provided; pump curves, motor data, layout drawing, control panel drawings consisting of wiring schematic, bill of materials and component layout drawing, and warranty statement.

PART 2 PRODUCTS

2.01 PUMPS

- A. The CONTRACTOR shall furnish and install one (1) complete simplex leachate pumping system as manufactured by EPG Companies, Inc. of Maple Grove, Minnesota (763-424-2613) or ENGINEER approved equivalent.
- B. Pumps shall be of centrifugal, submersible design suitable for primary landfill leachate. The pump shall be coupled to a submersible motor that is non-overloading throughout the operating curve of the pump.
- C. The pump shall be one (1) EPG SurePump™ Model 18-2 or approved equal rated for a minimum duty performance of 105 gallons per minute (GPM) at 45 feet total discharge head (TDH).
- D. Motor horsepower shall be a minimum of three (3) horsepower, and shall operate on 120/240 volt, single phase, 60 hertz supply power. Verify available voltage at site prior to ordering pump.
- E. Pump design shall include the following features:
 - 1. Semi-open, multi-vane hardened 316 stainless steel impellers.
 - 2. Pre-lubricated ball-type bearings.
 - 3. All wetted parts to be constructed of 316 stainless steel.
 - 4. All elastomers shall be Viton.
 - 5. A dual mechanical seal of silicon carbide/ceramic working in a separate oil chamber shall be provided with an additional lip seal installed under the oil chamber to inhibit silt, sand, and other material intrusion.

2.02 MOTOR DESIGN

- A. The motor stator housing shall be filled with glycol and water.
- B. The motor shall not require the use of oil or grease for lubrication.
- C. The motor, located on top of the oil chamber, shall be cooled by use of the pump media around the stator chamber.
- D. The motor shall be rated for a minimum of 10 evenly spaced starts per hour and shall be provided with internal thermal protection.
- E. A properly sized, jacketed power cable suitable for leachate service shall be provided in a length commensurate with the dimensional requirements of the application by field fit by installing CONTRACTOR. No cable splices will be permitted within the sump or riser for any reason.

2.03 CARRIAGE

- A. The pump shall be mounted in a patented 300 series stainless steel carriage/sled shroud for use in a 17 SDR /18-inch diameter HDPE riser pipe with a constant inside diameter set at a 3H to 1V slope.
- B. The carriage/sled shall provide a low center of gravity and all wheels shall remain in contact with the inner contour of the riser pipe. The wheels shall be constructed of non-corrosive material with self-lubricating qualities and must be minimum diameter of 6 inches to able to travel over welding beads typically found in riser pipe fabrications.
- C. The level sensor shall be carriage/sled mounted and be removable or replaceable without disassembly of the pump assembly or removal of the pump from the carriage/sled.
- D. A properly sized sensor cable suitable for leachate service shall be provided in a length commensurate with the dimensional requirements of the application by field fit by installing CONTRACTOR. No cable splices will be permitted within the sump or riser for any reason.
- E. A safety/retrieval assembly with properly sized cable suitable for leachate service shall be provided in a length commensurate with the dimensional requirements of the application by field fit by installing CONTRACTOR with appropriate dips, snap hooks, and anchor eyebolt constructed of 300 series stainless steel.

2.04 DISCHARGE HOSE

- A. Discharge hose shall be 3-inch thermoplastic vinyl nitrile (VNBR) flexible hose having a rated working pressure of 200 to 300 PSI and a temperature range of -20 to +180 degrees Fahrenheit.
- B. Hose shall be suitable for leachate service and shall be provided in a length commensurate with the dimensional requirements of the application by field fit by installing CONTRACTOR.

2.05 DISCHARGE HOSE FITTINGS

- A. All hose fittings, bands and accessories shall be 300 series stainless steel and shall be suitable for the application. A stainless-steel pump discharge cam and groove connector and companion stainless steel hose shank fitting shall be provided to connect the pump and hose. Fitting shall have a positive locking mechanism.

2.06 EXIT FITTINGS

- A. A riser side exit discharge disconnect fitting of 300 series stainless steel shall be provided and positioned within six (6) inches to 18 inches of the mouth of the riser to allow quick connection/disconnection of the pump discharge hose within the riser exit, allowing the pump to be removed without the interference of the stationary fittings. The exit arrangement shall thread through the riser pipe with a male threaded nipple as to provide a gas-tight transition to piping outside the riser.

- B. Fittings for the power and sensor cables shall be nylon construction non-corrosive and sized for the power and sensor cables provided for the pump.
- C. A 3-inch stainless steel flow meter fitting and required upstream/downstream straight pipe runs shall be provided for the installation of the flow meter.

2.07 CONTROL PANEL

- A. The system controller shall be manufactured and registered by a UL certified UL508, UL913 and UL698 panel shop permitted to make industrial control panels relating to hazardous locations and intrinsically safe apparatus and associated apparatus for use in Class I, II, and III, Division 1, Hazardous Locations. The system controller shall comply with all other necessary requirements dictated and noted by the designer for relevant panel location and service.
- B. The unit shall include a primary power Transient Voltage Surge Suppressor (TVSS) lightning arrestor (UL 1449 listed/40,000 amps/phase and phase indicating LED's), control circuit suppressor (UL 1449 listed) with operational indicating LED, and an instrument signal surge suppressor. The level monitoring system shall utilize an intrinsically safe barrier (ISB), dual barrier configuration. A plug-in type adjustable voltage monitor with operational LED shall be provided to protect against voltage fault conditions. A properly sized circuit breaker for voltage/phase monitor shall be provided on the back plate.
- C. The system controller shall provide the means to control and adjust pump operation, provide status information on pump conditions, faults, alarms, level indication and optionally flow indication, and appropriate electrical and motor protection.
- D. Control panel shall consist of a NEMA 4X, 14-gauge, 304 stainless steel enclosure (24x30 inch) with lockable outer cover door with an operator viewing window (11x17 inch) and the capability to open a minimum of 180 degrees.
- E. The inner door shall be a brushed-aluminum, dead-front, mounted on a continuous aircraft-type hinge. The dead-front door shall contain appropriate mounting of operator accessible controls and status information without exposing the operator to the live internal wiring of the system controller.
- F. Operator accessible components mounted on the dead front door shall minimally include following:
 1. H-O-A Switch
 2. Pump Run Indicating Light (Green)
 3. Motor Overload Indicating Light (Red)
 4. Digital Level Indicator
 5. Run Time Meter
 6. Main Disconnect Breaker Switch
 7. Pump Breaker Switch
 8. Control Circuit Breaker Switch
 9. High Level Light

10. Electronic Overload Relay

- G. The back plate shall consist of 12-gauge sheet steel finished with a primer coat and two coats of baked on enamel. All hardware mounted to the sub-panel shall be accomplished with machine thread tapped holes. Sheet metal screws are not acceptable. All devices shall be permanently identified with phenolic engraved nameplates.
- H. The panel power distribution shall include all necessary components and shall be completely wired with standard copper conductors. Control wiring shall be property sized and installed in Panduit-type wiring trays.
- I. An individual circuit breaker shall be provided from main power, each pump, and control circuit. All circuit breakers shall meet or exceed the North America and International Standards: UL, CSA, File No. E19224 Category NLDX and NLDX2; CSA File No. LR353, Class 3211-07, and UL File No. E19223, Category NKCR and NKCR2; GSA File No. LR353, Class 3211-03, plus IEC, VDE, CE and other International Standards, as does Cutler Hammer HQP Series thru QCFH Series or equal.
- J. Thermal magnetic breakers shall be quick-make and quick-break on manual or automatic operation. Breakers shall have inverse time characteristics secured through the use of bimetallic tripping elements supplemented by a magnetic trip.
- K. Breakers shall be designed so that an overload on one pole automatically trips and opens all legs. Field-installed handle ties shall not be acceptable.
- L. Motor starters shall be open frame, across the line, shall comply with the same above-mentioned standards as the breakers and shall be derated by 20%, as does Cutler Hammer CE12 Series thru ECE26 Series with interchangeable bimetallic overload units on each phase. Motor starter contacts and coil shall be replaceable from the front of the starter without removing it from the panel.
- M. Individual surge arrestors shall be provided in the control panel for incoming supply power, control circuit and the 4 to 20 mA instrument circuit.
- N. A fused-type control transformer shall be used to provide the 120 VAC control circuit.
- O. Individual surge arrestors shall be provided in the control panel for the primary incoming supply power circuit, secondary control circuit and the tertiary 4 to 20 mA instrument circuit.
- P. A top-mounted, 40 watt, weatherproof/shatterproof red visual high-level alarm beacon shall be provided.
- Q. The pump Hand, Off, and Auto (HOA) operating selections shall be capable of being set by a manual HOA switch.

2.08 LEVEL CONTROL

- A. A panel-mounted digital readout display controller with 3-1/2-inch digits shall be provided to indicate level in the sump. The controller shall be capable of accepting a 4 to 20 mA signal from a submersible transducer to provide a level indication range of 0 to 138.6 inches of liquid. When a high-level condition occurs, the display will flash until the condition is corrected.
- B. A submersible transducer with adequately sized cable shall be provided. The transducer shall be constructed of 300 series stainless steel and shall be mounted to the pump carriage. Transducer shall provide a 4 to 20 mA output signal and come equipped with built-in surge protection. Static accuracy should not exceed 1.0%.
- C. A permanent aneroid bellows type breather device shall be mounted in the control panel to prevent moisture in the vent tube.
- D. A panel-mounted intrinsically safe barrier shall be provided for the transducer signal.

2.09 ELECTRONIC OVERLOAD RELAY

- A. A single-phase electronic overload relay shall be provided. Device shall be programmable without requiring auxiliary electronic equipment. The device, in addition to field programming, must be programmable in shop by using 115/120V single phase power. Device must have LED digital readout for programming diagnostics and fault enunciation. The relay, at minimum, must detect high and low voltage and over or under current. The relay, at minimum, must include rapid cycle prevention timer, 45:1 current adjustment range on trip settings, last four faults in memory, programmable tamper guard and five-year warranty.

2.10 REMOTE LOCKOUT

- A. A high level lockout for the leachate storage tank (LST) shall be provided to inhibit the leachate extraction pump from pumping from the landfill during conditions of high level within the LST. The lockout will automatically reset once the liquid level drops, and adequate storage capacity is available. Signal from the pump system controller to the tank shall be intrinsically safe.

2.11 CABLE FITTINGS

- A. Non-metallic, compression type threaded cable fittings, properly sized for either the pump power cable or level sensor cable shall be provided for installation in the riser to provide a gas-tight transition to outside the riser for conduits.

PART 3 EXECUTION

3.01 START-UP

- A. The manufacturer or authorized representative of the system manufacturer shall provide field installation assistance, start-up, and operator training on the system. The scheduling of this service shall be coordinated by the CONTRACTOR to ensure the side slope riser and sump is completed, the piping and electrical service are in place, the control panel is set and connected to power prior to the manufacturer's on-site start-up visit.

- B. A complete operations and maintenance manual with index for the system shall be provided with manufacturer's contact list, equipment list, system logic, equipment cut sheets, parts breakdowns, control panel information and a troubleshooting guide.
- C. Electric power will be provided to the valve vault area by the OWNER. CONTRACTOR shall coordinate the power installation with his work and shall be responsible for all connections, disconnects, wiring, conduits and all materials, labor, permits and construction necessary to complete the work.
- D. Locate the control enclosure approximately 5-feet above ground and adjacent to the concrete valve vault on aluminum supports.
- E. Provide smooth surfaces at joints in the HDPE riser pipes to ensure that pumps can easily be removed and lowered.
- F. A start-up report shall be provided to include all component settings and motor operating characteristics and certification that the system has been properly installed or notes on any deficiencies that need correction or related recommendations.

PART 4 TESTING

- A. CONTRACTOR shall test pumps in the presence of the ENGINEER. Tests shall include demonstrating that the pumps will automatically alternate starts, start and stop at the water levels indicated on the plans, activate the alarm level indicator, and run simultaneously at the high level. There shall be no visible leaks in the piping during the tests.
- B. Pump tests shall utilize the pump manufacturer's standard start-up documentation, which shall be filled out completely, signed, dated, and submitted to the ENGINEER as part of the pump system Operation and Maintenance manual.

END OF SECTION 15160

**SECTION 15170
ELECTROMAGNETIC FLOW METER**

PART I GENERAL

1.01 SCOPE

- A. This section describes the requirements for flow measurement equipment.
- B. Under this item, the CONTRACTOR shall furnish and install the flow measurement equipment and accessories as indicated by the Contract Documents, and as herein specified.

1.02 QUALITY ASSURANCE

- A. Referenced Standards and Guidelines - Complies with applicable portions of ANSI/AWWA Standards and NSF/ANSI Standard 61, Annex G. There are currently no AWWA standards that specifically address electromagnetic metering.
 - 1. Flow measurement function complies with Industry Standards
 - a. ANSI B16.5 Class 150 RF
 - b. AWWA Class B
 - c. NEMA 4X/6P (IP66/IP67)
 - d. CSA
 - e. FM approved for Class 1, division I hazardous environments
 - f. CE

1.03 SUBMITTALS

- A. CONTRACTOR to provide submittal in accordance with Section 00900.
- B. The following information shall be included in the submittal for this section:
 - 1. Outline dimensions, conduit entry locations and weight.
 - 2. Customer connection and power wiring diagrams.
 - 3. Data sheets and catalog literature for microprocessor-based transmitter and transducer.
 - 4. Interconnection drawings.
 - 5. Installation and operations manual.
 - 6. List of spare parts.
 - 7. Complete technical product description including a complete list of options provided.

8. Any portions of this specification not met must be clearly indicated or the supplier and contractor shall be liable to provide all additional components required to meet this specification.

1.04 SYSTEM DESCRIPTION

- A. Electromagnetic flow meter is intended for fluid metering landfill leachate. Measures fluid flow of leachate, which are highly corrosive, somewhat viscous, contain a moderate amount of solids, or require special handling. No moving parts are in the flow stream. Amplifier can be remote-mounted. Unit shall be suited for measuring dynamic, non-continuous flow. In applications where a minimum and/or maximum flow rate must be tracked and monitored, the unit provides pulse signals that can be fed to dedicated batch controllers, PLCs and other more specialized instrumentation.

1.05 DEFINITIONS

- A. Amplifier – Device used for increasing the power of a signal. It does this by taking energy from a power supply and controlling the output to match the input signal shape but with larger amplitude.
- B. ANSI – (American National Standards Institute) A private, non-profit organization that oversees the development of voluntary consensus standards for products, services, processes, systems, and personnel in the United States. The organization also coordinates U.S. standards with international standards so that American products can be used worldwide.
- C. AWWA – (American Water Works Association) An international, non-profit professional organization founded to improve water quality and supply.
- D. Detector Coils – Also called an “induction loop”, an electromagnetic communication or detection system that uses a moving magnet to induce an electrical current in a nearby wire.
- E. Electrode – An electrical conductor used to make contact with a nonmetallic part of a circuit (e.g., a semiconductor, an electrolyte, or a vacuum).
- F. Modbus RTU – a serial communication protocol published by Modicon (now Schneider Electric) in 1979 for use with its programmable logic controllers (PLCs). This is used in serial communication and makes use of a compact, binary representation of the data for protocol communication.
- G. NEMA – (National Electrical Manufacturers Association) Is the 'Association of Electrical Equipment and Medical Imaging Manufacturers' in the United States. Its approximately 450 member companies manufacture products used in the generation, transmission, distribution, control, and end use of electricity. These

products are used in utility, industrial, commercial, institutional, and residential applications.

- H. NSF International – An independent, accredited organization that develops standards, and tests and certifies products and systems. They provide auditing, education and risk management solutions for public health and the environment.
- I. PLC – (Programmable Logic Controller) A digital computer used for automation of electromechanical processes, such as control of machinery on factory assembly lines, amusement rides, or light fixtures. PLCs are used in many industries and machines.
- J. PTFE – (Polytetrafluoroethylene) A synthetic fluoropolymer of tetrafluoroethylene that finds numerous applications. The best known brand name of PTFE is Teflon by DuPont Co.
- K. Serial Communications – In telecommunication and computer science, serial communication is the process of sending data one bit at a time, sequentially, over a communication channel or computer bus. This is in contrast to parallel communication, where several bits are sent as a whole, on a link with several parallel channels.

PART 2 PRODUCTS

2.01 APPROVED MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with specifications, provide flow measurement equipment by one of the following:
 - 1. Badger M3000 Electromagnetic Flow Meter, or approved equal.

2.02 OPERATING CONDITIONS

- A. System Components
 - 1. Metering Tube (Detector)
 - a. Consists of stainless steel tube lined with a non-conductive material. Energized coils around the metering tube create a magnetic field across the diameter of the pipe. As a conductive fluid flows through the magnetic field, a voltage is induced across two electrodes; this voltage is proportional to the average flow velocity of the fluid.
 - 2. Signal Amplifier

- a. Consists of unit that receives, amplifies, and processes the detector's analog signal. Signal is converted to both analog and digital signals that are used to display rate of flow and totalization. Processor controls zero-flow stability, analog and frequency outputs, serial communications, and a variety of other parameters. Integrated LCD display indicates rate of flow, forward and reverse totalizers and diagnostic messages. Display guides user through programmable routines.

B. Operational Requirements

1. Electromagnetic Flow Meter

- a. The flow meter system shall operate with a pulsed Direct Current (DC) excitation frequency, and shall produce a signal output that is directly proportional and linear with the volumetric flow rate of the liquid flowing through the metering tube (detector). The metering system shall include a metering tube (detector), a signal amplifier, and the necessary connecting wiring. The metering system shall have the ability to incorporate a remote mounted amplifier.

b. Engineering Units:

- 1) The signal amplifier shall be program selectable to display the following units of measure: U.S. gallons, million gallons (U.S.).

c. Operating Principle: Electromagnetic Induction

d. Metering Tube (Detector)

- 1) The metering tube (detector) shall be constructed of 316 stainless steel and rated for a maximum allowable, non-shock pressure and temperature for steel pipe flanges, according to ANSI B16.5.
- 2) The metering tube (detector) shall be available in line size from 1/4" [6 mm] to 12" [300mm].
- 3) The metering tube (detector) end connections shall be carbon steel or 316 stainless steel flanged, according to ANSI B16, Class 150 and AWWA Class B standards.
- 4) The insulating liner material of the metering tube (detector) shall be made of a hard rubber elastomer, and NSF-listed for meter sizes 4" and above, in conformance with

manufacturer's recommendation for the intended service or an NSF-listed meter option with PTFE liner.

- 5) The metering tube (detector) shall include two self-cleaning measuring electrodes. The electrode material shall be corrosion resistant and available in Alloy C or 316 stainless steel.
- 6) The metering tube (detector) shall include a third "empty pipe detection" electrode located in the upper portion of the inside diameter of the flow tube in order to detect an empty pipe condition when the flow tube is partially empty. Empty pipe detection that is not activated until the pipe is 50% empty is not acceptable.
- 7) The metering tube (detector) housing shall be constructed of carbon steel, welded at all joints, and rated to meet NEMA 4 (IP66) ratings.
- 8) For remote amplifier applications, the metering tube (detector) junction box enclosure shall be constructed of cast aluminum (powder-coated paint) and shall meet NEMA 4X (IP66) ratings.
- 9) When installed in non-metallic or internally lined piping, the metering tube (detector) shall be provided with a pair of corrosion resistant grounding rings. The grounding ring material shall be 316 stainless steel.
- 10) Fluid Temperature Range
 - i. For remote amplifier applications, the fluid temperature range shall be 32°F to 248°F [0°C to 120°C] at a maximum ambient temperature of 122°F [50°C] for the PTFE liner material.
 - ii. For meter-mounted amplifier applications, the fluid temperature range shall be 32°F to 212°F [0°C to 100°C] at a maximum ambient temperature of 122°F [50°C] for the PTFE liner material.

e. Signal Amplifier

- 1) The signal amplifier shall be microprocessor based and shall energize the detector coils with a digitally controlled pulsed DC. The excitation frequency shall be program selectable for

the following: 1Hz, 3.75Hz, 7.5Hz, or 15Hz. (factory optimized to pipe size and application)

- 2) The signal amplifier electrical power requirement shall be 85-265 VAC, 45-65Hz. The power consumption shall not exceed 20W.
- 3) The signal amplifier shall have an ambient temperature rating of -4 °F to 122 °F [-20 °C to 50 °C].
- 4) The signal amplifier shall include non-volatile memory capable of storing all programmable data and accumulated totalizer values in the event of a power interruption.
- 5) Automatic zero stability, low flow cut-off, empty pipe detection and bi-directional flow measurement shall be inherent capabilities of the signal amplifier.
- 6) All signal amplifier outputs shall be galvanically isolated to 500 millivolts (mV).
- 7) The signal amplifier and remote junction enclosures shall be constructed of cast aluminum (powder-coated paint) and shall meet NEMA 4X (IP66) ratings.
- 8) Outputs:

The signal amplifier shall provide a total of four digital outputs, one analog output and one digital input.

- i. Up to two open collector digital outputs, program selectable from the following: Forward pulse, reverse pulse, AMR pulse, flow set point, empty pipe alarm, flow direction, preset output, and error alarm.
- ii. Up to two AC solid-state relay outputs, program selectable from the following: Frequency output, flow set point, empty pipe alarm, flow direction, preset amount and error alarm.
- iii. One digital input, program selectable from the following: Remote reset and positive return to zero.
- iv. One analog output programmable and scalable from the following: 0-10mA, 0-20mA, or 4-20mA. Voltage sourced and isolated. Max. loop resistance = 750 ohms.

f. Control and Programming

- 1) The signal amplifier shall be programmed via three function buttons. The programming functions shall be available in a user-friendly, menu driven software through the four-line LCD interface. The signal amplifier shall accommodate the following languages: English, or Spanish.
- 2) Programmable parameters of the amplifier include, but are not limited to: calibration factors, totalizer resets, unit of measure, analog and pulse output scaling, flow-alarm functions, language selection, low-flow cutoff, noise dampening factor and excitation frequency selection.
- 3) The signal amplifier shall have a programming option allowing entry of a selected numeric password value for tamper protection.

g. System Performance

- 1) The metering system shall operate over a flow range of 0.10 to 39.4 ft/s [0.03 to 12.0 m/s].
- 2) The metering system shall perform to an accuracy ± 0.25 percent of rate for velocities greater than 1.64 ft/s [0.50 m/s].
- 3) The metering system shall be capable of measuring the volumetric flow rate of liquids having an electrical conductivity as low as 5.0 microohms per centimeter.
- 4) The system measuring repeatability shall be $<0.10\%$ of full scale.

h. Indication

- 1) The signal amplifier shall include a four-line, 16-character, backlit LCD interface to display the following values:
 - i. Flow rate in selectable rate units
 - ii. Forward totalizer in selectable volume units
 - iii. Reverse totalizer in selectable volume units
 - iv. Net totalizer in selectable volume units
 - v. Error and/or alarm messages
 - vi. Output Status

PART 3 EXECUTION

3.01 INSTALLATION

- A. Follow manufacturer's recommendation for installation. Installation will conform to the guidelines provided by the Installation & Operation Manual.

- B. Straight pipe requirement shall be an equivalent of three diameters on the inlet (upstream) side, and two diameters on the outlet (downstream) side, or in accordance with the Manufacturer's recommendations, whichever is more stringent.
- C. For best performance, place meter vertically, with liquid flowing upward and meter electrodes in a closed, full pipe.

3.02 CALIBRATION

- A. Each meter shall be hydraulically calibrated in an ISO 9000-certified testing facility, which utilizes a computerized gravimetric testing method with a measuring uncertainty of 0.1%.
- B. Each meter shall be provided with a calibration certificate indicating the measured error (percent deviation) at three different flows, respectively equivalent to 25%, 50% and 75% of the nominal flow rate for each size.

3.03 MANUFACTURER'S WARRANTY

- A. Terms
 - 1. The manufacturer of the above specified equipment warrants the Product to be free from defects in materials and workmanship appearing within the earlier of either: two (2) years after installation; or two (2) years and six (6) months after shipment from manufacturer.

END OF SECTION 15170

PART V - CQA PLAN

**PART V
CONSTRUCTION QUALITY ASSURANCE (CQA) PLAN**

TABLE OF CONTENTS

1.0	INTRODUCTION	1
1.1	PURPOSE.....	1
1.2	DEFINITIONS	1
1.2.1	Contact Documents	1
1.2.2	Quality Control.....	1
1.2.3	Quality Assurance	2
1.3	PARTIES.....	2
1.3.1	OWNER.....	2
1.3.2	ENGINEER.....	2
1.3.3	Construction Representative.....	2
1.3.4	CQA Consultant	2
1.3.5	Soils CQA Laboratory	3
1.3.6	Geosynthetic CQA Laboratory	3
1.3.7	CONTRACTOR	3
1.3.8	Geomembrane Manufacturer(s).....	3
1.3.9	Geomembrane Installer(s).....	3
1.3.10	Surveyor.....	3
1.4	COMMUNICATIONS AND MEETINGS.....	3
2.0	EARTH MATERIALS.....	4
2.1	INTRODUCTION	4
2.2	SCOPE	4
2.2.1	General	4
2.2.2	Organization Qualifications	4
2.3	EARTH MATERIALS CQA TESTING.....	5
2.3.1	General	5
2.3.2	Material Evaluation/Verification Testing.....	5
2.3.3	Construction Quality Evaluation Testing.....	5
2.3.4	Test Pad.....	6
2.4	DOCUMENTATION/CERTIFICATION.....	6
2.4.1	General	6
2.4.2	Construction Monitoring.....	6
2.4.3	Certification	7
3.0	GEOSYNTHETICS.....	7
3.1	INTRODUCTION	7
3.2	SCOPE	7
3.2.1	General	7
3.2.2	Installation.....	7
3.3	HDPE GEOMEMBRANE MANUFACTURE, FABRICATION, AND DELIVERY	8
3.3.1	High Density Polyethylene (HDPE) Geomembrane Manufacturing.....	8
3.3.2	Manufacturing.....	8
3.3.2.1	Submittals	8
3.3.2.2	Rolls	8

3.3.2.3	Conformance Testing.....	8
3.3.2.4	Test Results.....	9
3.3.3	<i>Delivery</i>	9
3.3.3.1	Transportation and Handling.....	9
3.3.3.2	Storage.....	10
3.4	GEOMEMBRANE INSTALLATION.....	10
3.4.1	<i>Earthwork</i>	10
3.4.1.1	Surface Preparation.....	10
3.4.2	<i>Geomembrane Placement</i>	10
3.4.2.1	Field Panel Identification.....	10
3.4.2.2	Field Panel Placement.....	10
3.4.3	<i>Field Seaming</i>	12
3.4.3.1	General Seaming Procedure.....	12
3.4.3.2	Seam Preparation.....	12
3.4.3.3	Weather Conditions for Seaming.....	12
3.4.3.4	Overlapping and Temporary Bonding.....	12
3.4.4	<i>Nondestructive Seam Continuity Testing</i>	13
3.4.5	<i>Destructive Testing</i>	13
3.4.5.1	Sampling Procedure.....	13
3.4.5.3	Construction Quality Assurance Laboratory Testing.....	13
3.4.5.4	Destructive Sample Pass/Fail Criteria.....	14
3.4.5.5	Procedures for Destructive Test Failure.....	14
3.4.6	<i>Defects and Repairs</i>	14
3.4.6.1	Verification of Repairs.....	14
3.4.6.2	Large Wrinkles.....	14
3.4.7	<i>Backfilling of Anchor Trench</i>	14
3.4.8	<i>Lining System Acceptance</i>	14
3.4.9	<i>Materials in Contact with the HDPE Geomembrane</i>	14
3.4.9.1	Soils.....	14
3.4.10	<i>Sumps and Appurtenances</i>	15
3.5	GEOTEXTILES.....	16
3.5.1	<i>Manufacturing</i>	16
3.5.2	<i>Labeling</i>	16
3.5.3	<i>Shipment and Storage</i>	16
3.5.4	<i>Conformance Testing</i>	16
3.5.4.1	Tests.....	16
3.5.4.2	Sampling Procedures.....	17
3.5.4.3	Test Results.....	17
3.5.4.4	Conformance Test Failure.....	17
3.5.5	<i>Handling and Placement</i>	17
3.5.6	<i>Seams and Overlaps</i>	17
3.5.7	<i>Repair</i>	17
3.5.8	<i>Placement of Soil Materials</i>	17
3.6	GEOCOMPOSITE.....	17
3.6.1	<i>Manufacturing</i>	17
3.6.2	<i>Labeling</i>	18
3.6.3	<i>Shipment and Storage</i>	18
3.6.4	<i>Conformance Testing</i>	18
3.6.4.1	Tests.....	18
3.6.5	<i>Handling and Placement</i>	18
3.6.6	<i>Repair</i>	18

3.6.7	Placement of Soil Materials	19
3.7	GEOSYNTHETIC CLAY LINER (GCL).....	19
3.7.1	Storage.....	19
3.7.2	Handling & Placement	19
3.7.3	Repairs	19
3.7.4	Conformance Testing	19
3.8	DOCUMENTATION	20
3.8.1	Daily Reports	20
3.8.2	Record Drawing.....	20
3.8.3	Final Certification Report.....	21
4.0	LEACHATE COLLECTION AND REMOVAL SYSTEM	21
4.1	INTRODUCTION	21
4.2	SCOPE	21
4.2.1	General	21
4.3	MANUFACTURING AND DELIVERY OF MATERIALS	21
4.3.1	Pipe, Fittings, and Manholes	21
4.3.2	Delivery	22
4.4	INSTALLATION OF PIPES AND MANHOLES	22
4.4.1	Testing.....	22
4.4.1.1	Examination of Materials.....	22
4.4.1.2	Alignment and Gradient.....	22
4.4.1.3	Leak Testing and Piping	22
4.4.1.4	Pipe Bedding and Backfill.....	23
4.4.1.5	Pressure Washing and Video Inspection	23

TABLE

Table 1 - Soil Testing Methods and Frequencies

CONSTRUCTION QUALITY ASSURANCE (CQA) PLAN

1.0 INTRODUCTION

1.1 PURPOSE

This Construction Quality Assurance Plan (the Plan) addresses the construction quality assurance (CQA) procedures and requirements to be employed during construction of the proposed Phase 7 Expansion project. The plan is intended to supplement, but not supersede, the Contract Documents; where a conflict arises, the Contract Documents shall govern.

All parties involved in the project should obtain a copy of this plan from the OWNER or ENGINEER. They should also obtain copies of any supplemental CQA documents prepared specifically for the project.

The overall goals of the CQA program are to ensure that proper construction techniques and procedures are employed, and to verify that the materials used meet the approved Specifications. Additionally, the program shall identify and define problems that may occur during construction, allowing corrective activities to be implemented in a timely manner. At the completion of the work, the program requires the certifying CQA Consultant(s) to prepare certification reports indicating that the facility has been constructed in accordance with the approved design standards and Contract Documents.

1.2 DEFINITIONS

The following definitions are applicable to this plan:

1.2.1 Contact Documents

The Contract Documents define the work to be completed and encompass all documents incorporated into the Agreement between OWNER and CONTRACTOR for the execution of the project described therein, including but not necessarily limited to: engineering drawings, technical specifications, this CQA Plan, general conditions, supplementary conditions, bid form, addenda to the bid documents, change orders and directives, and written documentation that may be prepared to define aspects of the work.

1.2.2 Quality Control

Definition (ASTM D3740): a planned system of activities, or the use of such a system, whose purpose is to provide a level of quality that meets the needs of users. The objective of quality control is to provide quality that is safe, adequate, dependable, and economical. The overall system involves integrating the quality factors of several related steps including: the proper specification of what is wanted, production to meet the full intent of the specification, inspection to determine whether the resulting material, product, service, etc., is in accordance with the Specifications, and review of usage to determine necessary revisions of Specifications.

In practice, Quality Control refers to those procedures, criteria, and tests employed and paid for by the CONTRACTOR(s) to confirm that the work satisfies the CONTRACTOR's standards and is in compliance with the Drawings and Specifications. This plan does not address Quality Control procedures, criteria, and/or tests employed by the CONTRACTOR.

1.2.3 Quality Assurance

Definition (ASTM D3740): a planned system of activities whose purpose is to provide assurance that the overall quality control program is in fact being effectively implemented. The system involves a continuing evaluation of the adequacy and effectiveness of the overall quality control program with the ability to have corrective measures initiated where necessary. For a specific material, product, service, etc., this involves verifications, audits, and the evaluation of the quality factors that affect the specification, production, inspection, and use of the product, service, system, or environment.

In practice, Quality Assurance refers to those procedures, criteria, and tests required and paid for by the OWNER to confirm that the work performed by the CONTRACTOR(s) is in compliance with the Contract Documents and any additional requirements of this plan.

1.2.4 Layer

A layer is defined as a compacted stratum composed of several lifts constructed without joints.

1.2.5 Lift

A lift is defined as a segment of a layer composed of the maximum thickness of soil permitted to be placed / compacted at one time.

1.3 PARTIES

1.3.1 OWNER

The OWNER is the owner of the solid waste permit and bears the ultimate responsibility for the facility; the OWNER may or may not also be the Operator of the facility. The OWNER shall contract and manage the CONTRACTOR(s), and the CQA consultant(s) and laboratories. For this project, Transylvania County is both the OWNER and Operator.

1.3.2 ENGINEER

The ENGINEER is the official representative of the OWNER and is responsible for the preparation of the Contract Documents. The ENGINEER is also responsible for the interpretation of those documents and for the resolution of technical matters that may arise during construction. For this project, the ENGINEER is LaBella Associates, P.C. (LaBella).

1.3.3 Construction Representative

The Construction Representative is a representative of the OWNER. The Construction Representative reports to the ENGINEER.

1.3.4 CQA Consultant

The CQA Consultant is independent from the CONTRACTOR(s), Manufacturer, and Installer, and is responsible for observing, testing, and documenting activities related to the Quality Assurance of the earthwork and geosynthetic components at the site. The CQA Consultant corresponds with the ENGINEER throughout the project and shall report deviations from the Work and items of non-compliance. The CQA Consultant is also responsible for issuing a certification report, sealed by a registered Professional Engineer, licensed in the State in which the project work is conducted.

1.3.5 Soils CQA Laboratory

The Soils CQA Laboratory is independent from the CONTRACTOR(s), and Supplier, responsible for performing the required laboratory testing of the project earthwork components.

1.3.6 Geosynthetic CQA Laboratory

The Geosynthetic CQA Laboratory is independent from the CONTRACTOR(s), Manufacturer, and Installer, responsible for performing the required laboratory testing of the project geosynthetic materials.

1.3.7 CONTRACTOR

The CONTRACTOR has the primary responsibility for ensuring that the work is performed in accordance with the Contract Documents developed by the ENGINEER and approved by the permitting agency. Other responsibilities include the performance of all construction activities at the site including site facilities, administration, material purchasing, procurement, supervision, Construction Quality Control, installation, and subcontracting. The CONTRACTOR is responsible for the protection of completed work until it is accepted by the OWNER. The CONTRACTOR is also responsible for informing the OWNER and CQA Consultants of the scheduling and occurrence of all construction activities.

1.3.8 Geomembrane Manufacturer(s)

The geomembrane manufacturer is responsible for the production of geomembrane rolls from resin.

1.3.9 Geomembrane Installer(s)

The Geomembrane Installer is responsible for the handling, sorting, placing, seaming, loading and other construction-related aspects of the project geosynthetics. The Geomembrane Installer is also responsible for transportation of the materials to the site, and the protection of the materials once they arrive on site, until the work is accepted by the CONTRACTOR.

1.3.10 Surveyor

The Surveyor is responsible for establishing and maintaining lines and grades and temporary benchmarks throughout all relevant areas of the construction site. The Surveyor shall issue a complete set of Record Drawings certified by a Professional Land Surveyor, licensed in the State in which the project work is conducted.

1.4 COMMUNICATIONS AND MEETINGS

Frequent and open communications are a necessary and essential component of this plan in order to achieve a high degree of coordination, cooperation, and quality in the finished product, and to minimize or avoid delays. It is one goal of this plan to resolve problems at the lowest possible level of authority while maintaining thorough documentation, informing all responsible parties, and obtaining approvals as necessary or appropriate. The documentation requirements of CQA activities are addressed in various sections of this plan. A series of meetings shall be held before, during, and after construction to facilitate planning, progress reports and problem resolution. Minutes are to be kept of all meetings as directed by the ENGINEER. The meetings shall be as follows unless otherwise directed by the OWNER:

- Preconstruction Meeting: to be held as directed by the ENGINEER and to be attended by the OWNER or Owner's Representative, CQA Consultant, CONTRACTOR, significant subcontractors and suppliers as designated by the ENGINEER.
- Progress Meetings: to be held as directed by the ENGINEER on a bi-weekly basis, unless otherwise prescribed by the Contract Documents, and to be attended by the OWNER or Owner's Representative, CQA Consultant, CONTRACTOR, and representatives of parties actively involved in the construction as designated by the ENGINEER.
- Post-Construction Resolution Meeting: to be attended by the OWNER or Owner's Representative, CQA Consultant, CONTRACTOR, significant subcontractors and suppliers as directed by the ENGINEER.

2.0 EARTH MATERIALS

2.1 INTRODUCTION

This section of the plan describes Construction Quality Assurance (CQA) procedures for the installation of the earth material components of the project.

2.2 SCOPE

2.2.1 General

The work addressed under this section shall facilitate proper construction of all earth material components of the project. All work shall be constructed to the lines, grades, and dimensions indicated by the Contract Documents, or as required by the OWNER or OWNER's Representative.

2.2.2 Organization Qualifications

Prior to commencement of the work, all organizations responsible for any portion of the construction, Construction Quality Control (CQC), and CQA shall provide the ENGINEER upon request, with the following information, at a minimum:

- Corporate Information:
 - Brief historical background; and,
 - Proof of insurance certificates.
- Professional capabilities:
 - Summary of corporate capabilities; and,
 - Summary of experience with similar projects.
- Personnel:
 - Lines of authority for project personnel;
 - Personnel responsibilities; and,
 - Resumes of key personnel to be involved.

2.3 EARTH MATERIALS CQA TESTING

2.3.1 General

Assurance that construction of the earth material components of the project has been performed in accordance with the Contract Documents shall be accomplished by use of CQA testing and visual observations. Specifically, CQA testing shall be conducted in two (2) categories:

- Pre-construction testing; and,
- Construction testing.

CQA testing within these categories shall consist of the following:

- Material Evaluation and Verification;
- Construction Quality Evaluation; and
- Special Testing.

2.3.2 Material Evaluation/Verification Testing

Pre-construction material evaluations shall be performed on samples from potential sources to ascertain their acceptability as construction materials. Evaluation tests are to be performed by the CQA laboratory. Test reports shall verify compliance with, or deviation from, the acceptability criteria as defined by the Contract Documents, and as detailed in this CQA Plan.

2.3.3 Construction Quality Evaluation Testing

Construction quality evaluations shall be performed on all components of earthwork construction at the frequencies shown in Table 1. Criteria to be used for determination of acceptability of the work shall be as identified in the Specifications and as detailed in this plan. Construction evaluation testing shall consist of visual observations of the work, in-place density/moisture content verification, investigations into the adequacy of layer bonding and clod destruction, elevation and thickness monitoring, and special testing. Evaluation of the construction work shall include the following:

- Observations and documentation of the water content, clod size and other physical properties of the soil during processing, placement and compaction;
- Observation and documentation of each compacted lift's ability to accept and bond to subsequent lifts;
- Observation and documentation of the thickness of compacted and loosely placed lifts;
- Observation and documentation of the performance of the compaction and heavy hauling equipment on the construction surface (sheepsfoot penetration, pumping, cracking, etc.); and
- Observation and documentation of the effectiveness of the procedures used to prevent desiccation and/or freezing of completed lifts and layers.

In-place density test methods shall cause minimal delay to the placement of subsequent lifts; therefore, the nuclear method is preferred. An acceptable test for soils used in structural or "controlled fill" applications (i.e. embankments, berms, backfill, soil liner, subgrade, etc.) shall be defined as one that meets or exceeds the specified minimum density within the specified moisture range.

If there is any question as to the classification of the tested soil, and hence the appropriateness of a given moisture-density plot, a “one-point” Standard Proctor compaction test shall be performed for comparison with the available plots. The optimum moisture content and maximum dry density extrapolated from the one-point test result must fall on or near the plotted line of optimums for the classification of a soil to be confirmed. For controlled fill, the reference maximum dry density can be adjusted to accommodate the one-point data.

