Project Manual for
Sidewall Odor Mitigation System
ITB SW-23-010

City of Bristol, Virginia
Integrated Solid Waste Management Facility
Solid Waste Permit #588
2655 Valley Drive
Bristol, Virginia 24201
276-645-7380

SCS ENGINEERS

02218208.11 | Revised November 7, 2022

15521 Midlothian Turnpike, Suite 305
Midlothian, VA 23113
804-378-7440

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1 EXECUTIVE SUMMARY

This Project Manual has been prepared by SCS Engineers (SCS) for the City of Bristol, Virginia for the Sidewall Odor Mitigation System at the Integrated Solid Waste Management Facility (ISWMF or landfill). This Project Manual is intended to comply with the conditions of Solid Waste Permit #588. In order to facilitate compliance, portions of the specifications have been adapted from The Technical Specifications for the Bristol Quarry Balefill Solid Waste Permit #588 dated November 2, 1995 prepared by STS Consultants.

DOCUMENT 00 11 16

INVITATION TO BID

Project: Bristol ISWMF Landfill Sidewall Odor Mitigation System Construction

Owner:

City of Bristol
2655 Valley Drive
Bristol, VA 24201

Engineer:

SCS Engineers
15521 Midlothian Turnpike, Suite 305
Midlothian, VA 23113 USA

Date: November 7, 2022

Prospective Bidders

Your firm is invited to submit a sealed Bid clearly labeled as follows:

City of Bristol, VA
Attention: Emily Compton, Procurement Specialist
300 Lee Street
Bristol, VA 24201
Bid on Sidewall Odor Mitigation System
Due Date: November 22, 2022 2:00 PM
ITB# SW-23-010

Bids should be submitted to the City of Bristol for construction of a landfill sidewall odor mitigation system. The Owner will receive Bids until 2:00 local time on the 22nd day of November 2022, for the following project:

Description:

The Owner requires the Project to be completed in 180 calendar days from date of award of contract. Parts of the Work must be substantially completed on or before the following Milestone(s):

- Phase 1 Completion - December 31, 2022

Electronic Bidding Documents may be obtained from the City of Bristol's website or the office of the Engineer by emailing aworth@scsengineers.com.

Hard Copies of Bidding Documents may be obtained from the office of the Engineer at a cost of $200.00 for one set.

An optional Pre-Bid Conference will be held at 2:00 PM on the 15th day of November 2022 at the Bristol Integrated Solid Waste Management Facility, 2655 Valley Drive, Bristol, VA 24201. Prospective Bidders are encouraged to attend this meeting. Site visits other than the pre-bid meeting should be coordinated with Mike Martin by calling 1 (276) 645-7380. Bidders that do not attend the Pre-Bid Conference must schedule at least one site visit prior to Bid submittal.

Bidders should submit questions to the Engineer at the pre-bid meeting or via e-mail to aworth@scsengineers.com prior to the pre-bid meeting.

Submit your Bid on the Bid Form provided. Bidders are required to complete Bid Form 00 41 13. Bidders may supplement this form as appropriate.

Your Bid will be required to be submitted under a condition of irrevocability for a period of 60 days after submission subject to Section 2.2-4330 of the Code of Virginia, as amended.

The Owner reserves the right to accept or reject any or all Bids.

END OF DOCUMENT 00 11 16

SECTION 00 21 13[i]

INSTRUCTIONS TO BIDDERS

0.0 INTENT

The intent of this Bid request is to obtain an offer to perform work to complete the construction of a sidewall odor mitigation system, in accordance with Contract Documents.

1.0 DEFINED TERMS

1.1 1.01 BIDDING DOCUMENTS

Contract Documents supplemented with Advertisement for Bids, Invitation To Bid, Instructions to Bidders, Information Available to Bidders, Bid Form, and bid securities, identified.

1.2 CONTRACT DOCUMENTS

Those items so designated in the Agreement, and which together comprise the Contract.

1.3 BID

Executed Bid Form and required attachments submitted in accordance with these Instructions to Bidders.

1.4 BID PRICE

Monetary sum identified by the Bidder in the Bid Form.

2.0 BIDDING DOCUMENTS

2.1

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.

2.2

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.

2.3

Electronic Bidding Documents may be obtained from the City's website or the office of the Engineer by emailing aworth@scsengineers.com. Hard Copies of Bidding Documents may be obtained from the office of the Engineer at a cost of $200.00 for one set. Prospective Bidders may view the Bid Documents at the office of the Owner or the office of the Engineer.

2.4 ELECTRONIC DOCUMENTS

2.4.1

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.

2.4.1.1

Bidding Documents will be provided in Adobe PDF (Portable Document Format) (.pdf) that is readable by Adobe Acrobat Reader Version 2017 or later. 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.

2.4.1.2

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 2.4.1.1 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.

3.0 BIDDER QUALIFICATIONS

To demonstrate qualification for performing the Work of this Contract, each Bidder shall submit written evidence including financial data, previous experience, present commitments, information on

subcontractors (including firms providing construction quality control), suppliers or others, and other such data as is required by the Bidder's Qualification Statement. Each Bid must contain evidence that the Bidder has a Class A license to do contracting work issued by the Commonwealth of Virginia.

4.0 PRE BID CONFERENCE

4.1

A Bidders conference is scheduled for 2:00 PM on November 15th, 2022 at the location of the Bristol Integrated Solid Waste Management Facility 2655 Valley Drive, Bristol, VA 24201.

4.2

General contract and major subcontract Bidders and suppliers are invited to attend.

4.3

Representatives of the Owner and Engineer will be in attendance.

4.4

Summarized minutes of this meeting will be circulated to known Bidders. These minutes will not form part of Contract Documents.

4.5

Information relevant to Bidding Documents will be issued by Addendum.

5.0 SITE AND OTHER AREAS

5.1 Site and Other Areas

5.1.1

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.

5.2 EXISTING SITE CONDITIONS

5.2.1 Subsurface and Physical Conditions; Hazardous Environmental Conditions

5.2.1.1 Supplementary Conditions

The Supplementary Conditions identify the following regarding existing conditions at or adjacent to the Site:

- Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data.
- 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.
- Reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site.
- Technical Data contained in such reports and drawings.

5.2.1.2

Owner will make copies of reports and drawings referenced above available to any Bidder on request. 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.

5.3 OTHER SITE-RELATED DOCUMENTS

5.3.1

In addition to the documents regarding existing Site conditions referred to in Paragraph 5.2.1.1, the following other documents relating to conditions at or adjacent to the Site are known to Owner and made available to Bidders for reference:

- Western Chimney Landfill Gas Pilot Mitigation Program Letter prepared by Draper Aden Associates dated January 31, 2022

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

5.3.2

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.

5.3.3

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

5.3.4

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.

5.4 SITE VISIT AND TESTING BY BIDDERS

5.4.1

Bidder is required to visit the Site and conduct a thorough visual examination of the Site and adjacent areas. During the visit the Bidder must not disturb any ongoing operations at the Site.

5.4.2

A Site visit is scheduled following the pre-bid conference.

5.4.3

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

5.4.4

All access to the Site other than during a regularly scheduled Site visit must be coordinated through the following Owner contact for visiting the Site: Mike Martin. Bidder must conduct the required Site visit during normal working hours.

Currently occupied premises at Project site are open for examination by Bidders only during the following hours:

- 7:00 AM to 4:00 PM Monday through Friday

5.4.5

Bidder is not required to conduct any subsurface testing, or exhaustive investigations of Site conditions.

5.4.6

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.

5.4.7

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.

5.4.8

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

5.5 OWNER'S SAFETY PROGRAM

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.

5.6 OTHER WORK AT THE SITE

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.

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.

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.

6.0 BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

6.1

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.

6.2

If Bidder is awarded the Contract, Bidder (as Contractor) will make similar express representations and certifications when it executes the Agreement.

7.0 INTERPRETATIONS AND ADDENDA

7.1

Owner on its own initiative may issue Addenda to clarify, correct, supplement, or change the Bidding Documents.

7.2

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:

Questions are to be submitted by November 15th, 2022.

7.3

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 less than seven days prior to the date for opening of Bids may not be answered.

7.4

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.

7.5

Bidders must notify Engineer in writing of all conflicts, errors, or discrepancies in the Contract Documents.

8.0 BID SECURITY

8.1

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 8.1.1. Such Bid bond will be issued in the form included in the Bidding Documents.

8.1.1

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.

8.2

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.

8.3

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.

8.4

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.

9.0 CONTRACT TIMES

9.1 TIME IS OF THE ESSENCE

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.

9.2 CONTRACT TIMES

The Work will be substantially complete within 150 days after the date when the Contract Times commence to run, and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within 180 days after the date when the Contract Times commence to run.

9.3 MILESTONES

Parts of the Work must be substantially completed on or before the following Milestone(s):

- Phase 1 Completion - December 31, 2022

10.0 SUBSTITUTE AND "OR EQUAL" ITEMS

10.1

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.

10.2

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.

11.0 SUBCONTRACTORS, SUPPLIERS, AND OTHERS

11.1

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 within five days after Bid opening:

- Geosynthetics Supplier and Installer
- Erosion and Sediment Control Installer
- Soils and Geosynthetics Testing Firms

11.2

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, Bidder's Bid price will be increased (or decreased) by the difference in cost occasioned by such substitution, and Owner may consider such price adjustment in evaluating Bids and making the Contract award.

11.3

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.

12.0 PREPARATION OF BID

12.1

The Bid Form is included with the Bidding Documents.

12.1.1

All blanks on the Bid Form must be completed in ink 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.

12.1.2

If the Bid Form expressly indicates that submitting pricing on a specific alternate item is optional, and Bidder elects to not furnish pricing for such optional alternate item, then Bidder may enter the words “No Bid” or “Not Applicable.”

12.2

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 which 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.

12.3

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 address and state of incorporation must be shown.

12.4

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.

12.5

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.

12.6

A Bid by an individual must show the Bidder's name and official address.

12.7

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.

12.8

All names must be printed in ink below the signatures.

12.9

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 email 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, or Bidder must certify in writing that it will obtain such licensure within the time for acceptance of Bids and attach such certification to the Bid. Bidder's state contractor license number, if any, must also be shown on the Bid Form.

13.0 BASIS OF BID

13.1 LUMP SUM

13.1.1 Bid Items

Bidders must submit a Bid on a lump sum basis for each item of Work listed in the lump sum section of the Bid Form.

13.2 UNIT PRICE

13.2.1 Bid Items

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.

13.2.2 Quantities

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 Section 01 20 00 Measurement and Payment.

13.2.3 Discrepancies

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.

14.0 SUBMITTAL OF BID

14.1

The Bidding Documents include one separate unbound copy of the Bid Form, and, if required, the Bid Bond Form. The unbound 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 2 of the Bid Form.

14.2

A Bid must be received no later than the date and time prescribed and at the place indicated in the Advertisement or invitation to bid 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 the location designated in the Advertisement.

14.3

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.

15.0 MODIFICATION AND WITHDRAWAL OF BID

15.1

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.

15.2

If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid and submit a new Bid prior to the date and time for the opening of Bids.

15.3

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 will be disqualified from further bidding on the Work.

16.0 OPENING OF BIDS

16.1

Bids will be opened at the time and place indicated in the advertisement or invitation to bid and, unless obviously non-responsive, read aloud publicly. An abstract of the amounts of the base Bids and major alternates, if any, will be made available to Bidders after the opening of Bids.

17.0 BIDS TO REMAIN SUBJECT TO ACCEPTANCE

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.

18.0 EVALUATION OF BIDS AND AWARD OF CONTRACT

18.1

Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner also reserves the right to waive all minor Bid informalities not involving price, time, or changes in the Work.

18.2

Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible.

18.3

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.

18.4

If Owner awards the contract for the Work, such award will be to the responsible Bidder submitting the lowest responsive Bid.

18.5 EVALUATION OF BIDS

18.5.1

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.

18.5.2

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.

18.5.3

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.

19.0 BONDS AND INSURANCE

19.1 PERFORMANCE BOND

A performance bond on the part of the contractor for 100 percent of the contract price. A "performance bond" is one executed in connection with a contract to secure fulfillment of all the contractor's requirements under such contract.

19.2 PAYMENT BOND

A payment bond on the part of the contractor for 100 percent of the contract price. A "payment bond" is one executed in connection with a contract to assure payment as required by law of all persons supplying labor and material in the execution of the work provided for in the contract.

19.3 BID BOND

Paragraph 8, Bid Security, of these Instructions, addresses any requirements for providing bid bonds as part of the bidding process.

20.0 SIGNING OF AGREEMENT

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.

END OF SECTION 00 21 13

SECTION 00 41 13

BID FORM

1.0 OWNER AND BIDDER

1.1

This Bid is submitted to: City of Bristol 300 Lee St, Bristol, VA 24201

1.2

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.

2.0 ATTACHMENTS TO THIS BID

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

- Required Bid security;
- List of Proposed Subcontractors;
- List of Proposed Suppliers;
- Evidence of authority to do business in the state of the Project; or a written covenant to obtain such authority within the time for acceptance of Bids;
- Contractor's license number as evidence of Bidder's State Contractor's License or a covenant by Bidder to obtain said license within the time for acceptance of Bids; and
- Required Bidder Qualification Statement with supporting data.

3.0 BASIS OF BID—UNIT PRICES

3.1 UNIT PRICE BIDS

Bidders should submit prices for the construction of the sidewall odor mitigation system. Bids will be evaluated on the lowest total price. Payment applications will be submitted separately for each category and the City of Bristol may elect to make separate payments for each category.

3.1.1 Unit Price – Sidewall Odor Mitigation System

#	Description	Unit[1,2]	Unit Price	Phase 1 Estimated Quantity	Phase 2 Estimated Quantity	Phase 1 Subtotal	Phase 2 Subtotal
1	Mobilization/Demobilization	LS	N/A	1	1	$	$
2	Health and Safety Planning and Accommodations	LS	N/A	1	1	$	$
3	Blower/Flare Piping Improvements	LS	N/A	1	0	$	
4	Perimeter LFG Horizontal Collector - Materials	Linear Ft	$	0	4700	$	$
5	Perimeter LFG Horizontal Collector - Installation	Linear Ft	$	222	4700	$	$
6	Sidewall Preparation and Repair	Linear Ft	$	222	4700	$	$
7	External Odor Mitigation System Horizontal Collector - Materials	Linear Ft	$	0	4700	$	$
8	External Odor Mitigation System Horizontal Collector - Installation	Linear Ft	$	222	4700	$	$
9	Low Permeability Soil Plug – Materials	Linear Ft	$	0	4700	$	$
10	Low Permeability Soil Plug – Installation	Linear Ft	$	222	4700	$	$
11	Soil Cover - Materials	Linear Ft	$	0	4700	$	$
12	Soil Cover - Installation	Linear Ft	$	288	4700	$	$
13	Temporary Termination of Pilot System	Each	$	2	0	$	$
14	Horizontal Collector Wellhead	Each	$	4	48	$	$

[1] LS indicates lump sum price
[2] Per linear ft of OMS indicates pricing is per installed linear foot of the Odor Mitigation System

#	Description	Unit[1,2]	Unit Price	Phase 1 Estimated Quantity	Phase 2 Estimated Quantity	Phase 1 Subtotal	Phase 2 Subtotal
15	Isolation Valves	Each	$	3	0	$	$
16	4" Landfill Gas Header - Materials	Ft	$	0	12,000	$	$
17	4" Landfill Gas Header - Installation	Ft	$	800	12,000	$	$
18	2" Airline and 4" Forcemain - Materials	Ft	$	0	1000	$	$
19	2" Airline and 4" Forcemain – Installation in trench	Ft	$	200	1000	$	$
20	Perimeter LFG Horizontal Collector Pump	Each	$	1	5	$	$
21	External Odor Mitigation System Horizontal Collector Pump	Each	$	1	5	$	$

3.1.2 Total Bid Price

Total Phase 1 Price	$
Total Phase 2 Price	$
Total for Phase 1 and Phase 2	$

4.0 TIME OF COMPLETION

4.1 TIME IS OF THE ESSENCE

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

4.2 CONTRACT TIMES

Bidder agrees that Phase 1 of the Work will be substantially complete within 30 calendar days after the date when the Contract Times commence to run. Bidder agrees that Phases 1 and 2 of the Work will be substantially complete within 150 calendar days after the date when the Contract Times commence to run, and will be completed and ready for final payment within 180 calendar days after the date when the Contract Times commence to run.

4.3 MILESTONES

Parts of the Work must be substantially completed on or before the following Milestone(s):

- Phase 1 Completion - December 31, 2022

4.4 LIQUIDATED DAMAGES

Bidder accepts the provisions of the Terms and Conditions as to liquidated damages.

5.0 BIDDER'S ACKNOWLEDGEMENTS: ACCEPTANCE PERIOD, INSTRUCTIONS, AND RECEIPT OF ADDENDA

5.1 BID ACCEPTANCE PERIOD

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.

5.2 INSTRUCTIONS TO BIDDERS

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

5.3 RECEIPT OF ADDENDA

Bidder hereby acknowledges receipt of the following Addenda:

Addendum Number	Addendum Date

6.0 BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

6.1 BIDDER'S REPRESENTATIONS

6.1.1

In submitting this Bid, Bidder represents the following:

6.1.1.1

Bidder has examined and carefully studied the Bidding Documents, including Addenda.

6.1.1.2

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.

6.1.1.3

Bidder is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.

6.1.1.4

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.

6.1.1.5

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.

6.1.1.6

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.

6.1.1.7

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.

6.1.1.8

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.

6.1.1.9

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.

6.1.1.10

The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

6.1.1.11

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.

6.2 BIDDER'S CERTIFICATIONS

6.2.1

The Bidder certifies the following:

6.2.1.1

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.

6.2.1.2

Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid.

6.2.1.3

Bidder has not solicited or induced any individual or entity to refrain from bidding.

6.2.1.4

Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 6.2.1.4:

6.2.1.4.1

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.

6.2.1.4.2

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.

6.2.1.4.3

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.

6.2.1.4.4

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.

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, 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.: (if applicable) _____

END OF SECTION 00 41 13

SECTION 00 43 10

BID BOND

LANDFILL TEMPERATURE MONITORING SYSTEM INSTALLATION PROJECT

BRISTOL INTEGRATED SOLID WASTE MANAGEMENT FACILITY

Bids shall be accompanied by a cashier's or bank check or Bid Guarantee Bond in the amount of not less than five percent (5%) of the bid made payable to the City of Bristol, Virginia, Owner, and subject to the conditions provided in the Instruction to Bidders.

BID GUARANTY

The undersigned bidder submits herewith bid guaranty in an amount of not less than five percent (5%) of the total amount of the bid offered and agrees and consents that the bid guaranty shall be forfeited to the City as liquidated damages if the required contract bond is not executed within fifteen (15) days from the date of the notice of award and work has not been started as required. The following documents are attached to and made a condition of this bid and constitute required Bid Security:

_____ Certified Check or Bank Check

_____ Bid Bond

BID AMOUNT: $ _____

BIDDER: _____

PERSON PREPARING BID: _____

TELEPHONE NUMBER: _____

ADDRESS: _____

_____

Submittal of signed BID Form signifies understanding and acceptance of all stated terms and conditions and acknowledgment of requirement of compliance with all applicable local, state and federal ordinances, laws, rules and regulations whether expressly stated herein or not.