Questions concerning the accuracy of any single test shall be addressed by retesting in that or another representative location. Periodic drive cylinder testing shall be performed to verify the adequacy of the nuclear gauge testing at the frequencies designated in Table 1. If a conflict exists between the drive cylinder testing and the corresponding nuclear density test results, then the drive cylinder results shall control.

Lifts shall be bonded together to the greatest extent possible. Bonding of lifts is enhanced by:

- Ensuring that the surface of the previously compacted lift (or subgrade) is rough before placing the new lift of soil;
- Adding moisture to the previously compacted lift (or subgrade); and
- Using a fully penetrating footed roller.

Evaluation of lift bonding in soil liner and similar applications shall be done by using test pits or auger holes to visually observe the lift interfaces. Alternatively, Shelby tubes pushed through the lift interfaces can be visually inspected for proper lift bonding.

2.3.4 Test Pad

A test pad shall be constructed as outlined in Specification Section 02218 to develop and demonstrate construction methods that shall be used to produce a compacted soil liner satisfying the requirements of the Specifications.

2.4 DOCUMENTATION/CERTIFICATION

2.4.1 General

The CQA Consultant shall document the activities associated with the construction of the earth material components of the project. Such documentation shall include, as a minimum, daily reports of construction activities and a summary technical report on the construction project. Documentation and reporting shall meet all requirements of the Contract Documents and this CQA Plan.

2.4.2 Construction Monitoring

Construction of earth material components of the project shall be monitored and documented by a CQA Consultant. Soils laboratory testing shall be performed and documented by an independent testing laboratory working under the direction of the CQA Consultant.

Written daily documents shall include a record of observations, test data sheets, identification of problems encountered during construction, corrective measures taken, weather conditions, and personnel and equipment on site. Prior to construction of compacted soil liner, the CQA Consultant shall provide the ENGINEER a drawing delineating where testing and other CQA activities have been

performed, the areas tested, and pertinent record data including, but not limited to: date, project name, location of test, CQA Consultant, results, etc.

2.4.3 Certification

The CQA Consultant(s) shall prepare a certification report addressing each major item identified above for each phase of construction under their areas of responsibility. Certification reports required by regulatory agencies shall be prepared and submitted as required by Rule .1624(b)(7)(B)(ii), for certification of the subgrade, the owner or operator will notify the Division via email no less than 24 hours before conducting the subgrade inspection.

Certification shall include assessments of compliance with the Contract Documents and the results of the physical sampling and testing. At a minimum, the certification report shall include:

- Copies of all daily CQA field reports;
- Results of all field testing including drawings depicting the locations of construction testing when appropriate;
- Results of all laboratory testing;
- Photographic record of the project including representative photographs of each major construction activity; and,
- Certification statement assessing compliance with the Contract Documents, sealed by a professional engineer, licensed in the State in which the project work is conducted.

3.0 GEOSYNTHETICS

3.1 INTRODUCTION

This section of the plan describes Construction Quality Assurance (CQA) procedures for the installation of all geosynthetic components of the project. This section is devoted to Quality Assurance, not to Quality Control. A separate geosynthetic quality control manual shall be submitted by the CONTRACTOR in accordance with the Specifications.

3.2 SCOPE

3.2.1 General

The work addressed under this section shall facilitate proper construction of all geosynthetic components for the project. All work shall be constructed to the lines, grades, and dimensions indicated by the Contract Documents, and as required by the ENGINEER, OWNER, or the Construction Representative.

The CQA Consultant shall issue a written daily report of activities. At a minimum, these reports shall include observations and test results as well as problems encountered and solutions.

3.2.2 Installation

The CQA Consultant shall verify that the geosynthetics are installed in accordance with the Contract Documents.

3.3 HDPE GEOMEMBRANE MANUFACTURE, FABRICATION, AND DELIVERY

3.3.1 High Density Polyethylene (HDPE) Geomembrane Manufacturing

The geomembrane shall be comprised of HDPE material manufactured of new, first-quality products designed and manufactured specifically for the purpose of liquid containment in hydraulic structures. Only one (1) type of resin {one (1) manufacturer, one (1) resin classification} shall be used to manufacture geomembrane for this project. In addition, all geomembrane used for this project shall be from the same batch unless otherwise approved in writing by the ENGINEER and the Geomembrane Installer or Geomembrane Manufacturer agree to pay for any additional conformance testing required.

3.3.2 Manufacturing

3.3.2.1 Submittals

The CQA Consultant shall verify that:

- The property values certified by the Geomembrane Manufacturer meet all of the Specifications; and,
- The measurements of properties by the Geomembrane Manufacturer are properly documented, the test methods used are acceptable, and the geomembrane meets the Geomembrane Manufacturer's manufacturing quality control (MQC) requirements.

The CONTRACTOR shall provide MQC certificates for every roll of material to the CQA Consultant at least seven (7) days prior to the loading and shipping of geomembrane to the site. The CQA Consultant shall review the MQC certificates and notify the Contractor if any geomembrane rolls are not approved for shipping.

3.3.2.2 Rolls

The CQA Consultant shall verify that the MQC certificates have been provided at the specified frequency for all rolls, identify each certificate related to a particular roll, review the MQC certificates, and verify that the certified roll properties meet the Specifications.

3.3.2.3 Conformance Testing

3.3.2.3.1 In-Plant Material Conformance Test Sampling

The CQA Consultant shall arrange for the CQA Laboratory to sample the geomembrane material in-plant and ship these samples to their laboratory for conformance testing as outlined in Specification Section 13320.

The CQA Consultant shall report any non-conformance of sampling procedures as outlined in Specification Section 13320 to the ENGINEER.

The expressed purpose of in-plant Material Conformance Test Sampling is to verify that geomembrane material designated for the OWNER'S project is in compliance with the Specifications prior to shipment

to the site. The Geomembrane Manufacturer shall make available all necessary personnel and equipment to assist the CQA Consultant in retrieving conformance samples of the geomembrane material.

Sampling Procedures

The samples will be taken from selected rolls by cutting full-width, one (1) meter long [three (3) feet long] samples from the outer wrap of the selected rolls. The ENGINEER shall mark the roll direction on the samples with an arrow. The outer revolution of geomembrane shall be discarded before the test sample is taken. The sample rolls must be relabeled for future identification.

Samples shall be taken at a rate as indicated in Specification Section 13320. Unless otherwise specified, samples shall be taken at a rate of one (1) per batch or one (1) per 100,000 ft², whichever is more frequent.

Test Procedures

The following test procedures shall be in compliance with the most recent Geosynthetic Institute (GSI) Standard Specification for the material. At minimum, the following tests shall be performed:

- Density: (ASTM D1505);
- Carbon black content: (ASTM D4218);
- Carbon black dispersion: (ASTM D5596);
- Thickness: smooth material (seam) (ASTM D5199), textured material (panel) (ASTM D 5994);
- Tensile break stress: (ASTM D6693);
- Tear resistance: (ASTM D1004);
- Asperity height (textured material): (ASTM D7466) and,
- Melt flow rate index: (ASTM D1238).

3.3.2.4 Test Results

The CQA Consultant shall examine all results from laboratory conformance testing and shall report any nonconformance to the ENGINEER.

3.3.2.4.1 Procedures in Event of a Conformance Test Failure

The CQA Consultant shall document actions taken in conjunction with conformance test failures and follow the procedures in Specification Section 13320.

3.3.3 Delivery

3.3.3.1 Transportation and Handling

The CQA Consultant shall verify that:

- Handling equipment used on the site does not damage the geomembrane; and,
- The Geomembrane Installer's personnel handle the geomembrane with care.

Upon delivery at the site, the Geomembrane Installer and the CQA Consultant shall conduct a surface observation of all rolls for defects and for damage. This examination shall be conducted without unrolling rolls unless defects or damages are found or suspected. After inspection, the CQA Consultant will indicate to the ENGINEER the following observations:

- Rolls, or portions thereof, which should be rejected and removed from the site because they have severe flaws; and,
- Rolls that include minor repairable flaws.

3.3.3.2 Storage

The CQA Consultant shall verify that the storage space selected is not in an area of low elevation and that cribbing techniques have been utilized which shall help ensure that the materials shall not be sitting in ponded water in the event of rainfall.

3.4 GEOMEMBRANE INSTALLATION

3.4.1 Earthwork

3.4.1.1 Surface Preparation

The CONTRACTOR shall be responsible for preparing the supporting soil according to the Contract Documents.

The CQA Consultant shall verify that:

- A qualified land surveyor, licensed in the State in which the project work is conducted, has verified all lines and grades;
- That the supporting soils meet the density specification and provide a firm foundation;
- Surface of the subgrade has been prepared and has been certified as acceptable to the Installer; and,
- The surface is generally smooth and free of rocks, sticks, roots, large quantities of loose soil, and abrupt changes in grade, which may cause damage to the geomembrane and require its repair after deployment.

In general, at any time before and during the geomembrane installation, the CQA Consultant shall indicate to the CONTRACTOR locations, which may not provide adequate support to the geomembrane.

3.4.2 Geomembrane Placement

3.4.2.1 Field Panel Identification

It shall be the responsibility of the CQA Consultant to ensure that each field panel shall be given an "identification code" (number or letter-number) consistent with the layout plan. This field panel identification code should be as simple and logical as possible (manufacturing roll numbers are usually cumbersome and are not related to location in the field).

3.4.2.2 Field Panel Placement

3.4.2.2.1 Location

The CQA Consultant shall verify that field panel installation follows the Geomembrane Installer's layout plan, as approved or modified by the ENGINEER prior to installation.

3.4.2.2.2 Installation Schedule

The CQA Consultant shall:

- Evaluate every change in the schedule proposed by the Geomembrane Installer and advise the ENGINEER on the acceptability of that change;
- Verify that the condition of the supporting soil has not changed detrimentally during installation; and,
- Record the identification code, location, and date of installation of each field panel.

3.4.2.2.3 Weather Conditions

Geomembrane placement shall not proceed:

- At ambient temperatures below 40 °F or above 104 °F unless authorized by the ENGINEER and CQA Consultant; and,
- During any precipitation, in an area of ponded water, or during excessive winds.

The CQA Consultant shall verify that the above conditions are fulfilled. Additionally, the CQA Consultant shall verify that the supporting soil has not been damaged by weather conditions.

3.4.2.2.4 Method of Placement

The CQA Consultant shall verify that:

- Any equipment used does not damage the geomembrane by handling, trafficking, heat, leakage of hydrocarbons or other means;
- The prepared surface underlying the geomembrane has not deteriorated since previous acceptance, and is still acceptable immediately prior to geomembrane placement; any geosynthetic elements immediately underlying the geomembrane are of acceptable cleanliness and are free of debris;
- All personnel working on the geomembrane do not smoke, wear shoes that may damage the geomembrane, or engage in other activities that could damage the geomembrane;
- The method used to unroll the panels does not cause scratches or crimps in the geomembrane and does not damage the supporting soil;
- The method used to place the panels minimizes wrinkles (especially differential wrinkles between adjacent panels);
- Adequate temporary loading and/or anchoring using sand bags has been placed to prevent uplift by wind. The loading should be continuous along the edges of panels to minimize the risk of wind flow under the panels;
- All field seaming and installation of appurtenances (sumps, etc.) are done in accordance with the Drawings and Specifications; and,

- Direct contact of equipment with the geomembrane is minimized; i.e., the geomembrane is protected by geotextile, extra geomembrane, or other suitable materials, in areas where heavy traffic may be expected.

3.4.2.2.5 Damage

The CQA Consultant shall visually examine each panel, after placement and prior to seaming, for damage. Damaged panels or portions of damaged panels, which have been rejected, shall be marked, and their removal from the work area recorded by the CQA Consultant. Repairs shall be made according to procedures described in Specification Section 13320.

As a minimum, The CQA Consultant shall ensure that each panel is placed in such a manner that it is unlikely to be damaged, and any tears, punctures, holes, thin spots, etc., are marked for repair or the panel is rejected.

3.4.3 Field Seaming

3.4.3.1 General Seaming Procedure

The CQA Consultant shall verify that the seaming procedures listed in Specification Section 13320 are followed and shall inform the ENGINEER if they are not.

- The CQA Consultant shall log all appropriate temperatures and conditions and shall log and report any non-compliance.
- The CQA Consultant shall observe all trial seam procedures and log the date, hour, ambient temperature, number of seaming unit, name of seamer, and pass or fail description. Additional samples may be cut from the remainder of the trial seam to be archived by the OWNER, and/or tested by the CQA Laboratory or CQA Consultant.

3.4.3.2 Seam Preparation

The CQA Consultant shall verify that:

- Prior to seaming, the seam area is clean and free of moisture, dust, dirt, debris of any kind, and foreign material;
- If seam overlap grinding is required, the process is completed according to the Manufacturer's instructions and specifications, and in a way that does not damage the geomembrane; the depth of the abrasion must not exceed 10 percent of the nominal material thickness; and,
- Seams are aligned with the fewest possible number of wrinkles and "fishmouths."

3.4.3.3 Weather Conditions for Seaming

The CQA Consultant shall verify that the weather conditions specified in Specification Section 13320 are fulfilled and shall advise the ENGINEER if the installation should be stopped or postponed.

3.4.3.4 Overlapping and Temporary Bonding

The CQA Consultant shall verify that:

- The panels of geomembrane have a finished overlap, sufficient to allow peel tests to be performed on the seam;
- No solvent or adhesive is used unless the product is approved in writing by the ENGINEER (samples shall be submitted to the ENGINEER for testing and evaluation); and,
- The procedure used to temporarily bond adjacent panels together does not damage the geomembrane (in particular, the temperature of hot air at the nozzle of any spot seaming apparatus is controlled such that the geomembrane is not damaged. "Damage" includes a loss in durability).

3.4.4 Nondestructive Seam Continuity Testing

The CQA Consultant shall:

- Observe all continuity testing;
- Record location, date, time, name of tester, and outcome of all testing; and,
- Inform the Installer of any required repairs.

The Geomembrane Installer shall complete any required repairs in accordance with Specification Section 13320.

The CQA Consultant shall:

- Observe the repair and re-testing of the repair;
- Mark on the geomembrane that the repair has been made; and,
- Record location, date, time, name of tester, and outcome of all testing.

3.4.5 Destructive Testing

3.4.5.1 Sampling Procedure

The CQA Consultant shall:

- Observe sample cutting; and,
- Assign a number to each sample, and mark it accordingly; record the reason for taking the sample at this location (e.g., statistical routine, suspicious feature of the geomembrane).

3.4.5.2 Field Testing

The CQA Consultant shall witness field tests and mark samples and portions with their number. The CQA Consultant shall also log the date and time, number of seaming unit, name of technician, seaming apparatus temperatures and speeds, pass or fail description.

3.4.5.3 Construction Quality Assurance Laboratory Testing

Destructive test samples shall be packaged and shipped by the CQA Consultant to the CQA Laboratory. The CQA Consultant shall be responsible for storing the archive samples. Test samples shall be tested by the CQA Laboratory.

Testing shall follow ASTM D4437 with no requirements for sample conditioning time. The minimum acceptable values to be obtained in these tests are those indicated in the Specifications. At least five (5) specimens shall be tested from the samples (e.g., peel, shear, peel, shear, etc.).

The CQA Laboratory shall provide test results no more than 24 hours after they receive the samples. The CQA Consultant shall review laboratory test results as they become available and make appropriate recommendations to the ENGINEER.

3.4.5.4 Destructive Sample Pass/Fail Criteria

The CQA Consultant shall document all laboratory results for destructive samples to ensure that they meet the requirements set forth in Specification Section 13320.

3.4.5.5 Procedures for Destructive Test Failure

The CQA Consultant shall document all actions taken in conjunction with destructive test failures, to verify that they meet the requirements set forth in Specification Section 13320.

3.4.6 Defects and Repairs

3.4.6.1 Verification of Repairs

The CQA Consultant should observe nondestructive testing of repairs and record the date of the repair and test outcome.

3.4.6.2 Large Wrinkles

The CQA Consultant shall indicate which wrinkles should be cut and seamed by the Geomembrane Installer. The repair thus produced shall be tested like any other seam.

3.4.7 Backfilling of Anchor Trench

The CQA Consultant shall observe the backfilling operation and advise the ENGINEER of any problems. Sandbags shall be removed from the anchor trench prior to backfilling.

3.4.8 Lining System Acceptance

The ENGINEER or representative of the ENGINEER shall inspect the tie-in to the existing liner system and approve the condition of the existing liner. The CQA Consultant shall verify that installation has proceeded in accordance with the CQA Plan, except as noted to the ENGINEER.

3.4.9 Materials in Contact with the HDPE Geomembrane

3.4.9.1 Soils

The CQA Consultant shall verify that installation methods follow established and accepted practices, including, but not limited to:

- Placement of soils on the geomembrane shall not proceed at an ambient temperature below 40°F or above 104°F, unless approved by the ENGINEER;
- A geotextile or other cushion may be installed between a drainage layer and the geomembrane, if approved by the ENGINEER;
- Equipment used for placing soil shall not be driven directly on the geomembrane;

- A minimum thickness of 1 foot of drainage material is specified between a light dozer (such as a wide pad Caterpillar D-5 or lighter) and a geomembrane;
- A minimum thickness of four (4) feet of soil or stone is required between rubber-tired vehicles and a geomembrane;
- In heavily trafficked areas such as access ramps, soil or stone thickness should be at least four (4) feet; and,
- Verify the required soil thickness, and that placement of soil is done in such a manner that geomembrane damage is unlikely.

The CQA Consultant shall inform the ENGINEER if any of the above conditions are not fulfilled.

3.4.10 Sumps and Appurtenances

The CQA Consultant shall review the Specifications and verify the use of geosynthetic layers between structures and geomembrane.

The CQA Consultant shall verify that:

- Installation of the geomembrane in sump and appurtenance areas, and connection of geomembrane to sumps and appurtenances have been made according to the Drawings and Specifications;
- Welding around appurtenances is continuous and complete, since neither non-destructive nor destructive testing may be feasible in these areas;
- Vacuum box shall be used to test the weld between the sump and geomembrane; and,
- The geomembrane has not been visibly damaged while making connections to sumps and appurtenances.

The CQA Consultant shall inform the ENGINEER if the any of the above conditions are not fulfilled.

3.4.11 Electrical Leak Location (ELL) Testing

The CQA Consultant shall arrange for Electric Leak Location (ELL) in accordance with Section 13330 once the geomembrane is covered with the drainage layer or the protective cover. Repairs of any leaks shall be made by the CONTRACTOR in accordance with this CQA Plan, and the Contract Documents.

The CQA Consultant shall:

- Arrange for the ELL Testing, once informed of a preferred testing date by the CONTRACTOR;
- Observe all ELL Testing and leak location surveys; and,
- Provide the CONTRACTOR with a report detailing any leaks and repair areas within seven (7) days of completion of the ELL Testing.

The CONTRACTOR shall:

- Be aware of the leak detection activities and account for such activities as outlined in Specification Section 13330;
- Provide access to the CQA Consultant and ELL testing company to perform and complete the test;
- Provide any site assistance needed to perform and complete the test; and,

- Repair any damage to the geomembrane once notified by the CQA Consultant in accordance with the Specifications.

3.5 GEOTEXTILES

3.5.1 Manufacturing

The CQA Consultant shall examine all manufacturer certifications to ensure that the property values listed on the certifications meet or exceed those specified for the particular type of geotextile. Any deviations shall be reported to the ENGINEER.

3.5.2 Labeling

The CQA Consultant shall examine rolls upon delivery and note any deviation from the requirements of Specification Section 13310 shall be reported to the ENGINEER.

3.5.3 Shipment and Storage

The CQA Consultant shall observe rolls upon delivery at the site and note any deviation from the requirements of Specification Section 13310 shall be reported to the ENGINEER. Any damaged rolls shall be rejected and replaced at no additional cost to the OWNER.

3.5.4 Conformance Testing

3.5.4.1 Tests

In-Plant Material Conformance Test Sampling

The CQA Consultant shall arrange for the CQA Laboratory to sample the geotextile material in-plant and ship these samples to their laboratory for conformance testing in accordance with Specification Section 13310.

The CQA Consultant shall report any nonconformance of sampling procedures in accordance with Specification Section 13310 to the ENGINEER.

NOTE: All geotextiles used for this project shall be from the same lot unless otherwise approved by the ENGINEER. The manufacturer or supplier shall perform additional conformance testing, at no additional cost to the OWNER.

At a minimum, the following tests shall be performed on geotextiles:

Mass per unit area	ASTM D5261
Grab strength	ASTM D4632
Tear strength	ASTM D4533
Puncture strength	ASTM D4833
Thickness.....	ASTM D5199
Permittivity*	ASTM D4491
Apparent opening size*	ASTM D4751

*Only if geotextile is to be used as a filter/separator

3.5.4.2 Sampling Procedures

The samples will be taken from selected rolls by removing the protective wrapping and cutting full-width, one (1) meter long [three (3) feet long] samples from the outer wrap of the selected rolls. The outer revolution of geotextile is to be discarded before the test sample is taken. The sample rolls must be labeled for future identification. Items to be considered include the following:

- The conformance test samples shall be identified by type, style, or lot and roll numbers. The machine direction should be noted on the sample(s) with a waterproof marker.
- A lot is defined as a unit of production, or a group of rolls having one (1) or more common properties, and being readily separable from other similar units; and,
- Unless otherwise stated, sampling should be based on one (1) sample per lot or one (1) sample per 100,000 square feet, whichever is greater.

3.5.4.3 Test Results

The CQA Consultant shall examine all results from laboratory conformance testing and shall report any non-conformance to the ENGINEER.

3.5.4.4 Conformance Test Failure

The CQA Consultant shall document all actions taken in conjunction with conformance test failures, to verify that actions taken meet the requirements set forth in Specification Section 13310.

3.5.5 Handling and Placement

The CQA Consultant shall note any noncompliance to Specification Section 13310 and report it to the ENGINEER.

3.5.6 Seams and Overlaps

The CQA Consultant shall note any noncompliance to Specification Section 13310.

3.5.7 Repair

The CQA Consultant shall observe all repairs, and shall note any noncompliance to Specification Section 13310.

3.5.8 Placement of Soil Materials

The CONTRACTOR shall place cover soil or drainage aggregate materials on top of a geotextile in such a manner as to ensure no damage occurs to the geotextile, including but not limited to slippage on underlying layers, and tensile stresses in the geotextile.

Unless otherwise specified by the ENGINEER, all lifts of soil material shall be placed in conformance with the practices provided in Section 3.4.9 of this CQA Plan. Any noncompliant materials or procedures shall be noted by the CQA Consultant and reported to the ENGINEER.

3.6 GEOCOMPOSITE

3.6.1 Manufacturing

The CQA Consultant shall examine all manufacturer’s certifications to ensure that the property values listed on the certifications meet or exceed those specified. Any deviations shall be reported to the ENGINEER.

3.6.2 Labeling

The CQA Consultant shall examine rolls upon delivery and any deviation from the requirements listed in Specification Section 13302 shall be reported to the ENGINEER.

3.6.3 Shipment and Storage

The CQA Consultant shall verify that geocomposites are free of soil and dust before installation and shall record the observation of this verification. Washing operations shall be observed by the CQA Consultant, and improper washing operations, which may damage the geonet composites, shall be reported to the ENGINEER.

3.6.4 Conformance Testing

3.6.4.1 Tests

In-Plant Material Conformance Test Sampling

The CQA Consultant shall arrange for the CQA Laboratory to sample the geocomposite material in-plant and ship these samples to their laboratory for conformance testing in accordance with Specification Section 13302.

The CQA Consultant shall report any nonconformance of sampling procedures in accordance with Specification Section 13302 to the ENGINEER.

NOTE: All geocomposite material used for this project shall be from the same lot unless otherwise approved by the ENGINEER. In the event that material from multiple lots is used, the manufacturer or supplier shall perform additional conformance testing, at no additional cost to the OWNER.

As a minimum, the following tests shall be performed on geocomposite:

Geonet thickness.....	ASTM D5199
Geotextile apparent opening size.....	ASTM D4751
Geotextile puncture strength.....	ASTM D4833
Geocomposite transmissivity.....	ASTM D4716

3.6.5 Handling and Placement

The CQA Consultant shall note any noncompliance with Specification Section 13302 and report them to the ENGINEER.

3.6.6 Repair

The CQA Consultant shall observe all repairs, and shall note any noncompliance with Specification Section 13302 and report them to the ENGINEER.

3.6.7 Placement of Soil Materials

Any noncompliance to Specification Section 13302 shall be noted by the CQA Consultant and reported to the ENGINEER.

If portions of the geocomposite are exposed, the CQA Consultant shall periodically place marks on the geocomposite and the underlying geomembrane and measure the elongation of the geocomposite during the placement of soil.

3.7 GEOSYNTHETIC CLAY LINER (GCL)

3.7.1 Storage

Geosynthetic clay liner rolls must always be stored in a location where they shall not be exposed to moisture.

3.7.2 Handling & Placement

All geosynthetic clay liner materials shall be installed in strict accordance with the manufacturer's instructions and recommendations, in addition to the following:

- On slopes, geosynthetic clay liners should be placed with overlap oriented parallel to the maximum slope (i.e. down the slope, not across the slope).
- Adjoining panels of geosynthetic clay liners should be overlapped a minimum of six inches (6") whereas end-of-panel overlaps should be a minimum of 24 inches.
- Geosynthetic clay liners shall not be installed in standing water or during rain.
- Geosynthetic clay liners should always be installed with the appropriate side facing up.
- Rolls should be pulled tight to smooth out any creases or folding.
- Precautions should be taken to avoid damage to any underlying geosynthetic materials while placing the geosynthetic clay liners.
- Cover geosynthetic clay liners with geomembrane or other cover materials after placement to avoid damage from precipitation.

3.7.3 Repairs

Repairs to cuts or tears in installed GCL material should extend a minimum of twelve inches (12") beyond the area in need of repair. Repair pieces should be held in place until cover material has been placed. Granular bentonite shall be applied at a rate of 0.25 pounds/linear foot, continuously under all edges of repair pieces.

3.7.4 Conformance Testing

In-Plant Material Conformance Test Sampling

The CQA Consultant shall arrange for the CQA Laboratory to sample the GCL material in-plant and ship these samples to their laboratory for conformance testing in accordance with Specification Section 13315.

The CQA Consultant shall report any non-conformance of sampling test results in accordance with Specification Section 13315 to the ENGINEER.

All GCL used for this project shall be from the same lot unless otherwise approved by the ENGINEER. In the event that material from multiple lots is used, the manufacturer or supplier shall perform additional conformance testing, at no additional cost to the OWNER.

At a minimum, the following tests shall be performed on the GCL to be used for this project:

Bentonite Swell Index.....	ASTM D5890
Bentonite Fluid Loss.....	ASTM D5891
Bentonite Mass per Area	ASTM D5993
GCL Grab Strength	ASTM D4632
GCL Peel Strength	ASTM D6496
GCL Tensile Strength.....	ASTM D6768
GCL Index Flux*	ASTM D5887
GCL Permeability*	ASTM D5887
GCL Hydrated Internal Shear Strength	ASTM D5321
Top Geotextile Component Mass per Area (Non-woven)	ASTM D5261
Bottom Geotextile Component Mass per Area (Woven or Non-woven)	ASTM D5261

*For Bottom Liner: Index Flux testing shall be done utilizing a hydraulic gradient of 2 psi and confining pressure of 5 psi.

3.8 DOCUMENTATION

3.8.1 Daily Reports

The CQA Consultant shall complete a daily report and/or logs on prescribed forms, outlining all of the activities for that day. Geomembrane area, panel numbers, and seams completed and approved, and measures taken to protect unfinished areas overnight should be identified. Failed seams or other panel areas requiring remedial action must be identified with regard to nature of action, required repair, and location. Repairs completed must also be identified. Any problems or concerns with regard to operations on site should also be noted. Any matters requiring action by the ENGINEER should be highlighted. A copy is to be submitted to the ENGINEER at the bi-weekly construction meeting following the report date.

3.8.2 Record Drawing

Record Drawing or drawings shall be prepared by the Geomembrane Installer. The Record Drawing shall include the following information for geomembrane:

- Location and dimensions of all geomembrane field panels;
- Identification of all seams and panels with appropriate numbers or “identification codes;”
- Location of all repairs; and,
- Location of all destructive test samples.

The Record Drawing shall address each surface of base grades, soil liner, geomembrane and drainage layer, and leachate pipes, and geomembrane; and if necessary, another drawing shall identify problems or unusual conditions of the geotextile or geocomposite layers. In addition, applicable cross-sections shall show layouts of geocomposite and geotextiles that are unusual or different from the Drawings.

3.8.3 Final Certification Report

A Final Certification Report shall be prepared by the CQA Consultant and submitted upon completion of the work. This report shall include all reports prepared by the CQA Consultant personnel, summarize the activities of the project, and document all aspects of the quality assurance program performed. At a minimum, the Final Certification Report shall include the following information:

- Personnel involved with the project;
- Scope of work and outline of project;
- Quality assurance methods;
- Test results (destructive and non-destructive, including laboratory tests);
- Certification sealed and signed by a registered Professional Engineer licensed in the State in which construction occurs; and,
- Record Drawings, sealed and signed by a registered Surveyor, licensed in the State in which construction occurs.

4.0 LEACHATE COLLECTION AND REMOVAL SYSTEM

4.1 INTRODUCTION

This section of the plan addresses the quality assurance of the installation of all pipes and manholes used on the project in the leachate collection and removal system (LCRS) including, leachate collection pipes and leachate transmission pipes.

4.2 SCOPE

4.2.1 General

The work addressed under this section shall facilitate proper construction of all LCRS components installed in or outside the disposal cells on the project. All work shall be constructed to the lines, grades, and dimensions indicated by the Contract Documents, or as required by the OWNER and ENGINEER or CQA Consultant. Construction Representative shall issue a written daily report of activities. These reports shall include, as a minimum, observations and test results as well as problems encountered, and solutions achieved. Construction reports summarizing significant events, as well as addressing all problems encountered and their solutions, shall be issued weekly to the OWNER and ENGINEER. The format of these reports shall be established at the pre-construction meeting.

4.3 MANUFACTURING AND DELIVERY OF MATERIALS

4.3.1 Pipe, Fittings, and Manholes

It is a requirement of the contract that prior to delivery of materials, the CONTRACTOR shall submit details or shop drawings, and manufacturer's specifications of all materials to be furnished for the project. These submittals will be reviewed by the ENGINEER to determine if the materials meet the requirements of the Contract Documents. The submittals will be either accepted, returned for corrections, or not accepted. Rejection shall require a resubmission of the information. Certificates of in-plant testing of prefabricated sumps and manholes shall be provided by the CONTRACTOR to the ENGINEER for review.

4.3.2 Delivery

Upon delivery, the Construction Representative shall inspect all pipes, fittings, and other appurtenances for conformity with the Specifications, and proper handling and storage. The Construction Representative may prescribe corrective repairs or may reject the material as deemed necessary.

4.4 INSTALLATION OF PIPES AND MANHOLES

4.4.1 Testing

Testing of pipes and manholes shall be in accordance with the CONTRACTOR'S testing plan as accepted by the ENGINEER. If submission of a testing plan is not required, all testing shall be in accordance with the latest version of AWWA Manual M55 or AWWA Standard C905. Testing shall be performed on manholes and sections of pipe after the manholes or pipe sections are determined adequate and ready for testing by the Construction Representative.

4.4.1.1 Examination of Materials

All pipes, fittings, manholes, and other appurtenances shall be examined carefully for damage and other defects immediately before installation. Defective materials shall be marked, and the deficiency shall be corrected, or the material shall be rejected and replaced as deemed necessary by the Construction Representative.

4.4.1.2 Alignment and Gradient

The alignment of the pipe shall be surveyed by a surveyor licensed in the State in which construction occurs.

Alignment and gradient of gravity leachate pipes flowing between manholes shall be checked by the Construction Representative by sighting from one (1) manhole to a strong light held at the next manhole. If the alignment varies horizontally more than 1/4 the diameter of the pipe or sags and high points are found on the slope; the CONTRACTOR shall locate and correct the defective condition to the satisfaction of the Construction Representative.

4.4.1.3 Leak Testing and Piping

For dual-containment leachate transmission pipes, the interior carrier pipe shall be tested using the hydraulic test method and the exterior containment pipe shall be tested using the pneumatic test method. Landfill gas (LFG) piping shall be tested using the pneumatic test method. Leak testing should be performed in accordance with ASME B31 Code for Pressure Piping and ASTMs E1003, F2164, and F2786.

The CONTRACTOR shall only perform the leak test when the pipe is clean, partially backfilled with cover material, and the appropriate appurtenances are closed. The Construction Representative shall provide a test record containing the following information, at a minimum:

- Date and time of test;
- Weather conditions and ambient temperature at the site during the test;

- Identification of pipe to be tested;
- Tet method;
- Test equipment;
- Test fluid;
- Test fluid temperature;
- Test pressure;
- Test duration;
- Any adjustments made to test pressure;
- Test duration;
- Test results;
- Description of test section, length, elevations, and site location; and,
- Description of any leaks or failures and the corrective actions performed.

Upon completion of the leak tests, the test records shall be provided to the ENGINEER for review.

4.4.1.4 Pipe Bedding and Backfill

The gradation and compaction of pipe bedding shall be tested by the CONTRACTOR to verify compliance with the Contract Documents.

4.4.1.5 Pressure Washing and Video Inspection

At the completion of construction, all leachate collection pipes, leachate transmission pipes, and manholes shall be thoroughly cleaned by methods that may include mechanical pigging, pressure washing, vacuuming and removal of any construction mud/silt or debris.

Video camera inspection of all leachate collection pipes, leachate transmission pipes, and manholes shall be conducted by the CONTRACTOR. A video report shall be made available to the ENGINEER for review and acceptance.

TABLE 1 - SOIL TESTING METHODS AND FREQUENCIES

Test Method	Structural Fill		Test Pad		Soil Liner	Drainage Layer	
	Index	Construction	Index	Construction	Construction	Index	Construction
Particle Size Analysis of Soils ASTM D422 or ASTM C117 for Drainage Layer Aggregates	One/Material	1/10,000 CY	One/Material	One/TP	1/10,000 CY	One/Material	1/10,000 CY
Unified Soil Classification System ASTM D2487	One/Material	1/10,000 CY	One/Material	One/TP	1/10,000 CY	One/Material	1/10,000 CY
Moisture Content of Soil Lab Method ASTM D2216	One/Material	1/10,000 CY	One/Material	One/TP	1/10,000 CY	One/Material	1/10,000 CY
Atterberg Limits ASTM D4318	NA	NA	One/Material	One/TP	1/10,000 CY	NA	NA
Specific Gravity ASTM D854	One/Material	NA	One/Material	One/TP	1/10,000 CY	One/Material	One/Material
Standard Proctor ASTM D698	One/Material	1/10,000 CY	One/Material	One/TP	1/10,000 CY	NA	NA
In-place Density by Drive Cylinder ASTM D2937	NA	1/Lift/Acre	NA	1/Lift	1/Lift/Acre	NA	NA
In-place Density by Nuclear Method ASTM D2922	NA	5/Lift/Acre	NA	5/Lift	5/Lift/Acre	NA	NA
In-place Moisture by Nuclear Method ASTM D3017	NA	5/Lift/Acre	NA	5/Lift	5/Lift/Acre	NA	NA
Soil Moisture By Direct Heating ASTM D4959	NA	1/Lift/Acre	NA	1/Lift	1/Lift/Acre	NA	NA
Undisturbed Hydraulic Conductivity ASTM D5084	NA	NA	NA	1/Lift	1/Lift/Acre	NA	NA
Laboratory Compacted Hydraulic Conductivity ASTM D5084 or ASTM D2434 for Drainage Layer Aggregate	NA	NA	One/Material	NA	One/Material	One/Material	1/10,000 CY
Triaxial Compression on Cohesive Soil ASTM D4767	One/Material	NA	NA	NA	NA	NA	NA

PART VI – BORROW STUDY REPORTS

BORROW STUDY REPORT 1

(PREPARED BY LABELLA ASSOCIATES, DATED MARCH 14, 2024)

March 14, 2024

Mr. Kenn Webb
Solid Waste Director
Transylvania County Solid Waste Department
500 Howell Road
Brevard, North Carolina 28712

**RE: Woodruff Landfill (Solid Waste Permit No. 88-07)
Borrow Study Report
LaBella Project No. 2233711.01 Phase 01**

Dear Mr. Webb:

This letter and attachments provide the results of LaBella Associates' (LaBella's) borrow study evaluation conducted at the Woodruff Landfill. The borrow study field investigations were conducted on December 6 and 7, 2023. The purpose of the borrow study was to identify the presence of low-permeability soils to be used in the construction of the liner system for the Phase 7 Expansion and suitable fill materials to be used for construction of the features associated with the Phase 7 Expansion.

Soils Identification

Prior to commencement of the field investigations, LaBella and Transylvania County (County) personnel identified a total of 15 test pit (TP) locations on the site. The TPs were located across two (2) investigation areas situated in regions north and west of the proposed Phase 7 Expansion footprint. These investigation areas were selected due to their proximity to the Phase 7 area and existing borrow area. However, based on location accessibility, geomorphological conditions, and presence of rock outcrops, the TP locations were reduced to 10 during the field investigation. The final TP locations sampled for this study were: TP-2, TP-3, TP-4, TP-5, TP-6, TP-7, TP-9, TP-10, TP-13, and TP-14. The field investigation areas and the TP locations are shown on Drawing No. 1 provided in Attachment 1.

From the identified TPs, soil samples were collected in 5-gallon buckets. A mini excavator, operated by County personnel, was used to excavate the TPs to a particular depth. The depth of the TPs varied depending on the observation of visible differences in soil stratification and the presence of weathered rock during excavation. For example, at TP-5, two (2) samples were collected based on a visible change in the soil strata from orange/brown silt to reddish-brown silt. Additional information about the TP depths, soil observations, and soil sample photographs are included in Attachment 3 (Borrow Study Photographic Log).

LaBella retained Kessel Engineering Group (Kessel) to perform laboratory testing of the collected soil samples. The laboratory tests performed included soil classification (for soil type determination), Atterberg limits (for soil plasticity evaluation), Standard Proctor Test (for soils' natural moisture content and optimum soil compaction estimation), and hydraulic conductivity (for permeability calculation). Kessel hired a third-party testing firm, Summit Engineering & Construction Services (Summit), to perform the hydraulic conductivity tests. For the hydraulic conductivity tests, only four (4) samples collected from TP-5, TP-9, and TP-10 were selected based on the results from the Atterberg limits test. The laboratory test results for all the collected soil samples are included in Attachment 2.



Low Permeability Soil Identification Results

During the performance of the hydraulic conductivity tests, Summit remolded the four (4) samples that met the plasticity criteria as derived from the Atterberg limits test, i.e., samples from TP-5, TP-9, and TP-10, at three to four percent (3-4%) above the optimum moisture content. Based on the hydraulic conductivity results, the soil samples from TP-5, TP-9, and TP-10 exhibited hydraulic conductivity values less than 1×10^{-5} cm/sec but greater than 1×10^{-7} cm/sec. A summary of the hydraulic conductivity results are included in Attachment 2. Based on these results, the soils encountered at TP-5, TP-9, and TP-10 locations may be suitable materials for the construction of the compacted soil liner (CSL) required for the Phase 7 Expansion.

Suitable Fill Results

The soil samples obtained from TP-2, TP-3, TP-4, TP-13, and TP-14 were identified as silty sand (SM) whereas the soil samples collected from TP-6, TP-7, and TP-10 were identified as sandy silt (ML). All the samples obtained from the aforementioned TP locations are considered non-cohesive soils. Based on the photographic log provided in Attachment 3, the soils encountered at TP-2, TP-3, TP-4, TP-6, TP-7, TP-13, and TP-14 had varying sizes of rock fragment. The soil materials encountered at TP-2, TP-3, TP-4, TP-6, TP-7, TP-10, TP-13, and TP-14 can possibly be used as fill material for construction of the ancillary site features associated with the Phase 7 Expansion (i.e., subgrades, berms, access roads, etc.). However, if fill material from the above-referenced TP locations will be used for berm construction, additional testing of the fill material (e.g., cohesion and friction angles tests) must be performed to meet the requirements listed in the Phase 7 Permit to Construct (PTC) Application, dated June 7, 2023.

Conclusions and Limitations

The findings from this borrow study may aid with the bid phase and construction of the Phase 7 Expansion. However, the results are assumed to be non-representative samples of the site and are only indicative of the location sampled. Additionally, LaBella completed the site investigations on December 6 and 7, 2023, and cannot guarantee that the site conditions observed during the field investigation will remain the same till the construction phase. Lastly, it is difficult to estimate the lateral extent of soil conditions at a TP location. As a result, it might be prudent if County personnel perform further excavations around the TP locations to delineate the approximate extents of the observed soil types identified in this borrow study. If you have any questions about this letter, or the attachments provided, please do not hesitate to give me a call on (704) 941-2142.

Respectfully submitted,

LaBella Associates

Kelechi Nwaokorie, E.I.T.
Project Engineer, Waste & Recycling

Cristine Quach
Staff Engineer, Waste & Recycling

Attachments: Attachment 1 – Drawing No. 1
Attachment 2 – Laboratory Testing Results
Attachment 3 – Borrow Study Photographic Log

c. Dwayne Smith – Landfill Operator, Woodruff Landfill
Van Burbach – Senior Technical Geologist, LaBella Associates

ATTACHMENT 1

Drawing No. 1

NOT FOR CONSTRUCTION

CORPORATE ENGINEERING
LICENSE NO. C-0430



© 2024 LaBella Associates

TRANSYLVANIA COUNTY

500 HOWELL ROAD
BREVARD, NC 28712

**WOODRUFF LANDFILL
PHASE 7 EXPANSION**

500 HOWELL ROAD
BREVARD, NC 28712

NO.	DATE	DESCRIPTION

PROJECT NUMBER: 2233711.01

DRAWN BY: DT

REVIEWED BY: CQ

ISSUED FOR: BORROW STUDY REPORT

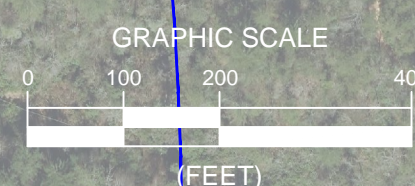
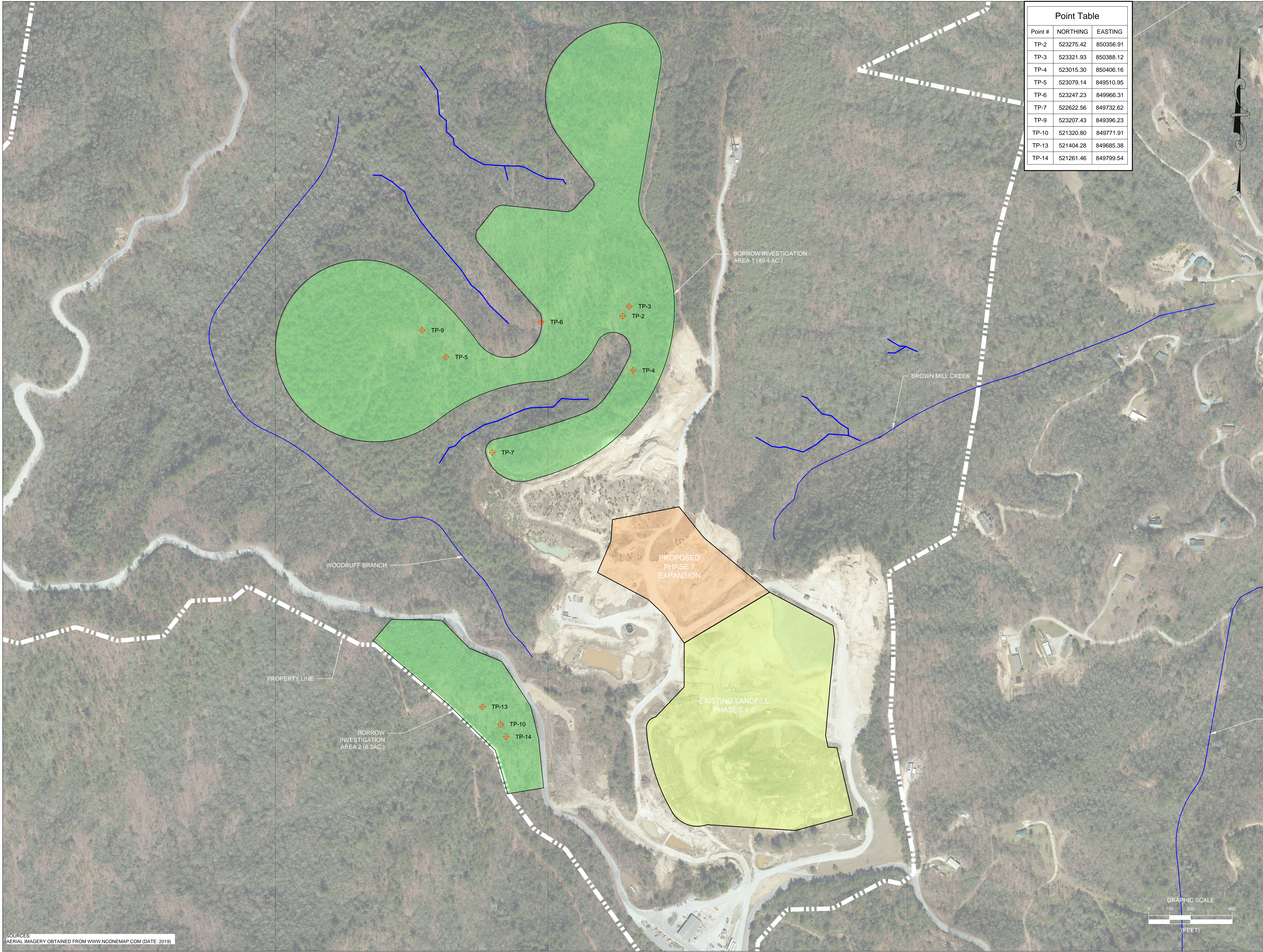
DATE: 3/14/2024

DRAWING NAME:

**BORROW STUDY
TEST PIT LOCATIONS**

DRAWING NUMBER:

Point Table		
Point #	NORTHING	EASTING
TP-2	523275.42	850356.91
TP-3	523321.93	850388.12
TP-4	523015.30	850406.16
TP-5	523079.14	849510.95
TP-6	523247.23	849966.31
TP-7	522622.56	849732.62
TP-9	523207.43	849396.23
TP-10	521320.80	849771.91
TP-13	521404.28	849685.38
TP-14	521261.46	849799.54



VERSION: 0.0
6/20/20 8:47:56 AM L:\Transylvania\dwg\2023 BORROW STUDY\Borrow Study.dwg Layout=WATERSHED

SOURCES:
AERIAL IMAGERY OBTAINED FROM WWW.NCONEMAP.COM (DATE: 2019)

ATTACHMENT 2

Low-Permeability Soil Identification Laboratory Results

ATTACHMENT 2A

Soil Identification and Permeability Results Summary Table

Kessel's Sample Control Numbers		Coordinates from Drawing No. 1	Sieve Analysis						Atterberg Limits			USCS		Moisture Density Relationship			Specific Gravity	
Sample No.	Remarks		% Gravel		% Sand			% Fines		LL	PL	PI	Soil Classification	Natural Moisture Content (MC) %	Optimum MC %	Dry Density pcf		
			Coarse	Fine	Coarse	Medium	Fine	Silt	Clay									
1	Sampled at TP-2	N 523275.42 E 850356.91	7.2	7.6	7.2	10.8	31.4	35.8		Non-Plastic Material ⁽¹⁾			SM	Silty Sand	20.3	14 ⁽²⁾	112.6 ⁽²⁾	2.48
2	Sampled at TP-3	N 523321.93 E 850388.12	8.4	9.3	6.9	9.8	33.3	32.3		Non-Plastic Material ⁽¹⁾			SM	Silty Sand	20.9	13.4 ⁽²⁾	114.7 ⁽²⁾	2.42
3	Sampled at TP-4	N 523015.30 E 850406.16	0.0	15.3	8.0	11.5	33.1	32.1		Non-Plastic Material ⁽¹⁾			SM	Silty Sand	17.8	15.9	102.5	2.75 ⁽³⁾
4	Sampled at TP-5A	N 523079.15 E 849510.95	0.0	1.8	2.2	5.4	33.9	56.7		31	22	9	CL	Lean Clay	20.4	17.0	107.4	2.75 ⁽³⁾
5	Sampled at TP-5B	N 523079.14 E 849510.95	0.0	1.5	3.5	6.3	32.1	56.6		32	21	11	CL	Lean Clay	20.8	16.5	106.3	2.75 ⁽³⁾
6	Sampled at TP-6	N 523247.23 E 849966.31	0.0	2.4	4.4	9.4	25.6	58.2		Non-Plastic Material ⁽¹⁾			ML	Sandy Silt	20.0	15.8	107.1	2.75 ⁽³⁾
7	Sampled at TP-7	N 522622.56 E 849732.62	0.0	6.7	7.0	11.3	24.8	50.2		Non-Plastic Material ⁽¹⁾			ML	Sandy Silt	13.5	16	105.9	2.75 ⁽³⁾
8	Sampled at TP-9	N 523207.43 E 849396.23	0.0	0.9	2.6	11.5	25.1	59.9		33	22	11	CL	Lean Clay	23.8	18.4	101.8	2.75 ⁽³⁾
9	Sampled at TP-10	N 521320.80 E 849771.91	0.0	0.2	1.1	3.5	40.9	54.3		33	24	9	ML	Sandy Silt	17.5	16.7	106.9	2.75 ⁽³⁾
10	Sampled at TP-13	N 521404.28 E 849685.38	0.0	4.9	6.9	13.4	42.9	31.9		Non-Plastic Material ⁽¹⁾			SM	Silty Sand	15.9	14.6	110.3	2.75 ⁽³⁾
11	Sampled at TP-14	N 521261.46 E 849799.54	0.0	2.3	4.2	9.3	45.9	38.3		Non-Plastic Material ⁽¹⁾			SM	Silty Sand	12.4	15.3	106.6	2.75 ⁽³⁾

Notes:

1. Permeability testing was not conducted on samples determined to be non-plastic based on Atterberg (plastic limits) test results.
2. Rock corrected test results were used for the moisture density relationship.
3. The Z-average value was used for the specific gravity.



Project: Woodruff Landfill Borrow Study
 Project No.: 2233711.01 Phase 01
 Checked By: CQ\HK Date: 2/13/2024
 Subject: Soil Permeability Test Results
 Sheet: 2 of 2

Sample Id	Permeability ⁽¹⁾											
	Sample Data		Soil Classification	1st Test: Remolded at Optimum Moisture				2nd Test: Remolded Wet of Optimum Moisture (+/- 5%)				
	Optimum MC (%)	Dry Density (pcf)		K (cm/sec)	MC (%)	Dry Density (pcf)	% Compaction	K (cm/sec)	MC % +/-	MC (%)	Dry Density (pcf)	% Compaction
TP-5A	17.0	107.4	Sandy Lean Clay	5.23×10^{-5}	16.9	102.1	95.1	5.44×10^{-6}	4.30	21.3	101.4	94.4
TP-5B	16.5	106.3	Sandy Lean Clay	4.20×10^{-5}	16.2	100.7	94.7	9.96×10^{-6}	3.90	20.4	101.2	95.2
TP-9	18.4	101.8	Sandy Lean Clay	See note 2				4.21×10^{-6}	3.00	21.4	97.3	95.6
TP-10	16.7	106.9	Sandy Silt	3.33×10^{-5}	16.7	101.7	95.1	5.10×10^{-7}	3.80	20.5	101.8	95.2

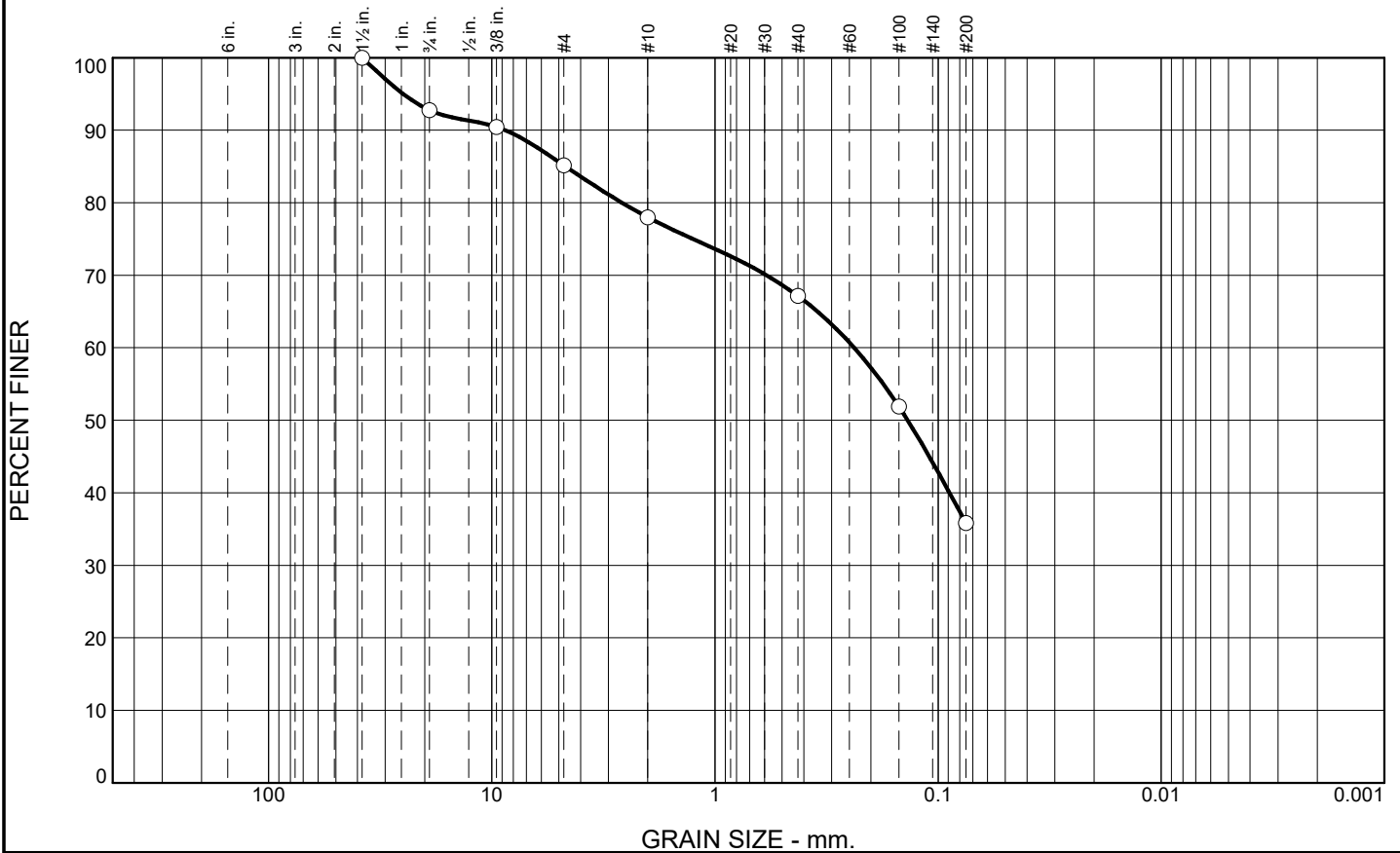
Notes:

1. Permeability tests were conducted by Summit Engineering and Construction Services Inc.
2. TP-9 was not tested at optimum moisture condition for permeability.

ATTACHMENT 2B

Compaction and Soil Particle Size Results

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	7.2	7.6	7.2	10.8	31.4	35.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1-1/2"	100.0		
3/4"	92.8		
3/8"	90.5		
#4	85.2		
#10	78.0		
#40	67.2		
#100	51.9		
#200	35.8		

Soil Description

Medium Brown, Silty SAND with Some Gravel

Atterberg Limits

PL= - LL= - PI= NP

Coefficients

D₉₀= 8.7062 D₈₅= 4.6703 D₆₀= 0.2378
D₅₀= 0.1369 D₃₀= D₁₅=
D₁₀= C_u= C_c=

Classification

USCS= SM AASHTO= -

Remarks

Sampled at TP-2

* (no specification provided)

Source of Sample: - Depth: -
Sample Number: 1

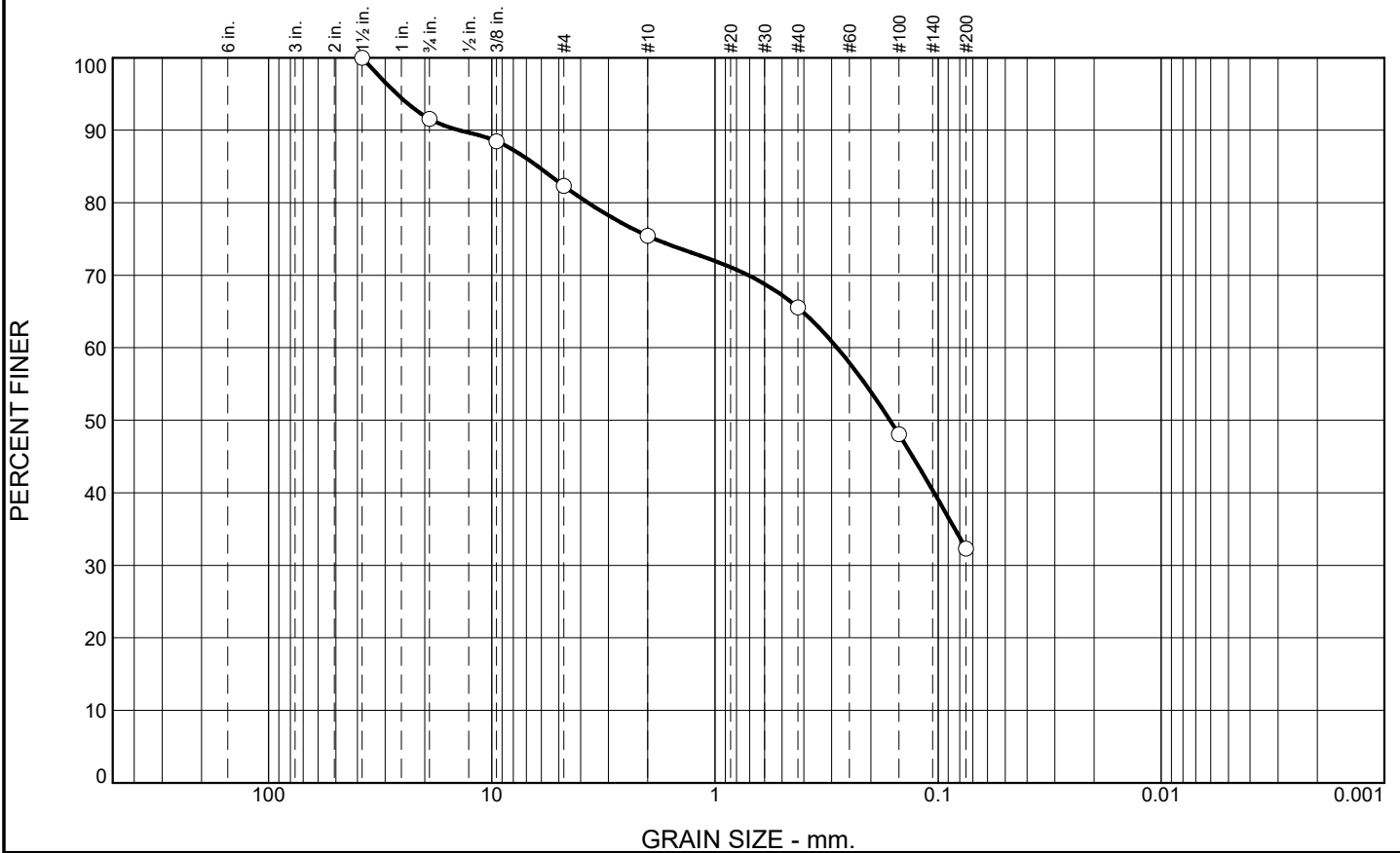
Date: 12/6/23

Kessel Engineering Group Asheville, NC	Client: Labella Associates Project: Brevard Landfill Project No: JA23-4743-01	Figure #1
---	--	------------------

Tested By: LB

Checked By: CW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	8.4	9.3	6.9	9.8	33.3	32.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1-1/2"	100.0		
3/4"	91.6		
3/8"	88.5		
#4	82.3		
#10	75.4		
#40	65.6		
#100	48.1		
#200	32.3		

Soil Description

Light Medium Brown, Silty SAND with Some Gravel

Atterberg Limits

PL= - LL= - PI= NP

Coefficients

D₉₀= 13.9932 D₈₅= 6.2184 D₆₀= 0.2833
D₅₀= 0.1643 D₃₀= D₁₅=
D₁₀= C_u= C_c=

Classification

USCS= SM AASHTO= -

Remarks

Sampled at TP-3

* (no specification provided)

Source of Sample: - Depth: -
Sample Number: 2

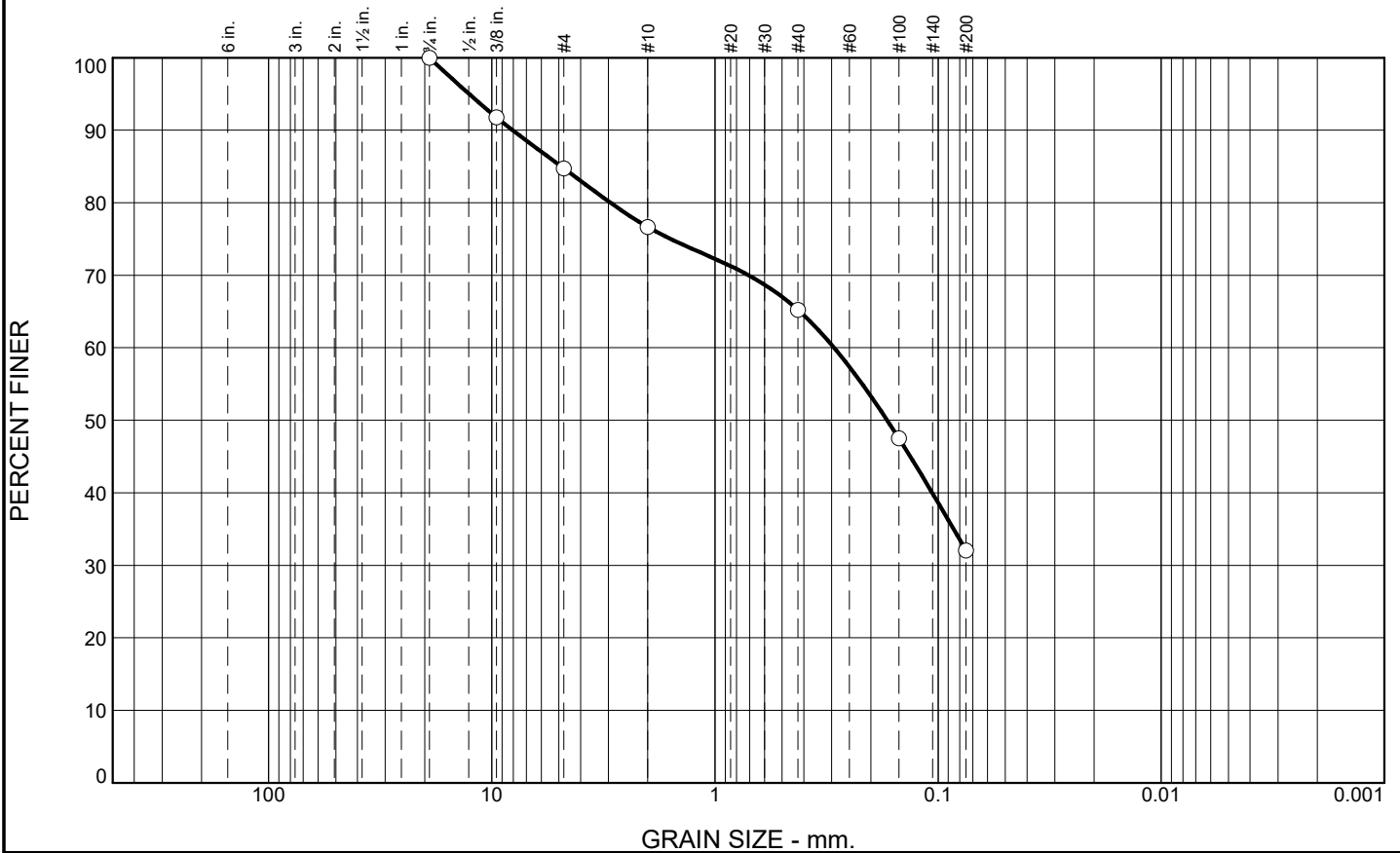
Date: 12/6/23

Kessel Engineering Group Asheville, NC	Client: Labella Associates Project: Brevard Landfill Project No: JA23-4743-01	Figure #2
---	--	------------------

Tested By: LB

Checked By: CW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	15.3	8.0	11.5	33.1	32.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
3/8"	91.8		
#4	84.7		
#10	76.7		
#40	65.2		
#100	47.5		
#200	32.1		

Soil Description

Tan, Silty SAND with Some Gravel

Atterberg Limits

PL= - LL= - PI= NP

Coefficients

D₉₀= 8.0689 D₈₅= 4.8811 D₆₀= 0.2923
D₅₀= 0.1691 D₃₀= D₁₅=
D₁₀= C_u= C_c=

Classification

USCS= SM AASHTO= -

Remarks

Sampled at TP-4

* (no specification provided)

Source of Sample: - Depth: -
Sample Number: 3

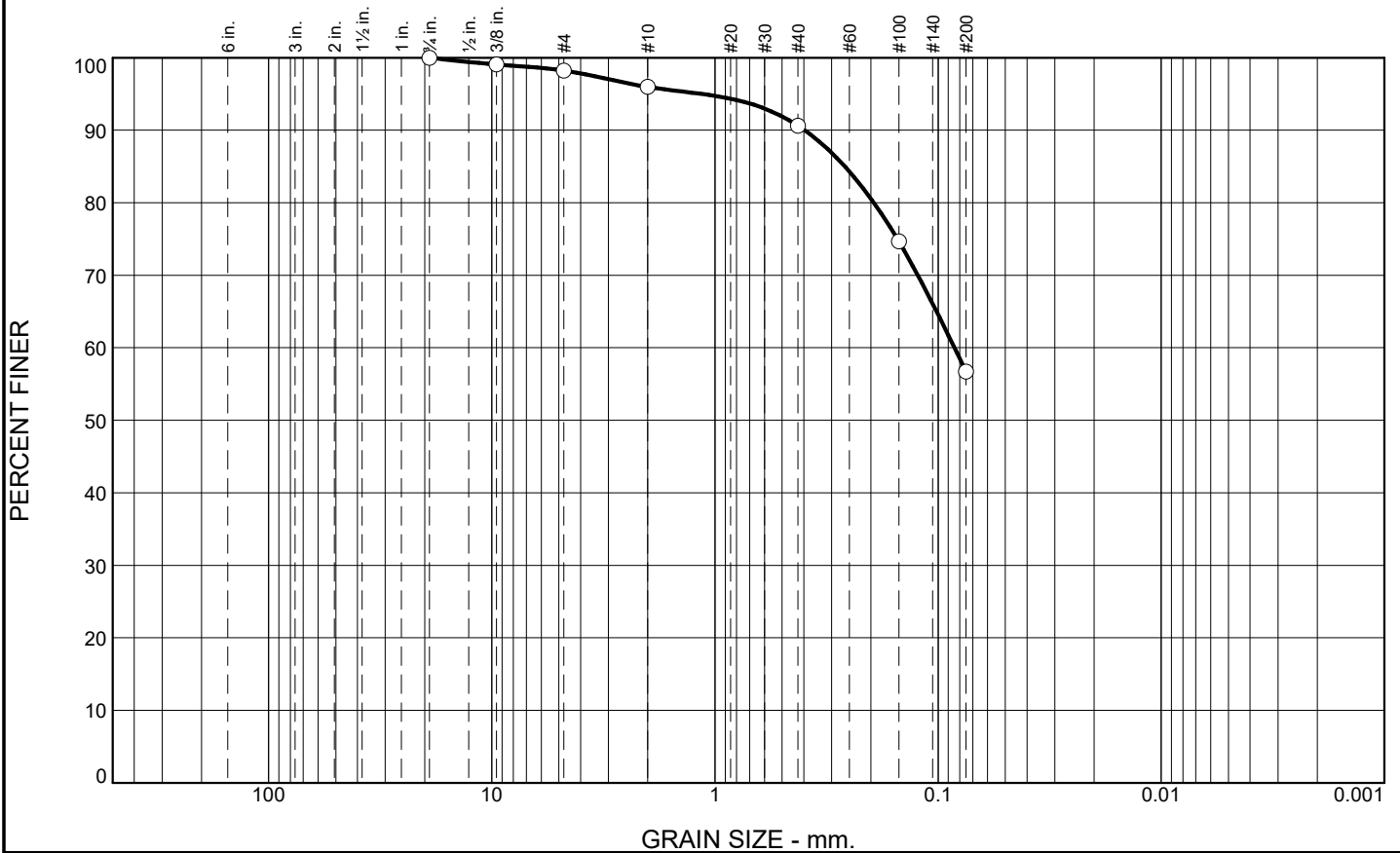
Date: 12/6/23

Kessel Engineering Group Asheville, NC	Client: Labella Associates Project: Brevard Landfill Project No: JA23-4743-01	Figure #3
---	--	------------------

Tested By: LB

Checked By: CW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.8	2.2	5.4	33.9	56.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
3/8"	99.1		
#4	98.2		
#10	96.0		
#40	90.6		
#100	74.7		
#200	56.7		

Soil Description

Brown, Lean, Sandy CLAY

Atterberg Limits

PL= 22 LL= 31 PI= 9

Coefficients

D₉₀= 0.3964 D₈₅= 0.2619 D₆₀= 0.0845
D₅₀= D₃₀= D₁₅=
D₁₀= C_u= C_c=

Classification

USCS= CL AASHTO= A-4(3)

Remarks

Sampled at TP-5A

* (no specification provided)

Source of Sample: - Depth: -
Sample Number: 4

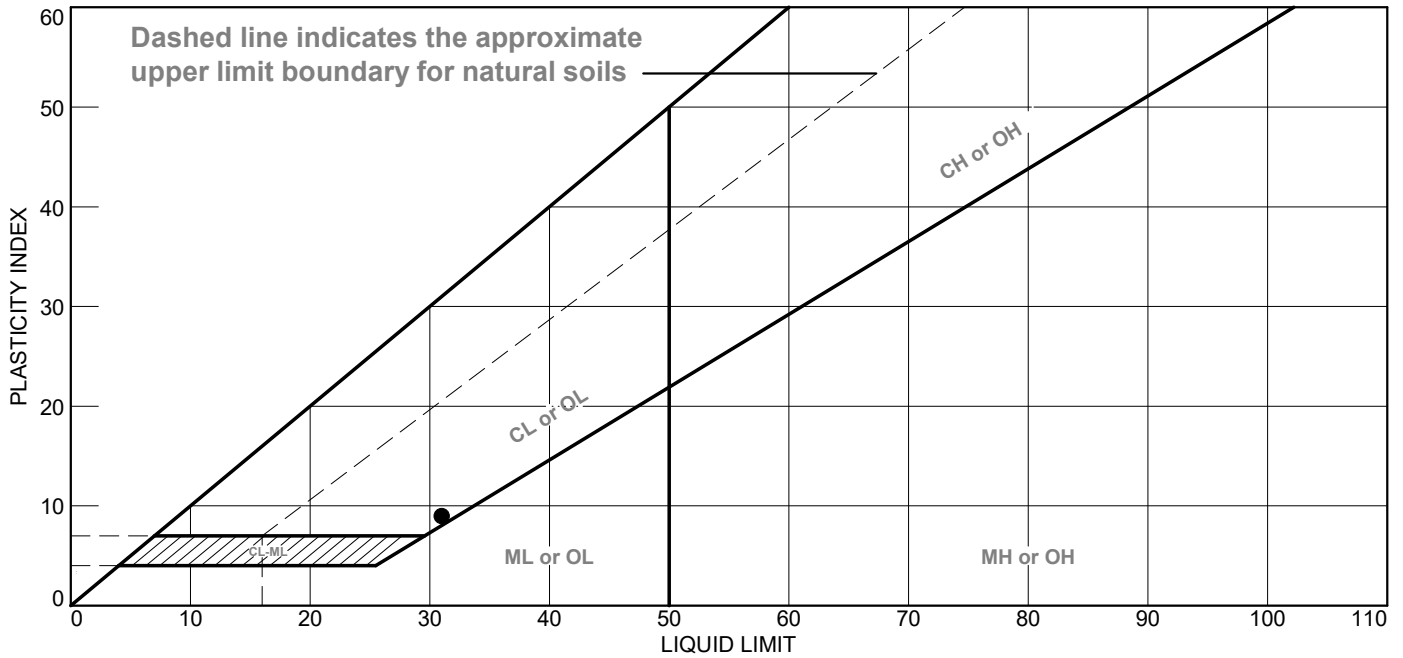
Date: 12/6/23

Kessel Engineering Group Asheville, NC	Client: Labella Associates Project: Brevard Landfill Project No: JA23-4743-01	Figure #4
---	--	------------------

Tested By: LB

Checked By: CW

LIQUID AND PLASTIC LIMITS TEST REPORT



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
• Brown, Lean, Sandy CLAY	31	22	9	90.6	56.7	CL

Project No. JA23-4743-01 **Client:** Labella Associates

Project: Brevard Landfill

Source of Sample: - **Depth:** -
Sample Number: 4

Remarks:

• Sampled at TP-5A

Kessel Engineering Group

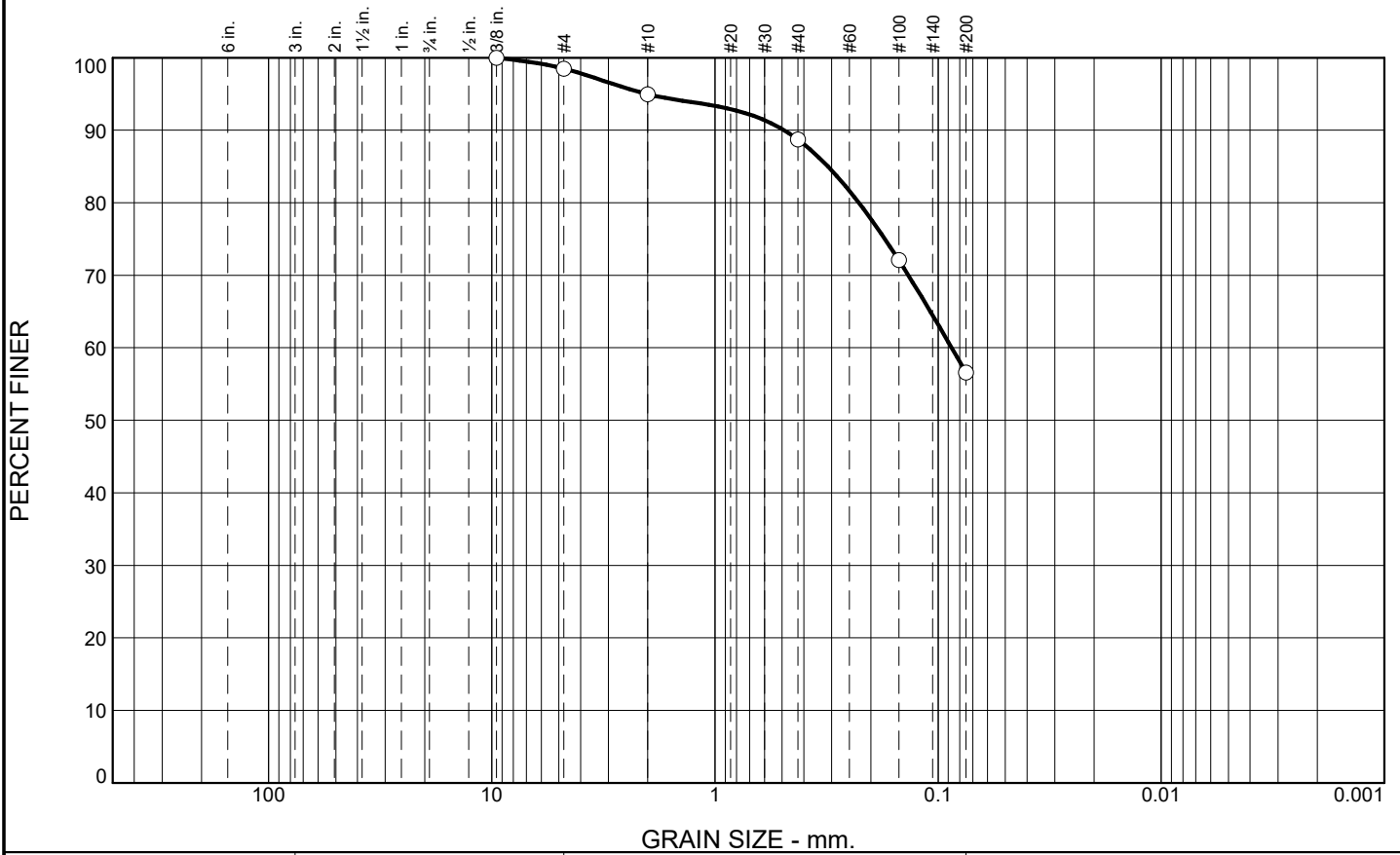
Asheville, NC

Figure #4

Tested By: MG

Checked By: CW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.5	3.5	6.3	32.1	56.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8"	100.0		
#4	98.5		
#10	95.0		
#40	88.7		
#100	72.1		
#200	56.6		

Soil Description

Reddish Brown, Lean, Sandy CLAY

Atterberg Limits

PL= 21 LL= 32 PI= 11

Coefficients

D₉₀= 0.4904 D₈₅= 0.3116 D₆₀= 0.0870
D₅₀= D₃₀= D₁₅=
D₁₀= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(4)

Remarks

Sampled at TP-5B

* (no specification provided)

Source of Sample: - Depth: -
Sample Number: 5

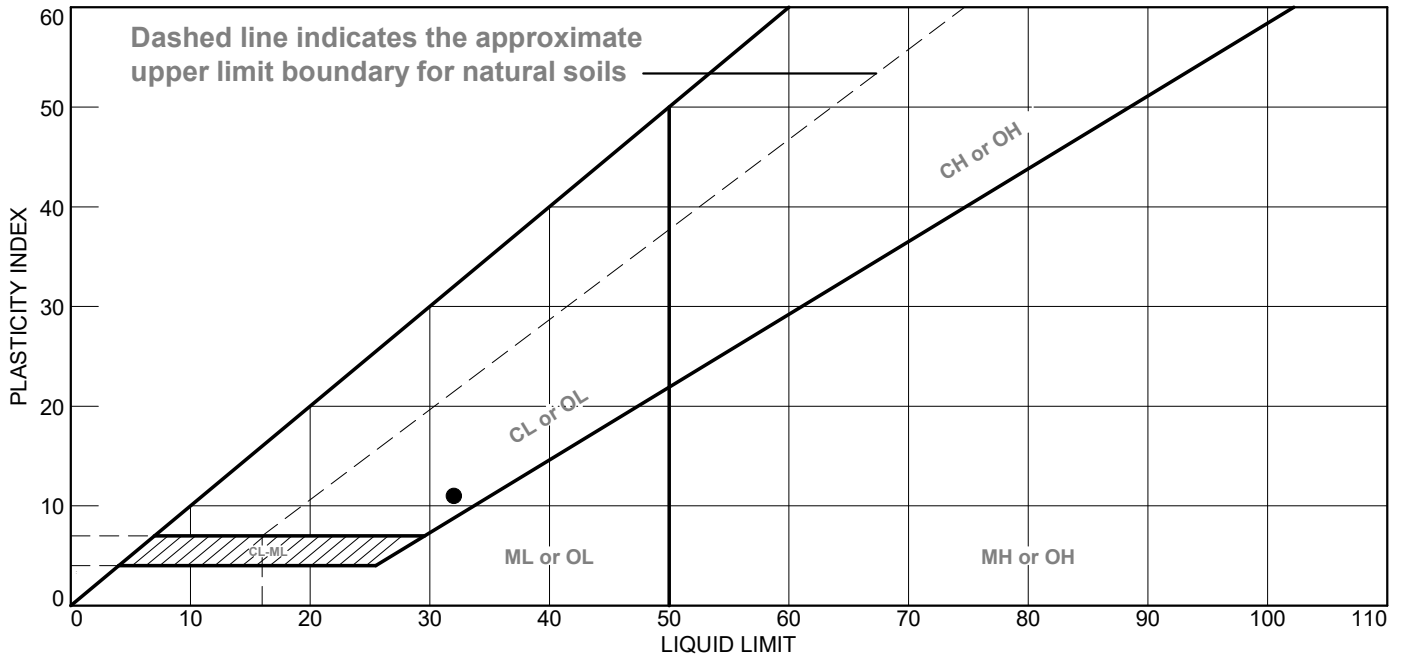
Date: 12/6/23

Kessel Engineering Group Asheville, NC	Client: Labella Associates Project: Brevard Landfill Project No: JA23-4743-01
Figure #5	