SIGNATURE: _____

PRINTED NAME: _____

TITLE: _____

COMPANY: _____

DATE: _____

SECTION 00 45 13

BIDDER'S QUALIFICATIONS[i]

1.0 GENERAL INFORMATION

1.1

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:			

1.2

Provide information on the Business's organizational structure:

Form of Business:	☐ Sole Proprietorship ☐ Partnership ☐ Corporation		
☐ Limited Liability Company ☐ 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?	☐ Yes ☐ No ☒ Pending		
SCC Identification Number:			

1.3

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:			

1.4

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

Name:		Title:	
Authorized to sign contracts: ☐ Yes ☐ No		Limit of Authority:	$
Name:		Title:	
Authorized to sign contracts: ☐ Yes ☐ No		Limit of Authority:	$
Name:		Title:	
Authorized to sign contracts: ☐ Yes ☐ No		Limit of Authority:	$
Name:		Title:	

2.0 LICENSING

2.1

Provide information regarding licensure for Business:

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

3.0 DIVERSE BUSINESS CERTIFICATIONS

3.1

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

Certification	Certifying Agency	Certification Date
☐ Disadvantaged Business Enterprise		
☐ Minority Business Enterprise		
☐ Woman-Owned Business Enterprise		
☐ Small Business Enterprise		
☐ Disabled Business Enterprise		
☐ Veteran-Owned Business Enterprise		
☐ Service-Disabled Veteran-Owned Business		
☐ HUBZone Business (Historically Underutilized) Business		
☐ Other		
☐ None		

4.0 SAFETY

4.1

Provide information regarding Business's safety organization and safety performance.

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

4.2

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

5.0 FINANCIAL

5.1

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:		☐ Attached
Date of Business's most recent audited financial statement:		☐ 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)		

6.0 SURETY INFORMATION

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?	☐ Yes ☐ 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? ☐ Yes ☐ No			
Mailing Address (principal place of business):			
Physical Address (principal place of business):			
Phone (main):		Phone (claims):	

7.0 INSURANCE

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?			☐ Yes ☐ No
Does provider have an A.M. Best Rating of A-VII or better?			☐ Yes ☐ No
Mailing Address (principal place of business):			
Physical Address (principal place of business):			
Phone (main):		Phone (claims):	

8.0 CONSTRUCTION EXPERIENCE

8.1

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:	

8.2

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? ☐ Yes ☐ No				
Been barred from contracting by any local, state, or federal agency within the last 5 years? ☐ Yes ☐ No				
Been released from a bid in the past 5 years? ☐ Yes ☐ No				
Defaulted on a project or failed to complete any contract awarded to it? ☐ Yes ☐ No				
Refused to construct or refused to provide materials defined in the contract documents or in a change order? ☐ Yes ☐ No				
Been a party to any currently pending litigation or arbitration? ☐ Yes ☐ No				

Provide full details in a separate attachment if the response to any of these questions is Yes.

8.3

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

8.4

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.

8.5

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.

9.0 REQUIRED ATTACHMENTS

9.1

Provide the following information with the Statement of Qualifications:

9.1.1

If Business is a Joint Venture, separate Qualifications Statements for each Joint Venturer, as required in Paragraph 1.02.

9.1.2

Diverse Business Certifications if required by Paragraph 3.1.

9.1.3

Certification of Business's safety performance if required by Paragraph 4.1.

9.1.4

Financial statements as required by Paragraph 5.1.

9.1.5

Attachments providing additional information as required by Paragraph 8.2.

9.1.6

Schedule A (Current Projects) as required by Paragraph 8.3.

9.1.7

Schedule B (Previous Experience with Similar Projects) as required by Paragraph 8.4.

9.1.8

Schedule C (Key Individuals) and resumes for the key individuals listed, as required by Paragraph 8.05.

9.1.9

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, 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				
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					

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					

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					

Schedule B—Previous Experience with Similar Projects

Name of Organization					
Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project Completed		
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 Name		
General Description of Project					
Project Cost			Date Project Completed		
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 Name		
General Description of Project					
Project Cost			Date Project Completed		
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 Name		
General Description of Project					
Project Cost			Date Project Completed		
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 Name		
General Description of Project					
Project Cost			Date Project Completed		
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 Name		
General Description of Project					
Project Cost			Date Project Completed		
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	

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00 51 00 - NOTICE OF AWARD

Date of			
Owner:	City of Bristol	Owner's Project No.:	SW-23-010
Engineer:	SCS Engineers	Engineer's Project	02218208.11
Project:	Sidewall Odor Mitigation System Construction		
Contract Name:	Agreement Between Owner And Contractor For **Sidewall Odor Mitigation Construction**		
Bidder:			
Bidder's			

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

Sidewall Odor Mitigation Construction

The Contract Price of the awarded Contract is $_____. 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.

Three (3) unexecuted counterparts of the Agreement accompany this Notice of Award, and one copy of the Contract Documents has been 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 three (3) 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.
3. Other conditions precedent (if any):

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.

Owner:	City of Bristol
By *(signature)*:	_____
Name *(printed)*:	_____
Title:	_____

Copy: Engineer

SECTION 00 55 00

NOTICE TO PROCEED[i]

Owner:	City of Bristol	Owner's Project No.:	SW-23-010
Engineer:	SCS Engineers	Engineer's Project No.:	02218208.11
Contractor:		Contractor's Project No.:	
Project:	Sidewall Odor Mitigation System Construction		
Contract Name:	Agreement Between Owner And Contractor For Sidewall Odor Mitigation Construction		
Effective Date of Contract:			

Owner hereby notifies Contractor that the Contract Times under the above Contract will commence to run on _____ pursuant to Paragraph II of the Terms and 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 150 from the date stated above for the commencement of the Contract Times, resulting in a date for Substantial Completion of _____; and the number of days to achieve readiness for final payment is 180 from the commencement date of the Contract Times, resulting in a date for readiness for final payment of _____.

Owner:	City of Bristol
By *(signature)*:	
Name *(printed)*:	
Title:	
Date Issued:	

Copy: Engineer

END OF SECTION 00 55 00

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SECTION 00 61 13.13 - PERFORMANCE BOND

Contractor [Full formal name of Contractor] Name: Address *(principal place of business)*:	**Surety [Full formal name of Surety]** Name: Address *(principal place of business)*:
Owner Name: **City of Bristol** Mailing address *(principal place of business)*: **300 Lee St** **Bristol, VA 24201**	**Contract** Description *(name and location)*: **Bristol ISWMF** **Sidewall Odor Mitigation System Construction** **2655 Valley Drive** **Bristol, VA 24201** Contract Price: Effective Date of Contract:
Bond Bond Amount: Date of Bond: *(Date of Bond cannot be earlier than Effective Date of Contract)* Modifications to this Bond form: ☐ None ☐ See Paragraph 16	
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.	

Contractor as Principal	Surety
_____ *(Full formal name of Contractor)*	_____ *(Full formal name of Surety) (corporate seal)*
By: _____ *(Signature)*	By: _____ *(Signature)(Attach Power of Attorney)*
Name: _____ *(Printed or typed)*	Name: _____ *(Printed or typed)*
Title: _____	Title: _____
Attest: _____ *(Signature)*	Attest: _____ *(Signature)*
Name: _____ *(Printed or typed)*	Name: _____ *(Printed or typed)*
Title: _____	Title: _____

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.

1. 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.

2. 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.

3. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond will arise after:

    3.1. 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;

    3.2. The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

    3.3. 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.

4. 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.

5. 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:

    5.1. Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

    5.2. Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

    5.3. 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

    5.4. 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.

6. 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.

7. 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:

   7.1. the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

   7.2. 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

   7.3. 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.

8. 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.

9. 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.

10. 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.

11. 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.

12. 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.

13. 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.

14. Definitions

    14.1. *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.

    14.2. *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.

    14.3. *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.

    14.4. *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.

    14.5. *Contract Documents*—All the documents that comprise the agreement between the Owner and Contractor.

15. 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.

SECTION 00 61 13.16 - PAYMENT BOND

Contractor	**Surety**
Name:	Name:
Address *(principal place of business)*:	Address *(principal place of business)*:
Owner	**Contract**
Name: **City of Bristol** Mailing address *(principal place of business)*: **300 Lee St** **Bristol, VA 24201**	Description *(name and location)*: **Bristol ISWMF** **Sidewall Odor Mitigation System Construction** **2655 Valley Drive** **Bristol, VA 24201** Contract Price: Effective Date of Contract:
Bond	
Bond Amount: Date of Bond: *(Date of Bond cannot be earlier than Effective Date of Contract)* Modifications to this Bond form: ☐ None ☐ 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
_____ *(Full formal name of Contractor)*	_____ *(Full formal name of Surety) (corporate seal)*
By: _____ *(Signature)*	By: _____ *(Signature)(Attach Power of Attorney)*
Name: _____ *(Printed or typed)*	Name: _____ *(Printed or typed)*
Title: _____	Title: _____
Attest: _____ *(Signature)*	Attest: _____ *(Signature)*
Name: _____ *(Printed or typed)*	Name: _____ *(Printed or typed)*
Title: _____	Title: _____
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.	

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.

Contractor's Application for Payment

Owner:	City of Bristol	**Owner's Project No.:**	SW-23-010
Engineer:	SCS Engineers	**Engineer's Project No.:**	02218208.11
Contractor:		**Contractor's Project No.:**	
Project:	Sidewall Odor Mitigation System Construction		
Contract:	Agreement Between Owner And Contractor For Sidewall Odor Mitigation Construction		
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:**	
Title:		**Title:**	
Date:		**Date:**	
Approved by Funding Agency			
By:		**By:**	
Title:		**Title:**	
Date:		**Date:**	

Progress Estimate - Lump Sum Work **Contractor's Application for Payment**

Owner:	City of Bristol	**Owner's Project No.:**	SW-23-010
Engineer:	SCS Engineers	**Engineer's Project No.:**	02218208.11
Contractor:		**Contractor's Project No.:**	
Project:	Sidewall Odor Mitigation System Construction		
Contract:	Agreement Between Owner And Contractor For Sidewall Odor Mitigation Construction		

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

A	B	C	D	E	F	G	H	I
			Work Completed					
Item No.	Description	Scheduled Value ($)	(D + E) From Previous Application ($)	This Period ($)	Materials Currently Stored (not in D or E) ($)	Work Completed and Materials Stored to Date (D + E + F) ($)	% of Scheduled Value (G / C) (%)	Balance to Finish (C - G) ($)
	Original Contract							
1	Lump Sum Bid Price for Mobilization/Demobilization					-		-
2	Health and Safety Planning and Accommodations					-		-
3	Blower/Flare Piping Improvements					-		-
						-		-
						-		-
						-		-
						-		-
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						-		-
						-		-
						-		-
						-		-
						-		-
	Original Contract Totals	$ -	$ -	$ -	$ -	$ -		$ -

Progress Estimate - Lump Sum Work **Contractor's Application for Payment**

Owner:	City of Bristol	**Owner's Project No.:**	SW-23-010
Engineer:	SCS Engineers	**Engineer's Project No.:**	02218208.11
Contractor:		**Contractor's Project No.:**	
Project:	Sidewall Odor Mitigation System Construction		
Contract:	Agreement Between Owner And Contractor For Sidewall Odor Mitigation Construction		

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

A	B	C	D	E	F	G	H	I
			Work Completed					
Item No.	Description	Scheduled Value ($)	(D + E) From Previous Application ($)	This Period ($)	Materials Currently Stored (not in D or E) ($)	Work Completed and Materials Stored to Date (D + E + F) ($)	% of Scheduled Value (G / C) (%)	Balance to Finish (C - G) ($)
Change Orders								
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
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						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
	Change Order Totals	$ -	$ -	$ -	$ -	$ -		$ -
Original Contract and Change Orders								
	Project Totals	$ -	$ -	$ -	$ -	$ -		$ -

Progress Estimate - Unit Price Work

Contractor's Application for Payment

Owner: City of Bristol
Engineer: SCS Engineers
Contractor:
Project: Sidewall Odor Mitigation System Construction
Contract: Agreement Between Owner And Contractor For Sidewall Odor Mitigation Construction

Owner's Project No.: SW-23-010
Engineer's Project No.: 02218208.11
Contractor's Project No.:

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

A	B	C	D	E	F	G	H	I	J	K	L
		Contract Information				Work Completed					
Bid Item No.	Description	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) ($)	Materials Currently Stored (not in G) ($)	Work Completed and Materials Stored to Date (H + I) ($)	% of Value of Item (J / F) (%)	Balance to Finish (F - J) ($)
Original Contract											
4	Perimeter LFG Horizontal Collector - Materials	4,700.00			-		-		-		-
5	Perimeter LFG Horizontal Collector - Installation	4,922.00			-		-		-		-
6	Sidewall Preparation and Repair	4,922.00			-		-		-		-
7	External Odor Mitigation System Horizontal Collector - Materials	4,700.00			-		-		-		-
8	External Odor Mitigation System Horizontal Collector - Installation	4,922.00			-		-		-		-
9	Low Permeability Soil Plug – Materials	4,700.00			-		-		-		-
10	Low Permeability Soil Plug – Installation	4,922.00			-		-		-		-
11	Soil Cover - Materials	4,700.00			-		-		-		-
12	Soil Cover - Installation	4,922.00			-		-		-		-
13	Temporary Termination of Pilot System	2.00			-		-		-		-
14	Horizontal Collector Wellhead	52.00			-		-		-		-
15	Isolation Valves	3.00			-		-		-		-
16	4" Landfill Gas Header - Materials	12,000.00			-		-		-		-
17	4" Landfill Gas Header - Installation	12,800.00			-		-		-		-
18	2" Airline and 4" Forcemain - Materials	1,000.00			-		-		-		-
19	2" Airline and 4" Forcemain – Installation in trench	1,200.00			-		-		-		-
20	Perimeter LFG Horizontal Collector Pump	6.00			-		-		-		-
21	External Odor Mitigation System Horizontal Collector Pump	6.00			-		-		-		-
					-		-		-		-
					-		-		-		-
				Original Contract Totals	$ -		$ -	$ -	$ -		$ -

Progress Estimate - Unit Price Work

Contractor's Application for Payment

Owner:	City of Bristol	**Owner's Project No.:**	SW-23-010
Engineer:	SCS Engineers	**Engineer's Project No.:**	02218208.11
Contractor:		**Contractor's Project No.:**	
Project:	Sidewall Odor Mitigation System Construction		
Contract:	Agreement Between Owner And Contractor For Sidewall Odor Mitigation Construction		

Application No.: ______ **Application Period:** From ______ to ______ **Application Date:** ______

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

Stored Materials Summary

Contractor's Application for Payment

Owner: City of Bristol
Engineer: SCS Engineers
Contractor:
Project: Sidewall Odor Mitigation System Construction
Contract: Agreement Between Owner And Contractor For Sidewall Odor Mitigation Construction

Owner's Project No.: SW-23-010
Engineer's Project No.: 02218208.11
Contractor's Project No.:

Application No.: ______ **Application Period:** From ______ to ______ **Application Date:** ______

A	B	C	D	E	F	G	H	I	J	K	L	M
						Materials Stored			Incorporated in Work			
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	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 ($)	Total Amount Incorporated in the Work (J+K) ($)	Materials Remaining in Storage (I-L) ($)
								-			-	-
								-			-	-
								-			-	-
								-			-	-
								-			-	-
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								-			-	-
								-			-	-
					Totals	$ -	$ -	$ -	$ -	$ -	$ -	$ -

SECTION 00 63 36

FIELD ORDER[i]

FIELD ORDER NO.: _____

Owner:	City of Bristol	Owner's Project No.:	SW-23-010
Engineer:	SCS Engineers	Engineer's Project No.:	02218208.11
Contractor:		Contractor's Project No.:	
Project:	Sidewall Odor Mitigation System Construction		
Contract Name:	Agreement Between Owner And Contractor For Sidewall Odor Mitigation Construction		
Date Issued:		Effective Date of Field Order:	

Contractor is hereby directed to promptly perform the Work described in this Field Order, 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:

Attachments:

Issued by Engineer

By: _____
Title: _____
Date: _____

END OF SECTION 00 63 36

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SECTION 00 63 49 - WORK CHANGE DIRECTIVE[i]

WORK CHANGE DIRECTIVE NO.: _____

Owner:	City of Bristol	Owner's Project No.:	SW-23-010
Engineer:	SCS Engineers	Engineer's Project No.:	02218208.11
Contractor:		Contractor's Project No.:	
Project:	Sidewall Odor Mitigation System Construction		
Contract Name:	Agreement Between Owner And Contractor for Sidewall Odor Mitigation System Construction		
Date Issued:		Effective Date of Work Change Directive:	

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

Description:

Attachments:

Purpose for the Work Change Directive:

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

☐ 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:	_____	_____
Title:	_____	_____
Date:	_____	_____

_____

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SECTION 00 63 63

CHANGE ORDER[i] NO.: _____

Owner:	City of Bristol	Owner's Project No.:	SW-23-010
Engineer:	SCS Engineers	Engineer's Project No.:	02218208.11
Contractor:		Contractor's Project No.:	
Project:	Sidewall Odor Mitigation System Construction Agreement Between Owner And Contractor For Sidewall Odor Mitigation System		
Contract Name:	Construction		
Date Issued:		Effective Date of Change Order:	

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

Description:

Attachments:

Change in Contract Price	Change in Contract Times
Original Contract Price: $ _____	Original Contract Times: Substantial Completion: _____ Ready for final payment: _____
[Increase] [Decrease] from previously approved Change Orders No. 1 to No. ___: $ _____	**[Increase] [Decrease]** from previously approved Change Orders No.1 to No. ___: 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)	Accepted by Contractor
By: _____	_____
Title: _____	_____
Date: _____	_____
Authorized by Owner	Approved by Funding Agency (if applicable)
By: _____	_____
Title: _____	_____
Date: _____	_____

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SECTION 00 65 16

CERTIFICATE OF SUBSTANTIAL COMPLETION[i]

Owner:	City of Bristol	Owner's Project No.:	SW-23-010
Engineer:	SCS Engineers	Engineer's Project No.:	02218208.11
Contractor:		Contractor's Project No.:	
Project:	Sidewall Odor Mitigation System Construction Agreement Between Owner And Contractor For Sidewall Odor Mitigation System		
Contract Name:	Construction		

This ☐ Preliminary ☐ Final Certificate of Substantial Completion applies to:

☐ All Work ☐ The following specified portions of the Work:

_____

Date of Substantial Completion: _____

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Work or portion thereof designated above is hereby established, subject to the provisions of the Contract pertaining to Substantial Completion. The date of Substantial Completion in the final Certificate of Substantial Completion marks the commencement of the contractual correction period and applicable warranties required by the Contract.

A punch list of items to be completed or corrected is attached to this Certificate. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

Amendments of contractual responsibilities recorded in this Certificate should be the product of mutual agreement of Owner and Contractor; see Paragraph 15.03.D of the General Conditions.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance, and warranties upon Owner's use or occupancy of the Work must be as provided in the Contract, except as amended as follows:

Amendments to Owner's Responsibilities: ☐ None ☐ As follows:

_____

Amendments to Contractor's Responsibilities: ☐ None ☐ As follows:

_____

The following documents are attached to and made a part of this Certificate:

_____

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents, nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract Documents.

Engineer

By *(signature)*: _____

Name *(printed)*: _____

Title: _____

END OF SECTION 00 65 16

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SECTION 00 70 00

TERMS AND CONDITIONS

The Agreement for Service ("Contract" or "Agreement") with the successful Offeror will contain the following Terms and Conditions. Offerors taking exception to these Terms and Conditions or intending to propose additional or alternative language must (a) identify with specificity the City Terms and Conditions to which they take exception or seek to amend or replace; and (b) include any additional or different language with their bid. Failure to both identify with specificity those terms and conditions Offeror takes exception to or seeks to amend or replace as well as to provide Offeror's additional or alternate terms and conditions may result in rejection of the bid.

A. Procedures

The extent and character of the services to be performed by the Offeror shall be subject to the general control and approval of the City and their authorized representative(s). Any change to the Contract must be approved in writing by the City.

B. Delays and Delivery Failures

The Offeror must keep the City advised at all times of services' status relative to the schedule as agreed upon by the parties. If delay is foreseen, the Offeror shall give immediate written notice to the Purchasing Department and include an expected resolution timeframe. Should the Offeror fail to deliver the proper item(s)/service(s) at the time and place(s) contracted for, or within the resolution timeframe submitted with the delay notification or should the Offeror fail to make a timely replacement of rejected items /services when so required, the City may purchase items/services of comparable quality and quantity in the open market to replace the undelivered or rejected items/services. The Offeror shall reimburse the City for all costs in excess of the Agreement price when purchases are made in the open market; or in the event that there is a balance the City owes to the Offeror from prior transactions, an amount equal to the additional expense incurred by the City as a result of the Offeror's nonperformance shall be deducted from the balance as payment.

C. Business, Professional, & Occupational License Requirement

All firms or individuals doing business in the City are required to be licensed in accordance with the City Code Section 18-28. - License Requirement.

Questions regarding licensing should be directed to the Office of Commissioner of Revenue, telephone (276) 645-7316.

D. Authorization to Conduct Business in the Commonwealth

A contractor organized as a stock or nonstock corporation, limited liability company, business trust, or limited partnership or registered as a registered limited liability partnership shall be authorized to transact business in the Commonwealth as a domestic or foreign business entity if so required by Title 13.1 or Title 50 of the Code of Virginia or as otherwise required by law. Any business entity described above that enters into a contract with a public body pursuant to the Virginia Public Procurement Act shall

not allow its existence to lapse or its certificate of authority or registration to transact business in the Commonwealth, if so required under Title 13.1 or Title 50, to be revoked or cancelled at any time during the term of the contract. A public body may void any contract with a business entity if the business entity fails to remain in compliance with the provisions of this section.

E. Insurance

1. The Offeror shall be responsible for its work and every part thereof, and for all materials, tools, equipment, appliances, and property of any and all description used in connection therewith. The Offeror assumes all risk of direct and indirect damage or injury to the property or persons used or employed on or in connection with the work contracted for, and of all damage or injury to any person or property wherever located, resulting from any action, omission, commission or operation under the Contract.

2. The Offeror and all sub-offerors shall, during the continuance of the work under the Contract, provide the following:

    a. Workers' Compensation and Employer's Liability to protect the Offeror from any liability or damages for any injuries (including death and disability) to any and all of its employees, including any and all liability or damage which may arise by virtue of any statute or law in force within the Commonwealth of Virginia.

    b. Comprehensive General Liability insurance to protect the Offeror, and the interest of the City, its officers, employees, and agents against any and all injuries to third parties, including bodily injury and personal injury, wherever located, resulting from any action or operation under the Contract or in connection with the contracted work. The General Liability insurance shall also include the Broad Form Property Damage endorsement, in addition to coverage for explosion, collapse, and underground hazards, where required.

    c. Automobile Liability insurance, covering all owned, non-owned, borrowed, leased, or rented vehicles operated by the Offeror.

    d. Professional Liability against any and all wrongful acts, errors, or omissions on the part of the Offeror resulting from any action or operation under the Contract or in connection with the contracted work.

3. The Offeror agrees to provide the above referenced policies with the following limits. Liability insurance limits may be arranged by General, Automobile and Professional Liability policies for the full limits required, or by a combination of underlying policies for lesser limits with the remaining limits provided by an Excess or Umbrella Liability policy.

    a. Workers' Compensation: Statutory requirements and benefits. Coverage is compulsory for employers of three or more employees, to include the employer.

    b. Employer's Liability:

i. Each Accident: $1,000,000
ii. Disease, Each Employee: $1,000,000
iii. Disease, Policy Limit: $2,000,000

c. Commercial General Liability:

i. General Aggregate $2,000,000
ii. Each Occurrence $1,000,000
iii. Commercial General Liability shall include bodily injury and property damage, personal injury, advertising injury, products and completed operations coverage. General Aggregate limit shall apply separately to the project. Contractor's insurance coverage shall be primary and non-contributory.

d. Automobile Liability: Combined Single Limit of $1,000,000

e. Professional Liability:

i. General Aggregate $2,000,000
ii. Each Occurrence $1,000,000

f. Umbrella Liability: $2,000,000 per occurrence.

4. The following provisions shall be agreed to by the Offeror:

a. No change, cancellation, or non-renewal shall be made in any insurance coverage without a forty-five (45) day written notice to the City. The Offeror shall furnish a new certificate prior to any change or cancellation date. The failure of the Offeror to deliver a new and valid certificate will result in suspension of all payments until the new certificate is furnished.

b. Liability Insurance "Claims Made" basis:

If the liability insurance purchased by the Offeror has been issued on a "claims made" basis, the Offeror must comply with the following additional conditions. The limits of liability and the extensions to be included as described previously in these provisions, remain the same. The Offeror must either:

i. Agree to provide, prior to commencing work under the Contract, certificates of insurance evidencing the above coverage for a period of two (2) years after final payment for the Contract for General Liability policies and five (5) years for Professional Liability policies. This certificate shall evidence a "retroactive date" no later than the beginning of the Offeror's work under this Contract,

or

ii. Purchase the extended reporting period endorsement for the policy or policies in force during the term of this Contract and evidence the purchase of this extended reporting period endorsement by means of a certificate of insurance or a copy of the endorsement itself.

c. The Offeror must disclose the amount of deductible/self-insured retention

applicable to the General Liability, Automobile Liability and Professional Liability policies, if any. The City reserves the right to request additional information to determine if the Offeror has the financial capacity to meet its obligations under a deductible /self-insured plan. If this provision is utilized, the Offeror will be permitted to provide evidence of its ability to fund the deductible /self-insured retention.

d. Origin of Insurance

i. The Offeror agrees to provide insurance issued by companies admitted within the Commonwealth of Virginia, with the Best's Key Rating of at least A:VII.
ii. European markets including those based in London, and the domestic surplus lines market that operate on a non-admitted basis are exempt from this requirement provided that the Offeror's broker can provide financial data to establish that a market's policyholder surpluses are equal to or exceed the surpluses that correspond to Best's A:VII Rating.

e. Required Certificates

i. The Offeror will provide an original signed Certificate of Insurance and such endorsements as prescribed herein.
ii. The Offeror will provide on request certified copies of all insurance coverage related to the Contract within ten (10) business days of request by the City. These certified copies will be sent to the City from the Offeror's insurance agent or representative. Any request made under this provision shall be deemed confidential and proprietary.
iii. Any certificates provided shall indicate the Contract name and number.

f. The City, its officers and employees shall be Endorsed to the Offeror's Automobile and General Liability policies as an "additional insured" with the provision that this coverage "is primary to all other coverage the City may possess." (Use "loss payee" where there is an insurable interest). A Certificate of Insurance evidencing the additional insured status must be presented to the City along with a copy of the Endorsement.

g. Compliance by the Offeror with the foregoing requirements as to carrying insurance shall not relieve the Offeror of their liabilities provisions of the Contract.

5. Contractual and other Liability insurance provided under this Contract shall not contain a supervision, inspection or engineering services exclusion that would preclude the City from supervising and/or inspecting the project as to the end result. The Offeror shall assume all on-the-job responsibilities as to the control of persons directly employed by it.

6. Precaution shall be exercised at all times for the protection of Persons (including employees) and property.

7. The Offeror is to comply with the Occupational Safety and Health Act of 1970,

Public Law 91-956, as it may apply to this Contract.

8. If an "ACORD" Insurance Certificate form is used by the Offeror's insurance agent, the words "endeavor to" and ". . . but failure to mail such notice shall impose no obligation or liability of any kind upon the company" in the "Cancellation" paragraph of the form shall be deleted.

9. The Offeror agrees to waive all rights of subrogation against the City, its officers, employees, and agents.

F. Hold Harmless

The Offeror shall indemnify and hold harmless the City, including its officials and employees, from all liability, losses, costs, damages, claims, causes of action, and suits of any nature (specifically including reasonable attorney's fees and defense costs incurred with the defense of third party claims) incidental to or brought as a consequence of any negligent act, error, omission, or breach of the applicable professional standard of care by the Offeror and /or its subcontractors. The Offeror agrees that this clause shall include, but is not limited to, claims involving infringement of patent or copyright. This section shall survive completion of the Contract. The City is prohibited from indemnifying Offeror and/or any other third parties.

G. Safety

All Offerors and sub-offerors performing services for the City are required and shall comply with all Occupational Safety and Health Administration (OSHA), State and City Safety and Occupational Health Standards and any other applicable rules and regulations. Also, all Offerors and sub-offerors shall be held responsible for the safety of their employees and any unsafe acts or conditions that may cause injury or damage to any persons or property within and around the work site area under this Contract.

H. Anti-Discrimination

By submitting their bids, offerors certify to the City that they will conform to the provisions of the Federal Civil Rights Act of 1964, as amended, as well as the Virginia Fair Employment Contracting Act of 1975, as amended, where applicable, the Virginians With Disabilities Act, the Americans With Disabilities Act and § 2.2-4311 of the Virginia Public Procurement Act (VPPA). If the award is made to a faith-based organization, the organization shall not discriminate against any recipient of goods, services, or disbursements made pursuant to the contract on the basis of the recipient's religion, religious belief, refusal to participate in a religious practice, or on the basis of race, age, color, gender sexual orientation, gender identity, or national origin and shall be subject to the same rules as other organizations that contract with public bodies to account for the use of the funds provided; however, if the faith-based organization segregates public funds into separate accounts, only the accounts and programs funded with public funds shall be subject to audit by the public body. (Code of Virginia, § 2.2-4343.1E).

In every contract over $10,000 the provisions in 1. and 2. below apply:

1. During the performance of this contract, the contractor agrees as follows:

    a. The contractor will not discriminate against any employee or applicant for

employment because of race, religion, color, sex, sexual orientation, gender identity, national origin, age, disability, or any other basis prohibited by state law relating to discrimination in employment, except where there is a bona fide occupational qualification reasonably necessary to the normal operation of the contractor. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause.

b. The contractor, in all solicitations or advertisements for employees placed by or on behalf of the contractor, will state that such contractor is an equal opportunity employer.

c. Notices, advertisements and solicitations placed in accordance with federal law, rule or regulation shall be deemed sufficient for the purpose of meeting the requirements of this section.

d. If the contractor employs more than five employees, the contractor shall (i) provide annual training on the contractor's sexual harassment policy to all supervisors and employees providing services in the Commonwealth, except such supervisors or employees that are required to complete sexual harassment training provided by the Department of Human Resource Management, and (ii) post the contractor's sexual harassment policy in (a) a conspicuous public place in each building located in the Commonwealth that the contractor owns or leases for business purposes and (b) the contractor's employee handbook.

e. The requirements of these provisions 1. and 2. are a material part of the contract. If the Contractor violates one of these provisions, the City may terminate the affected part of this contract for breach, or at its option, the whole contract. Violation of one of these provisions may also result in debarment from State contracting regardless of whether the specific contract is terminated.

f. In accordance with Executive Order 61 (2017), a prohibition on discrimination by the contractor, in its employment practices, subcontracting practices, and delivery of goods or services, on the basis of race, sex, color, national origin, religion, sexual orientation, gender identity, age, political affiliation, disability, or veteran status, is hereby incorporated in this contract.

2. The contractor will include the provisions of 1. above in every subcontract or purchase order over $10,000, so that the provisions will be binding upon each subcontractor or vendor.

I. Ethics in Public Contracting

The provisions contained in § 2.2-4367 through § 2.2-4377 of the Virginia Public Procurement Act as set forth in the 1950 Code of Virginia, as amended, shall be applicable to all Contracts solicited or entered into by the City. A copy of these provisions may be obtained from the Purchasing Department upon request.

The above-stated provisions supplement, but do not supersede, other provisions of law including, but not limited to, the Virginia State and Local Government Conflict of

Interests Act (§ 2.2-3100 et seq.), the Virginia Governmental Frauds Act (§ 18.2-498.1 et seq.) and Articles 2 and 3 of Chapter 10 of Title 18.2. The provisions apply notwithstanding the fact that the conduct described may not constitute a violation of the Virginia Conflict of Interests Act.

J. Drug-free Workplace

Every Contract of over $10,000 shall include the following provisions:

During the performance of this Contract, the Offeror agrees to (i) provide a drug-free workplace for the Offeror's employees; (ii) post in conspicuous places, available to employees and applicants for employment, a statement notifying employees that the unlawful manufacture, sale, distribution, dispensation, possession, or use of a controlled substance or marijuana is prohibited in the Offeror's workplace and specifying the actions that will be taken against employees for violations of such prohibition; (iii) state in all solicitations or advertisements for employees placed by or on behalf of the Offeror that the Offeror maintains a drug-free workplace; and (iv) include the provisions of the foregoing clauses in every subcontract or purchase order of over $10,000, so that the provisions will be binding upon each sub-offeror or vendor.

For the purposes of this section, "drug-free workplace' means a site for the performance of work done in connection with a specific Contract awarded to an Offeror in accordance with this chapter, the employees of whom are prohibited from engaging in the unlawful manufacture, sale, distribution, dispensation, possession, or use of a controlled substance or marijuana during the performance of the Contract.

K. Immigration Reform and Control Act of 1986

By entering this Contract, the Offeror certifies that it does not and will not during the performance of this Contract violate the provisions of the Federal Immigration Reform and Control Act of 1986, which prohibits employment of illegal aliens.

L. Exemption from Taxes

Pursuant to Va. Code § 58.1-609.1, the City is exempt from Virginia State Sales or Use Taxes and Federal Excise Tax, therefore the Offeror shall not charge the City for Virginia State Sales or Use Taxes or Federal Excise Tax on the finished goods or products provided under the Contract. However, this exemption does not apply to the Offeror, and the Offeror shall be responsible for the payment of any sales, use, or excise tax it incurs in providing the goods required by the Contract, including, but not limited to, taxes on materials purchased by an Offeror for incorporation in or use on a construction project. Nothing in this section shall prohibit the Offeror from including its own sales tax expense in connection with the Contract in its Contract price.

M. Ordering, Invoicing and Payment

All work requested under this Contract shall be placed on a City issued Purchase Order. The Offeror shall not accept credit card orders or payments.

The Offeror shall submit invoices, at the completion of tasks and submission of deliverables; such statement to include a detailed breakdown of all charges for that deliverable.

Payments for services are to be requested as monthly billings submitted by Offeror by the end of the calendar month and payable by the City within 30 days of receipt.

All such invoices will be paid timely by the City unless any items thereon are questioned, in which event payment will be withheld pending verification of the amount claimed and the validity of the claim. The Offeror shall provide complete cooperation during any such investigation.

All invoices shall be forwarded to the following address:

Director of Public Works
City of Bristol, Virginia
2515 Valley Drive
Bristol, VA 24201

Individual Offerors shall provide their social security numbers and proprietorships, partnerships, and corporations shall provide their federal employer identification number on the pricing form.

Offeror shall provide a current Form W-9 – Request for Taxpayer Identification Number and Certification.

N. Payments to Subcontractors

Within seven (7) days after receipt of amounts paid by the City for work performed by a subcontractor under this Contract, the Offeror shall either:

1. Pay the subcontractor for the proportionate share of the total payment received from the City attributable to the work performed by the subcontractor under this Contract; or

2. Notify the City and subcontractor, in writing, of his/her intention to withhold all or a part of the subcontractor's payment and the reason for non-payment.

   The Offeror shall pay interest to the subcontractor on all amounts owed that remain unpaid beyond the seven (7) day period except for amounts withheld as allowed in item 2 above.

   Unless otherwise provided under the terms of this Contract interest shall accrue at the rate of one percent (1 %) per month.

   The Offeror shall include in each of its subcontracts a provision requiring each subcontractor to include or otherwise be subject to the same payment and interest requirements as set forth above with respect to each lower-tier subcontractor.

   The Offeror's obligation to pay an interest charge to a subcontractor pursuant to this provision may not be construed to be an obligation of the City.

O. Substitutions

NO substitutions, additions or cancellations, including those of key personnel are

permitted after Contract award without written approval by the Purchasing Department. Where specific employees are proposed by the Offeror for the work, those employees shall perform the work as long as that employee works for the Offeror, either as an employee or subcontractor unless the City agrees to the substitution. Requests for substitutions will be reviewed by the City and approval may be given by the City at its sole discretion. The City shall be notified immediately by the Offeror when the substitution of key personnel or those identified in the bid may be necessary. The substitution process shall be complete within 14 calendar days of the Offerors notification to the City.

P. Assignment

The Agreement may not be assigned in whole or in part without the prior written consent of the Purchasing Department. The rights and obligations of the Offeror are personal and may be performed only by the Offeror. Any purported assignment that does not comply with this provision is void. This Agreement is binding upon and inures to the benefit of the parties and their respective permitted successors and assigns.

Q. Termination

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

1. Termination for Convenience

   The City may terminate this Contract for convenience at any time in which case the parties shall negotiate reasonable termination costs.

2. Termination for Cause

   In the event of Termination for Cause, the thirty (30) days advance notice is waived and the Offeror shall not be entitled to termination costs.

3. Termination Due to Unavailability of Funds in Succeeding Fiscal Years

   If funds are not appropriated or otherwise made available to support continuation of the performance of this Contract in a subsequent fiscal year, then the Contract shall be canceled and, to the extent permitted by law, the Offeror shall be reimbursed for the reasonable value of any non-recurring costs incurred but not amortized in the price of the supplies or services delivered under the Contract.

4. Availability of Funds

   It is understood and agreed between the parties herein that the City of Bristol Virginia shall be bound hereunder only to the extent of the funds appropriated and available or which may hereafter become available for the purpose of this agreement.

R. Contractual Disputes

The Offeror shall give written notice to the City Manager of intent to file a claim for money or other relief within ten (10) calendar days of the occurrence giving rise to the claim or at the beginning of the work upon which the claim is to be based, whichever is earlier.

The Offeror shall submit its invoice for final payment within thirty (30) days after completion or delivery.

The claim, with supporting documentation, shall be submitted to the City Manager by US Mail, return receipt requested, courier, or overnight delivery service, no later than sixty (60) days after final payment. If the claim is not disposed of by agreement, the City Manager shall reduce his decision to writing and mail via U.S. mail or otherwise forward a copy thereof to the Offeror with in thirty (30) days of the City's receipt of the claim.

The City Manager's decision shall be final unless the Offeror appeals within thirty (30) days by submitting a written letter of appeal to the City Manager, or his designee. The City Manager shall render a decision within sixty (60) days of receipt of the appeal.

No Offeror shall institute any legal action until all statutory requirements have been met. Each party shall bear its own costs and expenses resulting from any litigation, including attorney's fees.

S. Prime Offeror Responsibilities

The Offeror(s) shall be responsible for completely supervising and directing the work under the resulting Contract(s) and all subcontractors that they may utilize. Subcontractors who perform work under the resulting Contract shall be responsible to the prime Offeror. The Offeror agrees to be fully responsible for the acts and omissions of their subcontractors and of persons employed by them.

T. Ownership of Documents

Any reports, specifications, drawings, blueprints, negatives, electronic files or other documents prepared by the Offeror in the performance of its obligations under the Contract shall be the exclusive property of the City, and all such materials shall be returned to the City upon completion, termination, or cancellation of this Contract. The Offeror shall not use, willingly allow, or cause such materials to be used for any purpose other than performance of all Offeror's obligations under the resulting Contract without the prior written consent of the City. However, the Offeror may retain file copies which cannot be used without prior written consent of the City. The City agrees that the Offeror shall not be liable for damages, loss, or injury resulting from the future use of the provided documents for other than the project specified when the Offeror is not the firm of record.