Tested By: LB

Checked By: CW

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Reddish Brown, Lean, Sandy CLAY	32	21	11	88.7	56.6	CL

Project No. JA23-4743-01 **Client:** Labella Associates

Project: Brevard Landfill

Source of Sample: - **Depth:** -
Sample Number: 5

Kessel Engineering Group

Asheville, NC

Remarks:

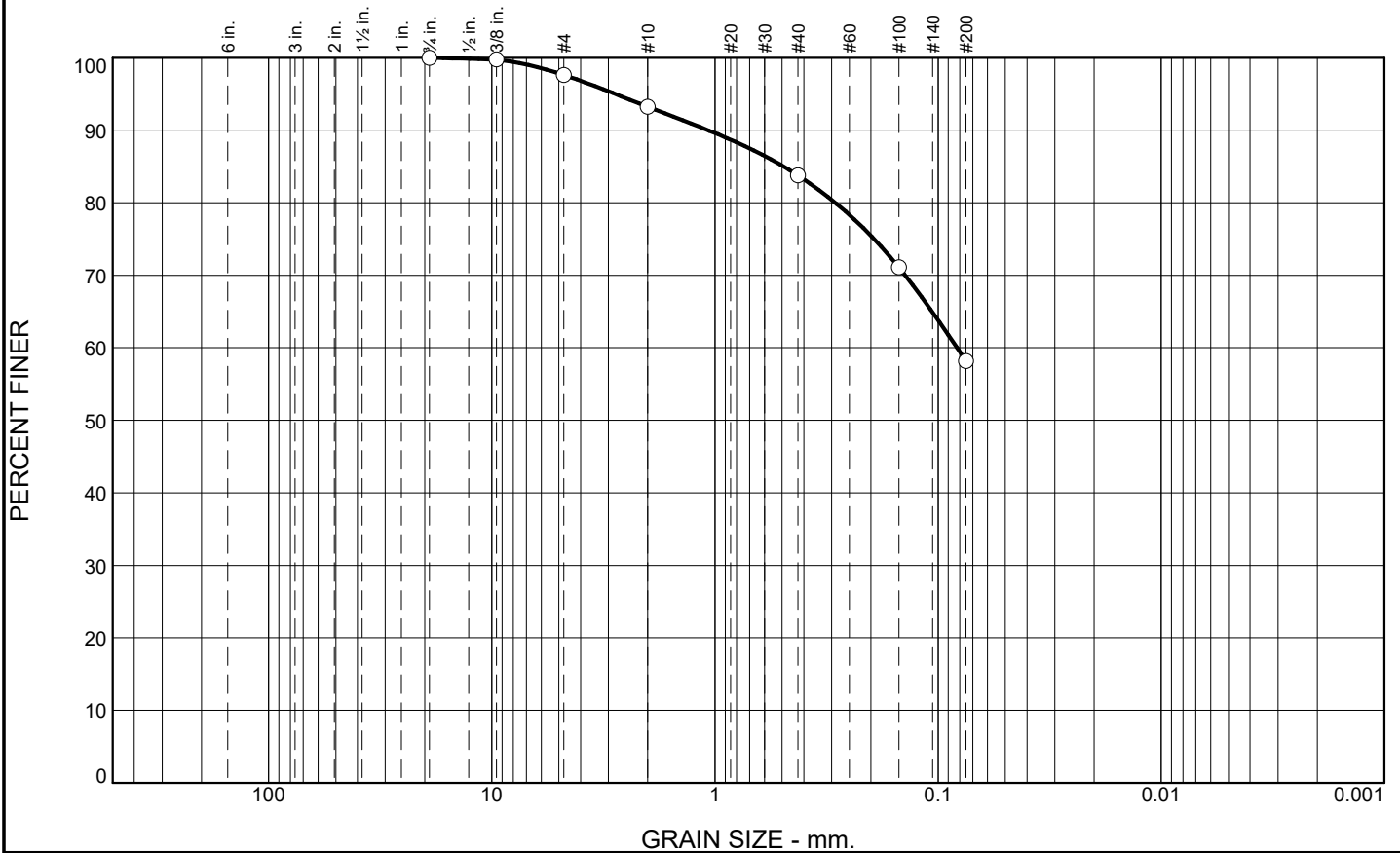
● Sampled at TP-5B

Figure #5

Tested By: MG

Checked By: CW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.4	4.4	9.4	25.6	58.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
3/8"	99.7		
#4	97.6		
#10	93.2		
#40	83.8		
#100	71.1		
#200	58.2		

Soil Description

Light Reddish Brown, Sandy SILT

Atterberg Limits

PL= - LL= - PI= NP

Coefficients

D₉₀= 1.0734 D₈₅= 0.4933 D₆₀= 0.0823
D₅₀= D₃₀= D₁₅=
D₁₀= C_u= C_c=

Classification

USCS= ML AASHTO= -

Remarks

Sampled at TP-6

* (no specification provided)

Source of Sample: - Depth: -
Sample Number: 6

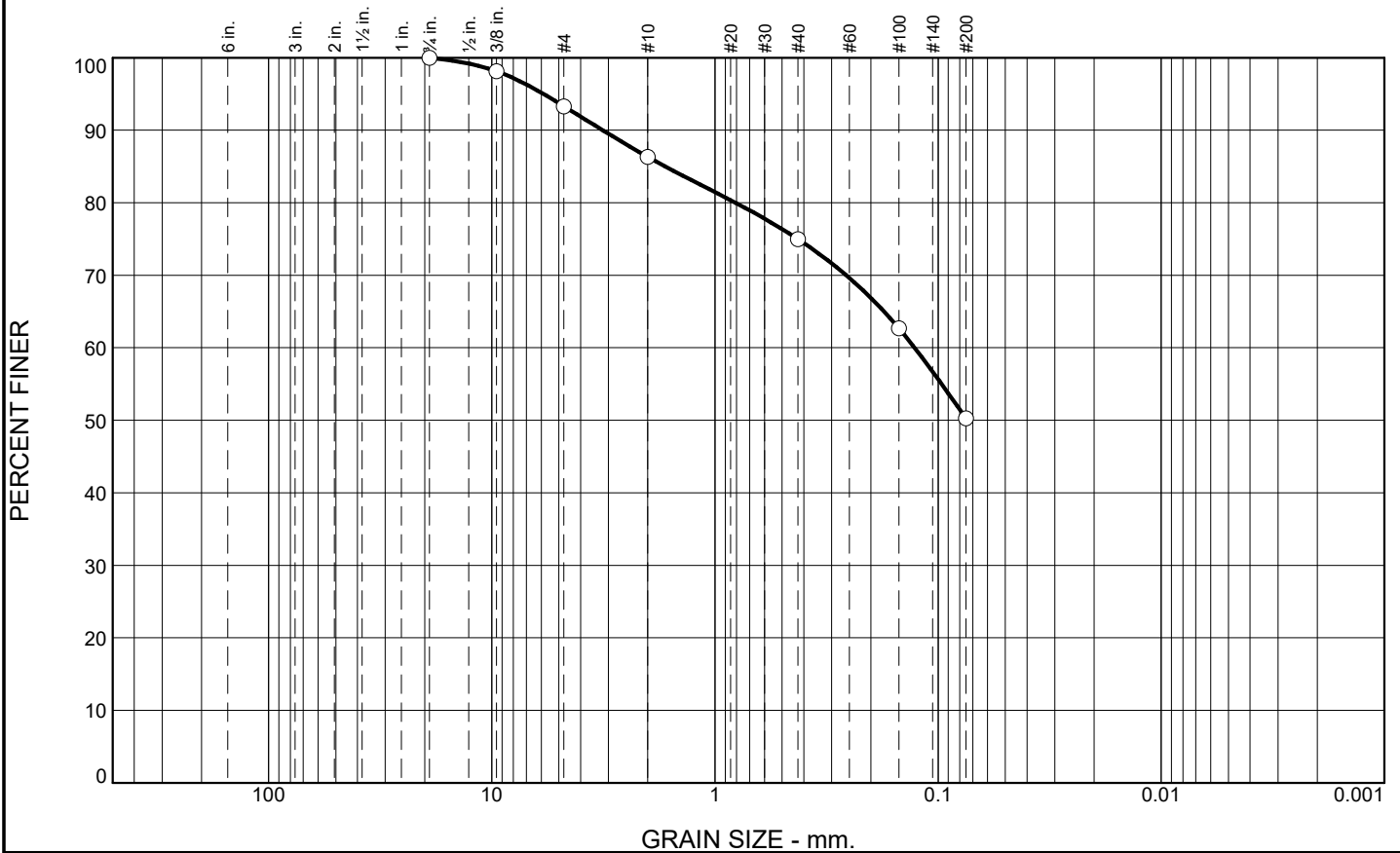
Date: 12/6/23

Kessel Engineering Group Asheville, NC	Client: Labella Associates Project: Brevard Landfill Project No: JA23-4743-01	Figure #6
---	--	------------------

Tested By: LB

Checked By: CW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	6.7	7.0	11.3	24.8	50.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
3/8"	98.1		
#4	93.3		
#10	86.3		
#40	75.0		
#100	62.7		
#200	50.2		

Soil Description

White, Sandy SILT with Trace Gravel

Atterberg Limits

PL= - LL= - PI= NP

Coefficients

D₉₀= 3.1848 D₈₅= 1.6685 D₆₀= 0.1274
D₅₀= D₃₀= D₁₅=
D₁₀= C_u= C_c=

Classification

USCS= ML AASHTO= -

Remarks

Sampled at TP-7

* (no specification provided)

Source of Sample: - Depth: -
Sample Number: 7

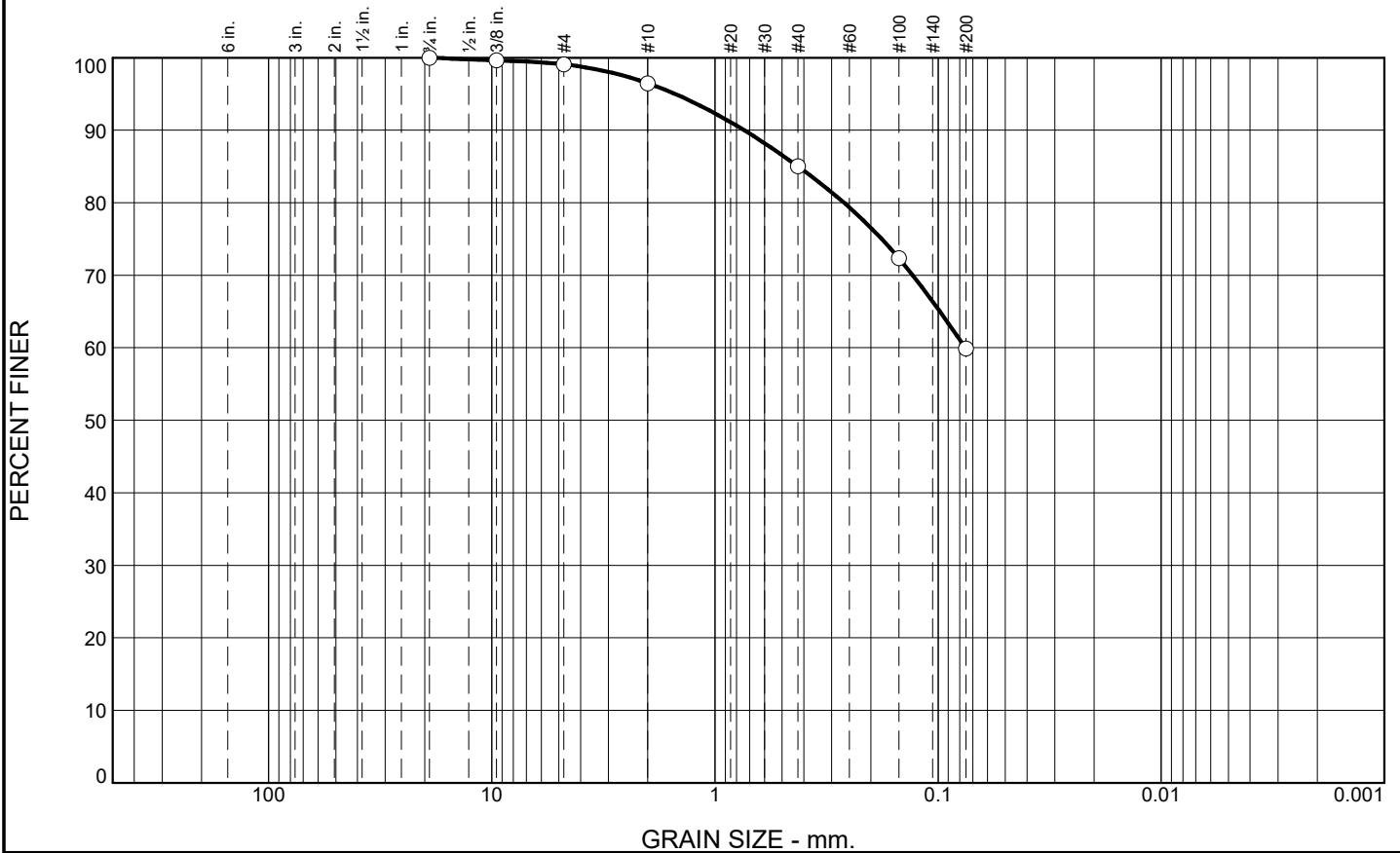
Date: 12/6/23

Kessel Engineering Group Asheville, NC	Client: Labella Associates Project: Brevard Landfill Project No: JA23-4743-01	Figure #7
---	--	------------------

Tested By: LB

Checked By: CW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.9	2.6	11.5	25.1	59.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
3/8"	99.6		
#4	99.1		
#10	96.5		
#40	85.0		
#100	72.3		
#200	59.9		

Soil Description

Medium Brown, Sandy, Lean CLAY

Atterberg Limits

PL= 22 LL= 33 PI= 11

Coefficients

D₉₀= 0.7402 D₈₅= 0.4243 D₆₀= 0.0755
D₅₀= D₃₀= D₁₅=
D₁₀= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(5)

Remarks

Sampled at TP-9

* (no specification provided)

Source of Sample: - Depth: -
Sample Number: 8

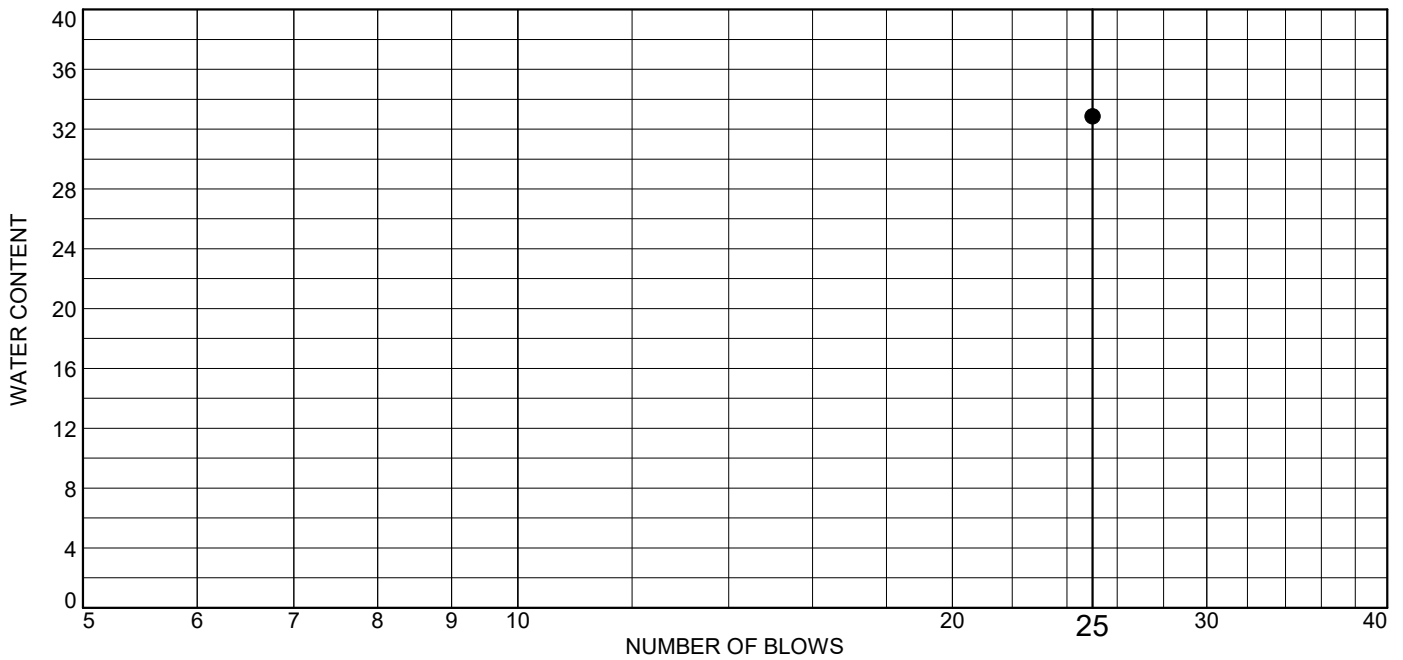
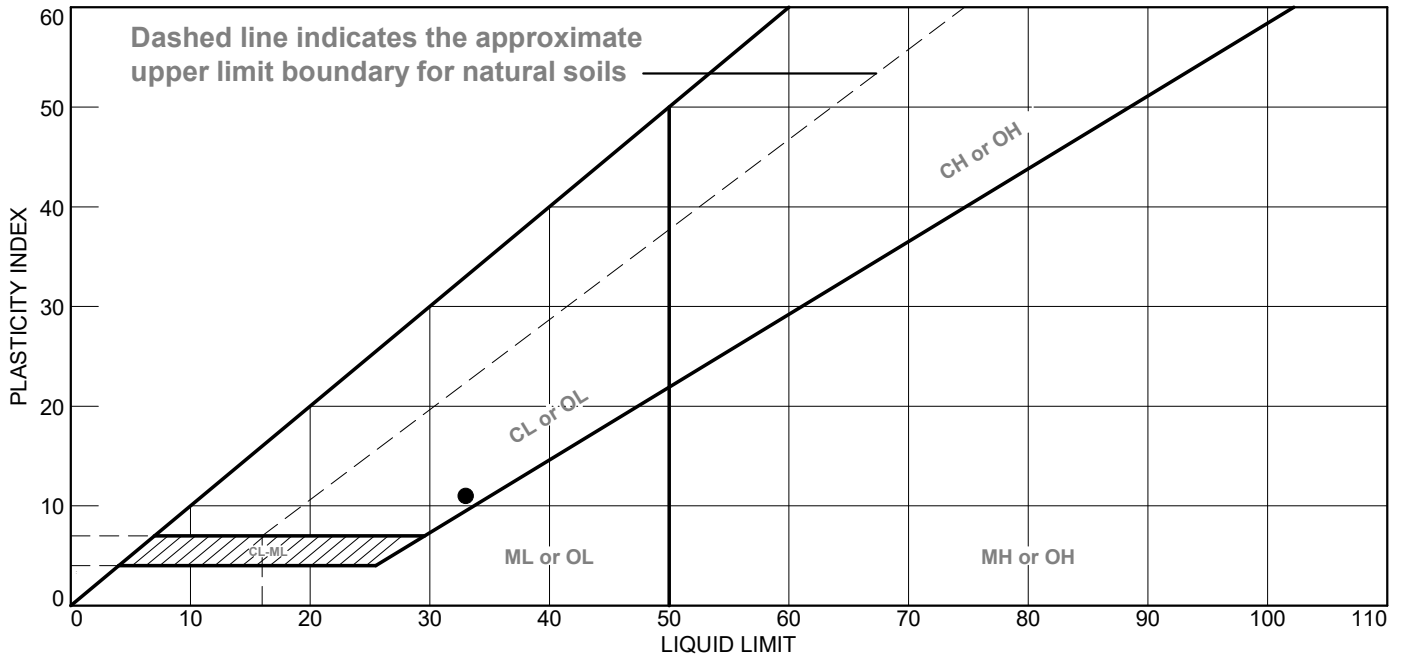
Date: 12/7/23

Kessel Engineering Group Asheville, NC	Client: Labella Associates Project: Brevard Landfill Project No: JA23-4743-01	Figure #8
---	--	------------------

Tested By: LB

Checked By: CW

LIQUID AND PLASTIC LIMITS TEST REPORT



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
• Medium Brown, Sandy, Lean CLAY	33	22	11	85.0	59.9	CL

Project No. JA23-4743-01 **Client:** Labella Associates

Project: Brevard Landfill

Source of Sample: - **Depth:** -
Sample Number: 8

Remarks:

• Sampled at TP-9

Kessel Engineering Group

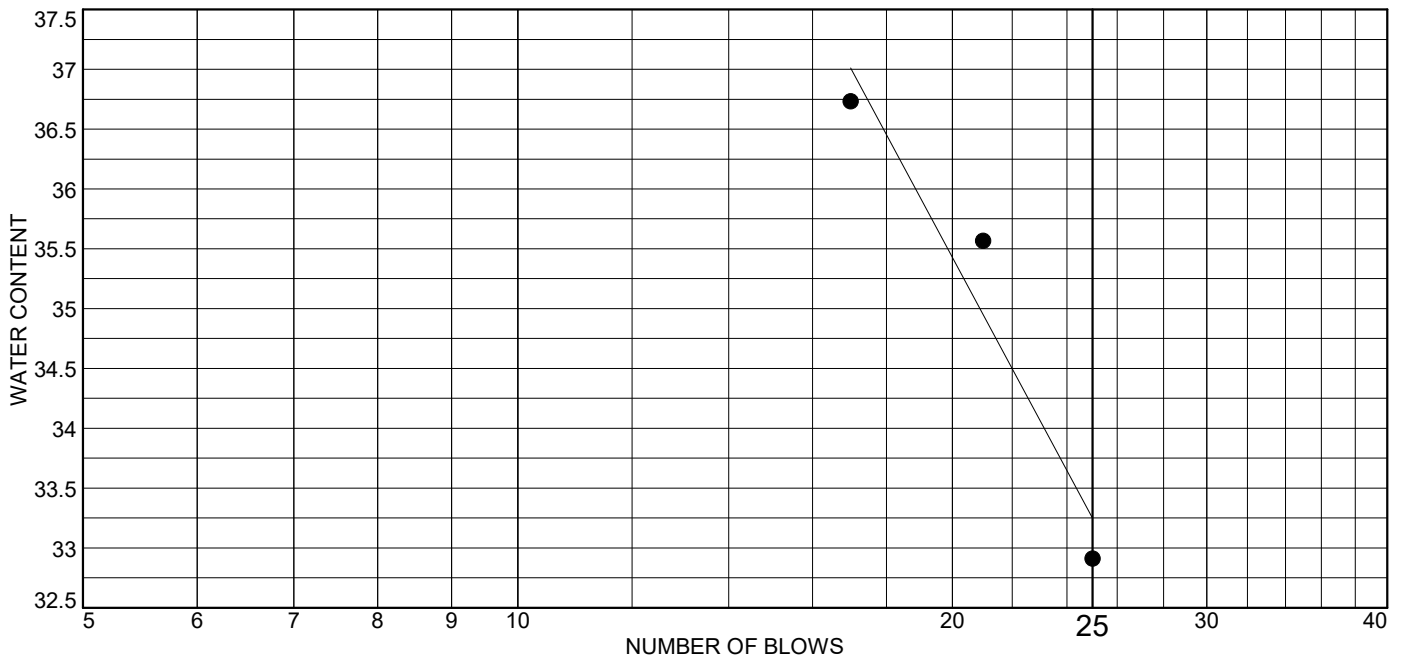
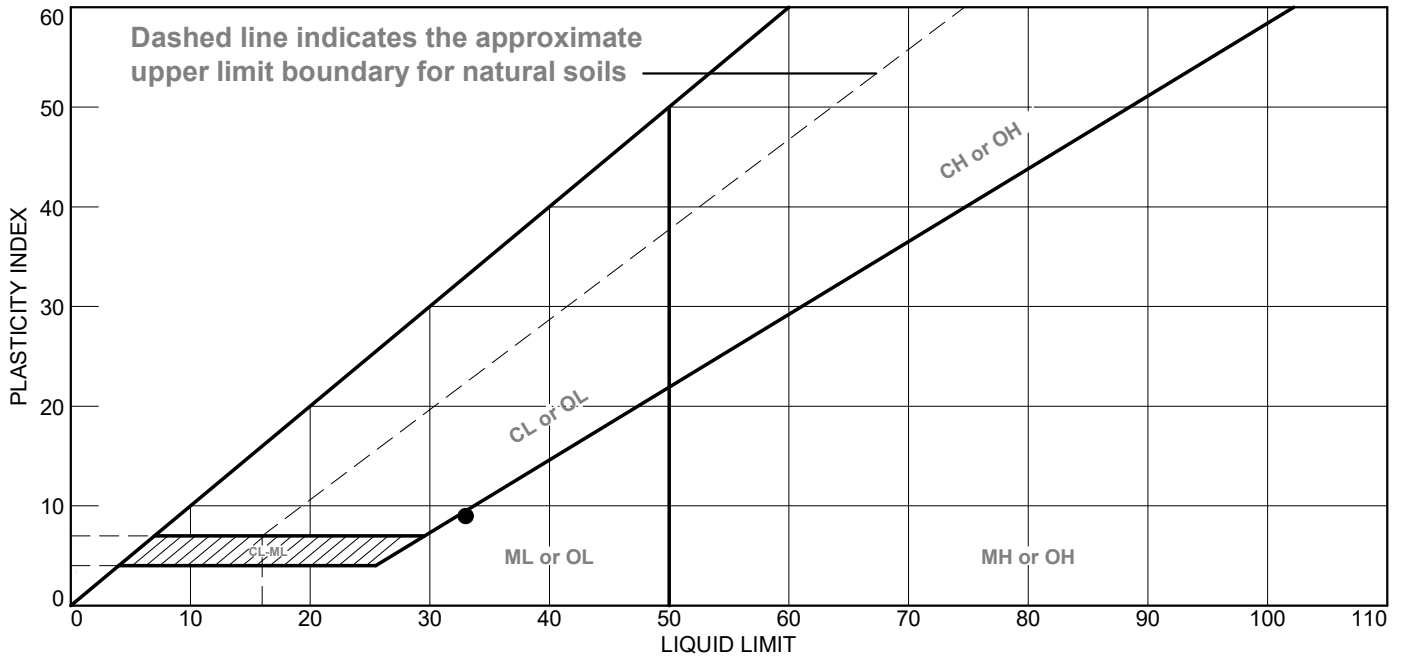
Asheville, NC

Figure #8

Tested By: MG

Checked By: CW

LIQUID AND PLASTIC LIMITS TEST REPORT



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● Tannish Brown, Sandy SILT	33	24	9	95.2	54.3	ML

Project No. JA23-4743-01 **Client:** Labella Associates

Project: Brevard Landfill

Source of Sample: - **Depth:** -
Sample Number: 9

Remarks:

● Sampled at TP-10

Kessel Engineering Group

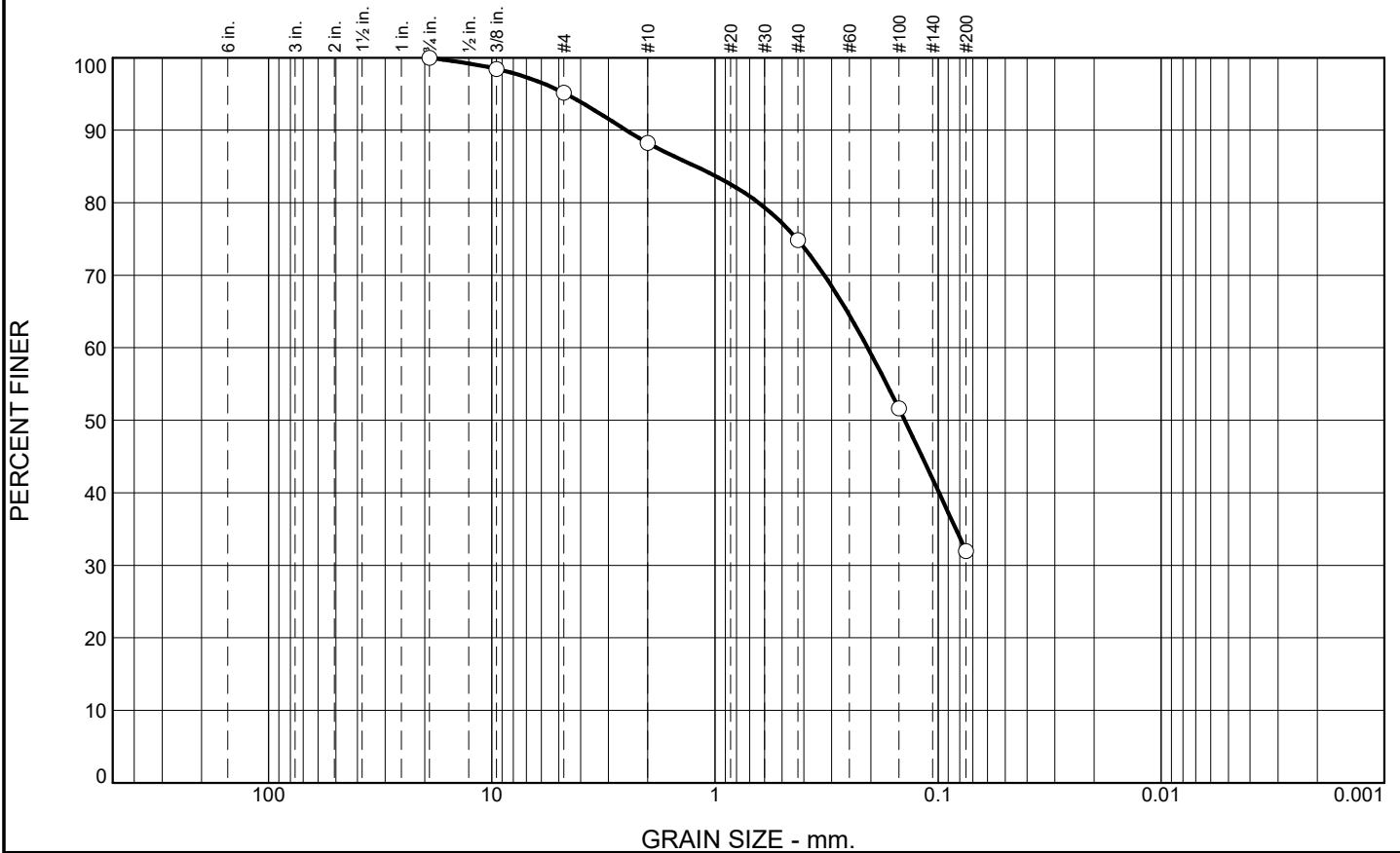
Asheville, NC

Figure #9

Tested By: MG

Checked By: CW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.9	6.9	13.4	42.9	31.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
3/8"	98.5		
#4	95.1		
#10	88.2		
#40	74.8		
#100	51.6		
#200	31.9		

Soil Description

Light Tannish Brown, Silty SAND

Atterberg Limits

PL= - LL= - PI= NP

Coefficients

D₉₀= 2.5008 D₈₅= 1.2175 D₆₀= 0.2070
D₅₀= 0.1413 D₃₀= D₁₅=
D₁₀= C_u= C_c=

Classification

USCS= SM AASHTO= -

Remarks

Sampled at TP-13

* (no specification provided)

Source of Sample: - Depth: -
Sample Number: 10

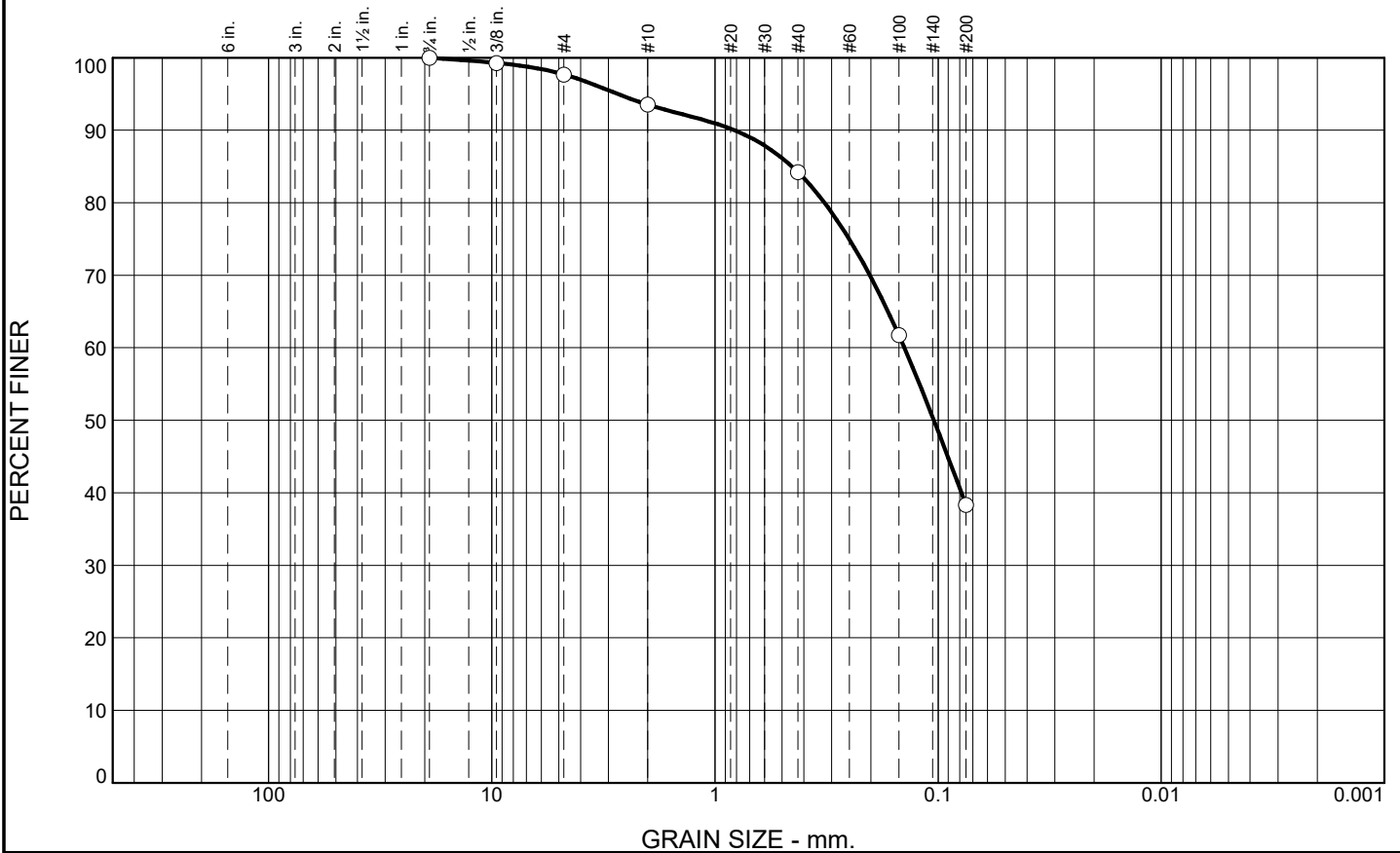
Date: 12/6/23

Kessel Engineering Group Asheville, NC	Client: Labella Associates Project: Brevard Landfill Project No: JA23-4743-01	Figure #10
---	--	-------------------

Tested By: LB

Checked By: CW

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.3	4.2	9.3	45.9	38.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
3/8"	99.3		
#4	97.7		
#10	93.5		
#40	84.2		
#100	61.7		
#200	38.3		

Soil Description

Light Brown, Silty SAND

Atterberg Limits

PL= - LL= - PI= NP

Coefficients

D₉₀= 0.8200 D₈₅= 0.4519 D₆₀= 0.1417
D₅₀= 0.1045 D₃₀= D₁₅=
D₁₀= C_u= C_c=

Classification

USCS= SM AASHTO= -

Remarks

Sampled at TP-14

* (no specification provided)

Source of Sample: - Depth: -
Sample Number: 11

Date: 12/6/23

Kessel Engineering Group Asheville, NC	Client: Labella Associates Project: Brevard Landfill Project No: JA23-4743-01	Figure #11
---	--	-------------------

Tested By: LB Checked By: CW

ATTACHMENT 2C
Permeability Test Results

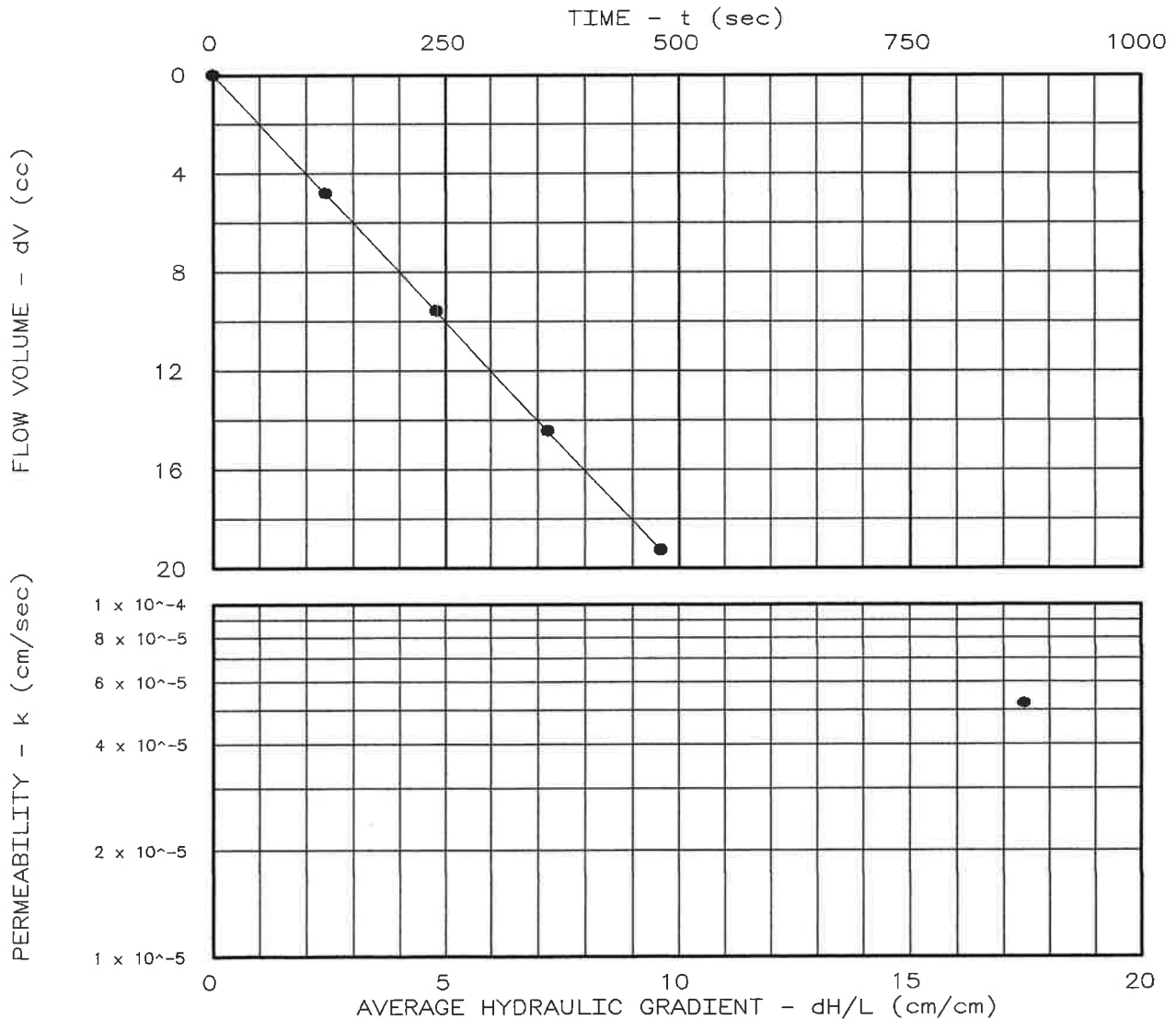
PERMEABILITY TEST REPORT

TEST DATA:

Specimen Height (cm): 7.62
 Specimen Diameter (cm): 7.28
 Dry Unit Weight (pcf): 102.1
 Moisture Before Test (%): 16.9
 Moisture After Test (%): 25.2
 Run Number: 1 ● 2 ▲
 Cell Pressure (psi): 77.0
 Test Pressure (psi): 72.0
 Back Pressure (psi): 70.1
 Diff. Head (psi): 1.9
 Flow Rate (cc/sec): 4.01×10^{-2}
 Perm. (cm/sec): 5.23×10^{-5}

SAMPLE DATA:

Sample Identification: TP-5A
 Visual Description: Brown, Lean, Sandy Clay
 Remarks: Remolded at optimum moisture
 Maximum Dry Density (pcf): 107.4
 Optimum Moisture Content (%): 17.0
 ASTM(D698)
 Percent Compaction: 95.1%
 Permeameter type: Flexible Wall
 Sample type: Remolded



Project: Brevard Landfill
 Location:
 Date: 02-06-24

Project No.:
 File No.: A24117.00240
 Lab No.: JA23-4743-01
 Tested by: FG
 Checked by: MH
 Test: CH - Constant head

PERMEABILITY TEST REPORT

SUMMIT ENG. & CONST. SERV., INC.

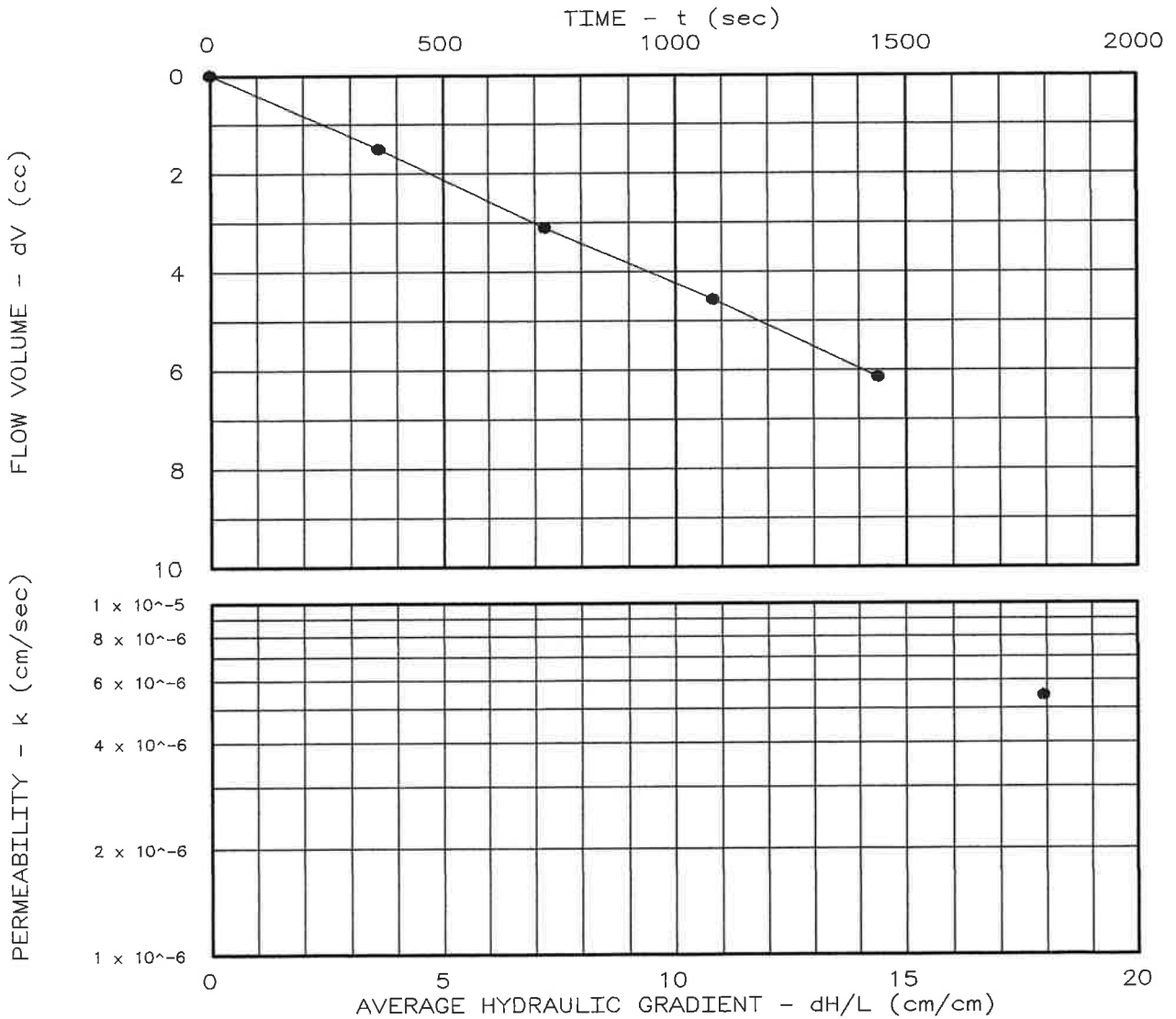
PERMEABILITY TEST REPORT

TEST DATA:

Specimen Height (cm): 7.65
 Specimen Diameter (cm): 7.28
 Dry Unit Weight (pcf): 101.4
 Moisture Before Test (%): 21.3
 Moisture After Test (%): 24.3
 Run Number: 1 ● 2 ▲
 Cell Pressure (psi): 77.0
 Test Pressure (psi): 72.0
 Back Pressure (psi): 70.1
 Diff. Head (psi): 1.9
 Flow Rate (cc/sec): 4.26×10^{-3}
 Perm. (cm/sec): 5.44×10^{-6}

SAMPLE DATA:

Sample Identification: TP-5A
 Visual Description: Brown, Lean, Sandy Clay
 Remarks: Remolded **wet** of optimum moisture
 Maximum Dry Density (pcf): 107.4
 Optimum Moisture Content (%): 17.0
 ASTM(D698)
 Percent Compaction: 94.4%
 Permeameter type: Flexible Wall
 Sample type: Remolded



Project: Brevard Landfill
 Location:
 Date: 02-06-24

Project No.:
 File No.: A24117.00240
 Lab No.: JA23-4743-01
 Tested by: FG
 Checked by: MH
 Test: CH - Constant head

PERMEABILITY TEST REPORT

SUMMIT ENG. & CONST. SERV., INC.

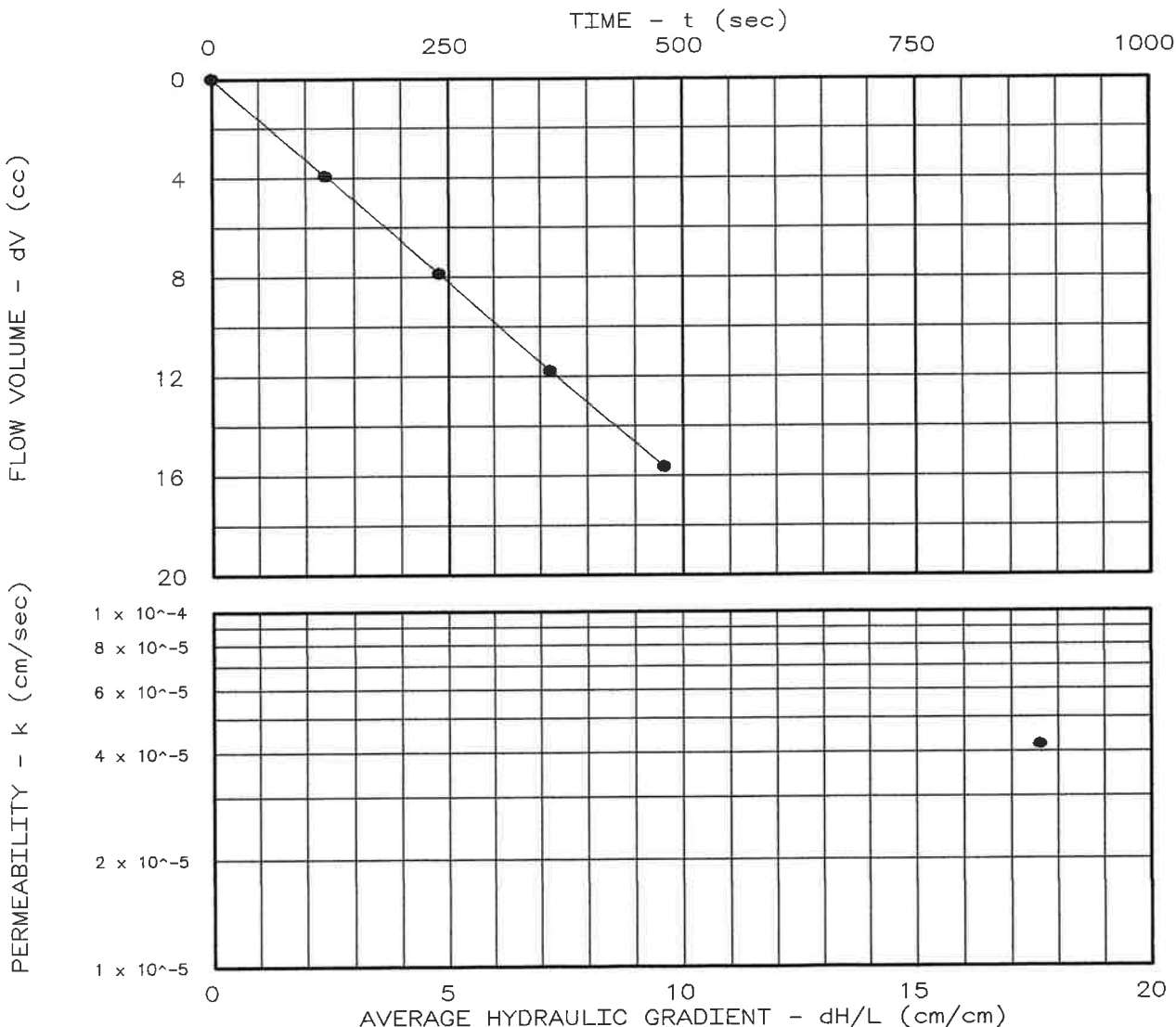
PERMEABILITY TEST REPORT

TEST DATA:

Specimen Height (cm): 7.64
 Specimen Diameter (cm): 7.29
 Dry Unit Weight (pcf): 100.7
 Moisture Before Test (%): 16.2
 Moisture After Test (%): 22.9
 Run Number: 1 ● 2 ▲
 Cell Pressure (psi): 77.0
 Test Pressure (psi): 72.0
 Back Pressure (psi): 70.1
 Diff. Head (psi): 1.9
 Flow Rate (cc/sec): 3.26×10^{-2}
 Perm. (cm/sec): 4.20×10^{-5}

SAMPLE DATA:

Sample Identification: TP-5B
 Visual Description: Reddish Brown, Lean Sandy Clay
 Remarks: Remolded to optimum moisture
 Maximum Dry Density (pcf): 106.3
 Optimum Moisture Content (%): 16.5 ASTM(D698)
 Percent Compaction: 94.7%
 Permeameter type: Flexible Wall
 Sample type: Remolded



Project: Brevard Landfill
 Location:
 Date: 02-06-24

Project No.:
 File No.: A24117.00240
 Lab No.: JA23-4743-01
 Tested by: FG
 Checked by: MH
 Test: CH - Constant head

PERMEABILITY TEST REPORT

SUMMIT ENG. & CONST. SERV., INC.

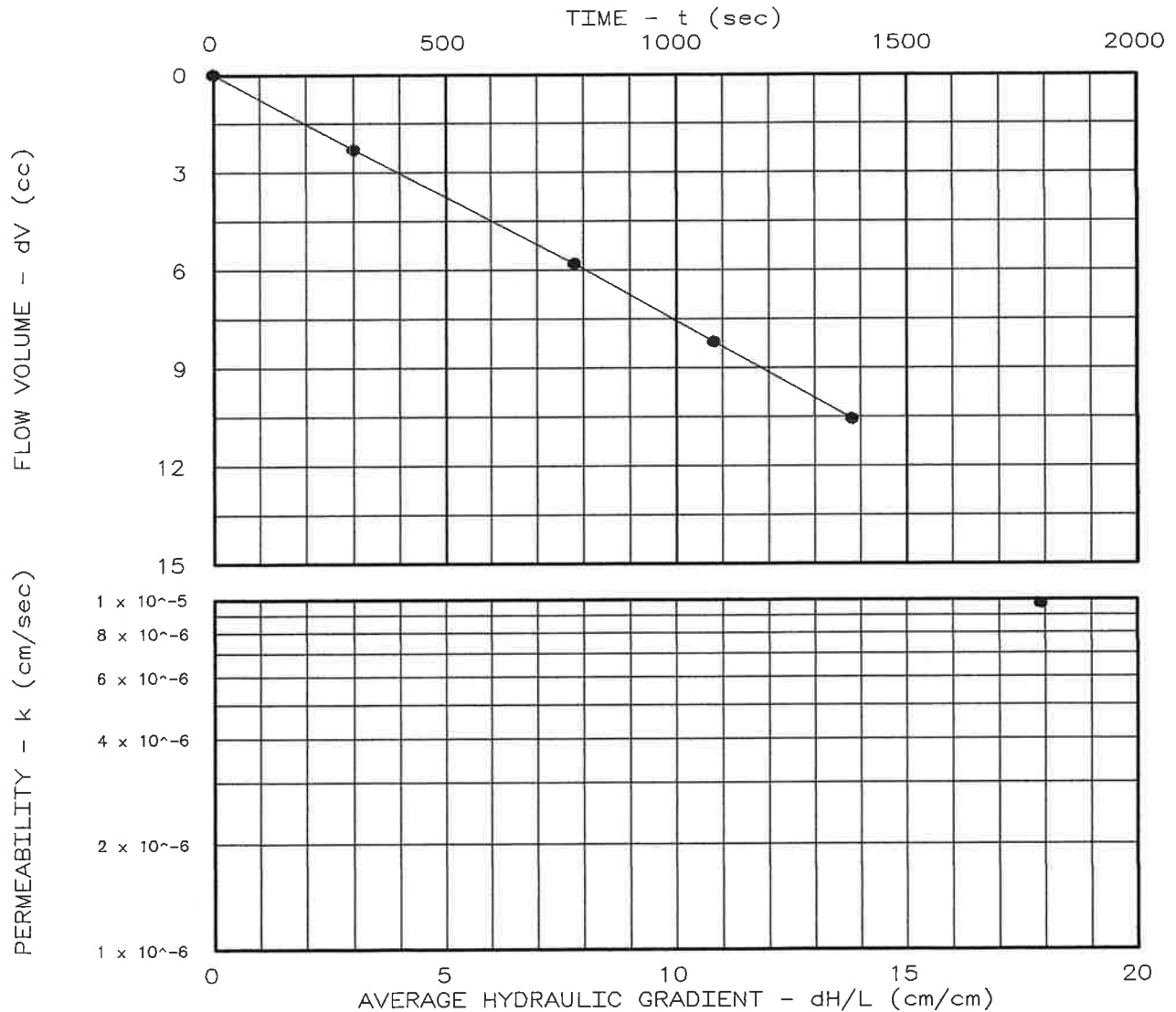
PERMEABILITY TEST REPORT

TEST DATA:

Specimen Height (cm): 7.62
 Specimen Diameter (cm): 7.28
 Dry Unit Weight (pcf): 101.2
 Moisture Before Test (%): 20.4
 Moisture After Test (%): 22.0
 Run Number: 1 ● 2 ▲
 Cell Pressure (psi): 77.0
 Test Pressure (psi): 72.0
 Back Pressure (psi): 70.1
 Diff. Head (psi): 1.9
 Flow Rate (cc/sec): 7.62×10^{-3}
 Perm. (cm/sec): 9.69×10^{-6}

SAMPLE DATA:

Sample Identification: TP-5B
 Visual Description: Reddish Brown, Lean Sandy Clay
 Remarks: Remolded to wet of optimum moisture
 Maximum Dry Density (pcf): 106.3
 Optimum Moisture Content (%): 16.5 ASTM(D698)
 Percent Compaction: 95.2%
 Permeameter type: Flexible Wall
 Sample type: Remolded



Project: Brevard Landfill
 Location:
 Date: 02-06-24

Project No.:
 File No.: A24117.00240
 Lab No.: JA23-4743-01
 Tested by: FG
 Checked by: MH
 Test: CH - Constant head

PERMEABILITY TEST REPORT

SUMMIT ENG. & CONST. SERV., INC.

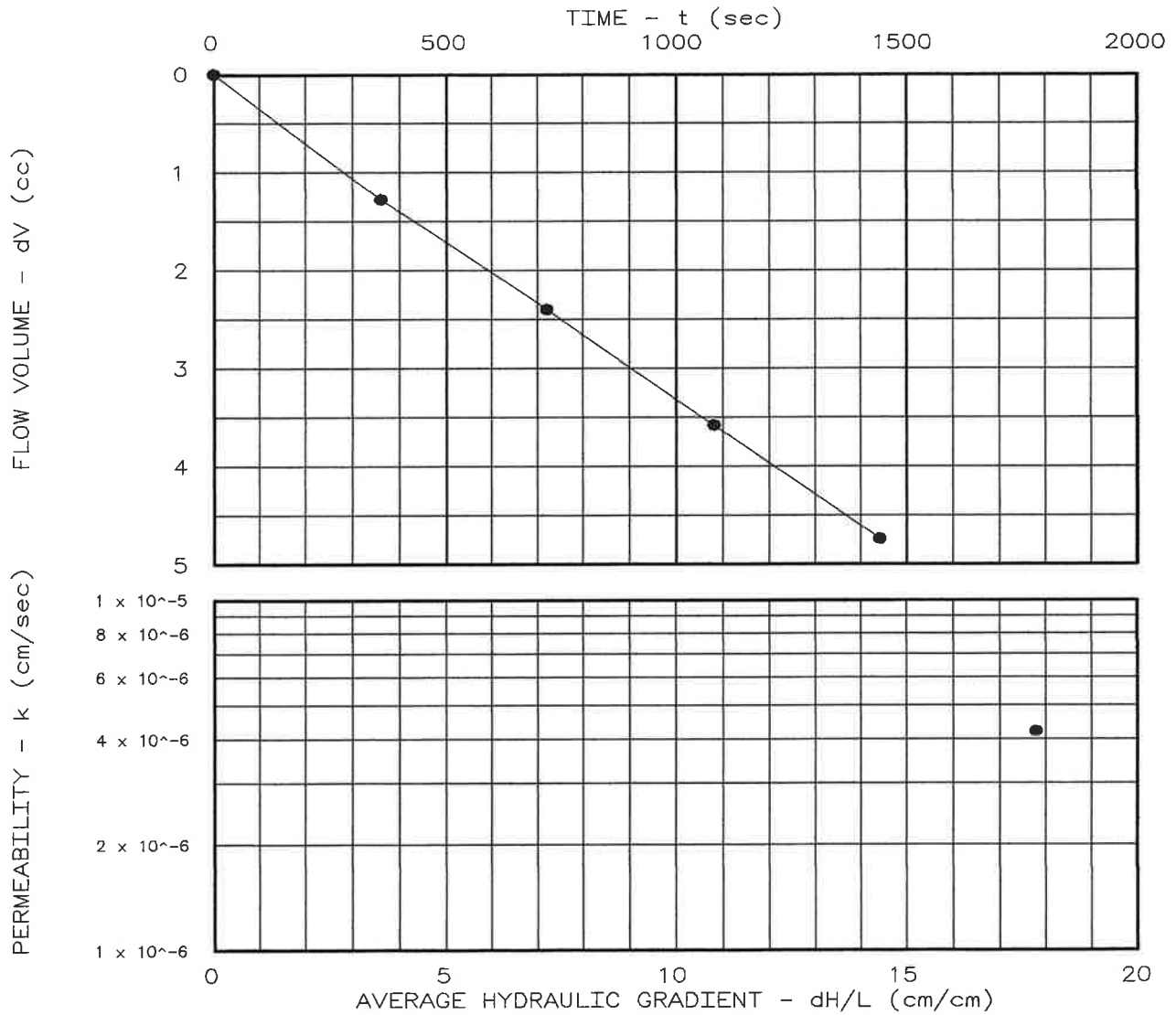
PERMEABILITY TEST REPORT

TEST DATA:

Specimen Height (cm): 7.65
 Specimen Diameter (cm): 7.28
 Dry Unit Weight (pcf): 97.3
 Moisture Before Test (%): 21.4
 Moisture After Test (%): 24.2
 Run Number: 1 ● 2 ▲
 Cell Pressure (psi): 77.0
 Test Pressure (psi): 72.0
 Back Pressure (psi): 70.1
 Diff. Head (psi): 1.9
 Flow Rate (cc/sec): 3.27×10^{-3}
 Perm. (cm/sec): 4.21×10^{-6}

SAMPLE DATA:

Sample Identification: TP-9
 Visual Description: Medium Brown, Sandy, Lean Clay (CL)
 Remarks: Remolded wet of optimum moisture
 Maximum Dry Density (pcf): 101.8
 Optimum Moisture Content (%): 18.4
 ASTM (D698)
 Percent Compaction: 95.6%
 Permeameter type: Flexible Wall
 Sample type: Remolded



Project: Brevard Landfill
 Location:
 Date: 02-06-24

PERMEABILITY TEST REPORT

SUMMIT ENG. & CONST. SERV., INC.

Project No.:
 File No.: A24117.00240
 Lab No.: JA23-4743-01
 Tested by: FG
 Checked by: MH
 Test: CH - Constant head

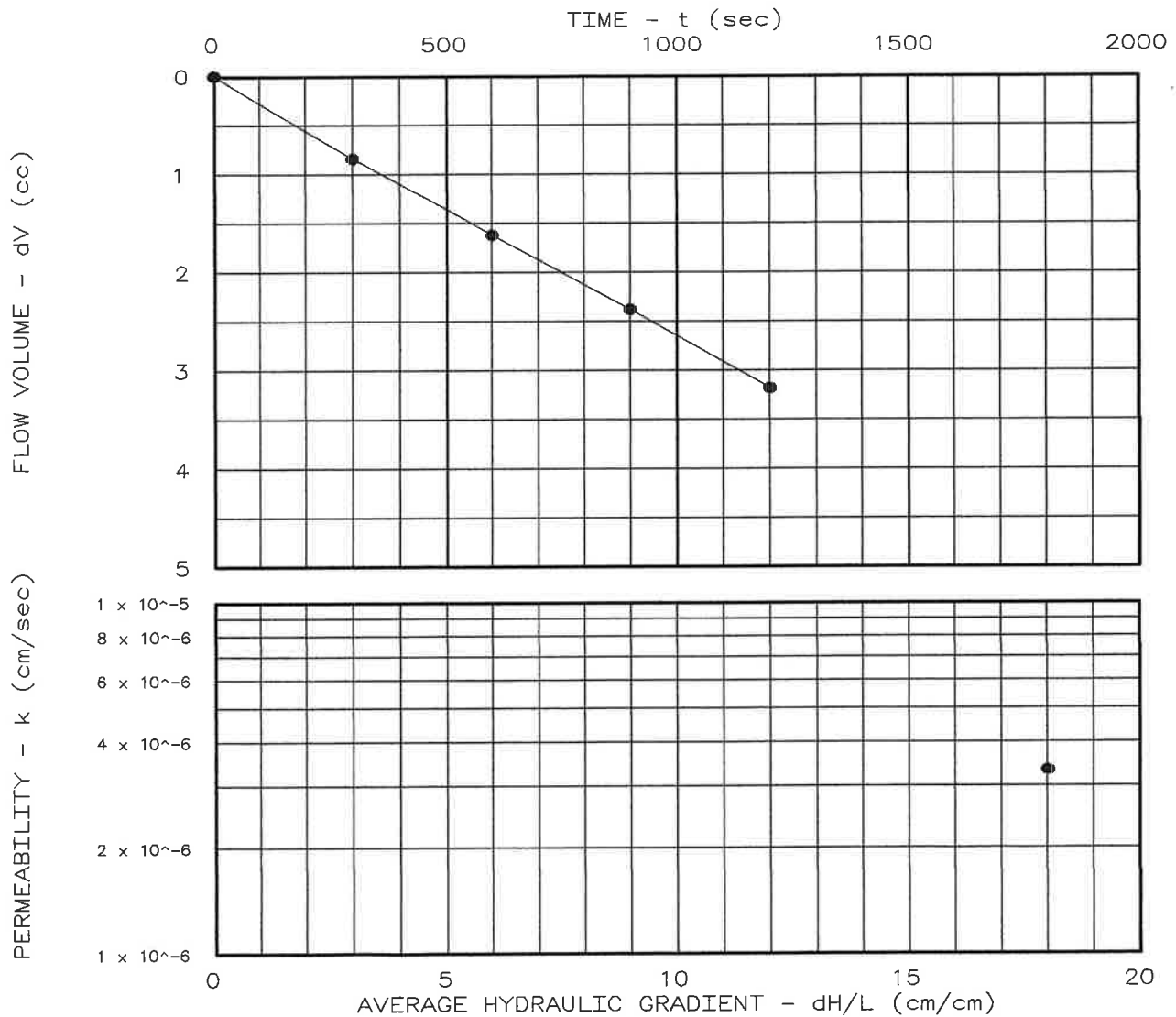
PERMEABILITY TEST REPORT

TEST DATA:

Specimen Height (cm): 7.63
 Specimen Diameter (cm): 7.28
 Dry Unit Weight (pcf): 101.7
 Moisture Before Test (%): 16.7
 Moisture After Test (%): 22.9
 Run Number: 1 ● 2 ▲
 Cell Pressure (psi): 77.0
 Test Pressure (psi): 72.0
 Back Pressure (psi): 70.0
 Diff. Head (psi): 2.0
 Flow Rate (cc/sec): 2.63×10^{-3}
 Perm. (cm/sec): 3.33×10^{-6}

SAMPLE DATA:

Sample Identification: TP-10
 Visual Description: Tan Brown, Sandy Silt
 Remarks: Remolded at optimum moisture
 Maximum Dry Density (pcf): 106.9
 Optimum Moisture Content (%): 16.7
 ASTM(D698)
 Percent Compaction: 95.1%
 Permeameter type: Flexible Wall
 Sample type: Remolded



Project: Brevard Landfill
 Location:
 Date: 02-06-24

Project No.:
 File No.: A24117.00240
 Lab No.: JA23-4743-01
 Tested by: FG
 Checked by: MH
 Test: CH - Constant head

PERMEABILITY TEST REPORT

SUMMIT ENG. & CONST. SERV., INC.

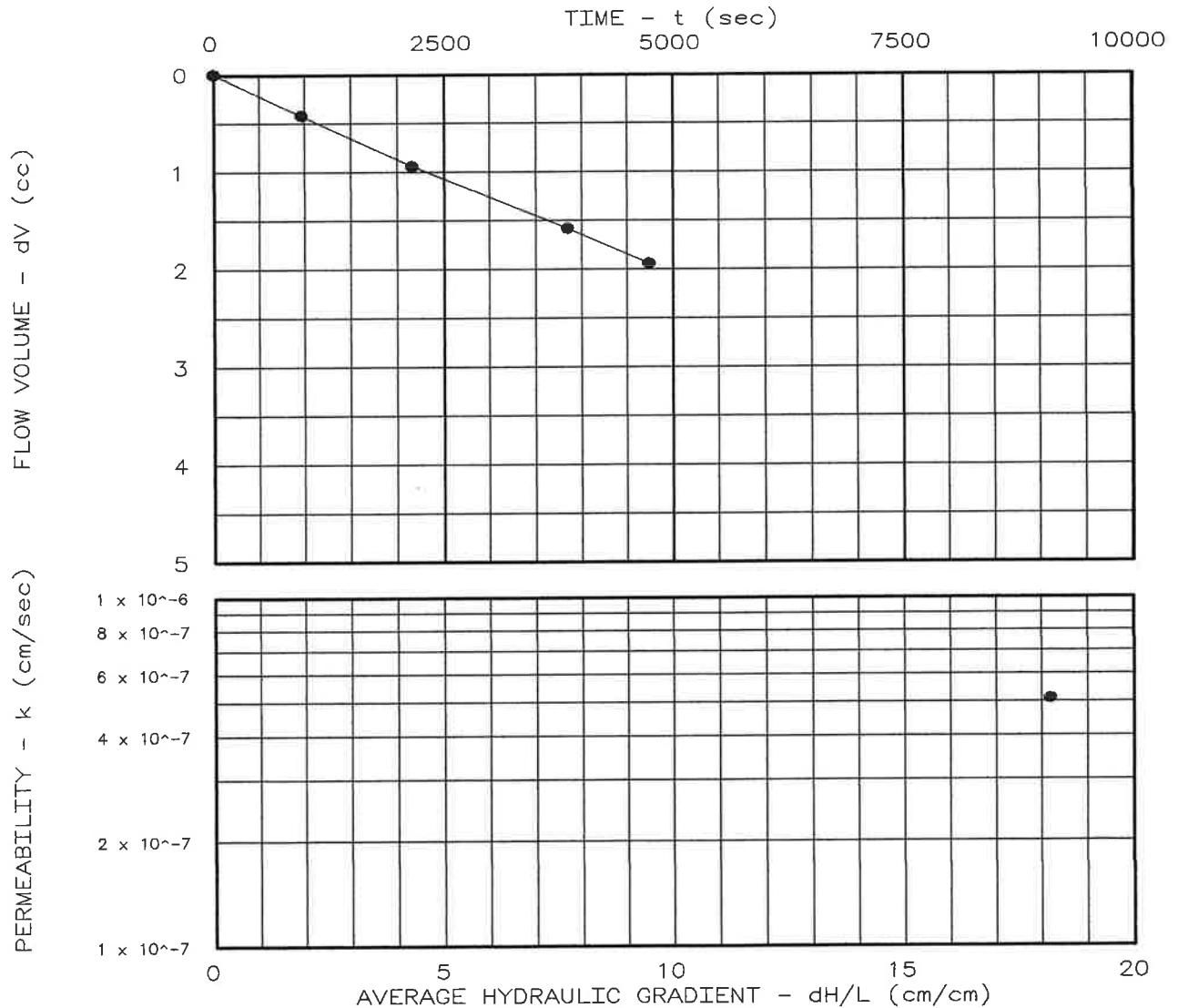
PERMEABILITY TEST REPORT

TEST DATA:

Specimen Height (cm): 7.63
 Specimen Diameter (cm): 7.28
 Dry Unit Weight (pcf): 101.8
 Moisture Before Test (%): 20.5
 Moisture After Test (%): 22.6
 Run Number: 1 ● 2 ▲
 Cell Pressure (psi): 77.0
 Test Pressure (psi): 72.0
 Back Pressure (psi): 70.0
 Diff. Head (psi): 2.0
 Flow Rate (cc/sec): 4.07×10^{-4}
 Perm. (cm/sec): 5.10×10^{-7}

SAMPLE DATA:

Sample Identification: TP-10
 Visual Description: Tan Brown, Sandy Silt
 Remarks: Remolded to wet of optimum moisture
 Maximum Dry Density (pcf): 106.9
 Optimum Moisture Content (%): 16.7
 ASTM(D698)
 Percent Compaction: 95.2%
 Permeameter type: Flexible Wall
 Sample type: Remolded



Project: Brevard Landfill
 Location:
 Date: 02-06-24

Project No.:
 File No.: A24117.00240
 Lab No.: JA23-4743-01
 Tested by: FG
 Checked by: MH
 Test: CH - Constant head

PERMEABILITY TEST REPORT

SUMMIT ENG. & CONST. SERV., INC.

ATTACHMENT 3
Borrow Study Photographic Log

TP No.	2	TP Location:	N 523275.42 E 850356.91	Time: 11:33 A.M.
Date:	12/06/2023			Weather: Sunny and Clear, 40°F
<p>Description/Observations: Excavation is approximate 7 to 8 feet deep. Medium to dark brown mottled. Lightly moist fine sandy silt, with small gravel, slightly cohesive.</p>				
<p>Additional Observations: Rock is present at the bottom of the excavation.</p>				

TP No.	3	TP Location:	N 523321.93 E 850388.12	Time: 10:50 A.M.
Date:	12/06/2023			Weather: Sunny and Clear, 39° F
<p>Description/Observations: Excavation is approximately 6 to 8 feet deep. Light brown to medium brown sandy silt with fine sand. Moist cohesive soils with various sizes of rocks. Consider for structural fill due to rock.</p>				
<p>Additional Observations: Weathered rock at the bottom of the pit, difficult to excavate.</p>				

TP No.	4	TP Location:	N 523015.30 E 850406.16	Time: 11:11 A.M.
Date:	12/06/2023			Weather: Sunny and Clear, 40 °F
<p>Description/Observations: Excavation is approximately 3 to 4 feet deep. Identical characteristics to sample taken from TP-3; weathered Henderson Gneiss.</p>				
<p>Additional Observations: Weathered rock at the bottom of the pit.</p>				

TP No.	5A	TP Location:	N 523079.14 E 849510.95	Time: 4:20 P.M.
Date:	12/06/2023			Weather: Sunny and Clear, 44 °F


Description/Observations:
 Excavation is 6 feet deep.
 Soil is orange/brown elastic silt with trace sand. Lightly moist, very cohesive.

Additional Observations:
 Two (2) samples were taken at TP-5 (5A and 5B).




TP No.	5B	TP Location:	N 523079.14 E 849510.95	Time: 4:22 P.M.
Date:	12/06/2023			Weather: Sunny and Clear, 40° F
<p>Description/Observations: Excavation is 2 feet lower than the sample taken for 5A. Soil is a mixture of the layers above.</p>				
<p>Additional Observations: Two (2) samples were taken at TP-5 (5A and 5B).</p>				

TP No.	6	TP Location:	N 523247.23 E 849966.31	Time: 3:45 P.M.
Date:	12/06/2023			Weather: Sunny and Clear, 40° F
<p>Description/Observations: Excavation is 6 feet deep. From 0-2 feet; soil is light to medium brown silt with fine sand; lightly moist and cohesive.</p> <p>From 2-6 feet; soil is orange/brown silt with fine sand; lightly moist and cohesive.</p> <p>At 6 feet; there was weathered Henderson gneiss.</p>				
<p>Additional Observations: Sample taken is a mixture of all layers.</p>				

TP No.	7	TP Location:	N 522622.56 E 849732.62	Time: 2:55 P.M.
Date:	12/06/2023			Weather: Sunny and Clear, 50 °F
<p>Description/Observations: Excavation is 6-8 feet deep.</p> <p>From 0-2 feet A-horizon soils. Below A-horizon is completely weathered Henderson gneiss.</p>				
<p>Additional Observations: Below 8 feet; partly weathered rock.</p>				

TP No.	9	TP Location:	N 523207.43 E 849396.23	Time: 9:48 A.M.
Date:	12/07/2023			Weather: Sunny and Clear, 38 °F
<p>Description/Observations: Excavation is 5 feet deep.</p> <p>From 0-3 feet: light to medium brown sandy silt, lightly moist and low cohesion.</p> <p>From 3-5 feet: Orange brown sandy silt; similar properties as above layer.</p>				
<p>Additional Observations: Weathered rock at the bottom.</p>				

TP No.	10	TP Location:	N 521320.80 E 849771.91	Time: 11:38 A.M.
Date:	12/07/2023			Weather: Sunny and Clear, 40 °F
<p>Description/Observations: Excavation is 5-6 feet deep. Soil is orange-brown, slightly moist. Cohesive silt with trace of sand. Almost consistent across whole depth of profile.</p>				
<p>Additional Observations: No rock encountered.</p>				

TP No.	13	TP Location:	N 521404.28 E 849685.38	Time: 11:55 A.M.
Date:	12/07/2023			Weather: Sunny and Clear, 45 °F
<p>Description/Observations: Excavation is 4-6 feet deep.</p> <p>From 0-2 feet: light brown sandy silt, non-cohesive, and minimal moisture.</p> <p>From 2-5 feet: light brown silty sand, non-cohesive, minimal moisture. Observed breakable mineral rock.</p>				
<p>Additional Observations:</p>				

TP No.	14	TP Location:	N 521261.46 E 849799.54	Time: 11:12 A.M.
Date:	12/07/2023			Weather: Sunny and Clear, 40° F
<p>Description/Observations: Excavation is 4-5 feet deep.</p> <p>From 0-4 feet: light brown sandy silt, non-cohesive and minimal moisture. Some pea gravel.</p> <p>From 4 feet: rock fragment observed at bottom. Rock was hard to break by hand.</p>				
<p>Additional Observations:</p>				

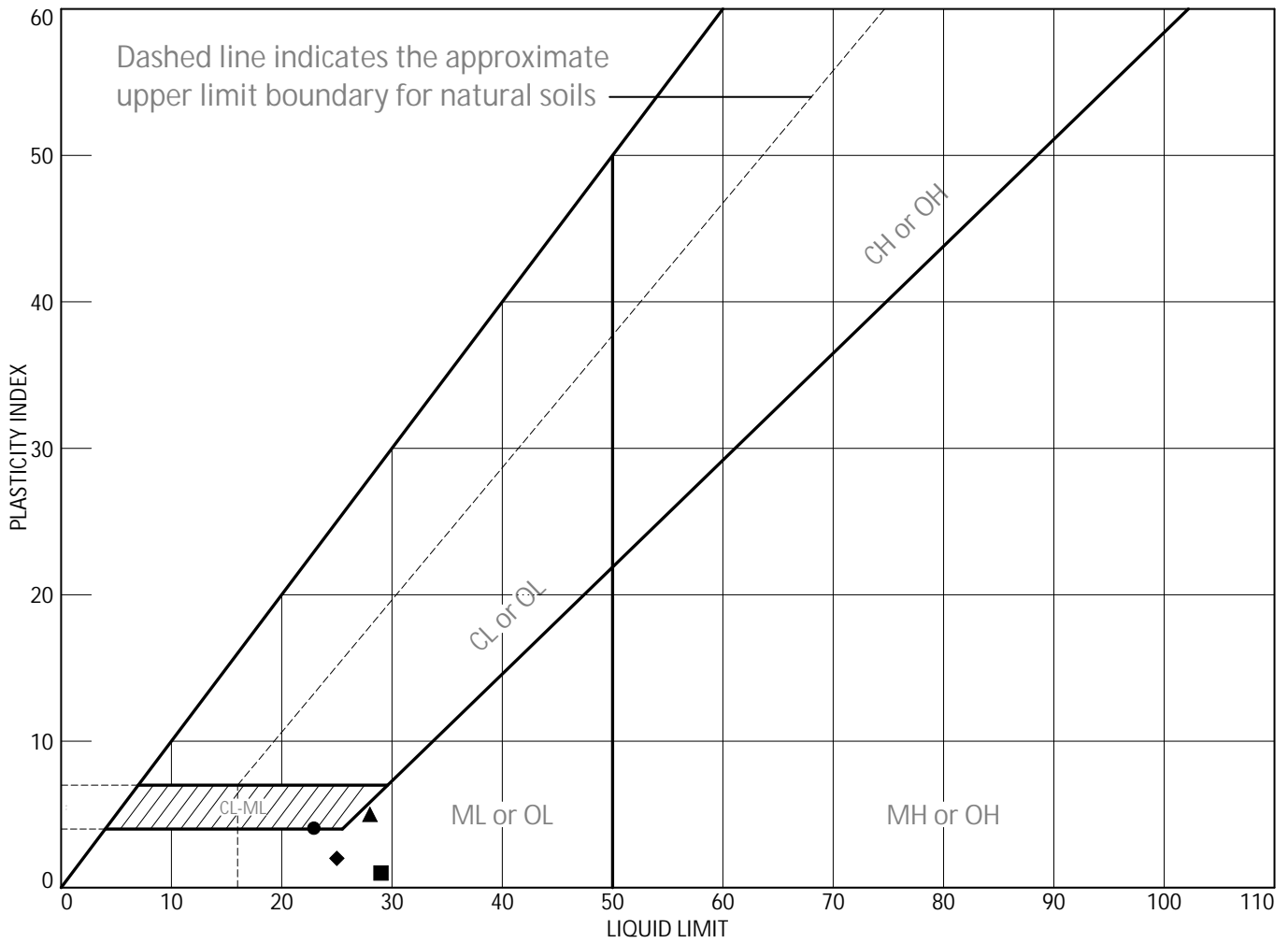
BORROW STUDY REPORT 2*

(PREPARED BY BLE, JANUARY-FEBRUARY 2025)

* DIRECT SHEAR RESULTS WILL BE PROVIDED IN ADDENDUM

Atterberg Limits Test Results

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	TP	TP-1		20.0	19	23	4	CL-ML
■	TP	TP-2		16.7	28	29	1	ML
▲	TP	TP-3A		22.3	23	28	5	ML
◆	TP	TP-3B		21.4	23	25	2	ML
▼	TP	TP-3C		19.1	27	26	NP	ML

Bunnell Lammons Engineering, Inc.