U. Submissions

All Project correspondence, design/review documents, reports etc., prepared by the Offeror shall be distributed to the City Manager for each major phase and sub phase of the Project in the quantities as directed. Within thirty (30) days of completion of each Project phase, submit a Project phase completion report with phase documents to the

City Manager.

V. Responsibility for Claims and Liabilities

The City's review, approval, or acceptance of, or payment for, any services required shall not be construed to operate as a waiver by the City of any rights or of any cause of action arising out of the Contract. The Offeror shall be and remains liable to the City for the accuracy and competency of plans, specifications, or other documents or work and Offeror is responsible to the City for any costs incurred resulting from any errors, acts or omissions in the performance of any services furnished.

W. Severability

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

X. Governing Law /Forum

This Agreement shall be governed and construed in all respects by its terms and by the laws of the Commonwealth of Virginia, without giving effect to its conflicts of law's provisions. Any judicial action shall be filed in the Circuit Court for the City of Bristol, Virginia. Offeror expressly waives any objection to venue or jurisdiction of the Circuit Court for the City of Bristol, Virginia. Offeror expressly consents to waiver of service of process in an action pending in the Circuit Court for the City of Bristol, Virginia pursuant to Virginia Code § 8.01-286.1.

Y. Notices

All notices and other communications hereunder shall be deemed to have been given when made in writing and either (a) delivered in person, (b) delivered to an agent, such as an overnight or similar delivery service, or (c) deposited in the United States mail, postage prepaid, certified or registered, addressed as follows:

TO OFFEROR:
TBD

TO CITY OF BRISTOL VIRGINIA:
City of Bristol Virginia
Purchasing Department
Emily
300 Lee Street
Bristol, VA 24201

Notice is deemed to have been received: (i) on the date of delivery if delivered in person; (ii) on the first business day after the date of delivery if sent by same day or overnight courier service; or (iii) on the third business day after the date of mailing, if sent by certified or registered United States Mail, return receipt requested, postage and charges prepaid.

Z. Counterparts

This Contract and any amendments or renewals hereto may be executed in a number of counterparts, and each counterpart signature, when taken with the other counterpart

signatures, is treated as if executed upon one original of this Contract or any amendment or renewal. A signature by any party to this Contract provided by facsimile or electronic mail is binding upon that party as if it were the original.

AA. Force Majeure

A party is not liable for failure to perform the party's obligations if such failure is as a result of Acts of God (including fire, flood, earthquake, storm, hurricane or other natural disaster), war, invasion, act of foreign enemies, hostilities (regardless of whether war is declared), civil war, rebellion, revolution, insurrection, military or usurped power or confiscation, terrorist activities, nationalization, government sanction, blockage, embargo, strikes at national level or industrial disputes at a national level, or strike or industrial disputes by labor not employed by the affected party, its subcontractors or its suppliers and which affect an essential portion of the contracted for works but excluding any industrial dispute which is specific to the performance of the works or this contract, interruption or failure of electricity or telephone service.

If a party asserts Force Majeure as an excuse for failure to perform the party's obligation, that party must immediately notify the other party giving full particulars of the event of force majeure and the reasons for the event of force majeure preventing that party from, or delaying that party in performing its obligations under this contract that party must use its reasonable efforts to mitigate the effect of the event of force majeure upon its or their performance of the contract and to fulfill its or their obligations under the contract.

An event of force majeure does not relieve a party from liability for an obligation which arose before the occurrence of that event, nor does that event affect the obligation to pay money in a timely manner which matured prior to the occurrence of that event.

The Offeror has no entitlement and City has no liability for: (1) any costs, losses, expenses, damages or the payment of any part of the contract price during an event of force majeure; and (2) any delay costs in any way incurred by the Offeror due to an event of force majeure.

BB. Survival of Terms

Upon discharge of this Agreement, Sections (Notice, Hold Harmless, Warranties, Governing Law/Forum, Contractual Disputes) of these Terms and Conditions continue and survive in full force and effect.

CC. Non-Waiver

No waiver of any provision of this Agreement shall constitute a waiver of any other provision nor shall any waiver of this Agreement constitute a continuing waiver unless otherwise expressly provided.

DD. Workmanship and Inspection

All services provided under this Contract shall be performed in a skillful, workmanlike and professional manner. The Offeror and its employees shall be professional and courteous at all times. The City may, in writing, require the Offeror to remove any employee from work for reasonable cause, as determined by the City. Further, the City

may, from time to time, make inspections of the services performed under this Agreement. Any inspection by the City does not relieve the Offeror of any responsibility in meeting the Agreement requirements. Offeror employees that have been removed at the direction of the City shall be replaced within seven calendar days after City notification.

EE. Debarment Status

By participating in this procurement, the vendor certifies that they are not currently debarred by the Commonwealth of Virginia or Federal Government from submitting a response for the type of goods and/or services covered by this solicitation. Vendor further certifies that they are not debarred from filling any order or accepting any resulting order, or that they are an agent of any person or entity that is currently debarred by the Commonwealth of Virginia or Federal Government. If a vendor is created or used for the purpose of circumventing a debarment decision against another vendor, the nondebarred vendor will be debarred for the same time period as the debarred vendor.

FF. Supremacy Clause

Notwithstanding any provision in the bidder's/proposer's response to the contrary, the bidder/proposer agrees that the terms and conditions contained in the City of Bristol, Virginia's Invitation to Bid or Request for Proposal prevail over contrary terms and conditions contained in the bidder's/proposer's response.

GG. Equal Employment Opportunity

The offeror hereby agrees that it will incorporate or cause to be incorporated into any contract for construction work, or modification thereof, as defined in the regulations of the Secretary of Labor at 41 CFR Chapter 60, which is paid for in whole or in part with funds obtained from the Federal Government or borrowed on the credit of the Federal Government pursuant to a grant, contract, loan, insurance, or guarantee, or undertaken pursuant to any Federal program involving such grant, contract, loan, insurance, or guarantee, the following equal opportunity clause:

During the performance of this contract, the contractor agrees as follows:

1. The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following:

   Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

2. The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.

3. The contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the contractor's legal duty to furnish information.

4. The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

5. The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

6. The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

7. In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

8. The contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect

to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance:

Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

The offeror further agrees that it will be bound by the above equal opportunity clause with respect to its own employment practices when it participates in federally assisted construction work: Provided, that if the offeror so participating is a State or local government, the above equal opportunity clause is not applicable to any agency, instrumentality or subdivision of such government which does not participate in work on or under the contract.

The offeror agrees that it will assist and cooperate actively with the administering agency and the Secretary of Labor in obtaining the compliance of contractors and subcontractors with the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that it will furnish the administering agency and the Secretary of Labor such information as they may require for the supervision of such compliance, and that it will otherwise assist the administering agency in the discharge of the agency's primary responsibility for securing compliance.

The offeror further agrees that it will refrain from entering into any contract or contract modification subject to Executive Order 11246 of September 24, 1965, with a contractor debarred from, or who has not demonstrated eligibility for, Government contracts and federally assisted construction contracts pursuant to the Executive Order and will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by the administering agency or the Secretary of Labor pursuant to Part II, Subpart D of the Executive Order. In addition, the offeror agrees that if it fails or refuses to comply with these undertakings, the administering agency may take any or all of the following actions: Cancel, terminate, or suspend in whole or in part this grant (contract, loan, insurance, guarantee); refrain from extending any further assistance to the offeror under the program with respect to which the failure or refund occurred until satisfactory assurance of future compliance has been received from such offeror; and refer the case to the Department of Justice for appropriate legal proceedings.

HH. Antitrust

By entering into a contract, the contractor conveys, sells, assigns, and transfers to the City of Bristol Virginia all rights, title and interest in and to all causes of action it may now have or hereafter acquire under the antitrust laws of the United States and the Commonwealth of Virginia, relating to the particular goods or services purchased or acquired by the City of Bristol Virginia under said contract.

II. Liquidated Damages

If the Contractor fails to achieve Milestone #1 Completion of the Work within the Contract Time and as otherwise required by the Contract Documents, the Owner shall be entitled to retain or recover from the Contractor, as Step One Liquidated Damages and not as a penalty, the following per diem amount commencing upon the first day following

expiration of the Contract Time and continuing until the actual date of Milestone #1 Completion. Such liquidated damages are hereby agreed to be a reasonable pre-estimate of damages the Owner will incur as a result of delayed Milestone #1 Completion of the Work:

One Thousand Dollars ($1,000.00) per consecutive calendar day for up to 15 Calendar Days beyond expiration of the Contract Times; then,

Two Thousand Dollars ($2,000.00) per consecutive calendar day after 15 Calendar Days beyond expiration of the Contract Times

If the Contractor fails to achieve Substantial Completion of the Work within the Contract Time and as otherwise required by the Contract Documents, the Owner shall be entitled to retain or recover from the Contractor, as Step Two Liquidated Damages and not as a penalty, the following per diem amount commencing upon the first day following expiration of the Contract Time and continuing until the actual date of Substantial Completion. Such liquidated damages are hereby agreed to be a reasonable pre-estimate of damages the Owner will incur as a result of delayed Substantial Completion of the Work:

One Thousand Dollars ($1,000.00) per consecutive calendar day for up to 15 Calendar Days beyond expiration of the Contract Times; then,

Two Thousand Dollars ($2,000.00) per consecutive calendar day after 15 Calendar Days beyond expiration of the Contract Times

If the Contractor fails to achieve Final Completion of the Work within the Contract Time, as Step Three Liquidated Damages and not as a penalty, the following per diem amount commencing upon the first day following the actual date of Substantial Completion and continuing until the actual date of Final Completion. Such liquidated damages are hereby agreed to be a reasonable pre-estimate of damages the Owner will incur as a result of delayed Final Completion of the Work:

One Thousand Dollars ($1,000.00) per consecutive calendar day for up to 15 Calendar Days beyond expiration of the Contract Times; then,

Two Thousand Dollars ($2,000.00) per consecutive calendar day after 15 Calendar Days beyond expiration of the Contract Times

The Owner may deduct liquidated damages described above from any unpaid amounts then or thereafter due the Contractor under this Agreement. Should the amount of any liquidated damages exceed the amount due or to become due to the Contractor, then the Contractor and his sureties shall be liable for and shall pay to the Owner the amount of any such excess.

JJ. Good Housekeeping

In accordance with the Clean Water Act, established by the Environmental Protection Agency (EPA) and enforced by the Virginia Department of Environmental Quality (DEQ), the City of Bristol Virginia is required to implement and enforce written procedures as part of the Municipal Separate Storm Sewer System (MS4) permit program requirements to prevent, to the maximum extent practicable, potential pollutants that will lead to a

point discharge at a natural drainage way. The City of Bristol Virginia's written procedures are provided in the Good Housekeeping/Pollution Prevention (GH/PP) manual provided to the Contractor. The Contractor shall employ good housekeeping practices outlined in the GH/PP manual and as directed in response to City inspection reports on all City properties and immediately remediate all spills containing potential pollutants as directed in the manual. If, through an audit or inspection, the EPA or DEQ renders fines to the City on account of poor practices determined to be the fault of Contractor, the City reserves the right to collect compensation from the Contractor. Contractors applying pesticides and herbicides shall provide evidence of appropriate certification in accordance with Virginia Law.

By signing the Contract, the Contractor acknowledges receipt of the GH/PP manual and certifies Contractor's understanding of its roles, responsibilities and liabilities associated with the City's MS4 Program. If the Contractor has any questions during the term of this contract concerning the Good Housekeeping and Pollution Prevention Manual, the Contractor may contact the Landfill Environmental & Safety Compliance Officer.

KK. Contract Provisions for Non-Federal Entity Contracts Under Federal Awards

1. All contracts awarded in excess of $100,000 that involve the employment of mechanics or laborers must include a provision for compliance with 40 U.S.C. 3702 and 3704, as supplemented by Department of Labor regulations, 29 CFR Part 5. Each contactor must be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay for all hours worked in excess of 40 hours in the work week. No laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous. These requirements do not apply to the purchases of supplies or materials or articles ordinarily available on the open market, or contracts for transportation or transmission of intelligence.

2. Contracts in excess of $150,000 must contain a provision requiring compliance with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401-7671q) and the Federal Water Pollution Contract Act as amended (33 U.S.C. 1251-1387). Violations must be reported to the Federal awarding agency and the Regional Office of the Environmental Protection Agency.

3. A contract award will not be made to parties listed on the government-wide exclusions in the System for Award Management (SAM), in accordance with the OMB guidelines at 2 CFR 180.

4. Contractors that apply or bid for an award exceeding $100,000 must file the required certification per the Byrd Anti-Lobbying Amendment (31 U.S.C. 1352). The contractor certifies that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by 31 U.S.C. 1352. Any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award will be disclosed.

5. As appropriate and to the extent consistent with law, the non-Federal entity should, to the greatest extent practicable under a Federal award, provide a preference for the purchase, acquisition, or use of goods, products, or materials produced in the United States (including but not limited to iron, aluminum, steel, cements, and other manufactured products). The requirements of this section must be included in all subawards including all contracts and purchase orders for work or products under this award. For purposes of this section:

    a. "Produced in the United States" means, for iron and steel products, that all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States.

    b. "Manufactured products" means items and construction materials composed in whole or in part of nonferrous metals such as aluminum; plastics and polymer-based products such as polyvinyl chloride pipe; aggregates such as concrete; glass, including optical fiber; and lumber.

6. Contractor must comply with section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act. The requirements of Section 6002 include procuring only items designated in guidelines of the Environmental Protection Agency (EPA) at 40 CFR part 247 that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition, where the purchase price of the item exceeds $10,000 or the value of the quantity acquired during the preceding fiscal year exceeded $10,000; procuring solid waste management services in a manner that maximized energy and resource recovery; and establishing an affirmative procurement program for procurement of recovered materials identified in the EPA guidelines.

LL. Contract Times

1. 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.

2. The Work will be substantially complete within 150 days after the date when the Contract Times commence to run, and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within 180 days after the date when the Contract Times commence to run.

3. Parts of the Work must be substantially completed on or before the following Milestone(s):

4. Phase 1 Completion - December 31, 2022

ATTACHMENT A

Sample Contract

(to be completed later)

CONTRACT FOR

Contract Number:

This contract entered into this____day of_____2022, by_____hereinafter called the "Contractor" and the City of Bristol Virginia, hereinafter called the "City".

WITNESSETH that the Contractor and the City, in consideration of mutual covenants, promises and agreementsherein contained, agree as follows:

SCOPE OF SERVICES: The Contractor shall provide the services to the City as set forth in the Invitation for Bid attached hereto.

CONTRACT PERIOD: The contract period is from_____.

COMPENSATION AND METHOD OF PAYMENT: The Contractor shall be paid in accordance with the Contract Documents in the amount of_____, subject to the Contract Document, Section 01 22 00 Measurement and Payment and Section 00 41 13 Bid Form. There shall be no addition(s) or deletion(s) to the Contract without the prior written approval of a Change Order issued by the City.

CONTRACT DOCUMENTS: The Contract Documents shall consist of the contract, Invitation for Bid and all attachments to the Invitation for Bid.

CONTRACTOR:	CITY OF BRISTOL VIRGINIA:
By:_____	By:_____
Title:_____	Title:_____
Date:_____	Date:_____

END OF SECTION 00 70 00

SECTION 00 70 00

TERMS AND CONDITIONS

The Agreement for Service ("Contract" or "Agreement") with the successful Offeror will contain the following Terms and Conditions. Offerors taking exception to these Terms and Conditions or intending to propose additional or alternative language must (a) identify with specificity the City Terms and Conditions to which they take exception or seek to amend or replace; and (b) include any additional or different language with their bid. Failure to both identify with specificity those terms and conditions Offeror takes exception to or seeks to amend or replace as well as to provide Offeror's additional or alternate terms and conditions may result in rejection of the bid.

A. Procedures

The extent and character of the services to be performed by the Offeror shall be subject to the general control and approval of the City and their authorized representative(s). Any change to the Contract must be approved in writing by the City.

B. Delays and Delivery Failures

The Offeror must keep the City advised at all times of services' status relative to the schedule as agreed upon by the parties. If delay is foreseen, the Offeror shall give immediate written notice to the Purchasing Department and include an expected resolution timeframe. Should the Offeror fail to deliver the proper item(s)/service(s) at the time and place(s) contracted for, or within the resolution timeframe submitted with the delay notification or should the Offeror fail to make a timely replacement of rejected items /services when so required, the City may purchase items/services of comparable quality and quantity in the open market to replace the undelivered or rejected items/services. The Offeror shall reimburse the City for all costs in excess of the Agreement price when purchases are made in the open market; or in the event that there is a balance the City owes to the Offeror from prior transactions, an amount equal to the additional expense incurred by the City as a result of the Offeror's nonperformance shall be deducted from the balance as payment.

C. Business, Professional, & Occupational License Requirement

All firms or individuals doing business in the City are required to be licensed in accordance with the City Code Section 18-28. - License Requirement.

Questions regarding licensing should be directed to the Office of Commissioner of Revenue, telephone (276) 645-7316.

D. Authorization to Conduct Business in the Commonwealth

A contractor organized as a stock or nonstock corporation, limited liability company, business trust, or limited partnership or registered as a registered limited liability partnership shall be authorized to transact business in the Commonwealth as a domestic or foreign business entity if so required by Title 13.1 or Title 50 of the Code of Virginia or as otherwise required by law. Any business entity described above that enters into a contract with a public body pursuant to the Virginia Public Procurement Act shall

not allow its existence to lapse or its certificate of authority or registration to transact business in the Commonwealth, if so required under Title 13.1 or Title 50, to be revoked or cancelled at any time during the term of the contract. A public body may void any contract with a business entity if the business entity fails to remain in compliance with the provisions of this section.

E. Insurance

1. The Offeror shall be responsible for its work and every part thereof, and for all materials, tools, equipment, appliances, and property of any and all description used in connection therewith. The Offeror assumes all risk of direct and indirect damage or injury to the property or persons used or employed on or in connection with the work contracted for, and of all damage or injury to any person or property wherever located, resulting from any action, omission, commission or operation under the Contract.

2. The Offeror and all sub-offerors shall, during the continuance of the work under the Contract, provide the following:

    a. Workers' Compensation and Employer's Liability to protect the Offeror from any liability or damages for any injuries (including death and disability) to any and all of its employees, including any and all liability or damage which may arise by virtue of any statute or law in force within the Commonwealth of Virginia.

    b. Comprehensive General Liability insurance to protect the Offeror, and the interest of the City, its officers, employees, and agents against any and all injuries to third parties, including bodily injury and personal injury, wherever located, resulting from any action or operation under the Contract or in connection with the contracted work. The General Liability insurance shall also include the Broad Form Property Damage endorsement, in addition to coverage for explosion, collapse, and underground hazards, where required.

    c. Automobile Liability insurance, covering all owned, non-owned, borrowed, leased, or rented vehicles operated by the Offeror.

    d. Professional Liability against any and all wrongful acts, errors, or omissions on the part of the Offeror resulting from any action or operation under the Contract or in connection with the contracted work.

3. The Offeror agrees to provide the above referenced policies with the following limits. Liability insurance limits may be arranged by General, Automobile and Professional Liability policies for the full limits required, or by a combination of underlying policies for lesser limits with the remaining limits provided by an Excess or Umbrella Liability policy.

    a. Workers' Compensation: Statutory requirements and benefits. Coverage is compulsory for employers of three or more employees, to include the employer.

    b. Employer's Liability:

i. Each Accident: $1,000,000
ii. Disease, Each Employee: $1,000,000
iii. Disease, Policy Limit: $2,000,000

c. Commercial General Liability:

i. General Aggregate $2,000,000
ii. Each Occurrence $1,000,000
iii. Commercial General Liability shall include bodily injury and property damage, personal injury, advertising injury, products and completed operations coverage. General Aggregate limit shall apply separately to the project. Contractor's insurance coverage shall be primary and non-contributory.

d. Automobile Liability: Combined Single Limit of $1,000,000

e. Professional Liability:

i. General Aggregate $2,000,000
ii. Each Occurrence $1,000,000

f. Umbrella Liability: $2,000,000 per occurrence.