Client: Transylvania County Solid Waste
Project: Woodruff County Landfill

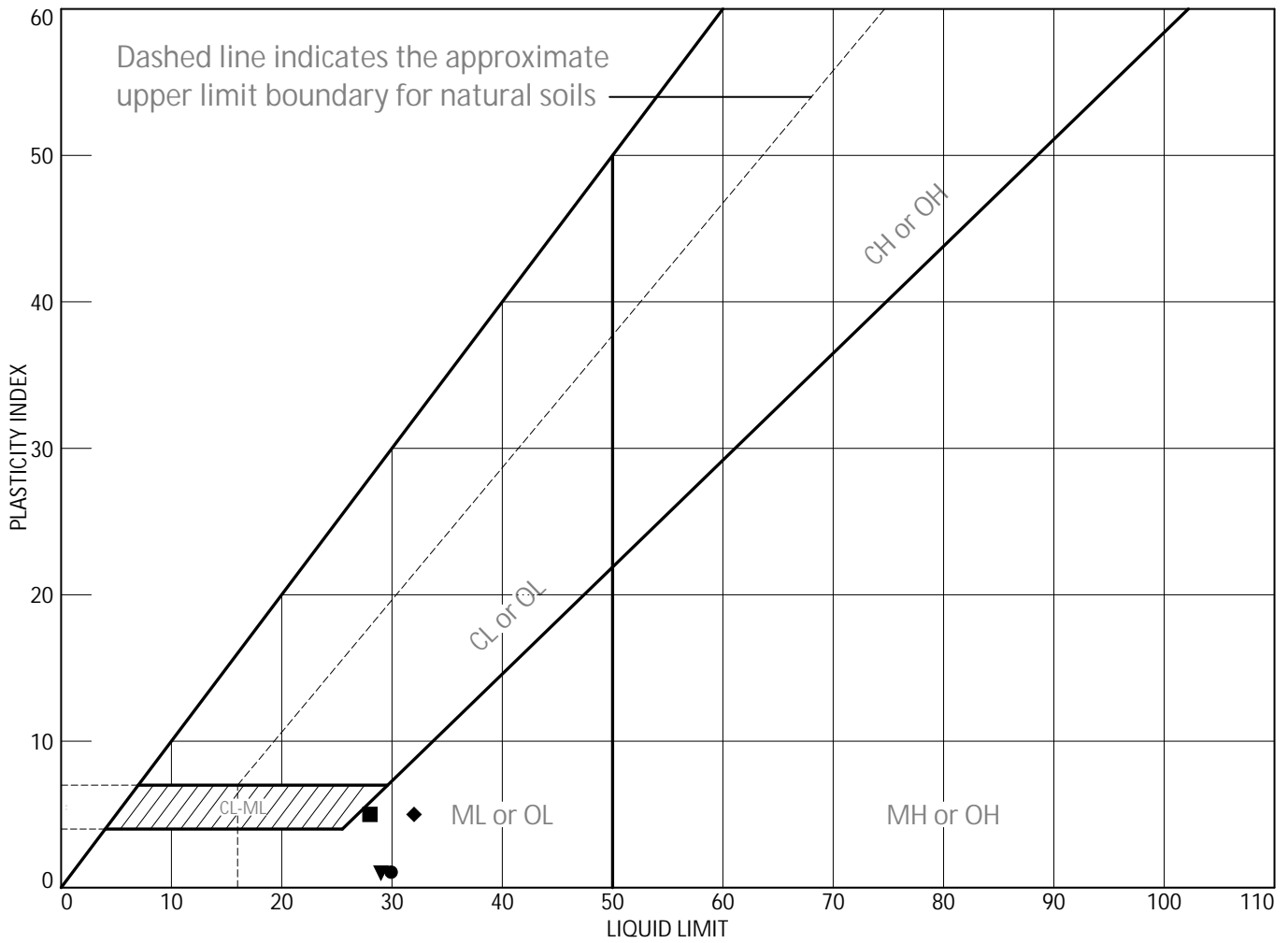
Greenville, SC

Project No.: 24201-03

Figure

Tested By: JM Checked By: ML

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	TP	TP-4		26.9	29	30	1	ML
■	TP	TP-5		20.9	23	28	5	ML
▲	TP	TP-6A		16.6	NP	32	NP	ML
◆	TP	TP-6B		19.6	27	32	5	ML
▼	TP	TP-7		16.6	28	29	1	ML

Bunnell Lammons Engineering, Inc.

Greenville, SC

Client: Transylvania County Solid Waste
Project: Woodruff County Landfill

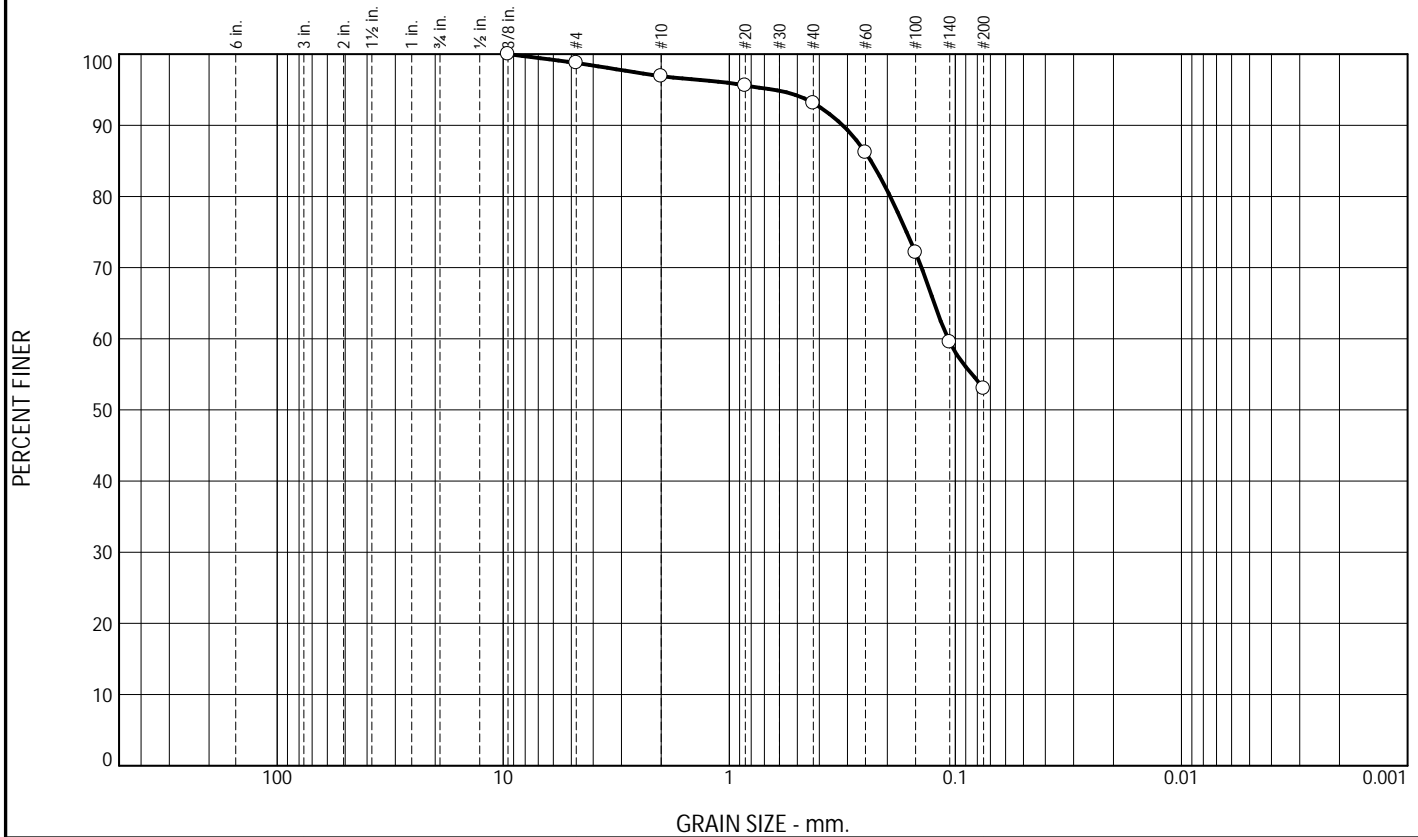
Project No.: 24201-03

Figure

Tested By: JM Checked By: ML

Sieve Analysis Test Results

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.2	1.9	3.8	40.1	53.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8	100.0		
#4	98.8		
#10	96.9		
#20	95.6		
#40	93.1		
#60	86.2		
#100	72.1		
#140	59.5		
#200	53.0		

Soil Description

Light tan sandy silty CLAY

Atterberg Limits
 PL= 19 LL= 23 PI= 4

Coefficients
 D₉₀= 0.3149 D₈₅= 0.2365 D₆₀= 0.1078
 D₅₀= D₃₀= D₁₅=
 D₁₀= C_u= C_c=

Classification
 USCS= CL-ML AASHTO= A-4(0)

Remarks

* (no specification provided)

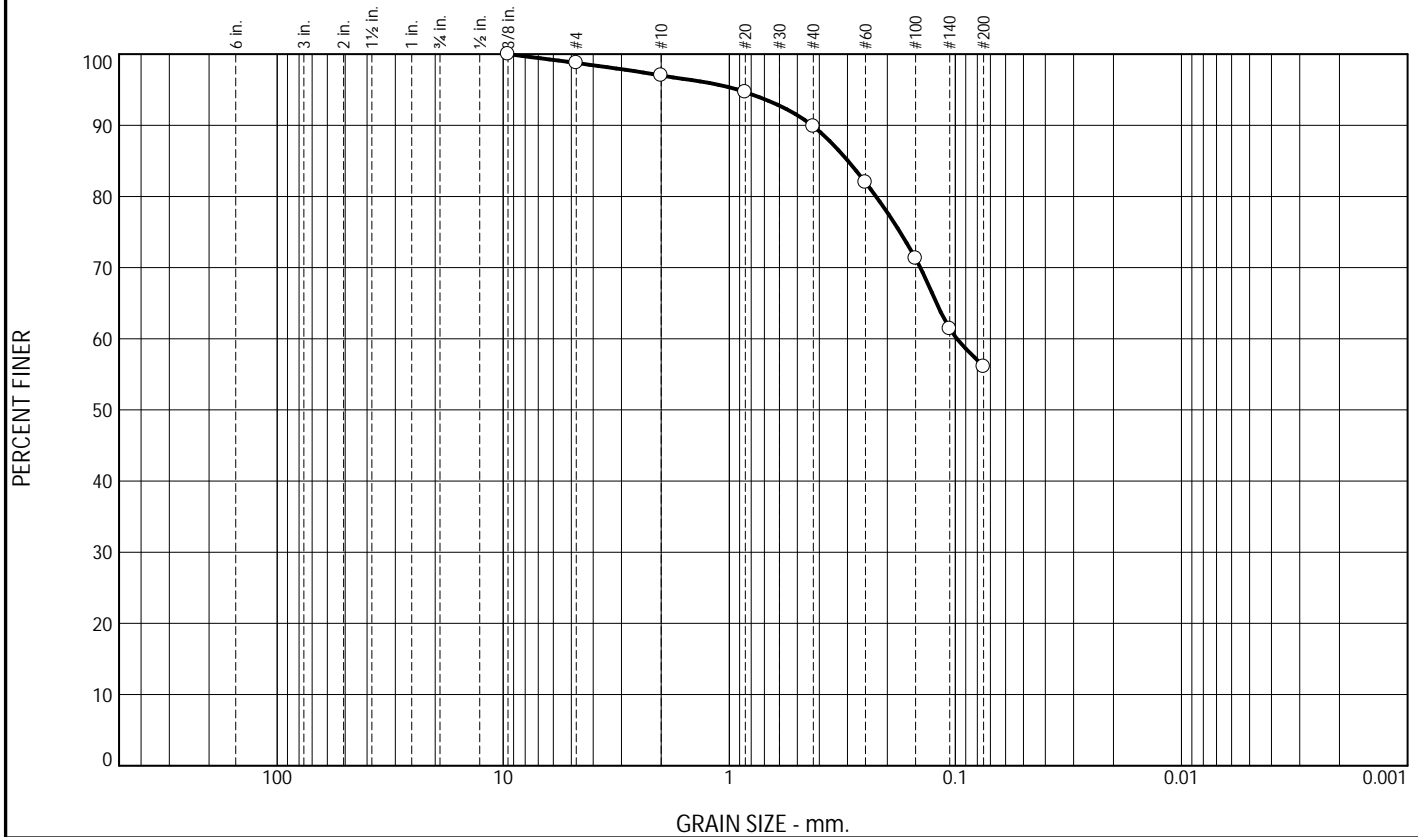
Source of Sample: TP
 Sample Number: TP-1

Date:

Bunnell Lammons Engineering, Inc. Greenville, SC	Client: Transylvania County Solid Waste Project: Woodruff County Landfill Project No: 24201-03
Figure	

Tested By: MW Checked By: ML

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.2	1.8	7.1	33.8	56.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8	100.0		
#4	98.8		
#10	97.0		
#20	94.7		
#40	89.9		
#60	82.0		
#100	71.3		
#140	61.4		
#200	56.1		

Soil Description

Light brown sandy SILT

PL= 28 Atterberg Limits LL= 29 PI= 1

Coefficients
 D₉₀= 0.4309 D₈₅= 0.2985 D₆₀= 0.0986
 D₅₀= D₃₀= D₁₅=
 D₁₀= C_u= C_c=

USCS= ML Classification
 AASHTO= A-4(0)

Remarks

* (no specification provided)

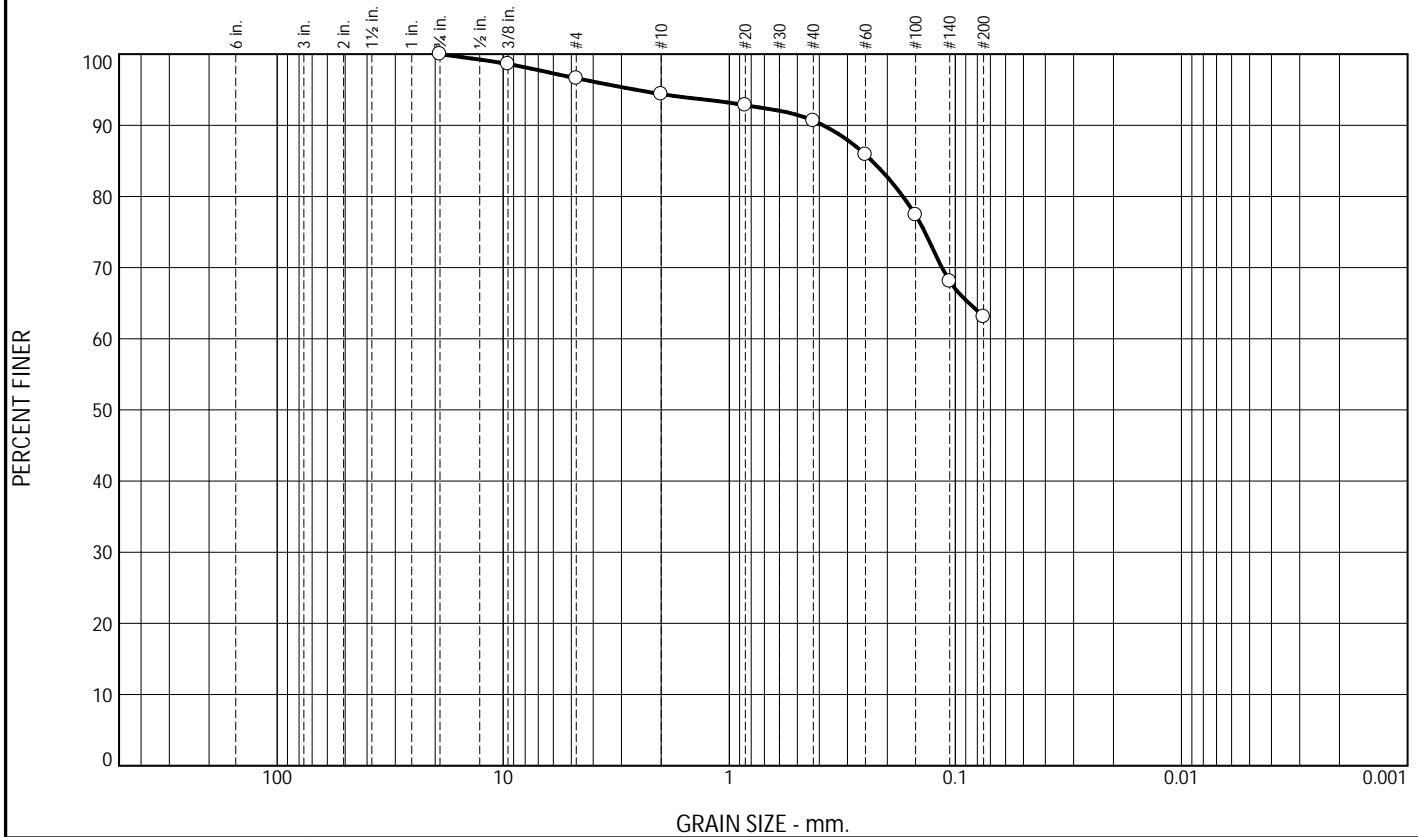
Source of Sample: TP
Sample Number: TP-2

Date:

Bunnell Lammons Engineering, Inc. Greenville, SC	Client: Transylvania County Solid Waste Project: Woodruff County Landfill Project No: 24201-03
Figure	

Tested By: LM Checked By: ML

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.4	2.2	3.8	27.5	63.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
3/8	98.6		
#4	96.6		
#10	94.4		
#20	92.8		
#40	90.6		
#60	85.9		
#100	77.4		
#140	68.1		
#200	63.1		

Soil Description

Tan brown sandy SILT

Atterberg Limits

PL= 23 LL= 28 PI= 5

Coefficients

D₉₀= 0.3846 D₈₅= 0.2338 D₆₀=
D₅₀= D₃₀= D₁₅=
D₁₀= C_u= C_c=

Classification

USCS= ML AASHTO= A-4(2)

Remarks

* (no specification provided)

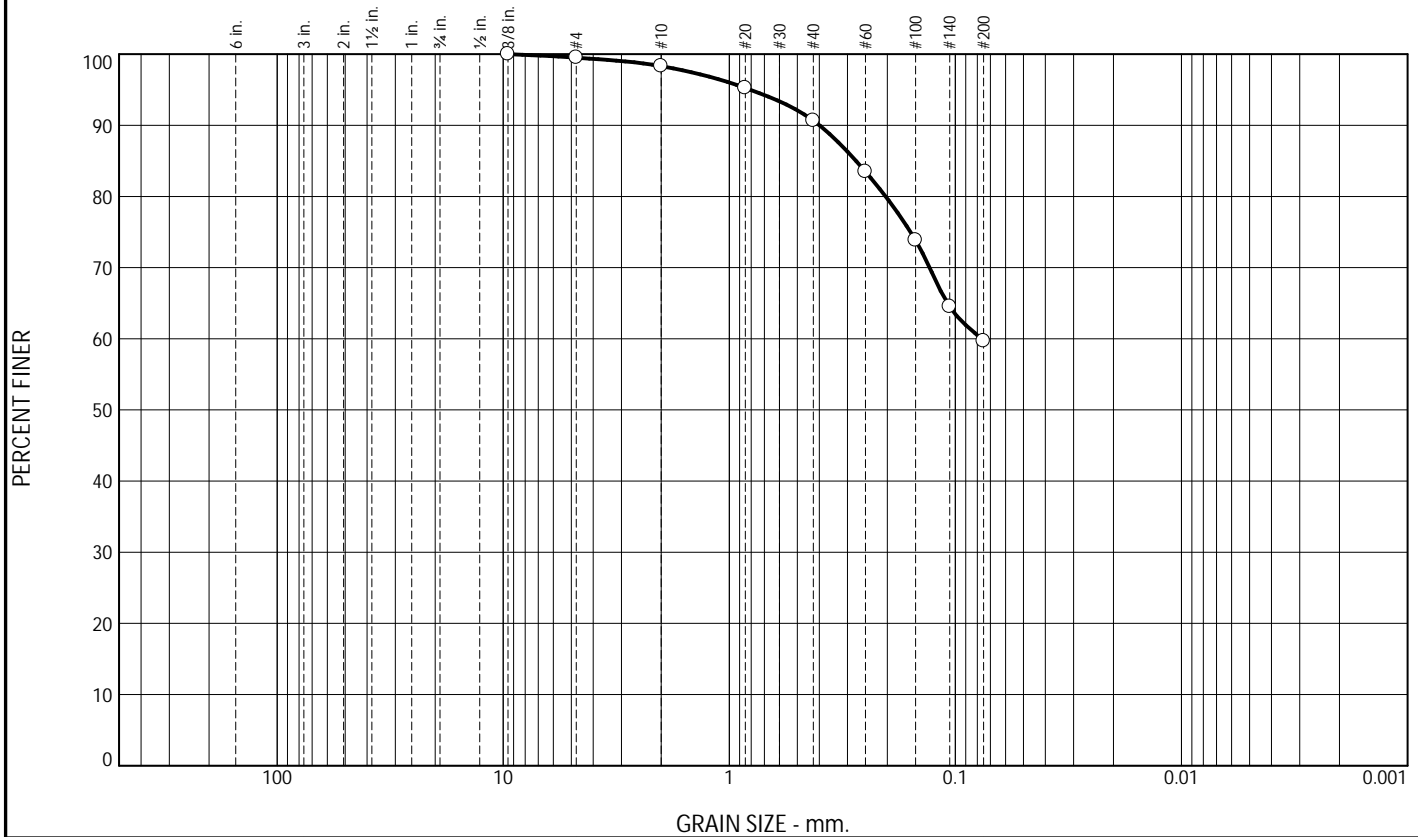
Source of Sample: TP
Sample Number: TP-3A

Date:

Bunnell Lammons Engineering, Inc. Greenville, SC	Client: Transylvania County Solid Waste Project: Woodruff County Landfill Project No: 24201-03
Figure	

Tested By: LM Checked By: ML

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.5	1.2	7.6	31.0	59.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8	100.0		
#4	99.5		
#10	98.3		
#20	95.2		
#40	90.7		
#60	83.5		
#100	73.9		
#140	64.5		
#200	59.7		

Soil Description

Light brown sandy SILT

Atterberg Limits

PL= 23 LL= 25 PI= 2

Coefficients

D₉₀= 0.3995 D₈₅= 0.2751 D₆₀= 0.0769

D₅₀= D₃₀= D₁₅=

D₁₀= C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

* (no specification provided)

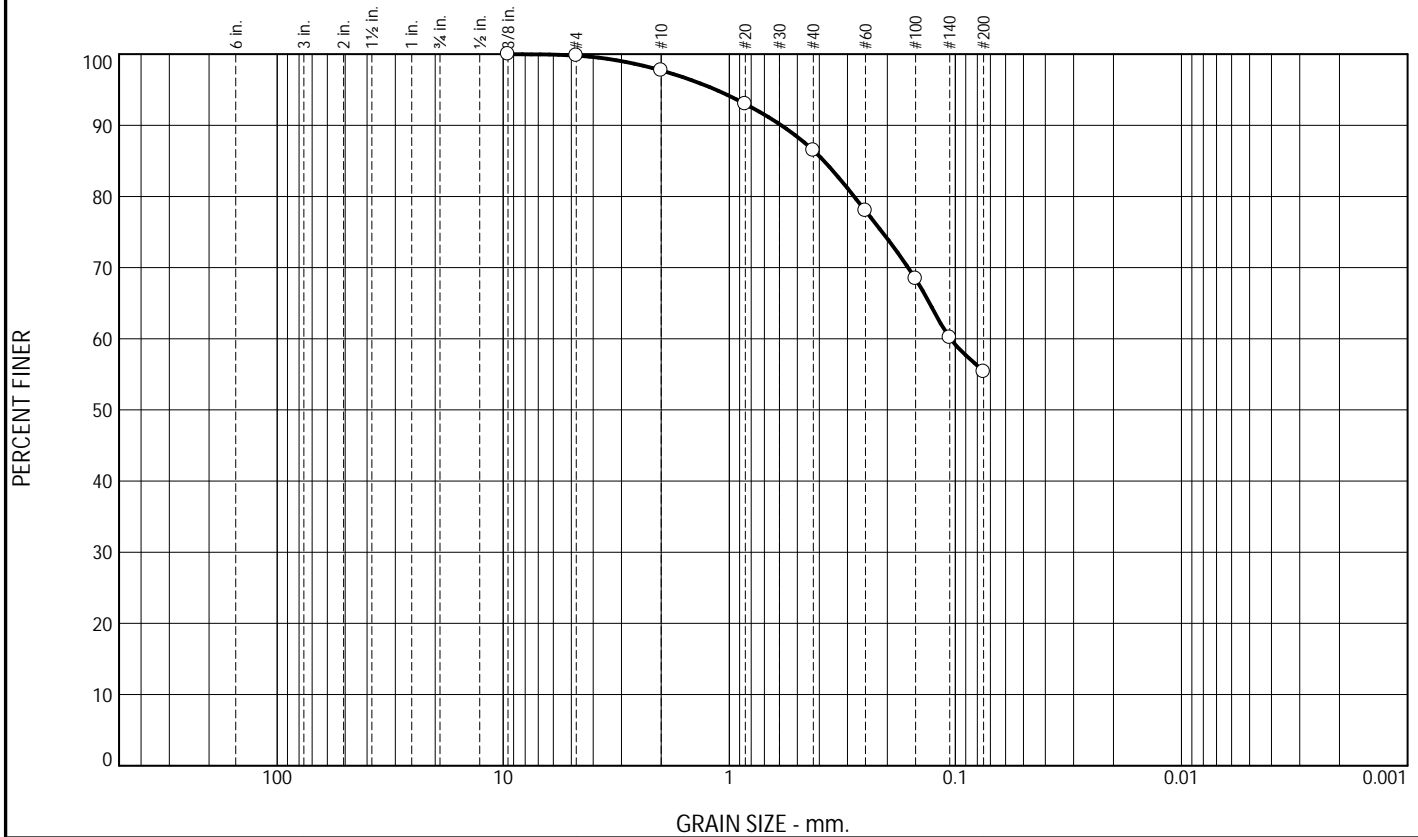
Source of Sample: TP
Sample Number: TP-3B

Date:

Bunnell Lammons Engineering, Inc. Greenville, SC	Client: Transylvania County Solid Waste Project: Woodruff County Landfill Project No: 24201-03
Figure	

Tested By: LM _____ Checked By: ML _____

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	2.1	11.2	31.1	55.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8	100.0		
#4	99.8		
#10	97.7		
#20	93.0		
#40	86.5		
#60	78.0		
#100	68.4		
#140	60.2		
#200	55.4		

Soil Description

Light tan sandy SILT

PL= 27 Atterberg Limits LL= 26 PI= NP

Coefficients
 D₉₀= 0.5886 D₈₅= 0.3816 D₆₀= 0.1051
 D₅₀= D₃₀= D₁₅=
 D₁₀= C_u= C_c=

USCS= ML Classification
 AASHTO= A-4(0)

Remarks

* (no specification provided)

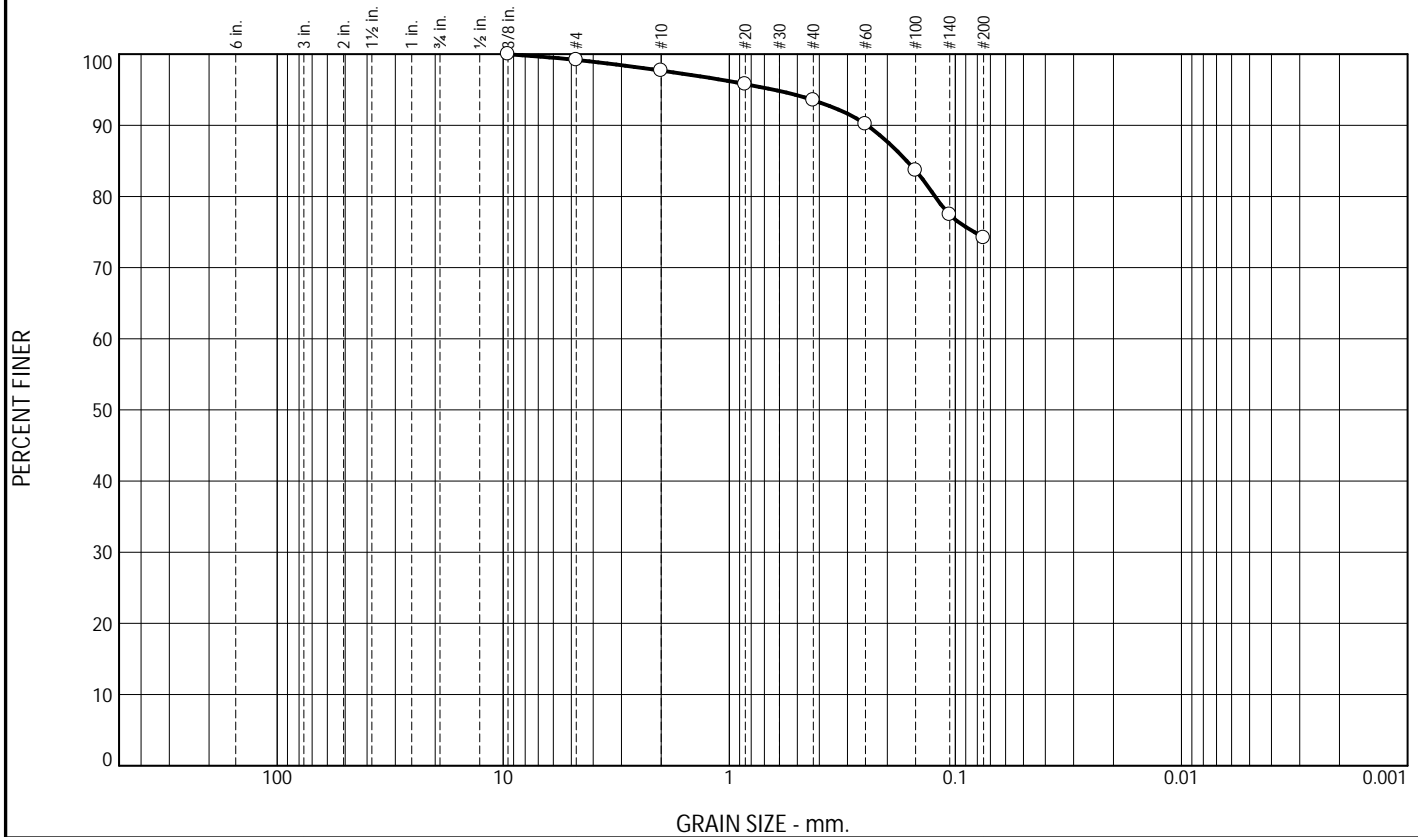
Source of Sample: TP
Sample Number: TP-3C

Date:

Bunnell Lammons Engineering, Inc. Greenville, SC	Client: Transylvania County Solid Waste Project: Woodruff County Landfill Project No: 24201-03
Figure	

Tested By: LM _____ Checked By: ML _____

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.8	1.5	4.2	19.3	74.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8	100.0		
#4	99.2		
#10	97.7		
#20	95.8		
#40	93.5		
#60	90.2		
#100	83.7		
#140	77.4		
#200	74.2		

Soil Description

Light reddish brown SILT with sand

Atterberg Limits
 PL= 29 LL= 30 PI= 1

Coefficients
 D₉₀= 0.2457 D₈₅= 0.1641 D₆₀=
 D₅₀= D₃₀= D₁₅=
 D₁₀= C_u= C_c=

Classification
 USCS= ML AASHTO= A-4(1)

Remarks

* (no specification provided)

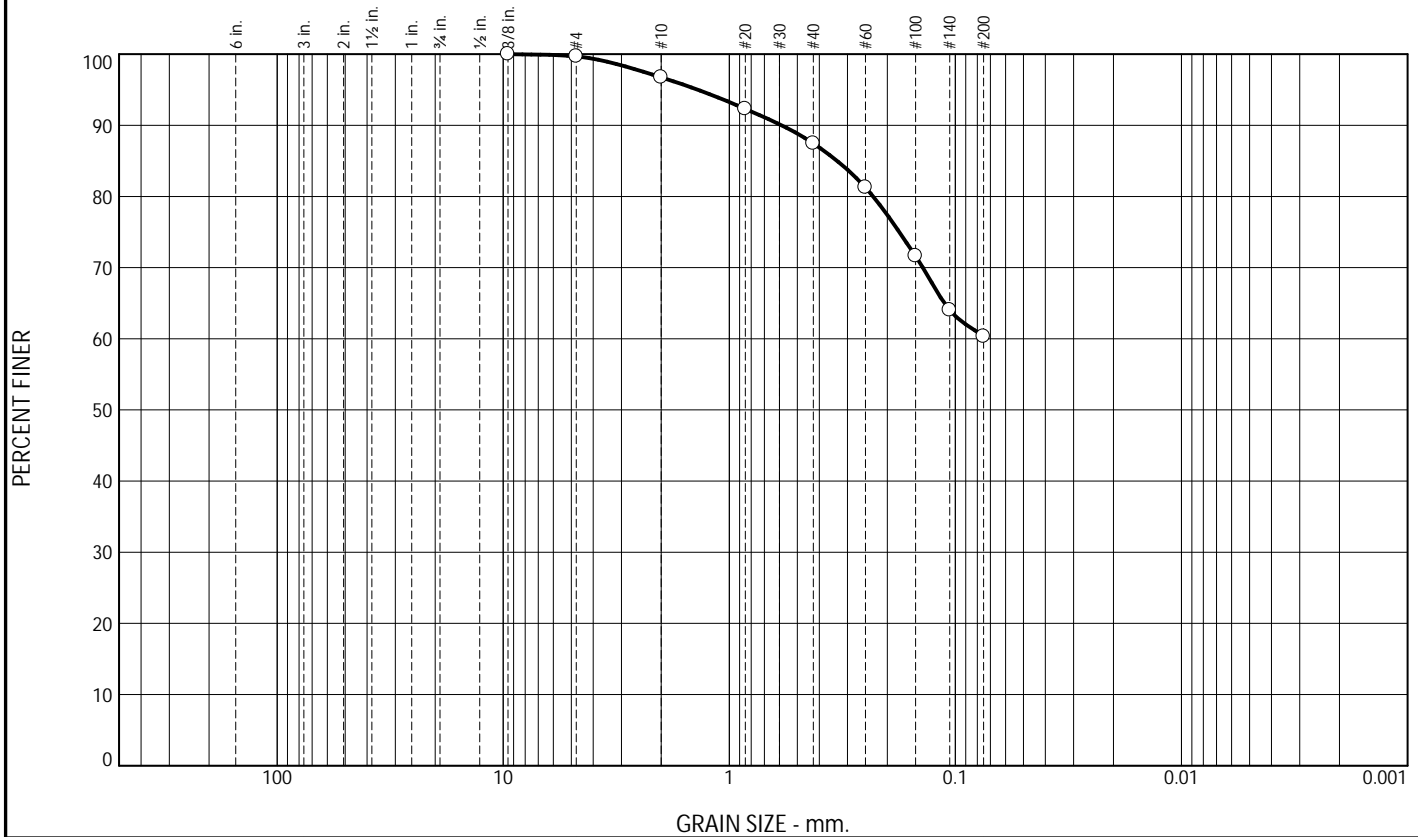
Source of Sample: TP
Sample Number: TP-4

Date:

Bunnell Lammons Engineering, Inc. Greenville, SC	Client: Transylvania County Solid Waste Project: Woodruff County Landfill Project No: 24201-03
Figure	

Tested By: LM Checked By: ML

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.3	3.0	9.2	27.2	60.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8	100.0		
#4	99.7		
#10	96.7		
#20	92.3		
#40	87.5		
#60	81.3		
#100	71.6		
#140	64.0		
#200	60.3		

Soil Description

Tan brown sandy SILT

PL= 23 Atterberg Limits LL= 28 PI= 5

Coefficients
 D₉₀= 0.5869 D₈₅= 0.3334 D₆₀=
 D₅₀= D₃₀= D₁₅=
 D₁₀= C_u= C_c=

USCS= ML Classification
 AASHTO= A-4(1)

Remarks

* (no specification provided)

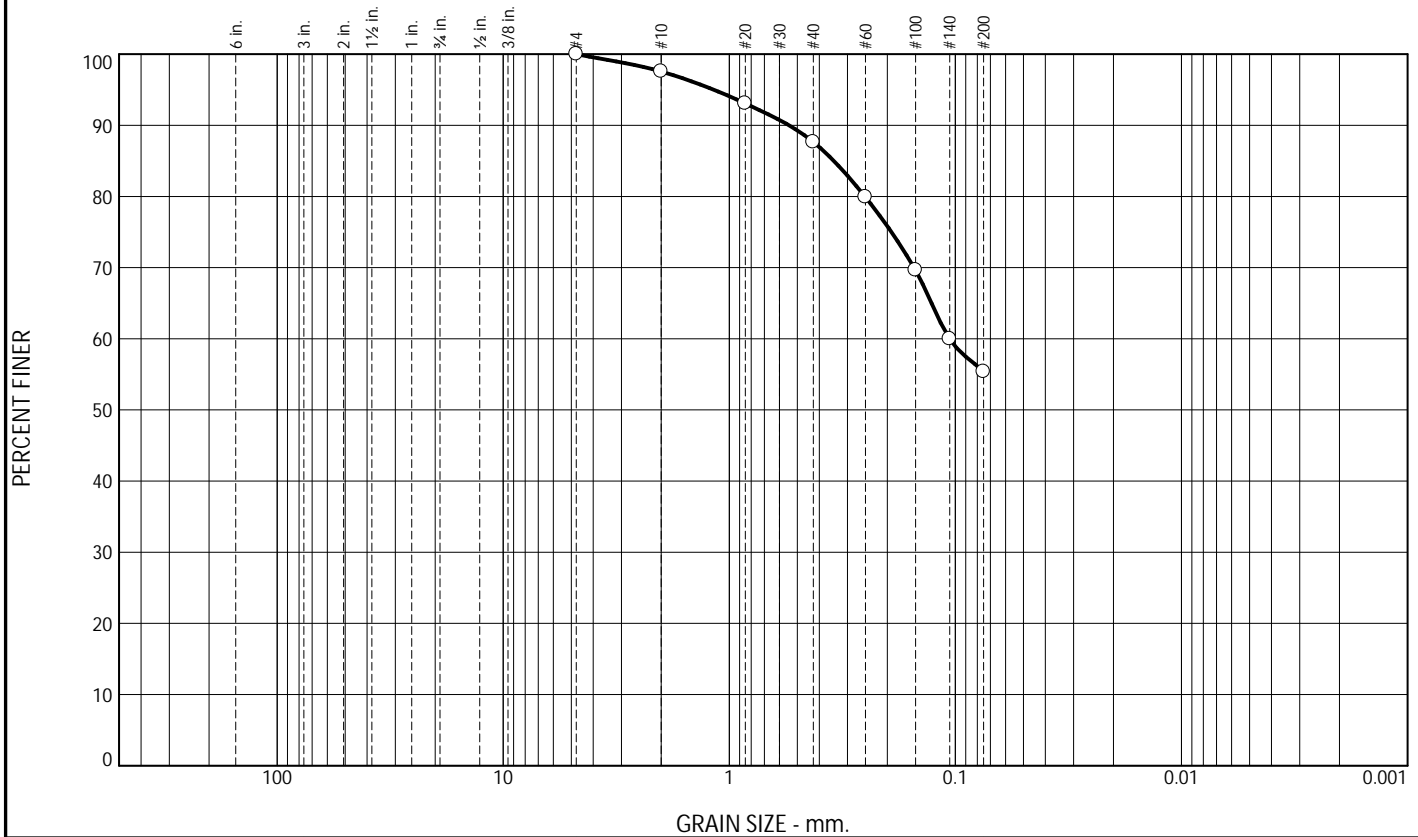
Source of Sample: TP
Sample Number: TP-5