4. The following provisions shall be agreed to by the Offeror:

a. No change, cancellation, or non-renewal shall be made in any insurance coverage without a forty-five (45) day written notice to the City. The Offeror shall furnish a new certificate prior to any change or cancellation date. The failure of the Offeror to deliver a new and valid certificate will result in suspension of all payments until the new certificate is furnished.

b. Liability Insurance "Claims Made" basis:

If the liability insurance purchased by the Offeror has been issued on a "claims made" basis, the Offeror must comply with the following additional conditions. The limits of liability and the extensions to be included as described previously in these provisions, remain the same. The Offeror must either:

i. Agree to provide, prior to commencing work under the Contract, certificates of insurance evidencing the above coverage for a period of two (2) years after final payment for the Contract for General Liability policies and five (5) years for Professional Liability policies. This certificate shall evidence a "retroactive date" no later than the beginning of the Offeror's work under this Contract,

or

ii. Purchase the extended reporting period endorsement for the policy or policies in force during the term of this Contract and evidence the purchase of this extended reporting period endorsement by means of a certificate of insurance or a copy of the endorsement itself.

c. The Offeror must disclose the amount of deductible/self-insured retention

applicable to the General Liability, Automobile Liability and Professional Liability policies, if any. The City reserves the right to request additional information to determine if the Offeror has the financial capacity to meet its obligations under a deductible /self-insured plan. If this provision is utilized, the Offeror will be permitted to provide evidence of its ability to fund the deductible /self-insured retention.

d. Origin of Insurance

i. The Offeror agrees to provide insurance issued by companies admitted within the Commonwealth of Virginia, with the Best's Key Rating of at least A:VII.
ii. European markets including those based in London, and the domestic surplus lines market that operate on a non-admitted basis are exempt from this requirement provided that the Offeror's broker can provide financial data to establish that a market's policyholder surpluses are equal to or exceed the surpluses that correspond to Best's A:VII Rating.

e. Required Certificates

i. The Offeror will provide an original signed Certificate of Insurance and such endorsements as prescribed herein.
ii. The Offeror will provide on request certified copies of all insurance coverage related to the Contract within ten (10) business days of request by the City. These certified copies will be sent to the City from the Offeror's insurance agent or representative. Any request made under this provision shall be deemed confidential and proprietary.
iii. Any certificates provided shall indicate the Contract name and number.

f. The City, its officers and employees shall be Endorsed to the Offeror's Automobile and General Liability policies as an "additional insured" with the provision that this coverage "is primary to all other coverage the City may possess." (Use "loss payee" where there is an insurable interest). A Certificate of Insurance evidencing the additional insured status must be presented to the City along with a copy of the Endorsement.

g. Compliance by the Offeror with the foregoing requirements as to carrying insurance shall not relieve the Offeror of their liabilities provisions of the Contract.

5. Contractual and other Liability insurance provided under this Contract shall not contain a supervision, inspection or engineering services exclusion that would preclude the City from supervising and/or inspecting the project as to the end result. The Offeror shall assume all on-the-job responsibilities as to the control of persons directly employed by it.

6. Precaution shall be exercised at all times for the protection of Persons (including employees) and property.

7. The Offeror is to comply with the Occupational Safety and Health Act of 1970,

Public Law 91-956, as it may apply to this Contract.

8. If an "ACORD" Insurance Certificate form is used by the Offeror's insurance agent, the words "endeavor to" and ". . . but failure to mail such notice shall impose no obligation or liability of any kind upon the company" in the "Cancellation" paragraph of the form shall be deleted.

9. The Offeror agrees to waive all rights of subrogation against the City, its officers, employees, and agents.

F. Hold Harmless

The Offeror shall indemnify and hold harmless the City, including its officials and employees, from all liability, losses, costs, damages, claims, causes of action, and suits of any nature (specifically including reasonable attorney's fees and defense costs incurred with the defense of third party claims) incidental to or brought as a consequence of any negligent act, error, omission, or breach of the applicable professional standard of care by the Offeror and /or its subcontractors. The Offeror agrees that this clause shall include, but is not limited to, claims involving infringement of patent or copyright. This section shall survive completion of the Contract. The City is prohibited from indemnifying Offeror and/or any other third parties.

G. Safety

All Offerors and sub-offerors performing services for the City are required and shall comply with all Occupational Safety and Health Administration (OSHA), State and City Safety and Occupational Health Standards and any other applicable rules and regulations. Also, all Offerors and sub-offerors shall be held responsible for the safety of their employees and any unsafe acts or conditions that may cause injury or damage to any persons or property within and around the work site area under this Contract.

H. Anti-Discrimination

By submitting their bids, offerors certify to the City that they will conform to the provisions of the Federal Civil Rights Act of 1964, as amended, as well as the Virginia Fair Employment Contracting Act of 1975, as amended, where applicable, the Virginians With Disabilities Act, the Americans With Disabilities Act and § 2.2-4311 of the Virginia Public Procurement Act (VPPA). If the award is made to a faith-based organization, the organization shall not discriminate against any recipient of goods, services, or disbursements made pursuant to the contract on the basis of the recipient's religion, religious belief, refusal to participate in a religious practice, or on the basis of race, age, color, gender sexual orientation, gender identity, or national origin and shall be subject to the same rules as other organizations that contract with public bodies to account for the use of the funds provided; however, if the faith-based organization segregates public funds into separate accounts, only the accounts and programs funded with public funds shall be subject to audit by the public body. (Code of Virginia, § 2.2-4343.1E).

In every contract over $10,000 the provisions in 1. and 2. below apply:

1. During the performance of this contract, the contractor agrees as follows:

    a. The contractor will not discriminate against any employee or applicant for

employment because of race, religion, color, sex, sexual orientation, gender identity, national origin, age, disability, or any other basis prohibited by state law relating to discrimination in employment, except where there is a bona fide occupational qualification reasonably necessary to the normal operation of the contractor. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause.

b. The contractor, in all solicitations or advertisements for employees placed by or on behalf of the contractor, will state that such contractor is an equal opportunity employer.

c. Notices, advertisements and solicitations placed in accordance with federal law, rule or regulation shall be deemed sufficient for the purpose of meeting the requirements of this section.

d. If the contractor employs more than five employees, the contractor shall (i) provide annual training on the contractor's sexual harassment policy to all supervisors and employees providing services in the Commonwealth, except such supervisors or employees that are required to complete sexual harassment training provided by the Department of Human Resource Management, and (ii) post the contractor's sexual harassment policy in (a) a conspicuous public place in each building located in the Commonwealth that the contractor owns or leases for business purposes and (b) the contractor's employee handbook.

e. The requirements of these provisions 1. and 2. are a material part of the contract. If the Contractor violates one of these provisions, the City may terminate the affected part of this contract for breach, or at its option, the whole contract. Violation of one of these provisions may also result in debarment from State contracting regardless of whether the specific contract is terminated.

f. In accordance with Executive Order 61 (2017), a prohibition on discrimination by the contractor, in its employment practices, subcontracting practices, and delivery of goods or services, on the basis of race, sex, color, national origin, religion, sexual orientation, gender identity, age, political affiliation, disability, or veteran status, is hereby incorporated in this contract.

2. The contractor will include the provisions of 1. above in every subcontract or purchase order over $10,000, so that the provisions will be binding upon each subcontractor or vendor.

I. Ethics in Public Contracting

The provisions contained in § 2.2-4367 through § 2.2-4377 of the Virginia Public Procurement Act as set forth in the 1950 Code of Virginia, as amended, shall be applicable to all Contracts solicited or entered into by the City. A copy of these provisions may be obtained from the Purchasing Department upon request.

The above-stated provisions supplement, but do not supersede, other provisions of law including, but not limited to, the Virginia State and Local Government Conflict of

Interests Act (§ 2.2-3100 et seq.), the Virginia Governmental Frauds Act (§ 18.2-498.1 et seq.) and Articles 2 and 3 of Chapter 10 of Title 18.2. The provisions apply notwithstanding the fact that the conduct described may not constitute a violation of the Virginia Conflict of Interests Act.

J. Drug-free Workplace

Every Contract of over $10,000 shall include the following provisions:

During the performance of this Contract, the Offeror agrees to (i) provide a drug-free workplace for the Offeror's employees; (ii) post in conspicuous places, available to employees and applicants for employment, a statement notifying employees that the unlawful manufacture, sale, distribution, dispensation, possession, or use of a controlled substance or marijuana is prohibited in the Offeror's workplace and specifying the actions that will be taken against employees for violations of such prohibition; (iii) state in all solicitations or advertisements for employees placed by or on behalf of the Offeror that the Offeror maintains a drug-free workplace; and (iv) include the provisions of the foregoing clauses in every subcontract or purchase order of over $10,000, so that the provisions will be binding upon each sub-offeror or vendor.

For the purposes of this section, "drug-free workplace' means a site for the performance of work done in connection with a specific Contract awarded to an Offeror in accordance with this chapter, the employees of whom are prohibited from engaging in the unlawful manufacture, sale, distribution, dispensation, possession, or use of a controlled substance or marijuana during the performance of the Contract.

K. Immigration Reform and Control Act of 1986

By entering this Contract, the Offeror certifies that it does not and will not during the performance of this Contract violate the provisions of the Federal Immigration Reform and Control Act of 1986, which prohibits employment of illegal aliens.

L. Exemption from Taxes

Pursuant to Va. Code § 58.1-609.1, the City is exempt from Virginia State Sales or Use Taxes and Federal Excise Tax, therefore the Offeror shall not charge the City for Virginia State Sales or Use Taxes or Federal Excise Tax on the finished goods or products provided under the Contract. However, this exemption does not apply to the Offeror, and the Offeror shall be responsible for the payment of any sales, use, or excise tax it incurs in providing the goods required by the Contract, including, but not limited to, taxes on materials purchased by an Offeror for incorporation in or use on a construction project. Nothing in this section shall prohibit the Offeror from including its own sales tax expense in connection with the Contract in its Contract price.

M. Ordering, Invoicing and Payment

All work requested under this Contract shall be placed on a City issued Purchase Order. The Offeror shall not accept credit card orders or payments.

The Offeror shall submit invoices, at the completion of tasks and submission of deliverables; such statement to include a detailed breakdown of all charges for that deliverable.

Payments for services are to be requested as monthly billings submitted by Offeror by the end of the calendar month and payable by the City within 30 days of receipt.

All such invoices will be paid timely by the City unless any items thereon are questioned, in which event payment will be withheld pending verification of the amount claimed and the validity of the claim. The Offeror shall provide complete cooperation during any such investigation.

All invoices shall be forwarded to the following address:

Director of Public Works
City of Bristol, Virginia
2515 Valley Drive
Bristol, VA 24201

Individual Offerors shall provide their social security numbers and proprietorships, partnerships, and corporations shall provide their federal employer identification number on the pricing form.

Offeror shall provide a current Form W-9 – Request for Taxpayer Identification Number and Certification.

N. Payments to Subcontractors

Within seven (7) days after receipt of amounts paid by the City for work performed by a subcontractor under this Contract, the Offeror shall either:

1. Pay the subcontractor for the proportionate share of the total payment received from the City attributable to the work performed by the subcontractor under this Contract; or

2. Notify the City and subcontractor, in writing, of his/her intention to withhold all or a part of the subcontractor's payment and the reason for non-payment.

   The Offeror shall pay interest to the subcontractor on all amounts owed that remain unpaid beyond the seven (7) day period except for amounts withheld as allowed in item 2 above.

   Unless otherwise provided under the terms of this Contract interest shall accrue at the rate of one percent (1 %) per month.

   The Offeror shall include in each of its subcontracts a provision requiring each subcontractor to include or otherwise be subject to the same payment and interest requirements as set forth above with respect to each lower-tier subcontractor.

   The Offeror's obligation to pay an interest charge to a subcontractor pursuant to this provision may not be construed to be an obligation of the City.

O. Substitutions

NO substitutions, additions or cancellations, including those of key personnel are

permitted after Contract award without written approval by the Purchasing Department. Where specific employees are proposed by the Offeror for the work, those employees shall perform the work as long as that employee works for the Offeror, either as an employee or subcontractor unless the City agrees to the substitution. Requests for substitutions will be reviewed by the City and approval may be given by the City at its sole discretion. The City shall be notified immediately by the Offeror when the substitution of key personnel or those identified in the bid may be necessary. The substitution process shall be complete within 14 calendar days of the Offerors notification to the City.

P. Assignment

The Agreement may not be assigned in whole or in part without the prior written consent of the Purchasing Department. The rights and obligations of the Offeror are personal and may be performed only by the Offeror. Any purported assignment that does not comply with this provision is void. This Agreement is binding upon and inures to the benefit of the parties and their respective permitted successors and assigns.

Q. Termination

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

1. Termination for Convenience

   The City may terminate this Contract for convenience at any time in which case the parties shall negotiate reasonable termination costs.

2. Termination for Cause

   In the event of Termination for Cause, the thirty (30) days advance notice is waived and the Offeror shall not be entitled to termination costs.

3. Termination Due to Unavailability of Funds in Succeeding Fiscal Years

   If funds are not appropriated or otherwise made available to support continuation of the performance of this Contract in a subsequent fiscal year, then the Contract shall be canceled and, to the extent permitted by law, the Offeror shall be reimbursed for the reasonable value of any non-recurring costs incurred but not amortized in the price of the supplies or services delivered under the Contract.

4. Availability of Funds

   It is understood and agreed between the parties herein that the City of Bristol Virginia shall be bound hereunder only to the extent of the funds appropriated and available or which may hereafter become available for the purpose of this agreement.

R. Contractual Disputes

The Offeror shall give written notice to the City Manager of intent to file a claim for money or other relief within ten (10) calendar days of the occurrence giving rise to the claim or at the beginning of the work upon which the claim is to be based, whichever is earlier.

The Offeror shall submit its invoice for final payment within thirty (30) days after completion or delivery.

The claim, with supporting documentation, shall be submitted to the City Manager by US Mail, return receipt requested, courier, or overnight delivery service, no later than sixty (60) days after final payment. If the claim is not disposed of by agreement, the City Manager shall reduce his decision to writing and mail via U.S. mail or otherwise forward a copy thereof to the Offeror with in thirty (30) days of the City's receipt of the claim.

The City Manager's decision shall be final unless the Offeror appeals within thirty (30) days by submitting a written letter of appeal to the City Manager, or his designee. The City Manager shall render a decision within sixty (60) days of receipt of the appeal.

No Offeror shall institute any legal action until all statutory requirements have been met. Each party shall bear its own costs and expenses resulting from any litigation, including attorney's fees.

S. Prime Offeror Responsibilities

The Offeror(s) shall be responsible for completely supervising and directing the work under the resulting Contract(s) and all subcontractors that they may utilize. Subcontractors who perform work under the resulting Contract shall be responsible to the prime Offeror. The Offeror agrees to be fully responsible for the acts and omissions of their subcontractors and of persons employed by them.

T. Ownership of Documents

Any reports, specifications, drawings, blueprints, negatives, electronic files or other documents prepared by the Offeror in the performance of its obligations under the Contract shall be the exclusive property of the City, and all such materials shall be returned to the City upon completion, termination, or cancellation of this Contract. The Offeror shall not use, willingly allow, or cause such materials to be used for any purpose other than performance of all Offeror's obligations under the resulting Contract without the prior written consent of the City. However, the Offeror may retain file copies which cannot be used without prior written consent of the City. The City agrees that the Offeror shall not be liable for damages, loss, or injury resulting from the future use of the provided documents for other than the project specified when the Offeror is not the firm of record.

U. Submissions

All Project correspondence, design/review documents, reports etc., prepared by the Offeror shall be distributed to the City Manager for each major phase and sub phase of the Project in the quantities as directed. Within thirty (30) days of completion of each Project phase, submit a Project phase completion report with phase documents to the

City Manager.

V. Responsibility for Claims and Liabilities

The City's review, approval, or acceptance of, or payment for, any services required shall not be construed to operate as a waiver by the City of any rights or of any cause of action arising out of the Contract. The Offeror shall be and remains liable to the City for the accuracy and competency of plans, specifications, or other documents or work and Offeror is responsible to the City for any costs incurred resulting from any errors, acts or omissions in the performance of any services furnished.

W. Severability

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

X. Governing Law /Forum

This Agreement shall be governed and construed in all respects by its terms and by the laws of the Commonwealth of Virginia, without giving effect to its conflicts of law's provisions. Any judicial action shall be filed in the Circuit Court for the City of Bristol, Virginia. Offeror expressly waives any objection to venue or jurisdiction of the Circuit Court for the City of Bristol, Virginia. Offeror expressly consents to waiver of service of process in an action pending in the Circuit Court for the City of Bristol, Virginia pursuant to Virginia Code § 8.01-286.1.

Y. Notices

All notices and other communications hereunder shall be deemed to have been given when made in writing and either (a) delivered in person, (b) delivered to an agent, such as an overnight or similar delivery service, or (c) deposited in the United States mail, postage prepaid, certified or registered, addressed as follows:

TO OFFEROR:
TBD

TO CITY OF BRISTOL VIRGINIA:
City of Bristol Virginia
Purchasing Department
Emily
300 Lee Street
Bristol, VA 24201

Notice is deemed to have been received: (i) on the date of delivery if delivered in person; (ii) on the first business day after the date of delivery if sent by same day or overnight courier service; or (iii) on the third business day after the date of mailing, if sent by certified or registered United States Mail, return receipt requested, postage and charges prepaid.

Z. Counterparts

This Contract and any amendments or renewals hereto may be executed in a number of counterparts, and each counterpart signature, when taken with the other counterpart

signatures, is treated as if executed upon one original of this Contract or any amendment or renewal. A signature by any party to this Contract provided by facsimile or electronic mail is binding upon that party as if it were the original.

AA. Force Majeure

A party is not liable for failure to perform the party's obligations if such failure is as a result of Acts of God (including fire, flood, earthquake, storm, hurricane or other natural disaster), war, invasion, act of foreign enemies, hostilities (regardless of whether war is declared), civil war, rebellion, revolution, insurrection, military or usurped power or confiscation, terrorist activities, nationalization, government sanction, blockage, embargo, strikes at national level or industrial disputes at a national level, or strike or industrial disputes by labor not employed by the affected party, its subcontractors or its suppliers and which affect an essential portion of the contracted for works but excluding any industrial dispute which is specific to the performance of the works or this contract, interruption or failure of electricity or telephone service.

If a party asserts Force Majeure as an excuse for failure to perform the party's obligation, that party must immediately notify the other party giving full particulars of the event of force majeure and the reasons for the event of force majeure preventing that party from, or delaying that party in performing its obligations under this contract that party must use its reasonable efforts to mitigate the effect of the event of force majeure upon its or their performance of the contract and to fulfill its or their obligations under the contract.

An event of force majeure does not relieve a party from liability for an obligation which arose before the occurrence of that event, nor does that event affect the obligation to pay money in a timely manner which matured prior to the occurrence of that event.

The Offeror has no entitlement and City has no liability for: (1) any costs, losses, expenses, damages or the payment of any part of the contract price during an event of force majeure; and (2) any delay costs in any way incurred by the Offeror due to an event of force majeure.

BB. Survival of Terms

Upon discharge of this Agreement, Sections (Notice, Hold Harmless, Warranties, Governing Law/Forum, Contractual Disputes) of these Terms and Conditions continue and survive in full force and effect.