Date:

Bunnell Lammons Engineering, Inc. Greenville, SC	Client: Transylvania County Solid Waste Project: Woodruff County Landfill Project No: 24201-03
Figure	

Tested By: LM Checked By: ML

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	2.4	10.0	32.2	55.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	97.6		
#20	93.1		
#40	87.6		
#60	79.9		
#100	69.6		
#140	60.0		
#200	55.4		

Soil Description

Light brown sandy SILT

Atterberg Limits
 PL= NP LL= 32 PI= NP

Coefficients
 D₉₀= 0.5443 D₈₅= 0.3450 D₆₀= 0.1061
 D₅₀= D₃₀= D₁₅=
 D₁₀= C_u= C_c=

Classification
 USCS= ML AASHTO= A-4(0)

Remarks

* (no specification provided)

Source of Sample: TP
 Sample Number: TP-6A

Date:

Bunnell Lammons Engineering, Inc. Greenville, SC	Client: Transylvania County Solid Waste Project: Woodruff County Landfill Project No: 24201-03
Figure	

Tested By: MW Checked By: ML

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.7	4.0	9.8	26.9	57.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8	100.0		
#4	98.3		
#10	94.3		
#20	89.5		
#40	84.5		
#60	78.6		
#100	69.6		
#140	62.1		
#200	57.6		

Soil Description

Tan brown sandy SILT

Atterberg Limits
 PL= 27 LL= 32 PI= 5

Coefficients
 D₉₀= 0.9185 D₈₅= 0.4497 D₆₀= 0.0918
 D₅₀= D₃₀= D₁₅=
 D₁₀= C_u= C_c=

Classification
 USCS= ML AASHTO= A-4(2)

Remarks

* (no specification provided)

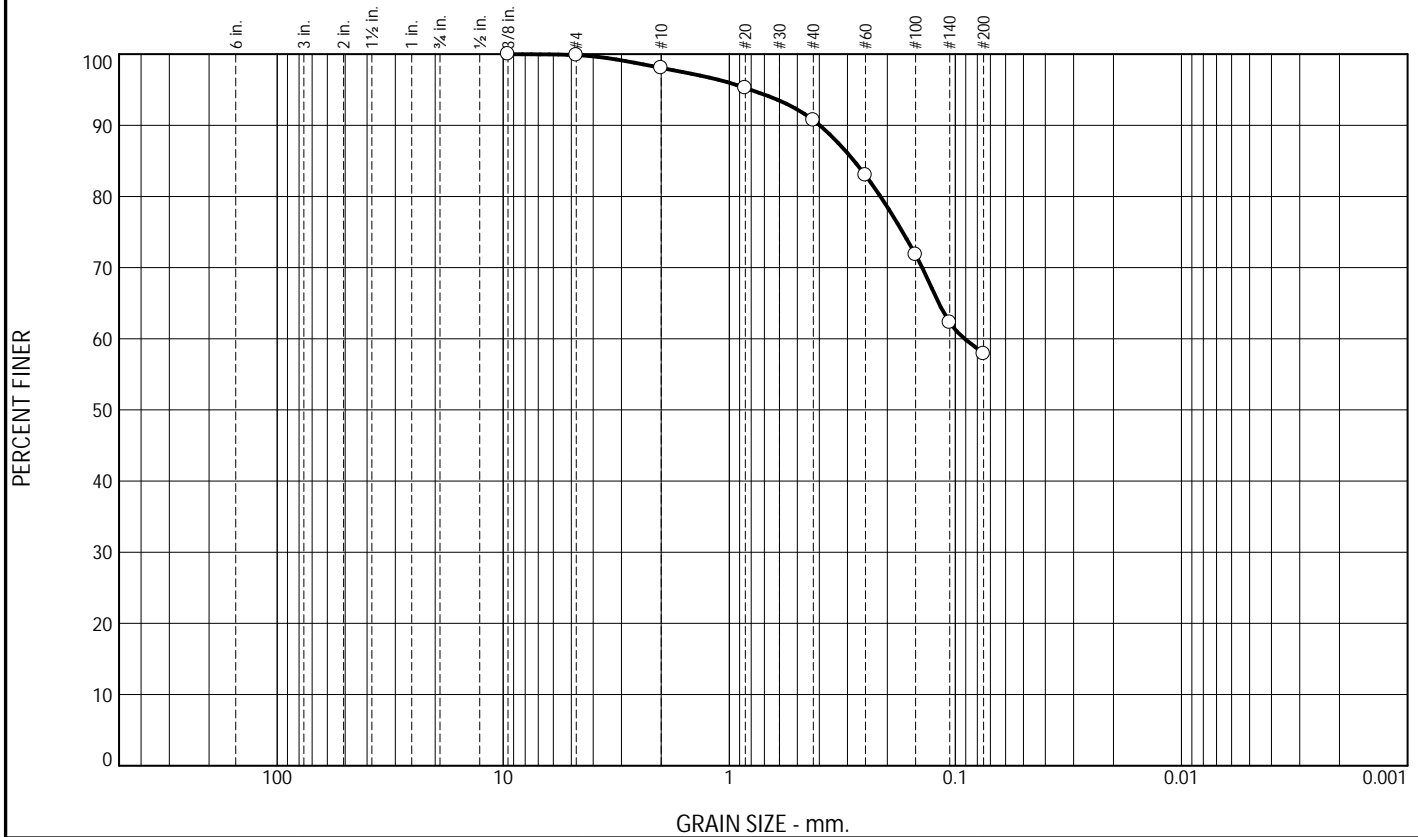
Source of Sample: TP
 Sample Number: TP-6B

Date:

Bunnell Lammons Engineering, Inc. Greenville, SC	Client: Transylvania County Solid Waste Project: Woodruff County Landfill Project No: 24201-03
Figure	

Tested By: LM Checked By: ML

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	1.8	7.4	32.8	57.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8	100.0		
#4	99.9		
#10	98.1		
#20	95.3		
#40	90.7		
#60	83.0		
#100	71.8		
#140	62.3		
#200	57.9		

Soil Description

Tan brown sandy SILT

Atterberg Limits
 PL= 28 LL= 29 PI= 1

Coefficients
 D₉₀= 0.3983 D₈₅= 0.2807 D₆₀= 0.0911
 D₅₀= D₃₀= D₁₅=
 D₁₀= C_u= C_c=

Classification
 USCS= ML AASHTO= A-4(0)

Remarks

* (no specification provided)

Source of Sample: TP
Sample Number: TP-7

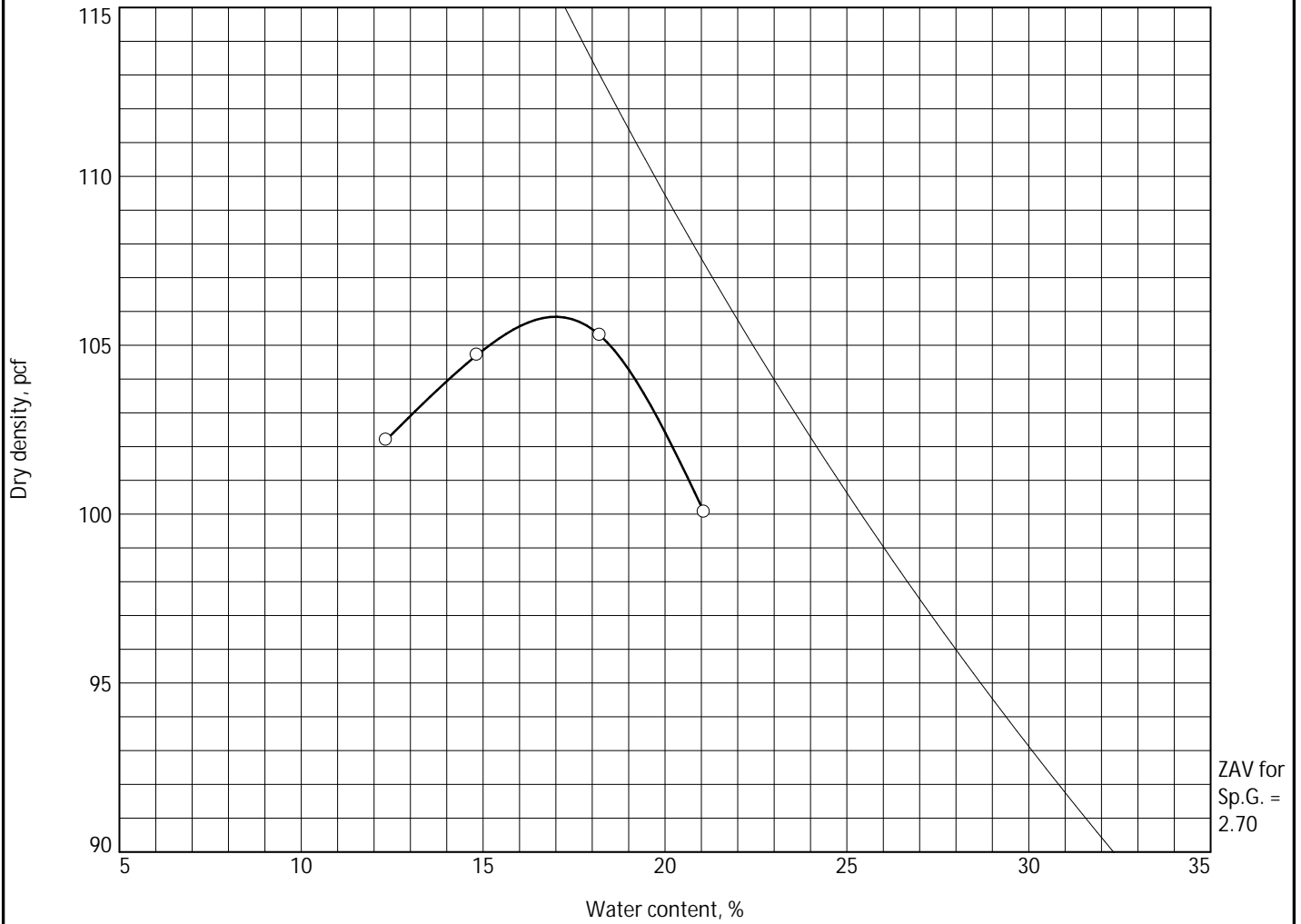
Date:

Bunnell Lammons Engineering, Inc. Greenville, SC	Client: Transylvania County Solid Waste Project: Woodruff County Landfill Project No: 24201-03	Figure
--	--	--------

Tested By: LM _____ Checked By: ML _____

Standard Proctor Test Results

COMPACTION TEST REPORT



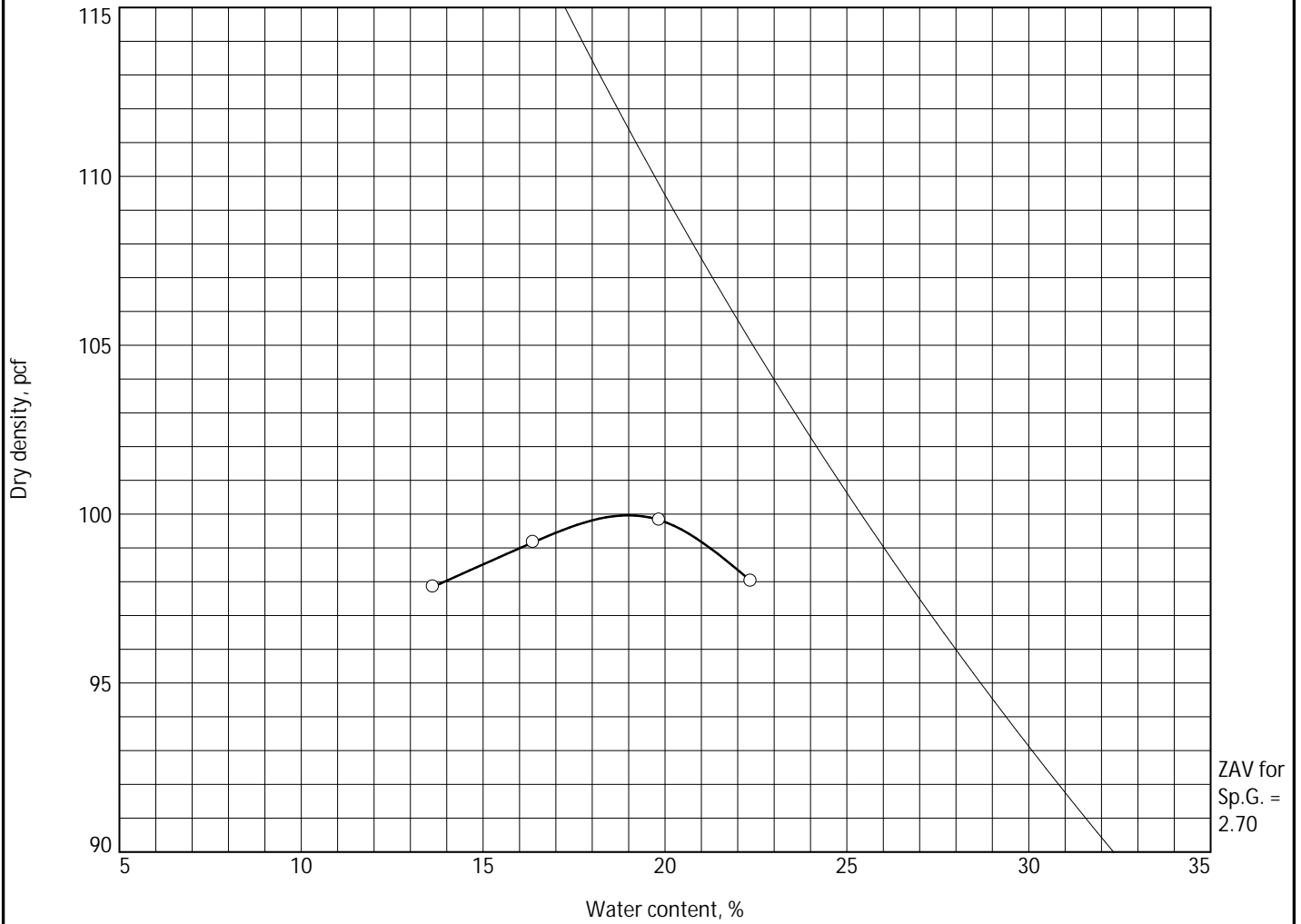
Test specification: ASTM D 698-12 Method A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
	ML	A-4(0)	21.4		25	2	0.5	59.7

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 105.8 pcf Optimum moisture = 17.0 %	Light brown sandy SILT
Project No. 24201-03 Client: Transylvania County Solid Waste Project: Woodruff County Landfill Date: 12-11-2024 Source of Sample: TP Sample Number: TP-3B Bunnell Lammons Engineering, Inc. Greenville, SC	Remarks:

Tested By: CB Checked By: DM

COMPACTION TEST REPORT



Test specification: ASTM D 698-12 Method A Standard

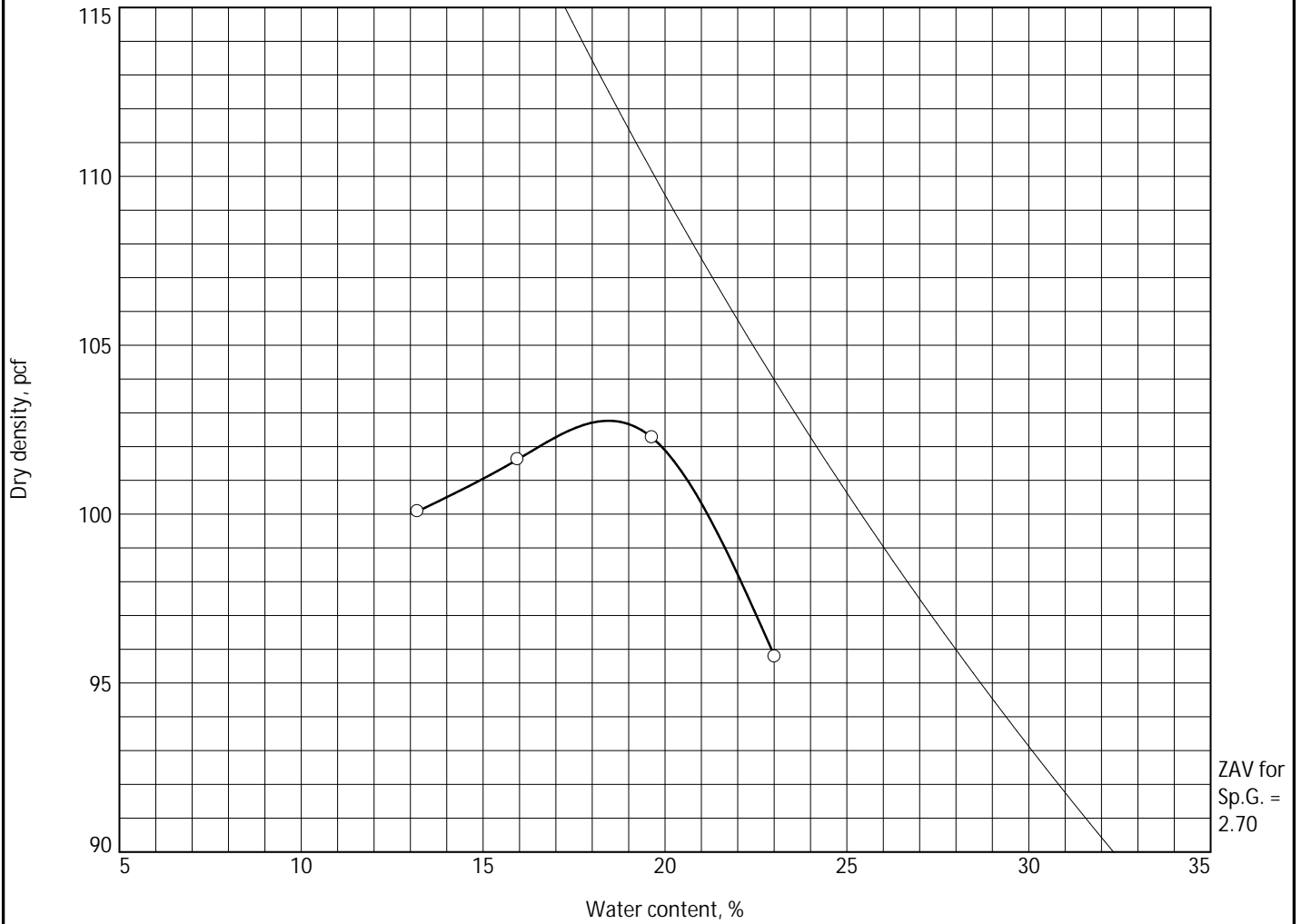
Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
	ML	A-4(1)	26.9		30	1	0.8	74.2

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 100.0 pcf Optimum moisture = 19.0 %	Light reddish brown SILT with sand
Project No. 24201-03 Client: Transylvania County Solid Waste Project: Woodruff County Landfill Date: 12-11-2024 Source of Sample: TP Sample Number: TP-4 Bunnell Lammons Engineering, Inc. Greenville, SC	Remarks:

Tested By: CB Checked By: DM

Figure

COMPACTION TEST REPORT



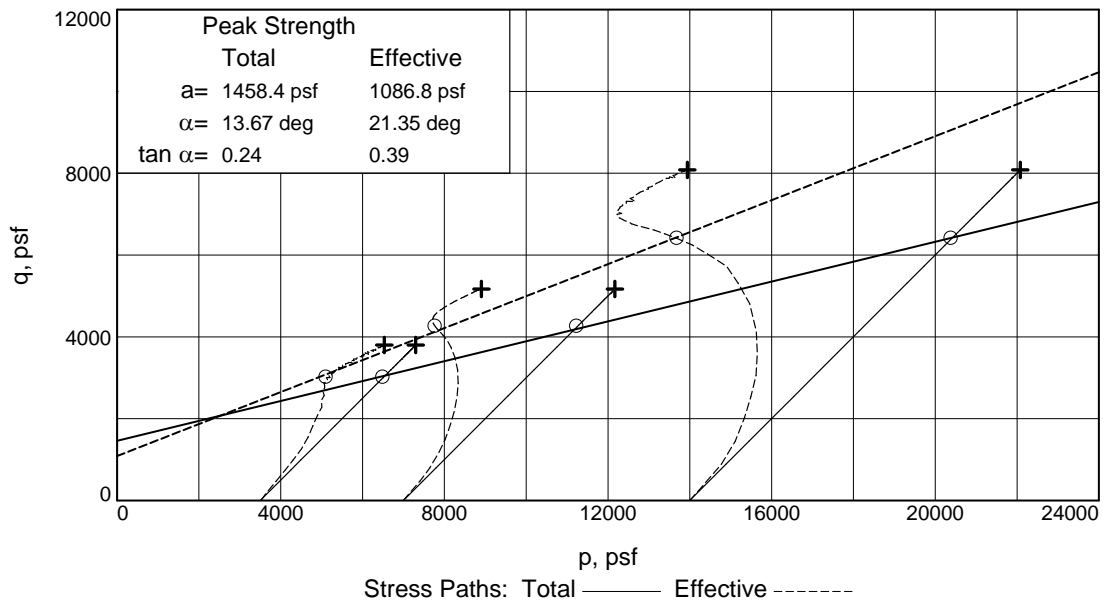
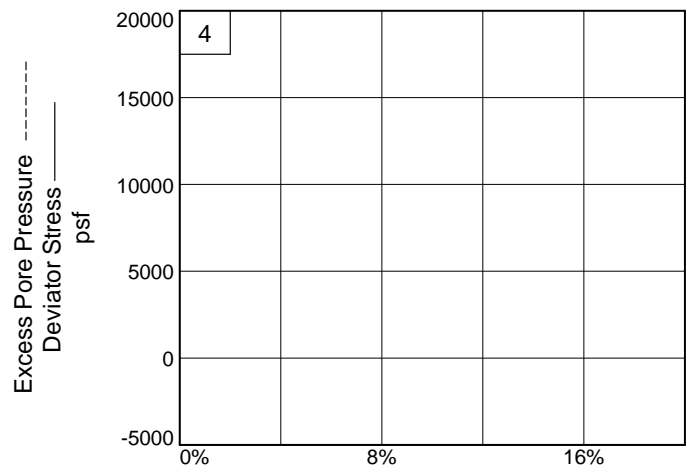
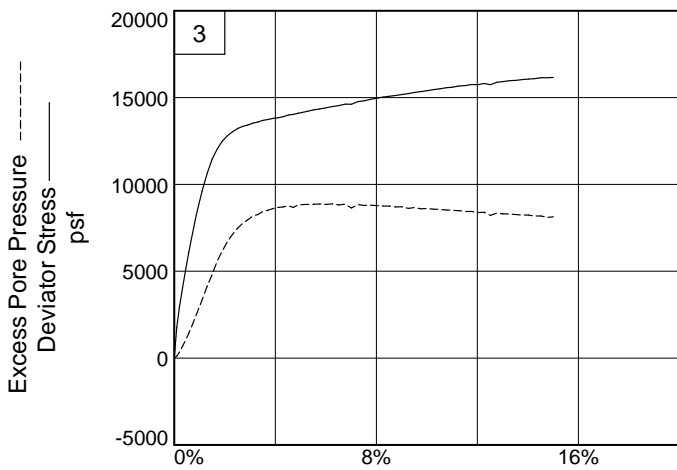
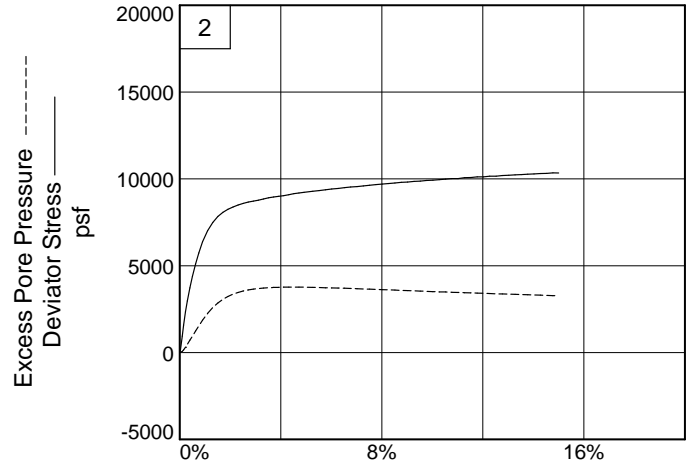
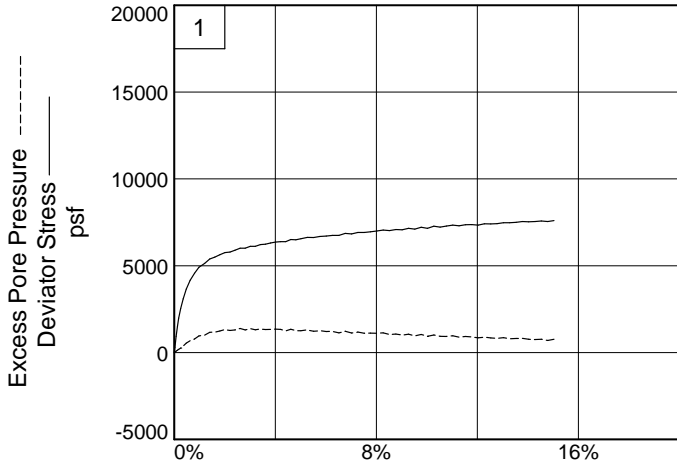
Test specification: ASTM D 698-12 Method A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
	ML	A-4(0)	16.6		29	1	0.1	57.9

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 102.8 pcf Optimum moisture = 18.5 %	Tan brown sandy SILT
Project No. 24201-03 Client: Transylvania County Solid Waste Project: Woodruff County Landfill Date: 12-10-2024 Source of Sample: TP Sample Number: TP-7 Bunnell Lammons Engineering, Inc. Greenville, SC	Remarks:

Tested By: MW Checked By: DM

Triaxial Shear Test Results



Client: Transylvania County Solid Waste

Project: Woodruff County Landfill

Source of Sample: TP

Sample Number: TP-1

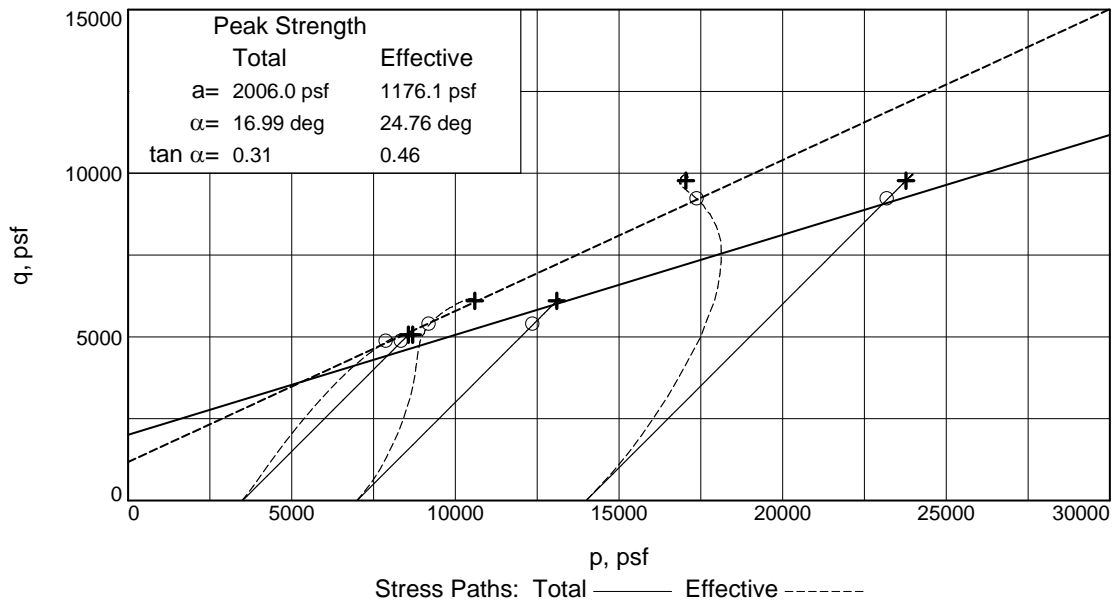
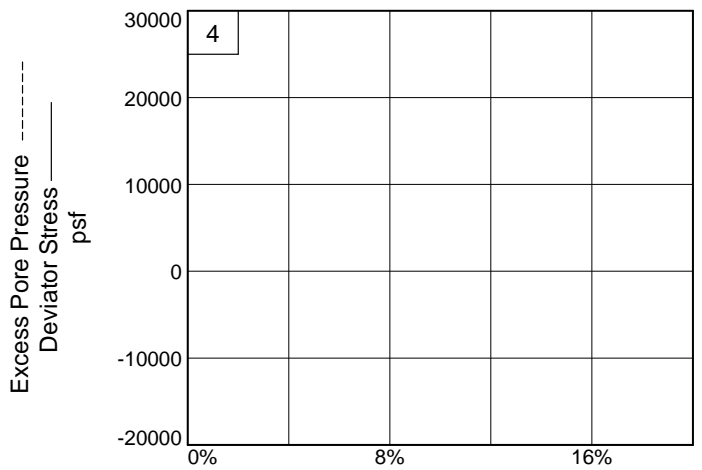
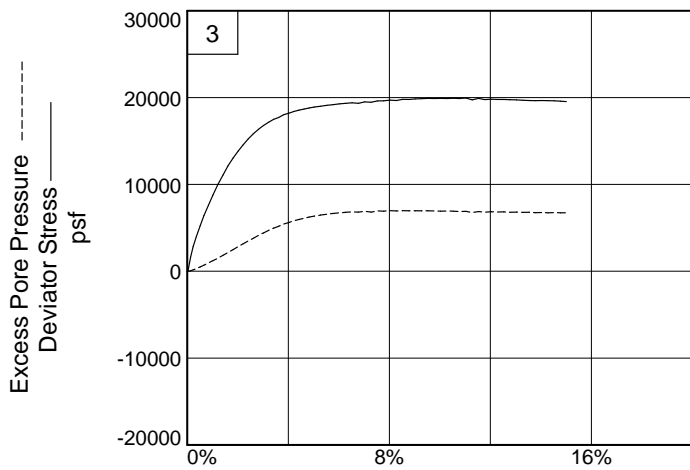
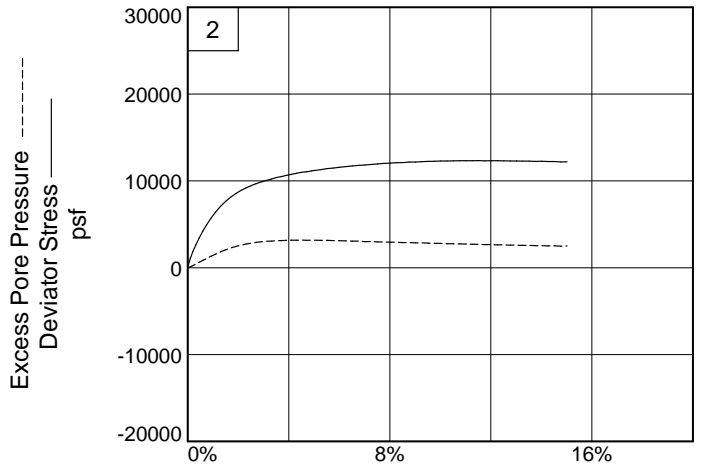
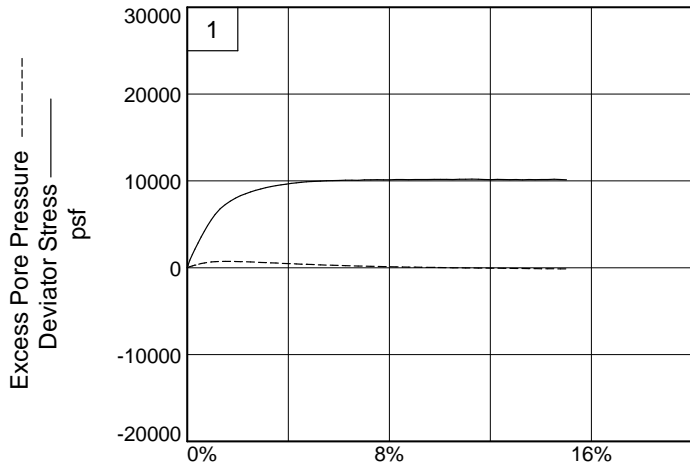
Project No.: 24201-03

Figure _____

Bunnell Lammons Engineering, Inc.

Tested By: JM

Checked By: ML



Client: Transylvania County Solid Waste

Project: Woodruff County Landfill

Source of Sample: TP

Sample Number: TP-2

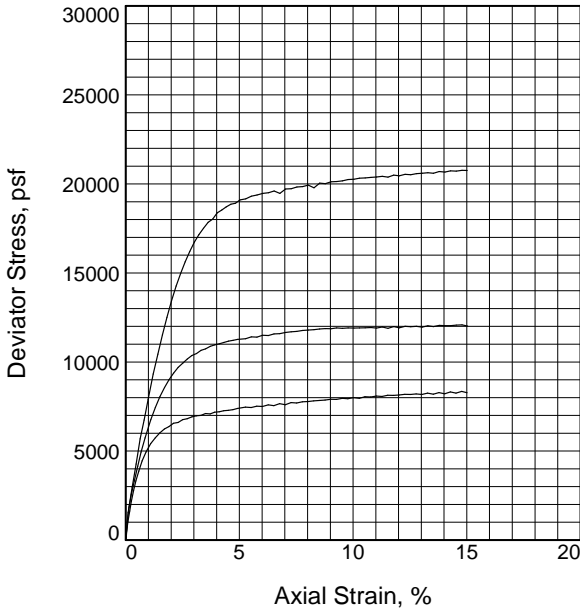
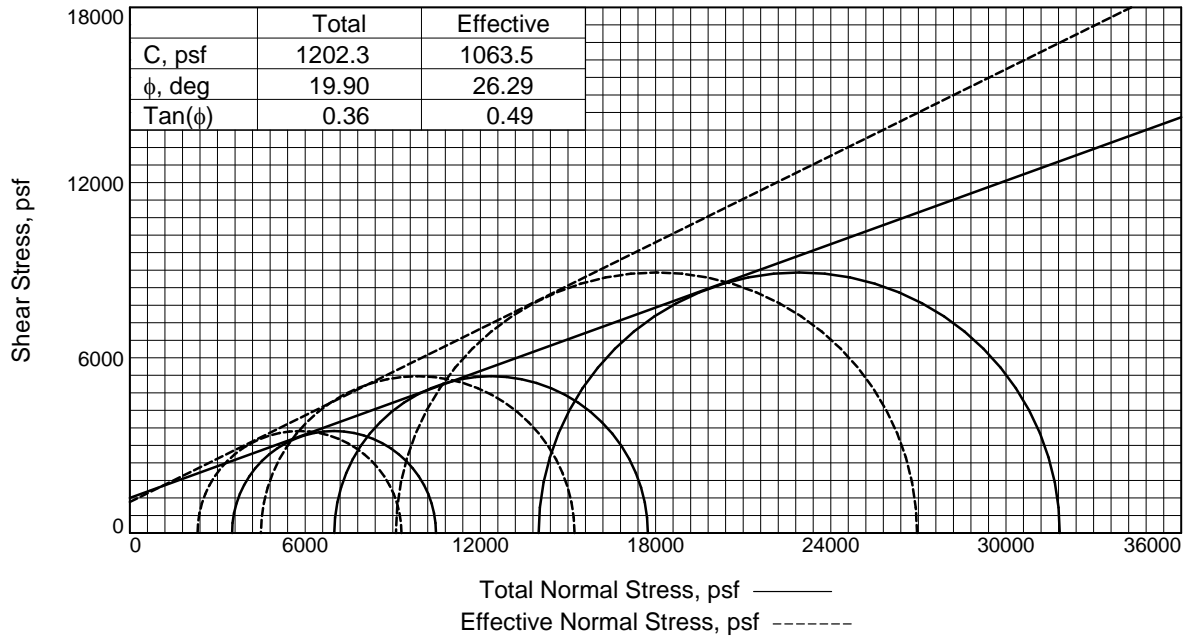
Project No.: 24201-03

Figure _____

Bunnell Lammons Engineering, Inc.

Tested By: JM

Checked By: ML



Sample No.	1	2	3	
Initial	Water Content, %	16.1	16.1	16.1
	Dry Density, pcf	103.6	103.6	103.6
	Saturation, %	69.5	69.5	69.5
	Void Ratio	0.6269	0.6269	0.6269
	Diameter, in.	2.865	2.865	2.865
	Height, in.	6.000	6.000	6.000
At Test	Water Content, %	19.7	19.0	18.0
	Dry Density, pcf	104.8	105.7	107.3
	Saturation, %	87.1	86.3	85.3
	Void Ratio	0.6090	0.5953	0.5712
	Diameter, in.	2.857	2.850	2.830
	Height, in.	5.968	5.945	5.938
Strain rate, %/min.	0.08	0.08	0.08	
Eff. Cell Pressure, psi	24.300	48.600	97.200	
Fail. Stress, psf	6982.2	10737.4	17844.9	
Excess Pore Pr., psf	1183.6	2512.2	4887.2	
Strain, %	3.1	3.5	3.6	
Ult. Stress, psf	8271.5	12019.2	20755.8	
Excess Pore Pr., psf	656.2	2599.5	6457.6	
Strain, %	15.0	15.0	15.0	
$\bar{\sigma}_1$ Failure, psf	9297.7	15223.6	26954.5	
$\bar{\sigma}_3$ Failure, psf	2315.6	4486.2	9109.6	

Type of Test:

CU with Pore Pressures

Sample Type: Remolded

Description: Tan brown sandy SILT

LL= 28 PL= 23 PI= 5

Assumed Specific Gravity= 2.7

Remarks:

Figure _____

Client: Transylvania County Solid Waste

Project: Woodruff County Landfill

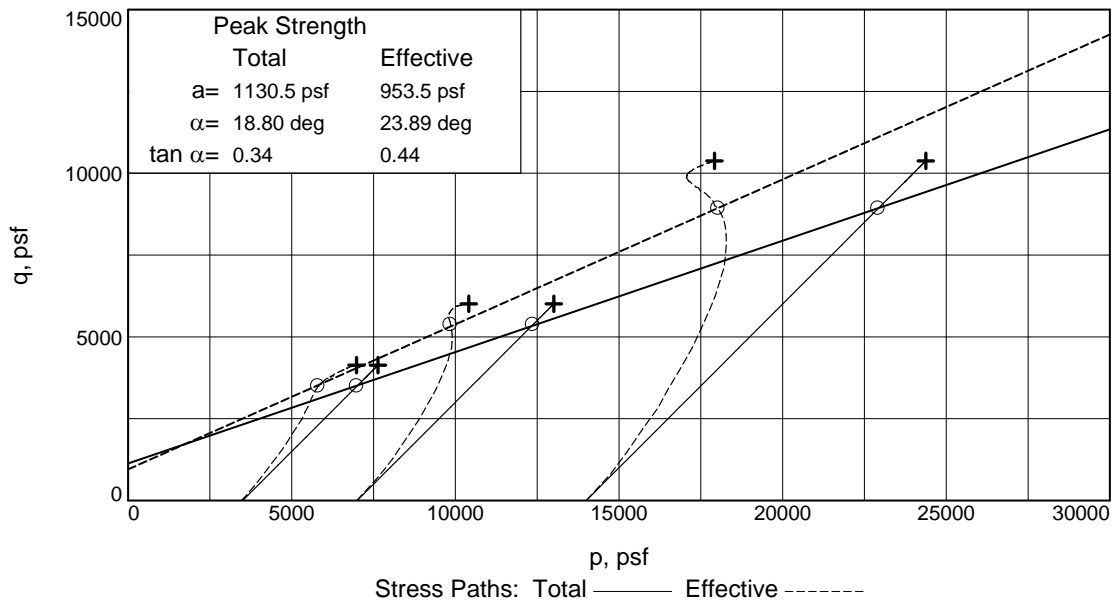
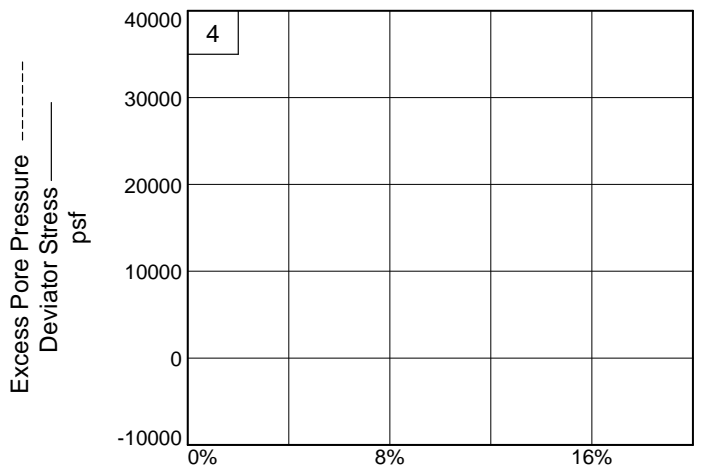
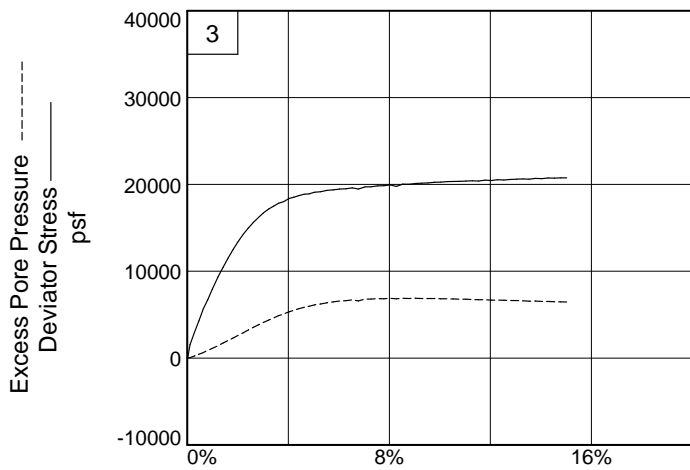
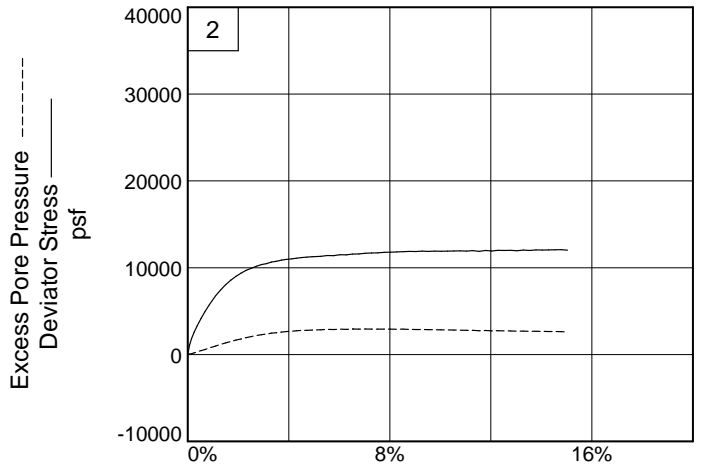
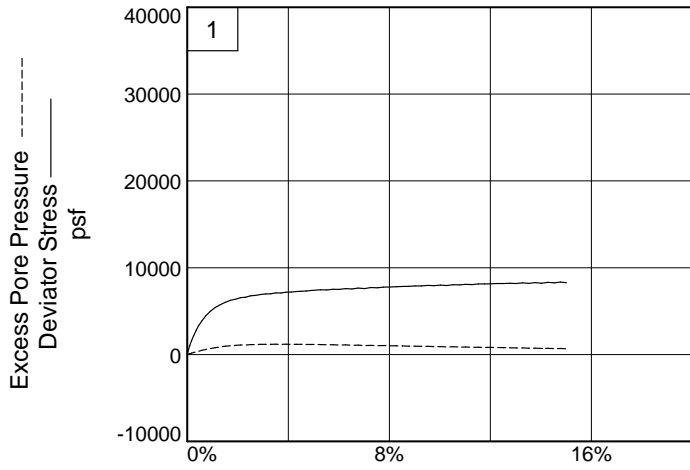
Source of Sample: TP

Sample Number: TP-3A

Proj. No.: 24201-03

Date Sampled:

TRIAXIAL SHEAR TEST REPORT
Bunnell Lammons Engineering, Inc.
Greenville, SC



Client: Transylvania County Solid Waste

Project: Woodruff County Landfill

Source of Sample: TP

Sample Number: TP-3A

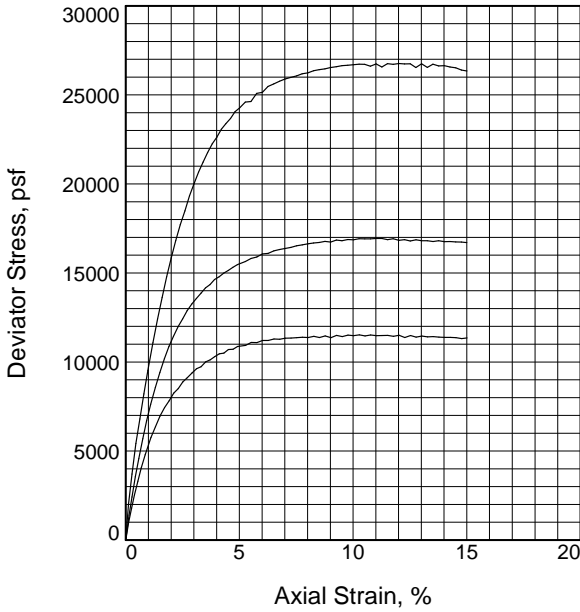
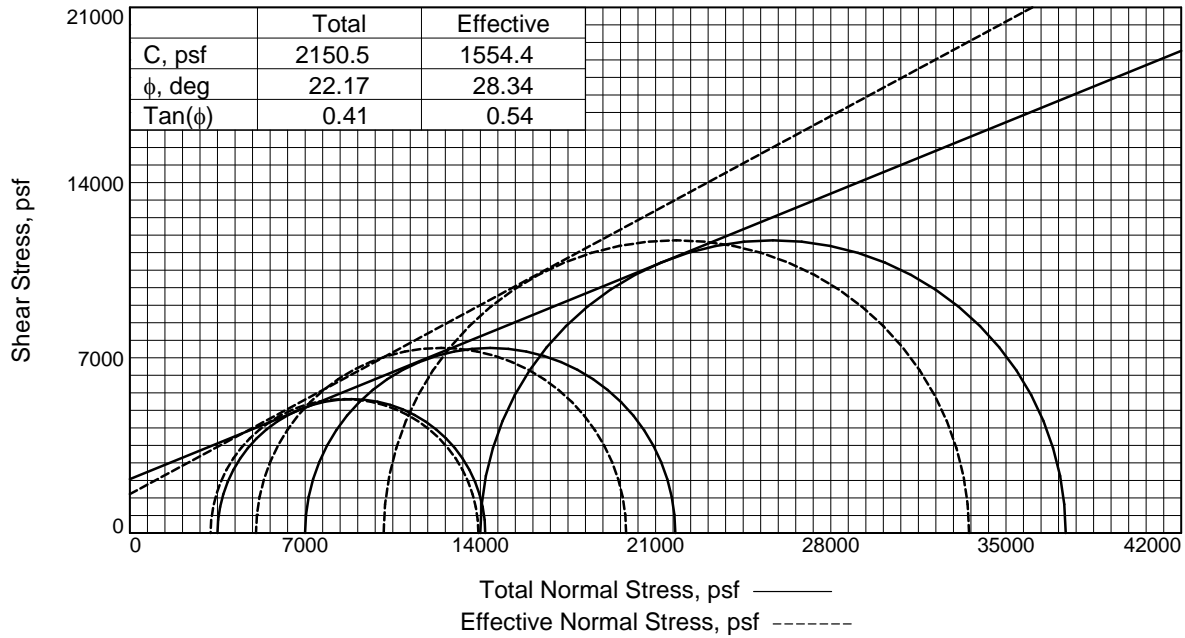
Project No.: 24201-03

Figure _____

Bunnell Lammons Engineering, Inc.

Tested By: JM

Checked By: ML



Sample No.	1	2	3	
Initial	Water Content, %	17.0	17.0	17.0
	Dry Density, pcf	100.6	100.6	100.6
	Saturation, %	67.8	67.8	67.8
	Void Ratio	0.6750	0.6750	0.6750
	Diameter, in.	2.865	2.865	2.865
	Height, in.	6.000	6.000	6.000
At Test	Water Content, %	21.2	21.1	20.4
	Dry Density, pcf	102.3	103.6	104.7
	Saturation, %	88.3	90.8	90.3
	Void Ratio	0.6483	0.6265	0.6102
	Diameter, in.	2.851	2.837	2.827
	Height, in.	5.962	5.942	5.922
Strain rate, %/min.	0.08	0.08	0.08	
Eff. Cell Pressure, psi	24.300	48.600	97.200	
Fail. Stress, psf	10696.8	14789.5	23388.9	
Excess Pore Pr., psf	275.4	1961.5	3860.8	
Strain, %	4.5	4.1	4.4	
Ult. Stress, psf	11351.1	16709.4	26346.4	
Excess Pore Pr., psf	-677.8	1212.5	4418.6	
Strain, %	15.0	15.0	15.0	
$\bar{\sigma}_1$ Failure, psf	13920.7	19826.4	33524.9	
$\bar{\sigma}_3$ Failure, psf	3223.8	5036.9	10136.0	

Type of Test:

CU with Pore Pressures

Sample Type: Remolded

Description: Light brown sandy SILT

LL= 25 PL= 23 PI= 2

Assumed Specific Gravity= 2.7

Remarks:

Figure _____

Client: Transylvania County Solid Waste

Project: Woodruff County Landfill

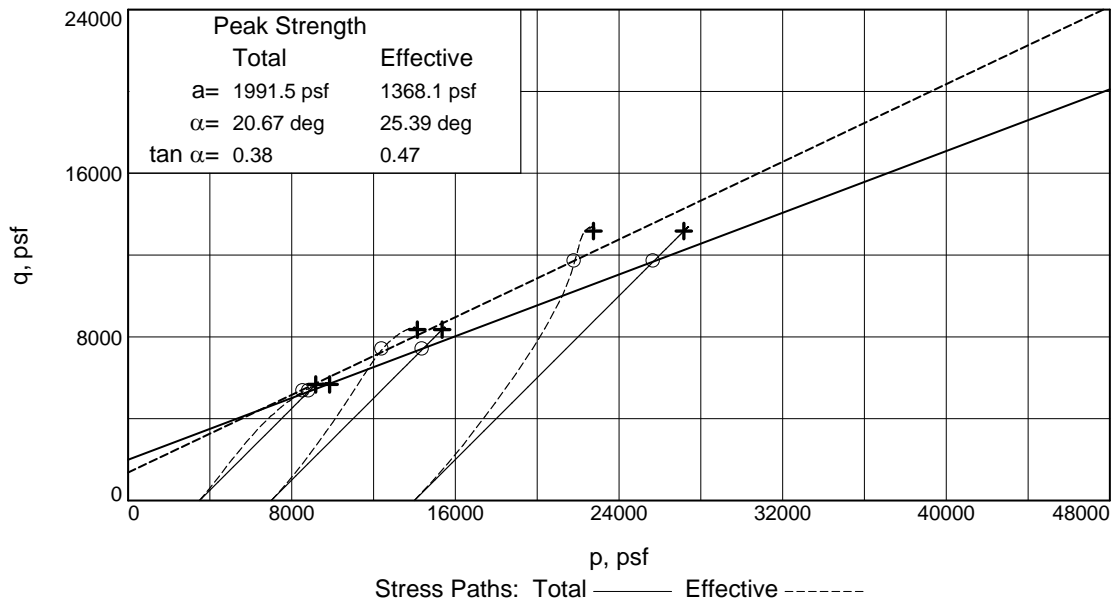
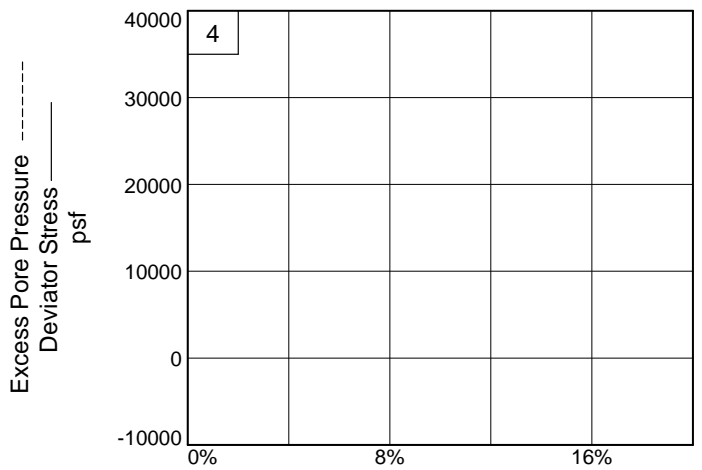
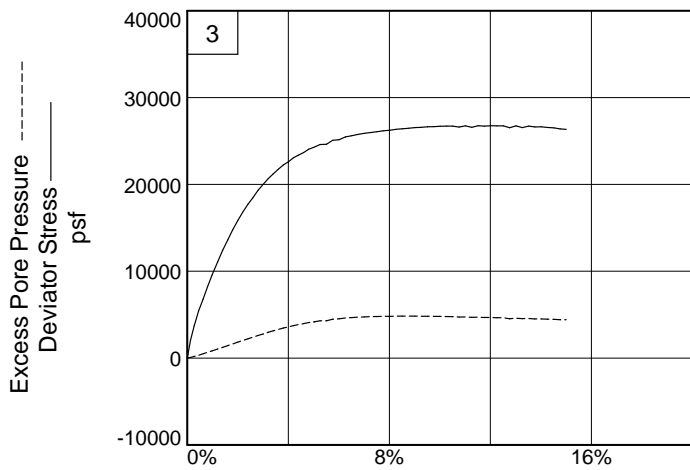
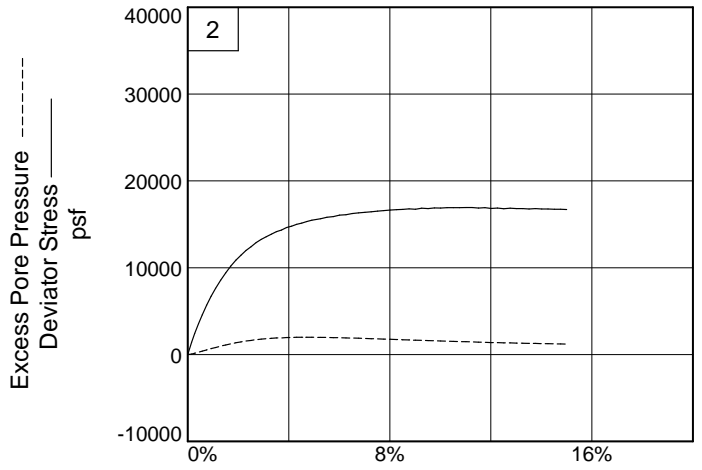
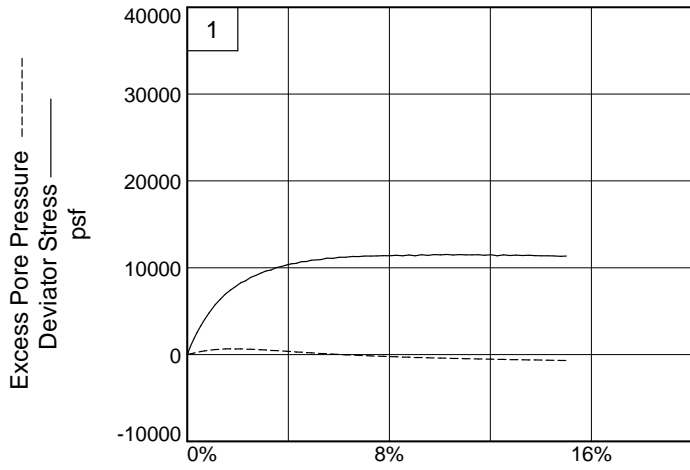
Source of Sample: TP

Sample Number: TP-3B

Proj. No.: 24201-03

Date Sampled:

TRIAXIAL SHEAR TEST REPORT
 Bunnell Lammons Engineering, Inc.
 Greenville, SC



Client: Transylvania County Solid Waste

Project: Woodruff County Landfill

Source of Sample: TP

Sample Number: TP-3B

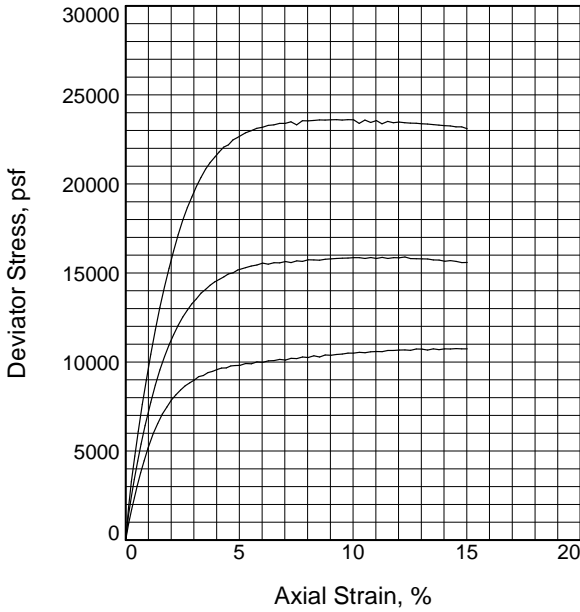
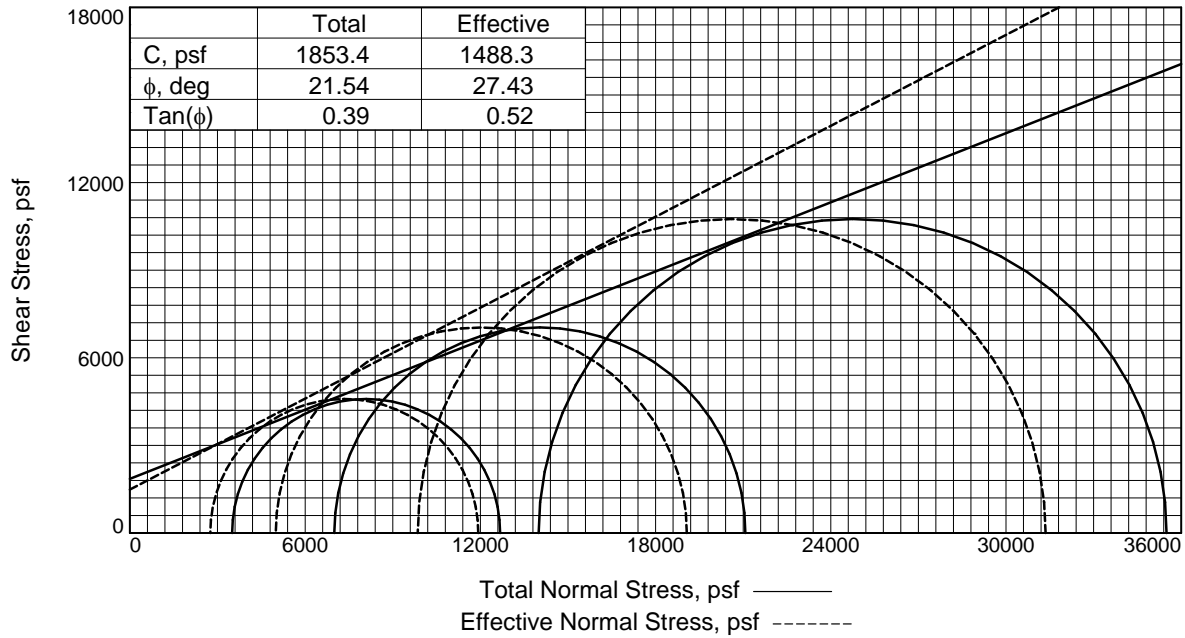
Project No.: 24201-03

Figure _____

Bunnell Lammons Engineering, Inc.

Tested By: JM

Checked By: ML



Sample No.	1	2	3	
Initial	Water Content, %	18.1	18.1	18.1
	Dry Density, pcf	99.7	99.7	99.7
	Saturation, %	70.7	70.7	70.7
	Void Ratio	0.6903	0.6903	0.6903
	Diameter, in.	2.865	2.865	2.865
	Height, in.	6.000	6.000	6.000
At Test	Water Content, %	22.2	21.5	21.0
	Dry Density, pcf	101.8	102.0	103.1
	Saturation, %	91.4	88.7	89.3
	Void Ratio	0.6556	0.6532	0.6344
	Diameter, in.	2.845	2.846	2.834
	Height, in.	5.960	5.948	5.928
Strain rate, %/min.	0.08	0.08	0.08	
Eff. Cell Pressure, psi	24.300	48.600	97.200	
Fail. Stress, psf	9177.9	14077.6	21501.1	
Excess Pore Pr., psf	747.5	2004.6	4141.3	
Strain, %	3.2	3.5	3.9	
Ult. Stress, psf	10738.7	15592.5	23104.3	
Excess Pore Pr., psf	-99.9	1450.8	5426.0	
Strain, %	15.0	15.0	15.0	
$\bar{\sigma}_1$ Failure, psf	11929.5	19071.4	31356.6	
$\bar{\sigma}_3$ Failure, psf	2751.7	4993.8	9855.5	

Type of Test:

CU with Pore Pressures

Sample Type: Remolded

Description: Light tan sandy SILT

LL= 26

PI= NP

Assumed Specific Gravity= 2.7

Remarks:

Figure _____

Client: Transylvania County Solid Waste

Project: Woodruff County Landfill

Source of Sample: TP

Sample Number: TP-3C

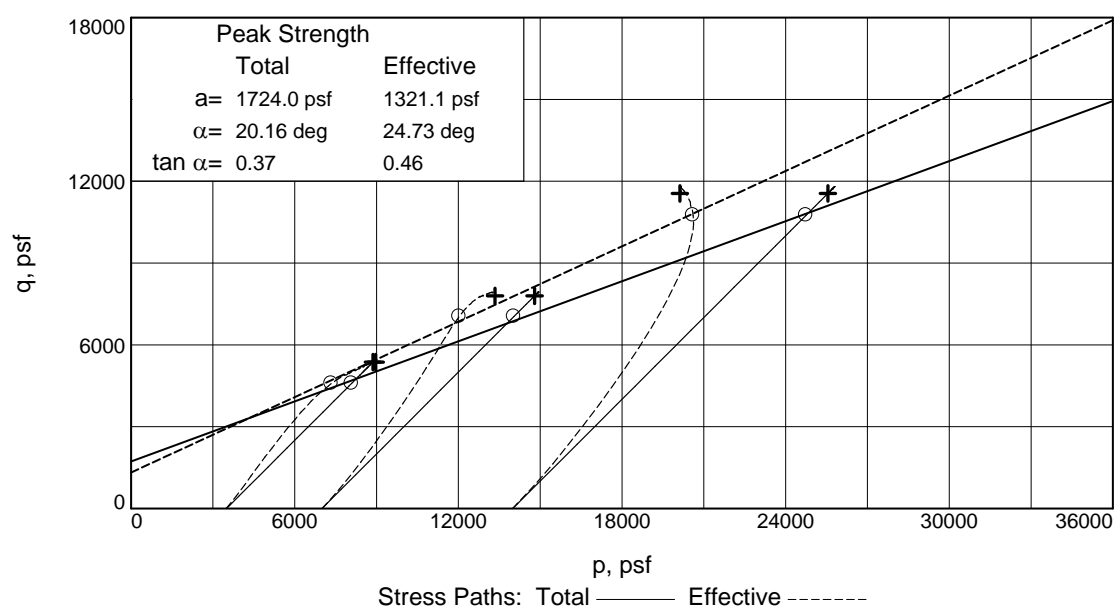
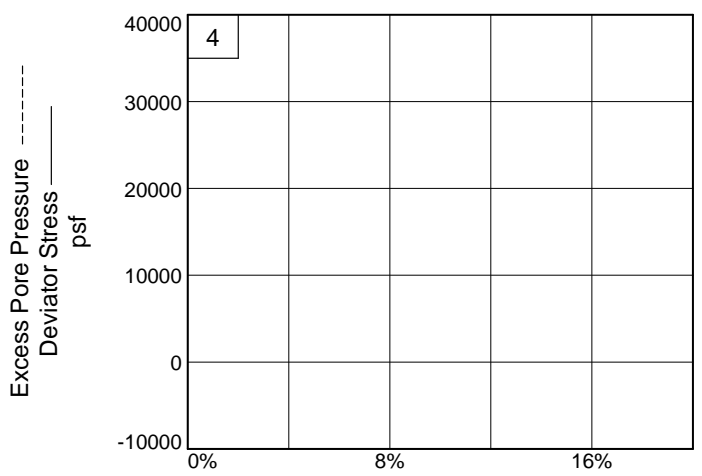
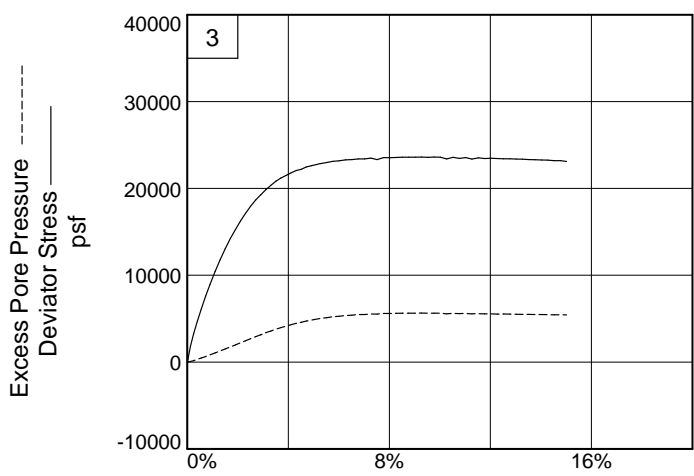
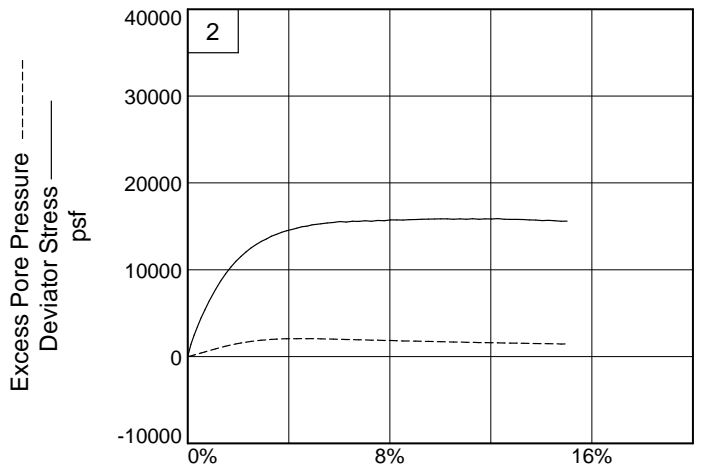
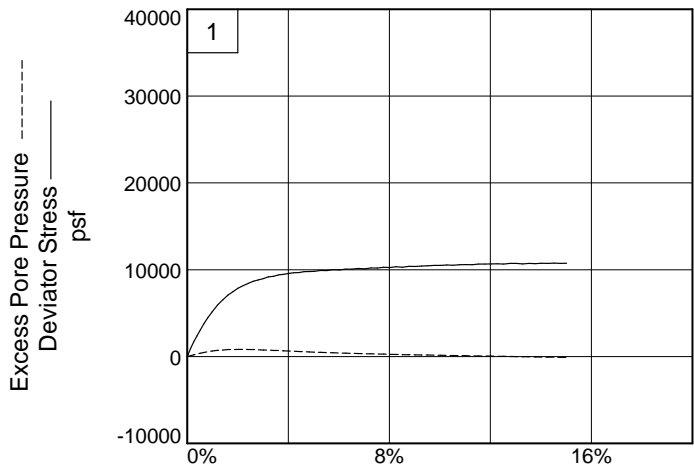
Proj. No.: 24201-03

Date Sampled:

TRIAXIAL SHEAR TEST REPORT
Bunnell Lammons Engineering, Inc.
Greenville, SC

Tested By: JM

Checked By: ML



Client: Transylvania County Solid Waste

Project: Woodruff County Landfill

Source of Sample: TP

Sample Number: TP-3C

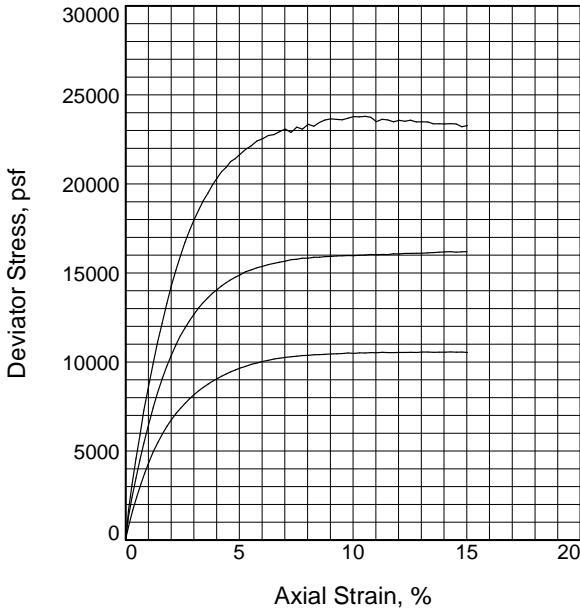
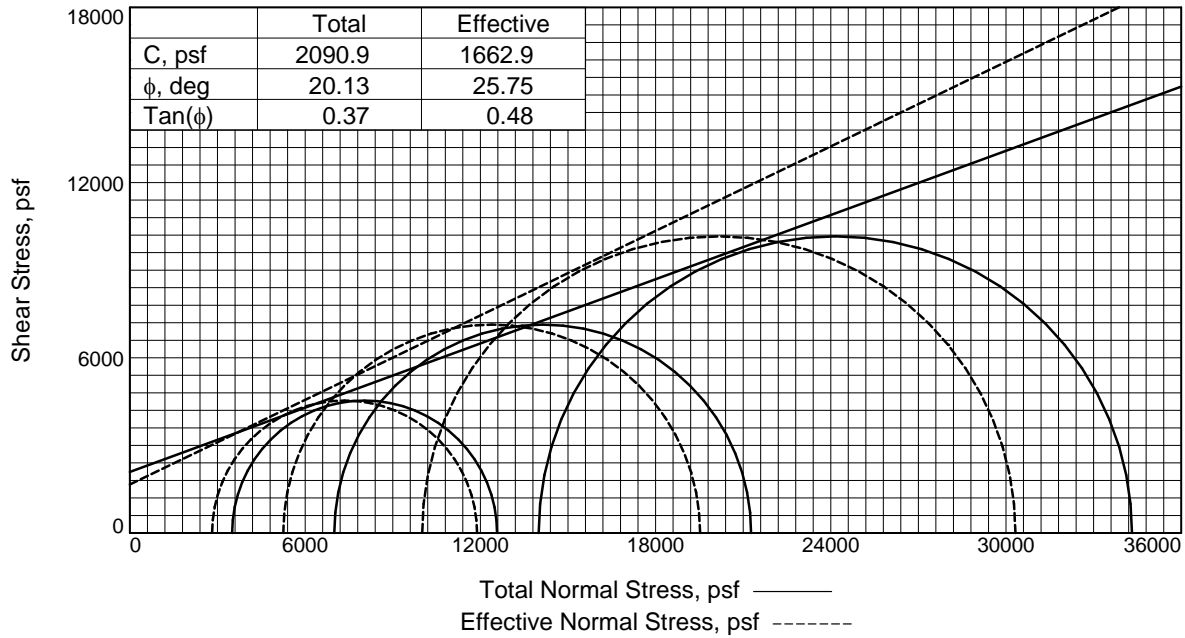
Project No.: 24201-03

Figure _____

Bunnell Lammons Engineering, Inc.

Tested By: JM

Checked By: ML



Sample No.	1	2	3	
Initial	Water Content, %	19.0	19.0	19.0
	Dry Density, pcf	95.0	95.0	95.0
	Saturation, %	66.5	66.5	66.5
	Void Ratio	0.7737	0.7737	0.7737
	Diameter, in.	2.865	2.865	2.865
	Height, in.	6.000	6.000	6.000
At Test	Water Content, %	25.3	24.2	23.4
	Dry Density, pcf	96.5	96.5	97.7
	Saturation, %	91.6	87.7	87.3
	Void Ratio	0.7465	0.7459	0.7245
	Diameter, in.	2.856	2.857	2.848
	Height, in.	5.946	5.938	5.905
Strain rate, %/min.	0.08	0.08	0.08	
Eff. Cell Pressure, psi	24.300	48.600	97.200	
Fail. Stress, psf	9071.5	14273.4	20316.2	
Excess Pore Pr., psf	684.0	1746.3	3989.1	
Strain, %	4.0	4.2	4.0	
Ult. Stress, psf	10534.6	16198.2	23279.2	
Excess Pore Pr., psf	-305.3	1148.8	4760.5	
Strain, %	15.0	15.0	15.0	
$\bar{\sigma}_1$ Failure, psf	11886.7	19525.4	30323.9	
$\bar{\sigma}_3$ Failure, psf	2815.2	5252.1	10007.7	

Type of Test:

CU with Pore Pressures

Sample Type: Remolded

Description: Light reddish brown SILT with sand

LL= 30 PL= 29 PI= 1

Assumed Specific Gravity= 2.7

Remarks:

Figure _____

Client: Transylvania County Solid Waste

Project: Woodruff County Landfill

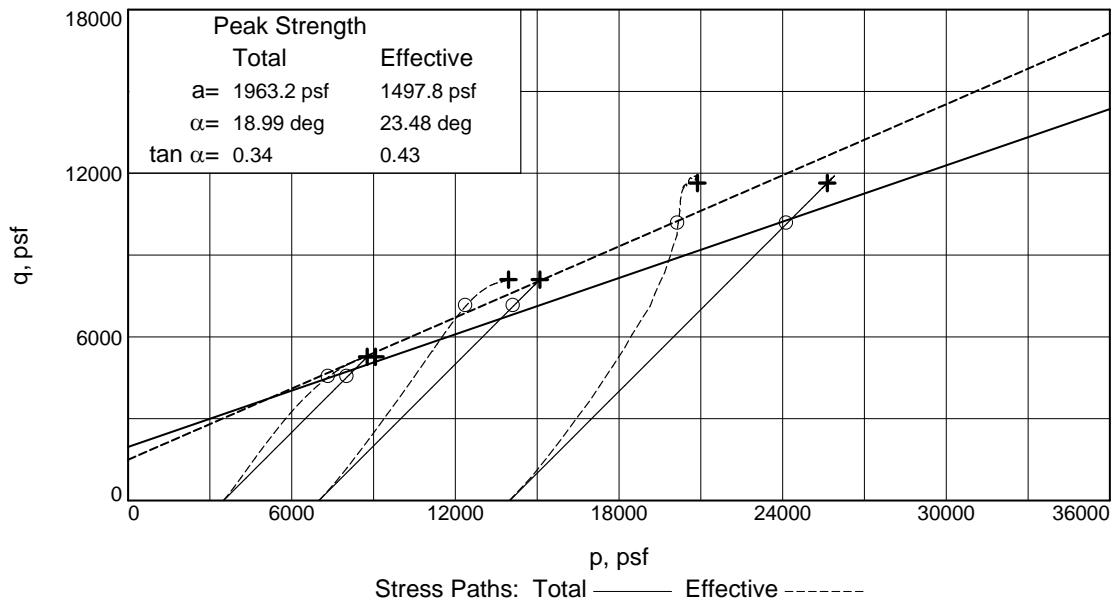
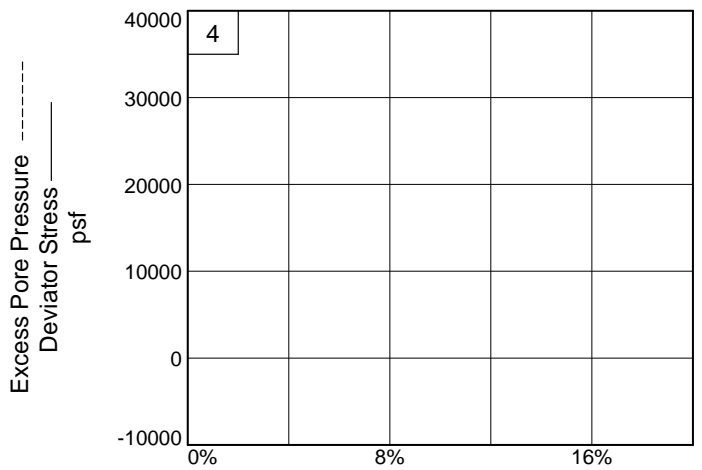
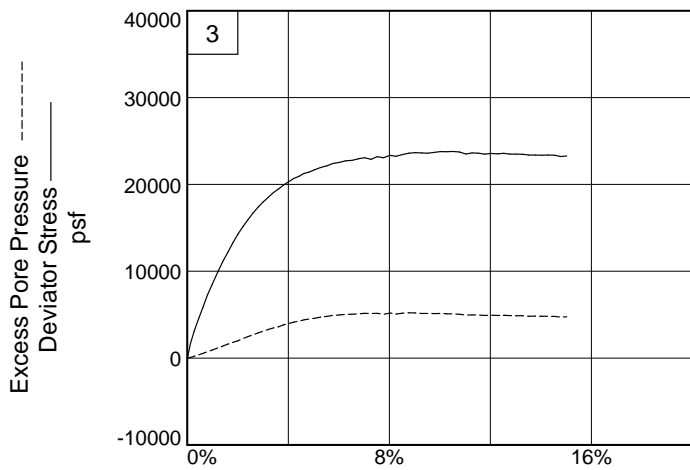
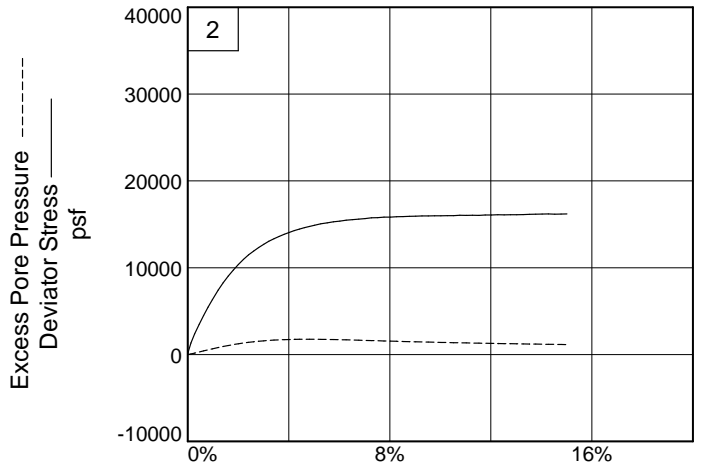
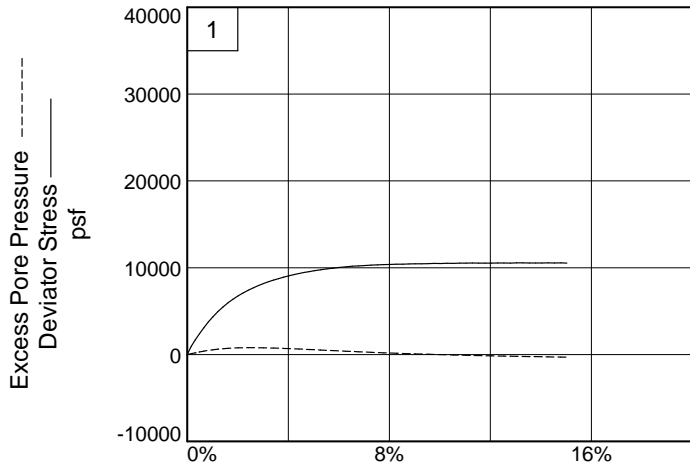
Source of Sample: TP

Sample Number: TP-4

Proj. No.: 24201-03

Date Sampled:

TRIAXIAL SHEAR TEST REPORT
Bunnell Lammons Engineering, Inc.
Greenville, SC



Client: Transylvania County Solid Waste

Project: Woodruff County Landfill

Source of Sample: TP

Sample Number: TP-4

Project No.: 24201-03

Figure _____

Bunnell Lammons Engineering, Inc.

Tested By: JM

Checked By: ML

ADDENDUM