CC. Non-Waiver

No waiver of any provision of this Agreement shall constitute a waiver of any other provision nor shall any waiver of this Agreement constitute a continuing waiver unless otherwise expressly provided.

DD. Workmanship and Inspection

All services provided under this Contract shall be performed in a skillful, workmanlike and professional manner. The Offeror and its employees shall be professional and courteous at all times. The City may, in writing, require the Offeror to remove any employee from work for reasonable cause, as determined by the City. Further, the City

may, from time to time, make inspections of the services performed under this Agreement. Any inspection by the City does not relieve the Offeror of any responsibility in meeting the Agreement requirements. Offeror employees that have been removed at the direction of the City shall be replaced within seven calendar days after City notification.

EE. Debarment Status

By participating in this procurement, the vendor certifies that they are not currently debarred by the Commonwealth of Virginia or Federal Government from submitting a response for the type of goods and/or services covered by this solicitation. Vendor further certifies that they are not debarred from filling any order or accepting any resulting order, or that they are an agent of any person or entity that is currently debarred by the Commonwealth of Virginia or Federal Government. If a vendor is created or used for the purpose of circumventing a debarment decision against another vendor, the nondebarred vendor will be debarred for the same time period as the debarred vendor.

FF. Supremacy Clause

Notwithstanding any provision in the bidder's/proposer's response to the contrary, the bidder/proposer agrees that the terms and conditions contained in the City of Bristol, Virginia's Invitation to Bid or Request for Proposal prevail over contrary terms and conditions contained in the bidder's/proposer's response.

GG. Equal Employment Opportunity

The offeror hereby agrees that it will incorporate or cause to be incorporated into any contract for construction work, or modification thereof, as defined in the regulations of the Secretary of Labor at 41 CFR Chapter 60, which is paid for in whole or in part with funds obtained from the Federal Government or borrowed on the credit of the Federal Government pursuant to a grant, contract, loan, insurance, or guarantee, or undertaken pursuant to any Federal program involving such grant, contract, loan, insurance, or guarantee, the following equal opportunity clause:

During the performance of this contract, the contractor agrees as follows:

1. The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following:

   Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

2. The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.

3. The contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the contractor's legal duty to furnish information.

4. The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

5. The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

6. The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

7. In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

8. The contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect

to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance:

Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

The offeror further agrees that it will be bound by the above equal opportunity clause with respect to its own employment practices when it participates in federally assisted construction work: Provided, that if the offeror so participating is a State or local government, the above equal opportunity clause is not applicable to any agency, instrumentality or subdivision of such government which does not participate in work on or under the contract.

The offeror agrees that it will assist and cooperate actively with the administering agency and the Secretary of Labor in obtaining the compliance of contractors and subcontractors with the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that it will furnish the administering agency and the Secretary of Labor such information as they may require for the supervision of such compliance, and that it will otherwise assist the administering agency in the discharge of the agency's primary responsibility for securing compliance.

The offeror further agrees that it will refrain from entering into any contract or contract modification subject to Executive Order 11246 of September 24, 1965, with a contractor debarred from, or who has not demonstrated eligibility for, Government contracts and federally assisted construction contracts pursuant to the Executive Order and will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by the administering agency or the Secretary of Labor pursuant to Part II, Subpart D of the Executive Order. In addition, the offeror agrees that if it fails or refuses to comply with these undertakings, the administering agency may take any or all of the following actions: Cancel, terminate, or suspend in whole or in part this grant (contract, loan, insurance, guarantee); refrain from extending any further assistance to the offeror under the program with respect to which the failure or refund occurred until satisfactory assurance of future compliance has been received from such offeror; and refer the case to the Department of Justice for appropriate legal proceedings.

HH. Antitrust

By entering into a contract, the contractor conveys, sells, assigns, and transfers to the City of Bristol Virginia all rights, title and interest in and to all causes of action it may now have or hereafter acquire under the antitrust laws of the United States and the Commonwealth of Virginia, relating to the particular goods or services purchased or acquired by the City of Bristol Virginia under said contract.

II. Liquidated Damages

If the Contractor fails to achieve Milestone #1 Completion of the Work within the Contract Time and as otherwise required by the Contract Documents, the Owner shall be entitled to retain or recover from the Contractor, as Step One Liquidated Damages and not as a penalty, the following per diem amount commencing upon the first day following

expiration of the Contract Time and continuing until the actual date of Milestone #1 Completion. Such liquidated damages are hereby agreed to be a reasonable pre-estimate of damages the Owner will incur as a result of delayed Milestone #1 Completion of the Work:

One Thousand Dollars ($1,000.00) per consecutive calendar day for up to 15 Calendar Days beyond expiration of the Contract Times; then,

Two Thousand Dollars ($2,000.00) per consecutive calendar day after 15 Calendar Days beyond expiration of the Contract Times

If the Contractor fails to achieve Substantial Completion of the Work within the Contract Time and as otherwise required by the Contract Documents, the Owner shall be entitled to retain or recover from the Contractor, as Step Two Liquidated Damages and not as a penalty, the following per diem amount commencing upon the first day following expiration of the Contract Time and continuing until the actual date of Substantial Completion. Such liquidated damages are hereby agreed to be a reasonable pre-estimate of damages the Owner will incur as a result of delayed Substantial Completion of the Work:

One Thousand Dollars ($1,000.00) per consecutive calendar day for up to 15 Calendar Days beyond expiration of the Contract Times; then,

Two Thousand Dollars ($2,000.00) per consecutive calendar day after 15 Calendar Days beyond expiration of the Contract Times

If the Contractor fails to achieve Final Completion of the Work within the Contract Time, as Step Three Liquidated Damages and not as a penalty, the following per diem amount commencing upon the first day following the actual date of Substantial Completion and continuing until the actual date of Final Completion. Such liquidated damages are hereby agreed to be a reasonable pre-estimate of damages the Owner will incur as a result of delayed Final Completion of the Work:

One Thousand Dollars ($1,000.00) per consecutive calendar day for up to 15 Calendar Days beyond expiration of the Contract Times; then,

Two Thousand Dollars ($2,000.00) per consecutive calendar day after 15 Calendar Days beyond expiration of the Contract Times

The Owner may deduct liquidated damages described above from any unpaid amounts then or thereafter due the Contractor under this Agreement. Should the amount of any liquidated damages exceed the amount due or to become due to the Contractor, then the Contractor and his sureties shall be liable for and shall pay to the Owner the amount of any such excess.

JJ. Good Housekeeping

In accordance with the Clean Water Act, established by the Environmental Protection Agency (EPA) and enforced by the Virginia Department of Environmental Quality (DEQ), the City of Bristol Virginia is required to implement and enforce written procedures as part of the Municipal Separate Storm Sewer System (MS4) permit program requirements to prevent, to the maximum extent practicable, potential pollutants that will lead to a

point discharge at a natural drainage way. The City of Bristol Virginia's written procedures are provided in the Good Housekeeping/Pollution Prevention (GH/PP) manual provided to the Contractor. The Contractor shall employ good housekeeping practices outlined in the GH/PP manual and as directed in response to City inspection reports on all City properties and immediately remediate all spills containing potential pollutants as directed in the manual. If, through an audit or inspection, the EPA or DEQ renders fines to the City on account of poor practices determined to be the fault of Contractor, the City reserves the right to collect compensation from the Contractor. Contractors applying pesticides and herbicides shall provide evidence of appropriate certification in accordance with Virginia Law.

By signing the Contract, the Contractor acknowledges receipt of the GH/PP manual and certifies Contractor's understanding of its roles, responsibilities and liabilities associated with the City's MS4 Program. If the Contractor has any questions during the term of this contract concerning the Good Housekeeping and Pollution Prevention Manual, the Contractor may contact the Landfill Environmental & Safety Compliance Officer.

KK. Contract Provisions for Non-Federal Entity Contracts Under Federal Awards

1. All contracts awarded in excess of $100,000 that involve the employment of mechanics or laborers must include a provision for compliance with 40 U.S.C. 3702 and 3704, as supplemented by Department of Labor regulations, 29 CFR Part 5. Each contactor must be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay for all hours worked in excess of 40 hours in the work week. No laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous. These requirements do not apply to the purchases of supplies or materials or articles ordinarily available on the open market, or contracts for transportation or transmission of intelligence.

2. Contracts in excess of $150,000 must contain a provision requiring compliance with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401-7671q) and the Federal Water Pollution Contract Act as amended (33 U.S.C. 1251-1387). Violations must be reported to the Federal awarding agency and the Regional Office of the Environmental Protection Agency.

3. A contract award will not be made to parties listed on the government-wide exclusions in the System for Award Management (SAM), in accordance with the OMB guidelines at 2 CFR 180.

4. Contractors that apply or bid for an award exceeding $100,000 must file the required certification per the Byrd Anti-Lobbying Amendment (31 U.S.C. 1352). The contractor certifies that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by 31 U.S.C. 1352. Any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award will be disclosed.

5. As appropriate and to the extent consistent with law, the non-Federal entity should, to the greatest extent practicable under a Federal award, provide a preference for the purchase, acquisition, or use of goods, products, or materials produced in the United States (including but not limited to iron, aluminum, steel, cements, and other manufactured products). The requirements of this section must be included in all subawards including all contracts and purchase orders for work or products under this award. For purposes of this section:

    a. "Produced in the United States" means, for iron and steel products, that all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States.

    b. "Manufactured products" means items and construction materials composed in whole or in part of nonferrous metals such as aluminum; plastics and polymer-based products such as polyvinyl chloride pipe; aggregates such as concrete; glass, including optical fiber; and lumber.

6. Contractor must comply with section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act. The requirements of Section 6002 include procuring only items designated in guidelines of the Environmental Protection Agency (EPA) at 40 CFR part 247 that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition, where the purchase price of the item exceeds $10,000 or the value of the quantity acquired during the preceding fiscal year exceeded $10,000; procuring solid waste management services in a manner that maximized energy and resource recovery; and establishing an affirmative procurement program for procurement of recovered materials identified in the EPA guidelines.

LL. Contract Times

1. 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.

2. The Work will be substantially complete within 150 days after the date when the Contract Times commence to run, and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within 180 days after the date when the Contract Times commence to run.

3. Parts of the Work must be substantially completed on or before the following Milestone(s):

4. Phase 1 Completion - 30 Days

ATTACHMENT A

Sample Contract

(to be completed later)

CONTRACT FOR

Contract Number:

This contract entered into this____day of_____2022, by_____hereinafter called the "Contractor" and the City of Bristol Virginia, hereinafter called the "City".

WITNESSETH that the Contractor and the City, in consideration of mutual covenants, promises and agreementsherein contained, agree as follows:

SCOPE OF SERVICES: The Contractor shall provide the services to the City as set forth in the Invitation for Bid attached hereto.

CONTRACT PERIOD: The contract period is from_____.

COMPENSATION AND METHOD OF PAYMENT: The Contractor shall be paid in accordance with the Contract Documents in the amount of_____, subject to the Contract Document, Section 01 22 00 Measurement and Payment and Section 00 41 13 Bid Form. There shall be no addition(s) or deletion(s) to the Contract without the prior written approval of a Change Order issued by the City.

CONTRACT DOCUMENTS: The Contract Documents shall consist of the contract, Invitation for Bid and all attachments to the Invitation for Bid.

CONTRACTOR:	CITY OF BRISTOL VIRGINIA:
By:_____	By:_____
Title:_____	Title:_____
Date:_____	Date:_____

END OF SECTION 00 70 00

SECTION 01 11 00

SUMMARY OF WORK

1.0 GENERAL

1.1 SECTION INCLUDES

- Contract description.
- Owner supplied products
- Contractor's use of site and premises.
- Owner Occupancy
- Progress Meetings

1.2 CONTRACT DESCRIPTION

1.2.1

Work of the Project includes construction of **a landfill gas collection system along the sidewall of a quarry landfill.** The work includes the items listed in the following sections as identified on the Bid Form. The work is described by the Specifications and Project Drawings.

1.2.1.1 Mobilization/Demobilization

Mobilization and Demobilization includes the preparatory work and operations in mobilizing for the commencement of the work including, but not limited to, those operations necessary for the movement of personnel, equipment, supplies, and incidentals to the project site, and for any other pre-construction expense necessary for the start of the work. Mobilization and Demobilization shall also include bonds (not included in another bid item); permits (not included in another bid item); utility services; sanitary facilities; temporary field offices for CONTRACTOR; construction photographs; surveying; survey control, field measurements for payment, and record drawings. The CONTRACTOR will clean-up the site, remove all debris, and restore roads and stormwater controls to the pre-construction condition.

The lump sum price for Mobilization and Demobilization shall not exceed 10% of the Contract Bid amount or the amounts outlined in Section 01 20 00.

1.2.1.2 Health and Safety Planning and Accommodations

Provide a Health and Safety Plan that addresses respiratory protection procedure to adequately protect employees from side emissions as outlined in the Specifications. The Health and Safety Plan will be implemented during construction. The CONTRACTOR will provide all labor, equipment, and incidentals required to prepare and implement the program including documentation, testing, analysis, personal protective equipment, safety equipment, training, meetings, and all other

construction items complete and in-place. The CONTRACTOR will maintain this program for the duration of the project.

1.2.1.3 Blower/Flare Piping Improvements

Remove the existing piping for the blower flare station and replace with the piping shown on Sheet 6 of the Drawings as outlined in the Specifications. The contractor will furnish labor, equipment, materials, and incidentals required for removal of the existing piping, installation of the new piping, and all other construction items associated with the modifications.

1.2.1.4 Perimeter LFG Horizontal Collector - Materials

Provide the VDOT #3 aggregate, perforated pipe, and geocompsite drainage net required to construct the perimeter landfill gas horizontal collector. The CONTRACTOR will furnish all labor, materials, and incidentals required to ship the materials to the site and provide manufactures' testing as specified by the plans and specifications. All materials will be stored at a location determined by the OWNER in accordance with the Specifications.

1.2.1.5 Perimeter LFG Horizontal Collector - Installation

Excavate and place the VDOT #3 aggregate, perforated pipe, and geocomposite drainage net necessary to install the perimeter landfill gas horizontal collector. The CONTRACTOR will furnishing all labor, equipment, and incidentals required to excavate, transport materials, remove waste, repair geosynthetics, place aggregate, place piping, and tie-in additional geocomposite. The CONTRACTOR will protect the existing geosynthetics and provide materials, labor, and incidentals to make necessary repairs.

1.2.1.6 Sidewall Preparation and Repair

The CONTRACTOR will remove the rockfall protection system, vegetation and loose materials; and apply shotcrete in accordance with the plans and specifications. The CONTRACTOR will repair the existing geotextile and geomembrane above the top of the proposed low permeability soil layer as depicted in the plans. The CONTRACTOR will furnish all labor, materials, equipment, and incidentals required for preparation of the sidewall for deployment of the sidewall odor mitigation system.

1.2.1.7 External Odor Mitigation System Horizontal Collector - Materials

Provide the VDOT #3 aggregate, perforated pipe, and geotextile required to construct the perimeter landfill gas horizontal collector in accordance with the plans and specifications. The CONTRACTOR will furnish all labor, materials, and incidentals required to ship the materials to the site and provide manufactures' testing as specified by the plans and specifications. All materials will be stored at a location determined by the OWNER in accordance with the Specifications.

1.2.1.8 External Odor Mitigation System Horizontal Collector - Installation

Place the VDOT #3 aggregate, perforated pipe, and geotextile necessary to install the external odor mitigation system horizontal collector in accordance with the plans and specifications. The CONTRACTOR will furnishing all labor, equipment, and incidentals required to transport materials, repair geosynthetics, place aggregate, place piping, and tie-in additional geotextile.

1.2.1.9 Low Permeability Soil Plug – Materials

Provide the low permeability soil and geomembrane required to construct the low permeability soil plug in accordance with the plans and specifications. The CONTRACTOR will furnish all labor, materials, and incidentals required to ship the materials to the site and provide manufactures' and bulk material testing as specified by the plans and specifications. All materials will be stored at a location determined by the OWNER in accordance with the Specifications.

1.2.1.10 Low Permeability Soil Plug – Installation

Place the low permeability soil and geomembrane necessary to install the low permeability soil plug in accordance with the plans and specifications. The CONTRACTOR will furnishing all labor, equipment, and incidentals required to transport materials, repair geosynthetics, place soil, conpact soil, perform compaction testing, attach geomembrane flap, perform installation testing, and install anchor trench.

1.2.1.11 Soil Cover - Materials

Provide the general fill required to construct the soil cover plug in accordance with the plans and specifications. The CONTRACTOR will furnish all labor, materials, and incidentals required to ship the materials to the site and provide bulk material testing as specified by the plans and specifications. All materials will be stored at a location determined by the OWNER in accordance with the Specifications.

1.2.1.12 Soil Cover – Installation

The contractor will place the soil cover layer in accordance with the plans and specifications. The CONTRACTOR will furnish all labor, equipment, and incidentals required to transport, and place fill material to cover the low permeability soil plug and geomembrane.

1.2.1.13 Temporary Termination of Pilot System

Upon completion of Phase 1 of the system (or Pilot System), the Contractor will terminate each end of the system as shown in detail 4 on Sheet 5 of the plans. The CONTRACTOR will furnish all labor, equipment, and incidentals required to transport, place, compact, attach, test, and as appropriate remove the temporary terminations. The terminations will only be removed during construction of Phase 2 with approval from the ENGINEER.

1.2.1.14 Horizontal Collector Wellhead

The CONTRACTOR will install horizontal collector wellheads as shown on Sheet 2 and Sheet 2A of the Plans. The wellheads shall be connected to both Horizontal collectors as shown on Detail 2 on Sheet 5. Each well head should include the fittings and connections as depicted in Detail 3 on Sheet 5. The CONTRACTOR will furnish all labor, equipment, materials, and incidentals required for connections, boots, risers, and placement of the wellheads.

1.2.1.15 Isolation Valves

The CONTRACTOR will install the isolation valves with the plans and specifications. The CONTRACTOR will furnish all labor materials, equipment, and incidentals required for placement and connection of the valves.

1.2.1.16 4" Landfill Gas Header - Materials

Provide the pipe required to construct the landfill gas header in accordance with the plans and specifications. The CONTRACTOR will furnish all labor, materials, and incidentals required to ship the materials to the site and provide manufactures' testing as specified by the plans and specifications. All materials will be stored at a location determined by the OWNER in accordance with the Specifications.

1.2.1.17 4" Landfill Gas Header - Installation

The CONTRACTOR will install landfill gas header in accordance with the plans and specifications. The CONTRACTOR will furnish all labor materials, equipment, and incidentals required for construction of the landfill gas header along the landfill surface and sidewall to connect to the blower and flare.

1.2.1.18 2" Airline and 4" Forcemain - Materials

Provide the pipe and magnetic tape required to construct the airline and forcemain in accordance with the plans and specifications. The CONTRACTOR will furnish all labor, materials, and incidentals required to ship the materials to the site and provide manufactures' testing as specified by the plans and specifications. All materials will be stored at a location determined by the OWNER in accordance with the Specifications.

1.2.1.19 2" Airline and 4" Forcemain – Installation in Trench

The CONTRACTOR will install airline and forcemain in trenches in accordance with the plans and specifications. The CONTRACTOR will install pipes, soil, and fittings to install the airline and forcemain in trenches. The CONTRACTOR will furnish all labor, equipment, and incidentals required for construction of the airline and forcemain in trenches.

1.2.1.20 Perimeter LFG Horizontal Collector Pump

The CONTRACTOR will install liquids removal pumps for the perimeter landfill gas horizontal collector in accordance with the plans and specifications. The CONTRACTOR will furnish all labor, equipment, and incidentals required to excavate and regrade the area, install piping and aggregate; backfill and compaction; connections to airline and forcemain; connections to horizontal collector; and all other construction items.

1.2.1.21 External Odor Mitigation System Horizontal Collector Pump

The CONTRACTOR will install liquids removal pumps for the external odor mitigation horizontal collector in accordance with the plans and specifications. The CONTRACTOR will furnish all labor, equipment, and incidentals required to excavate and regrade the area, install piping and aggregate; backfill and compaction; connections to airline and forcemain; connections to horizontal collector; install geosynthetics and boot; and all other construction items.

1.3 OWNER SUPPLIED PRODUCTS

The following items Furnished by Owner for Installation by Contractor:

- 19,500 ft^2 of 40-mil LLDPE Geomembrane
- 5,200 ft^2 of 270-mil Geocomposite
- 5,200 ft^2 of 16 oz/yd^2 Non-woven Geotextile
- 200 ft of 2" Solid Wall SDR 9 HDPE Pipe
- 1,000 ft of 4" Solid Wall SDR 11 HDPE Pipe
- 520 ft of 6" Perforated SDR 11 HDPE Pipe
- 60 ft of 6" Solid Wall SDR 11 HDPE Pipe
- 100 ft of 4" Solid Wall SDR 11 HDPE Pipe
- 2,400 tons of VDOT #3 Aggregate
- 1,800 yd^3 Low Permeability Soil
- 600 yd^3 General Fill

1.4 CONTRACTOR'S USE OF SITE AND PREMISES

1.4.1

Owner agrees to make the Site accessible to Contractor during normal working hours (Monday through Friday 7:00 a.m. to 4:00 p.m.). Equipment maintenance, preparation, fueling, site maintenance, planning, and administration may occur outside of these hours as long as no material placement or construction occur. Contractor may work on Saturdays, Sundays, and extended days if provided written authorization from Owner. Contact Owner to coordinate Site access.

1.4.2

Construction operations limited to areas noted on Drawings.

1.4.3

Cooperate with Owner to minimize conflict and to facilitate Owner's operations.

1.4.4

Contractor shall provide and maintain such sanitary accommodations for the use of its employees and those of its Subcontractors as may be necessary to comply with the requirements and regulations of the local and state departments of health. These accommodations shall be at Contractor's expense.

1.5 OWNER OCCUPANCY

1.5.1

The Owner will occupy the property during the entire period of construction.

1.5.2

Cooperate with Owner to minimize conflict, and to facilitate Owner's operations.

1.5.3

Schedule the Work to accommodate Owner occupancy.

1.6 PROGRESS MEETINGS

Progress meetings will be held at least every other week, unless Owner directs otherwise, to discuss the activities and accomplishments for the preceding weeks, review the work location and activities for the upcoming week, identify the Contractor's personnel and equipment assignments for the upcoming week(s), and discuss potential construction problems. The date, time, and location of progress meetings will be established at the pre-construction conference.

END OF SECTION 01 11 00

SECTION 01 20 00

MEASUREMENT AND PAYMENT

1.0 GENERAL

1.1 APPLICATIONS FOR PAYMENT

1.1.1 Payment Terms

Payments shall be made in accordance with the procedures in the Terms and Conditions.

1.1.2 Application Form

Submit three (3) paper copies or one (1) electronic copy of each application on EJCDC C-620-2018 (Section 00 62 76 of the Specifications).

1.1.3 Content and Format

Utilize Bid Items for listing items in Application for Payment.

1.1.4 Payment Period

Submit at intervals stipulated in the Agreement.

1.1.5 Substantiating Data

When Architect/Engineer requires substantiating information, submit data justifying dollar amounts in question. Include the following with Application for Payment:

1.1.5.1 Construction Quality Control Data

Current soil and geosynthetic quality control test results, data, and daily reports. Test results and product specifications should be provided for all stored materials.

1.1.5.2 Record Documents

Record documents as specified in the project specifications, for review by Owner which will be returned to Contractor.

2.0 PRODUCTS - NOT USED

3.0 EXECUTION

3.1 MEASUREMENT AND PAYMENT

3.1.1 LUMP SUM PAY ITEMS - GENERAL SITE

3.1.1.1 MOBILIZATION AND DEMOBILIZATION

Measurement of the various items of work for Mobilization and Demobilization will not be made for payment and all items shall be included in the Contract Lump Sum Price. Mobilization shall be compensated as indicated on the bid form. Mobilization shall consist of the performance of construction preparatory operations, including the movement of personnel and equipment to the project site, placement of project identification signs, payment of applicable fees and cost of insurance, payment of performance and payment bonds and other insurance premiums and for the establishment of the field offices, and other facilities necessary to being work on a substantial phase of the contract. The basis of payment shall be as follows:

Total Original Contract Amount, Including Mobilization		Total Limit for Mobilization
More Than	To & Including	
$0	$100,000	10% of total contract amount
$100,000	$500,000	$10,000 plus 3% of total contract over $100,000
$500,000	$1,500,000	$22,000 plus 2% of total contract over $500,000
$1,500,000	More	$42,500 plus 1% of total contract over $1,500,000

Partial payments shall be as follows:

- One-third of the amount established above as the total limit will be released to Contractor with the first progress payment.
- Remaining two-thirds (2/3) to be divided over the next five (5) progress payments on an equal basis.

No deductions will be made, nor will any increase be made, in the lump sum mobilization item amount regardless of decreases or increases in the final Contract Price or for any other cause.

The lump sum price for Mobilization and Demobilization shall not exceed 10% of the of the Contract Bid amount.

3.1.1.2 Health and Safety Planning and Accommodations

Measurement for the various items required for Health and Safety Planning and Accommodations will not be made for payment and all items shall be included in the contract Lump Sum Price.

Payment for Health and Safety Planning and Accommodations shall be made at the Lump Sum Price, which price and payment shall be full compensation for furnishing all labor, equipment, and incidentals required to provide a Health and Safety Plan; safe work procedures; personal protective equipment; laboratory testing; field testing equipment; safety meetings; safety training; and all other construction items complete and in-place. The cost of maintaining these controls for the duration of the project should be included in the Lump Sum Price.

3.1.1.3 Blower/Flare Piping Improvements

Measurement for the various items required for Blower/Flare Piping Improvements will not be made for payment and all items shall be included in the contract Lump Sum Price.

Payment for Blower/Flare Piping Improvements shall be made at the Lump Sum Price, which price and payment shall be full compensation for furnishing labor, equipment, materials, and incidentals required for removal of existing blower/flare piping, replacement of blower/flare piping, and all other construction items complete and in-place in accordance with the plans and specifications.

3.1.2 UNIT PRICE PAY ITEMS - GENERAL SITE

3.1.2.4 Perimeter LFG Horizontal Collector - Materials

Measurement for the various items required to provide Perimeter LFG Horizontal Collector - Materials shall be made at the Contract Unit Price per each linear foot of the SOMS satisfactorily installed by the CONTRACTOR and accepted by the ENGINEER.

Payment for the construction of Perimeter LFG Horizontal Collector - Materials shall be made at the Unit Price Per Linear Foot, which price and payment shall be full compensation for furnishing all labor materials, equipment, and incidentals required for providing materials for Perimeter LFG Horizontal Collector; and all other construction items complete and in-place in accordance with the plans and specifications.

3.1.2.5 Perimeter LFG Horizontal Collector - Installation

Measurement for the various items required to construct Perimeter LFG Horizontal Collector - Installation shall be made at the Contract Unit Price per each linear foot of the SOMS satisfactorily installed by the CONTRACTOR and accepted by the ENGINEER.

Payment for the construction of Perimeter LFG Horizontal Collector - Installation shall be made at the Unit Price Per Linear Foot, which price and payment shall be full compensation for furnishing all labor materials, equipment, and incidentals required for construction of Perimeter LFG Horizontal Collector; and all other construction items complete and in-place in accordance with the plans and specifications.

3.1.2.6 Sidewall Preparation and Repair

Measurement for the various items required to complete Sidewall Preparation and Repair shall be made at the Contract Unit Price per each linear foot of the SOMS satisfactorily installed by the CONTRACTOR and accepted by the ENGINEER.

Payment for the completion of Sidewall Preparation and Repair - Installation shall be made at the Unit Price Per Linear Foot, which price and payment shall be full compensation for furnishing all labor materials, equipment, and incidentals required for completion of Sidewall Preparation and Repair; and all other construction items complete and in-place in accordance with the plans and specifications.

3.1.2.7 External Odor Mitigation System Horizontal Collector - Materials

Measurement for the various items required to provide External Odor Mitigation System Horizontal Collector - Materials shall be made at the Contract Unit Price per each linear foot of the SOMS satisfactorily installed by the CONTRACTOR and accepted by the ENGINEER.

Payment for the construction of External Odor Mitigation System Horizontal Collector - Materials shall be made at the Unit Price Per Linear Foot, which price and payment shall be full compensation for furnishing all labor materials, equipment, and incidentals required for providing materials for External Odor Mitigation System Horizontal Collector; and all other construction items complete and in-place in accordance with the plans and specifications.

3.1.2.8 External Odor Mitigation System Horizontal Collector - Installation

Measurement for the various items required to construct External Odor Mitigation System Horizontal Collector - Installation shall be made at the Contract Unit Price per each linear foot of the SOMS satisfactorily installed by the CONTRACTOR and accepted by the ENGINEER.

Payment for the construction of External Odor Mitigation System Horizontal Collector - Installation shall be made at the Unit Price Per Linear Foot, which price and payment shall be full compensation for furnishing all labor materials, equipment, and incidentals required for construction of External Odor Mitigation System Horizontal Collector; and all other construction items complete and in-place in accordance with the plans and specifications.

3.1.2.9 Low Permeability Soil Plug - Materials

Measurement for the various items required to provide Low Permeability Soil Plug - Materials shall be made at the Contract Unit Price per each linear foot of the SOMS satisfactorily installed by the CONTRACTOR and accepted by the ENGINEER.

Payment for the construction of Low Permeability Soil Plug - Materials shall be made at the Unit Price Per Linear Foot, which price and payment shall be full compensation for furnishing all labor materials, equipment, and incidentals required for providing materials for Low Permeability Soil Plug; and all other construction items complete and in-place in accordance with the plans and specifications.

3.1.2.10 Low Permeability Soil Plug - Installation

Measurement for the various items required to construct Low Permeability Soil Plug - Installation shall be made at the Contract Unit Price per each linear foot of the SOMS satisfactorily installed by the CONTRACTOR and accepted by the ENGINEER.

Payment for the construction of Low Permeability Soil Plug - Installation shall be made at the Unit Price Per Linear Foot, which price and payment shall be full compensation for furnishing all labor materials, equipment, and incidentals required for construction of Low Permeability Soil Plug; and all other construction items complete and in-place in accordance with the plans and specifications.

3.1.2.11 Soil Cover - Materials

Measurement for the various items required to provide Soil Cover - Materials shall be made at the Contract Unit Price per each linear foot of the SOMS satisfactorily installed by the CONTRACTOR and accepted by the ENGINEER.

Payment for the construction of Soil Cover - Materials shall be made at the Unit Price Per Linear Foot, which price and payment shall be full compensation for furnishing all labor materials, equipment, and incidentals required for providing materials for Soil Cover; and all other construction items complete and in-place in accordance with the plans and specifications.

3.1.2.12 Soil Cover - Installation

Measurement for the various items required to construct Soil Cover - Installation shall be made at the Contract Unit Price per each linear foot of the SOMS satisfactorily installed by the CONTRACTOR and accepted by the ENGINEER.

Payment for the construction of Soil Cover - Installation shall be made at the Unit Price Per Linear Foot, which price and payment shall be full compensation for furnishing all labor materials, equipment, and incidentals required for construction of Soil Cover; and all other construction items complete and in-place in accordance with the plans and specifications.

3.1.2.13 Temporary Termination of Pilot System

Measurement for the various items required to construct Temporary Termination of Pilot System shall be made at the Contract Unit Price per each Temporary Termination satisfactorily installed by the CONTRACTOR and accepted by the ENGINEER.

Payment for the construction of Temporary Termination of Pilot System shall be made at the Unit Price Per Termination, which price and payment shall be full compensation for furnishing all labor materials, equipment, and incidentals required for construction of Temporary Termination of Pilot System; and all other construction items complete and in-place in accordance with the plans and specifications.

3.1.2.14 Horizontal Collector Wellhead

Measurement for the various items required to construct Horizontal Collector Wellhead shall be made at the Contract Unit Price per each Horizontal Collector Wellhead satisfactorily installed by the CONTRACTOR and accepted by the ENGINEER.

Payment for the construction of Horizontal Collector Wellhead shall be made at the Unit Price Per Wellhead, which price and payment shall be full compensation for furnishing all labor materials, equipment, and incidentals required for construction of Horizontal Collector Wellhead; and all other construction items complete and in-place in accordance with the plans and specifications.

3.1.2.15 Isolation Valves

Measurement for the various items required to construct Isolation Valves shall be made at the Contract Unit Price per each valve satisfactorily installed by the CONTRACTOR and accepted by the ENGINEER.

Payment for the construction of Isolation Valves shall be made at the Unit Price Per Valve, which price and payment shall be full compensation for furnishing all labor materials, equipment, and incidentals required for construction of Isolation Valves; and all other construction items complete and in-place in accordance with the plans and specifications.

3.1.2.16 Landfill Gas Header- Materials

Measurement for the various items required to provide Landfill Gas Header - Materials shall be made at the Contract Unit Price per each linear foot of the Landfill Gas Header satisfactorily installed by the CONTRACTOR and accepted by the ENGINEER.

Payment for the construction of Landfill Gas Header - Materials shall be made at the Unit Price Per Linear Foot, which price and payment shall be full compensation for furnishing all labor materials, equipment, and incidentals required for providing materials for Landfill Gas Header; and all other construction items complete and in-place in accordance with the plans and specifications.

3.1.2.17 Landfill Gas Header - Installation

Measurement for the various items required to construct Landfill Gas Header - Installation shall be made at the Contract Unit Price per each linear foot of the Landfill Gas Header satisfactorily installed by the CONTRACTOR and accepted by the ENGINEER.

Payment for the construction of Landfill Gas Header - Installation shall be made at the Unit Price Per Linear Foot, which price and payment shall be full compensation for furnishing all labor materials, equipment, and incidentals required for construction of Landfill Gas Header; and all other construction items complete and in-place in accordance with the plans and specifications.

3.1.2.18 Airline and Forcemain - Materials

Measurement for the various items required to provide Airline and Forcemain - Materials shall be made at the Contract Unit Price per each linear foot of the Airline and Forcemain satisfactorily installed by the CONTRACTOR and accepted by the ENGINEER.

Payment for the construction of Airline and Forcemain - Materials shall be made at the Unit Price Per Linear Foot, which price and payment shall be full compensation for furnishing all labor materials, equipment, and incidentals required for providing materials for Airline and Forcemain; and all other construction items complete and in-place in accordance with the plans and specifications.

3.1.2.19 Airline and Forcemain - Installation

Measurement for the various items required to construct Airline and Forcemain - Installation shall be made at the Contract Unit Price per each linear foot of the Airline and Forcemain satisfactorily installed by the CONTRACTOR and accepted by the ENGINEER.

Payment for the construction of Airline and Forcemain - Installation shall be made at the Unit Price Per Linear Foot, which price and payment shall be full compensation for furnishing all labor materials, equipment, and incidentals required for construction of Airline and Forcemain; and all other construction items complete and in-place in accordance with the plans and specifications.

3.1.2.20 Perimeter LFG Horizontal Collector Pump

Measurement for the various items required to construct Perimeter LFG Horizontal Collector Pump shall be made at the Contract Unit Price per each valve satisfactorily installed by the CONTRACTOR and accepted by the ENGINEER.

Payment for the construction of Perimeter LFG Horizontal Collector Pump shall be made at the Unit Price Per Pump, which price and payment shall be full compensation for furnishing all labor materials, equipment, and incidentals required for construction of Perimeter LFG Horizontal Collector Pump; and all other construction items complete and in-place in accordance with the plans and specifications.

3.1.2.21 External Odor Mitigation System Horizontal Collector Pump

Measurement for the various items required to construct External Odor Mitigation System Horizontal Collector Pump shall be made at the Contract Unit Price per each valve satisfactorily installed by the CONTRACTOR and accepted by the ENGINEER.

Payment for the construction of External Odor Mitigation System Horizontal Collector Pump shall be made at the Unit Price Per Pump, which price and payment shall be full compensation for furnishing all labor materials, equipment, and incidentals required for construction of External Odor Mitigation System Horizontal Collector Pump; and all other construction items complete and in-place in accordance with the plans and specifications.

END OF SECTION 01 20 00

SECTION 01 30 00

ADMINISTRATIVE REQUIREMENTS

1.0 GENERAL

1.1 SECTION INCLUDES

- Coordination and project conditions.
- Field engineering.
- Preconstruction meeting.
- Site mobilization meeting.
- Progress meetings.
- Pre-installation meetings.
- Cutting and patching.
- Special procedures.

1.2 COORDINATION AND PROJECT CONDITIONS

1.2.1

Coordinate scheduling, submittals, and Work of various sections of Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements.

1.3 FIELD ENGINEERING

1.3.1 Equipment and Contractors

Utilize Global Positioning Systems on equipment and for field location acceptable to Engineer. If third party surveying is used, employ Land Surveyor registered in State of Virginia and acceptable to Engineer.

1.3.2 Reference Points

Owner will locate and protect survey control and reference points. Promptly notify Engineer of discrepancies discovered.

1.3.3 Horizontal Datum

Horizontal control datum for survey is NAD 83 Virginia South.

1.3.4 Vertical Datum

Vertical control datum for survey is NAVD88.

1.3.5 Set Backs

Verify set-backs and easements; confirm drawing dimensions and elevations.

1.3.6 Surveying Services

Provide field engineering services. Establish elevations, lines, and levels, utilizing recognized engineering survey practices.

1.3.7 Protection of Control Points

Protect survey control points prior to starting site work; preserve permanent reference points during construction.

1.3.8 Loss of Control Points

Promptly report to Architect/Engineer loss or destruction of reference point or relocation required because of changes in grades or other reasons.

1.3.9 Dislocated Control Points

Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect/Engineer.

1.4 PRECONSTRUCTION MEETING

1.4.1 Coordination

Engineer will schedule meeting after Notice of Award.

1.4.2 Attendance

Attendance Required: Owner, Architect/Engineer, and Contractor.

1.4.3 Agenda

- Execution of Owner-Contractor Agreement.
- Submission of executed bonds and insurance certificates.
- Distribution of Contract Documents.
- Submission of list of Subcontractors, list of products, schedule of values, and progress schedule.
- Designation of personnel representing parties in Contract, Owner, and Architect/Engineer.

- Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
- Scheduling.
- Scheduling activities of Geosynthetics Installer

1.4.4 Minutes

Engineer will record minutes and distribute copies within two days after meeting to participants, with electronic copies to Contractor, Owner, and those affected by decisions made.

1.5 SITE MOBILIZATION MEETING

1.5.1 Coordination

Engineer will schedule meeting at Project site prior to Contractor occupancy. Meeting may coincide with or immediately follow preconstruction meeting.

1.5.2 Attendance

Attendance Required: Owner, Architect/Engineer, Contractor, Contractor's Superintendent, and major Subcontractors.

1.5.3 Agenda

- Use of premises by Owner and Contractor.
- Owner's requirements.
- Construction facilities and controls provided by Owner.
- Temporary utilities provided by Owner.
- Survey and layout.
- Security and housekeeping procedures.
- Schedules.
- Application for payment procedures.
- Procedures for testing.
- Procedures for maintaining record documents.
- Requirements for start-up of equipment.
- Inspection and acceptance of equipment put into service during construction period.

1.5.4 Minutes

Engineer will record minutes and distribute copies within two days after meeting to participants, with electronic copies to Contractor, Owner, and those affected by decisions made.

1.6 PROGRESS MEETINGS

1.6.1 Meeting Schedule

Schedule and administer meetings throughout progress of the Work at maximum bi-monthly intervals.

1.6.2 Coordination

Engineer will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

1.6.3 Attendance

Attendance Required: Job superintendent, major subcontractors and suppliers, Owner, Engineer, as appropriate to agenda topics for each meeting.

1.6.4 Agenda

- Review minutes of previous meetings.
- Review of Work progress.
- Field observations, problems, and decisions.
- Identification of problems impeding planned progress.
- Review of submittals schedule and status of submittals.
- Review of off-site fabrication and delivery schedules.
- Maintenance of progress schedule.
- Corrective measures to regain projected schedules.
- Planned progress during succeeding work period.
- Coordination of projected progress.
- Maintenance of quality and work standards.
- Effect of proposed changes on progress schedule and coordination.
- Other business relating to Work.

1.6.5 Minutes

Engineer will record minutes and distribute copies within two days after meeting to participants, with electronic copies to Contractor, Owner, and those affected by decisions made.

1.7 PRE-INSTALLATION MEETINGS

1.7.1 Scheduling

When required in individual specification sections, convene pre-installation meetings at Project site prior to commencing work of specific section.

1.7.2 Attendance

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

1.7.3 Scheduling

Notify Engineer four days in advance of meeting date. Meeting Date may coincide with a Progress Meeting.

1.7.4 Agenda and Coordination

Engineer will prepare agenda and preside at meeting:

- Review conditions of installation, preparation and installation procedures.
- Review coordination with related work.

1.7.5 Minutes

Engineer will record minutes and distribute copies within two days after meeting to participants, with electronic copies to Contractor, Owner, and those affected by decisions made.

2.0 PRODUCTS - NOT USED

3.0 EXECUTION – NOT USED

END OF SECTION 01 30 00

SECTION 01 33 00

SUBMITTAL PROCEDURES

1.0 GENERAL

1.1 SECTION INCLUDES

A. Submittal procedures
B. Construction progress schedules
C. Proposed products list
D. Product data
E. Shop drawings
F. Samples
G. Design data
H. Test reports
I. Certificates
J. Manufacturer's instructions
K. Manufacturer's field reports
L. Erection drawings
M. Construction photographs

1.2 SUBMITTAL PROCEDURES

A. Transmit each submittal with a Submittal Form.
B. Sequentially number transmittal forms. Mark revised submittals with original number and sequential alphabetic suffix.
C. Identify Project, Contractor, subcontractor and supplier; pertinent drawing and detail number, and specification section number, appropriate to submittal.
D. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with requirements of the Work and Contract Documents.
E. Schedule submittals to expedite Project, and deliver to Engineer electronically. Coordinate submission of related items.
F. For each submittal for review, allow 15 days excluding delivery time to and from Contractor.
G. Identify variations from Contract Documents and product or system limitations which may be detrimental to successful performance of completed Work.

H. Allow space on submittals for Contractor and Engineer review stamps.
I. When revised for resubmission, identify changes made since previous submission.
J. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.
K. Submittals not requested will not be recognized or processed.
L. All submittals shall be submitted electronically.

1.3 CONSTRUCTION PROGRESS SCHEDULES

A. Submit initial schedules within 5 days after date of Owner-Contractor Agreement established in Notice to Proceed. After review, resubmit required revised data within 5 days.

B. Submit revised Progress Schedules with each Application for Payment.

C. Distribute copies of reviewed schedules to Project site file, subcontractors, suppliers, and other concerned parties.

D. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

E. Submit computer generated horizontal bar chart with separate line for each major portion of Work, identifying first work day of each week.

F. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate early and late start, early and late finish, float dates, and duration.

G. Indicate estimated percentage of completion for each item of Work at each submission.

H. Submit separate schedule of submittal dates for shop drawings, product data, and samples, including Owner furnished products and products identified under Allowances, and dates reviewed submittals will be required from Engineer. Indicate decision dates for selection of finishes.

I. Indicate delivery dates for Owner furnished products and products identified under Allowances.

J. Revisions To Schedules:
   1. Indicate progress of each activity to date of submittal, and projected completion date of each activity.
   2. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.
   3. Prepare narrative report to define problem areas, anticipated delays, and impact on Schedule. Report corrective action taken, or proposed, and its effect.

1.4 PROPOSED PRODUCTS LIST

A. Within 5 days after date of Owner-Contractor Agreement, submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.

B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.5 PRODUCT DATA

A. Product Data: Submit to Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.

B. Submit product data electronically.

C. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

D. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

1.6 SHOP DRAWINGS

A. Shop Drawings: Submit to Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.

1.7 SAMPLES

A. Samples: Submit to Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.

B. Include identification on each sample, with full Project information.

C. Submit number of samples specified in individual specification sections; Engineer will retain samples.

D. Reviewed samples which may be used in the Work are indicated in individual specification sections.

1.8 DESIGN DATA

A. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

1.9 TEST REPORTS

A. Submit test reports for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

1.10 CERTIFICATES

A. When specified in individual specification sections, submit certification by manufacturer, installation/application subcontractor, or Contractor to Engineer, in quantities specified for Product Data.

B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Engineer.

1.11 MANUFACTURER'S INSTRUCTIONS

A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to Engineer for delivery to Owner in quantities specified for Product Data.

B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.12 INSTALLATION DRAWINGS

A. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

B. Data indicating inappropriate or unacceptable Work may be subject to action by Engineer or Owner.

2.0 PRODUCTS - NOT USED

3.0 EXECUTION

Repeated failure to present acceptable submittals or excessive services required of Engineer due to repeated presentation of unacceptable submittals shall 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 Contractor.

END OF SECTION 01 33 00

SECTION 01 35 29

HEALTH AND SAFETY PLAN

1.0 GENERAL

1.1 GENERAL

1.1.1 Exclusion Zone

In the event that the ENGINEER or OWNER identify an exclusion zone, the CONTRACTOR will use only site crew members in the identified area that are trained in accordance with the United States Occupational Safety and Health Administration (OSHA) regulations 29 CFR 1910.120. The workers also need to have completed the minimum 40-hour Hazardous Materials training course and necessary refresher courses. This applies to both the CONTRACTOR's workers and any Subcontractor site workers.

1.1.2 Medical Monitoring Program

All site workers that work in the identified exclusion zone must be under a Medical Monitoring Program as outlined in 29 CFR 1910.120, and be physically capable of wearing a respirator, if necessary.

1.1.3 Stop Work

Actions that potentially endanger workers shall be stopped immediately and brought to the OWNER's attention. Health and Safety is the responsibility of the CONTRACTOR.

1.2 SITE-SPECIFIC HEALTH AND SAFETY PLAN

1.2.1 Preparation

The CONTRACTOR shall prepare a written site-specific Health and Safety Plan (Plan) for use by the CONTRACTOR and Subcontractor site workers. This plan must be prepared to meet the 29 CFR 1910.120 OSHA regulations and shall include as a minimum, the following:

1.2.1.1 Organizational Structure

Organizational Structure to include general supervision, Health and Safety officer, lines of authority, and responsibility and communication. The Health and Safety Officer shall be a worker who will be present at all times during site construction, in addition to his/her other site duties.

1.2.1.2 Comprehensive Work Plan

Comprehensive Work Plan to include the work tasks and objectives, resources needed, and training requirements for workers (health and safety, machine operations license, etc.). This shall also include a section on safety procedures to be followed for excavation and well drilling in landfill waste and work in areas where exposure to landfill gas, condensate, and/or leachate is likely.

1.2.1.3 Health and Safety

Health and Safety to include identification of possible site hazards (e.g., solid waste, landfill gas, and leachate), training levels for each category of site workers, personal protective equipment and medical surveillance needed, site control measures, and confined space entry procedures.

1.2.1.4 Emergency Response Plans

Emergency Response Plans to include all emergency telephone numbers, a highlighted map showing the quickest route to the nearest emergency care facility and written directions to such facility.

1.2.1.5 Air Monitoring Procedures

Air Monitoring Procedures to include frequency and type of air monitoring of exposed refuse, landfill surfaces, boreholes and excavations, and site worker areas, calibration of air monitoring equipment, and action levels of air contaminants for site worker protection. All equipment calibration and field gas measurements shall be recorded with the date and time of sample, and the sampler's name. Sampling shall be done by a CONTRACTOR's worker trained in the use of the gas sampling equipment. These trained workers shall be designated in the CONTRACTOR's Plan.

1.2.1.6 Respiratory Protection Program

Respiratory Protection Program to include written documentation of the CONTRACTOR's respiratory program. The program should address how to protect employees from the sidewall gas emissions.

1.2.1.7 Well Drilling Installation and Excavation Safety Procedures

Well Drilling Installation and Excavation Safety Procedures to include prevention of fall hazards and controlled access zones.

1.2.1.8 Signature Page

A signature page for all site workers covered by the Plan (CONTRACTOR and Subcontractor site workers).

1.2.2 Acceptance

Acceptance of the CONTRACTOR's Plan by the OWNER is necessary prior to the start of site operations. The Plan should incorporate and be consistent with the OWNER's and the LANDFILL OPERATOR's health and safety policies and procedures.

1.2.3 Considerations

The CONTRACTOR shall consider the various materials disposed of (municipal solid waste, construction and demolition debris) that may be encountered during excavation in preparing the Health and Safety Plan.

1.2.4 References

The Health and Safety Plan should reflect information contained in "A Compilation of Landfill Gas Field Practices and Procedures, Solid Waste Association of North America (SWANA), August 2011."

1.3 SITE OPERATIONS

1.3.1 Location

The Plan will be kept on site in an easily accessible spot during all site operating hours. All site workers will be notified of the location of the Plan.

1.3.2 Safety Meeting

A Safety Meeting will be held by CONTRACTOR and attended by all CONTRACTOR site workers prior to starting construction. At this safety meeting, the Plan will be reviewed with the site workers, and all site workers will sign the Plan indicating that they have been apprised of the Plan's contents. New site workers must review the Plan with the CONTRACTOR's Health and Safety Officer prior to beginning work on site, and must sign that they have been apprised of the Plan's contents.

1.3.3 Lighting

Site operations will take place in conditions of adequate light only.

1.3.4 Landfill gas

Areas of open refuse (i.e., excavations, trenches and boreholes) will be periodically monitored for combustible gases, methane, carbon monoxide, benzene, hydrogen sulfide and oxygen through the use of field gas meters. Respiratory protection for acid gases and organic vapors will be used by the worker while monitoring gas levels, if deemed necessary by the CONTRACTOR. Appropriate respiratory protection will be taken by other workers as necessary.

1.3.5 Excavation

No workers will be allowed in any trench or excavation while excavation of the area is in progress. Entry into the excavation shall be made only after the CONTRACTOR's site worker has monitored the air in the excavation, and determined the appropriate level of personal protection required for entry into the excavation. Site workers in excavations must be supervised at all times.

1.3.6 Skin Protection

Site workers will limit their dermal exposure to landfill gas, leachate, condensate, and excavated refuse. Minimal skin protection includes puncture resistant shoes meeting ANSI standards, long

pants, long-sleeved shirts, safety glasses, safety vests, hard hats, and rubber gloves to be used when handling refuse.

1.3.7 Start-up and Shut-down

Start-up and shutdown of engines will not be done in areas of excavated refuse or where elevated landfill gas emissions have been documented.

2.0 PRODUCTS

Not used.

3.0 EXECUTION

Not used.

END OF SECTION 01 35 29

SECTION 01 45 00

CONSTRUCTION QUALITY CONTROL

1.0 GENERAL

1.1 SECTION INCLUDES

- Quality Control Requirements
- Tolerances.
- References.
- Labeling.
- Testing and inspection services.
- Examination.
- Preparation.

1.2 QUALITY CONTROL REQUIREMENTS

1.2.1 Construction Quality Control

The CONTRACTOR is responsible for construction quality control (CQC) and shall establish and maintain an effective quality control system in compliance with the Contract Documents. The construction quality control system shall consist of plans, procedures, tests and observation, and organization necessary to produce an end product which complies with the contract requirements. The system shall cover all construction and manufacturing operations, both on-site and off-site, and shall be keyed to the proposed construction sequence.

Contractor will be required to provide, coordinate and oversee the following activities on the Project in accordance with the Specifications and CQA Manual:

1.2.1.1 Materials Testing

Laboratory and field soil and geosynthetics testing in accordance with the project specifications.

1.2.1.2 Operational Testing

Laboratory and field soil and geosynthetics testing to guide construction operations.

1.2.1.3 Surveying

Field stake-out surveying and surveying to facilitate construction operations.

1.2.2 Construction Quality Assurance

The Owner is responsible for and will provide Construction Quality Assurance (CQA), which will provide independent monitoring and verification of compliance with all construction and CQC requirements.

Minimum testing requirements are included in applicable Specification sections. Owner will provide the following testing on the Project:

1.2.2.1 Materials Testing

Laboratory and field soil and geosynthetics testing as outlined in the project specifications.

All tests which fail to comply with the minimum requirements shall be retested at Contractor's expense using Owner's contracted representatives. Owner reserves the right to direct additional testing and sampling.

1.2.2.2 Surveying

Provision of construction quality assurance surveying.

1.2.2.3 Drawings

Record drawings.

Results of all analyses shall be submitted to Engineer as soon as they are available. Should any analyses show that the product or material tested does not comply with the Specification, Contractor shall remove, repair, or replace the product or material at no expense to Owner. Contractor may, at his option and expense, perform additional testing to substantiate the claim the product or material complies with the specification requirements.

1.3 MEASUREMENT AND PAYMENT

Separate payment will not be made for providing and maintaining an effective Construction Quality Control program, CONTRACTOR Quality Control (CQC) Plan and associated testing provisions during the progression of the work will not be paid for separately and shall be included within the applicable work item on the bid form.

1.4 QUALITY CONTROL AND CONTROL OF INSTALLATION

1.4.1

Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

1.4.2

Comply with manufacturers' instructions, including each step in sequence.

1.4.3

When manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

1.4.4

Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

1.4.5

Perform Work by persons qualified to produce required and specified quality.

1.4.6

Verify field measurements are as indicated on Shop Drawings or as instructed by manufacturer.

1.4.7

Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.5 TOLERANCES

1.5.1

Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

1.5.2

Comply with manufacturers' tolerances. When manufacturers' tolerances conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.

1.5.3

Adjust products to appropriate dimensions; position before securing products in place.

1.6 REFERENCES

1.6.1

For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of standard, except when more rigid requirements are specified or are required by applicable codes.

1.6.2

Conform to reference standard by date of issue current on date of Contract Documents, except where specific date is established by code.

1.6.3

Obtain copies of standards where required by product specification sections.

1.6.4

When specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.

1.6.5

Neither contractual relationships, duties, nor responsibilities of parties in Contract nor those of Engineer shall be altered from Contract Documents by mention or inference otherwise in reference documents.

1.7 TESTING AND INSPECTION SERVICES

1.7.1

The Contractor may employ a third party firm to support construction quality control on the project.

1.7.2

Employ and pay for services of an independent testing agency or laboratory acceptable to Owner to perform specified testing. Refer to Section 01 45 29 for laboratory requirements.

1.7.3

The independent firm will perform tests, inspections, and other services specified in individual specification sections and as required by Engineer.

1.7.4

Testing, inspections and source quality control may occur on or off project site. Perform off-site testing as required by Engineer.

1.7.5

Reports will be submitted by independent firm to Engineer and Contractor, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.

1.7.6

Contractor shall cooperate with independent firm; furnish samples of materials, equipment, tools, storage, safe access, and assistance by incidental labor as requested.

1.7.6.1

Notify Engineer and independent firm 48 hours prior to expected time for operations requiring services.

1.7.6.2

Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.

2.0 PRODUCTS

2.1 CONSTRUCTION QUALITY CONTROL PLAN

2.1.1 Content of the CQC Plan

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

2.1.1.1 Organizational Chart

A description of the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff shall implement the three phase control system for all aspects of the work specified. The staff shall include a CQC System Manager who shall report to the Site Superintendent or someone higher in the CONTRACTOR's organization. Site Superintendent in this context shall mean the individual with responsibility for the overall management of the project including quality and production.

2.1.1.2 Resumes

A description of the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff shall implement the three phase control system for all aspects of the work specified. The staff shall include a CQC System Manager who shall report to the Site Superintendent or someone higher in the CONTRACTOR's organization. Site Superintendent in this context shall mean the individual with responsibility for the overall management of the project including quality and production.

2.1.1.3 Letter of Authorization

A copy of the letter to the CQC System Manager signed by an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager including authority to stop work which is not in compliance with the contract. The CQC System Manager shall issue letters of direction to all other various quality

control representatives outlining duties, authorities and responsibilities. Copies of these letters and documents will also be furnished to the Owner.

2.1.1.4 Submittal

Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, off-site fabricators, suppliers and purchasing agents shall be in accordance with the Section 01 33 00.

2.1.1.5 Testing

Control, verification and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, and person responsible for each test.

2.1.1.6 Inspection

Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.

2.1.1.7 Deficiencies

Procedures for tracking construction deficiencies from identification through acceptable corrective action. These procedures will establish verification that identified deficiencies have been corrected.

2.1.1.8 Daily Report and Monthly Report

Reporting procedures, including proposed reporting formats.

2.1.1.9 A list of the definable features of work.

A definable feature of work is a task which is separate and distinct from other tasks and has separate control requirements. It could be identified by different trades or disciplines, or it could be work by the same trade in a different environment. Although each section of the specifications may generally be considered as a definable feature of work, there are frequently more than one definable feature under a particular section. This list will be agreed upon during the Pre-Construction Conference and subsequent progress meetings.

2.1.1.10 Samples

Samples of all daily report and inspection forms.

2.1.1.11 Laboratories

The name and address of all quality control laboratories.

2.1.2 Acceptance of Plan

Acceptance of the CONTRACTOR's plan is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction. The Owner reserves the right to require the CONTRACTOR to make changes in his CQC plan and operations including removal of personnel, as necessary, to obtain the quality specified.

2.1.3 Notification of Changes

After acceptance of the CQC plan, the CONTRACTOR shall notify the ENGINEER in writing a minimum of seven (7) calendar days prior to any proposed change. Proposed changes are subject to acceptance by the ENGINEER and OWNER.

3.0 EXECUTION

3.1 CONSTRUCTION QUALITY CONTROL ORGANIZATION

3.1.1 CQC System Manager

The CONTRACTOR shall identify an individual within his organization at the site of the work who shall be responsible for overall management of CQC and have the authority to act in all CQC matters for the CONTRACTOR. This CQC System Manager shall be on the site at all times during construction and will be employed by the CONTRACTOR, except as noted in the following. An alternate for the CQC System Manager will be identified by the CQC System Manager in the plan to serve in the event of the system manager's absence. Periods of absence may not exceed 2 weeks at any one time, and not more than 15 workdays during a calendar year. The requirements for the alternate will be the same as for the designated CQC system manager.

3.1.2 CQC Organizational Staffing

The CONTRACTOR shall provide a CQC staff which shall be at the site of work at all times during progress of the work, with authority to take any action necessary to ensure compliance with the contract.

3.1.3 CQC Staff

Following are the minimum requirements for the CQC staff. These minimum requirements will not necessarily assure an adequate staff to meet the CQC requirements at all times during construction. The actual strength of the CQC staff may vary during any specific work period to cover the needs of the work period. When necessary for a proper CQC staffing on-site, the CONTRACTOR will add additional staff at no cost to the OWNER. This listing of minimum staff in no way relieves the CONTRACTOR of meeting the basic requirements of quality construction in accordance with contract requirements. All CQC staff members shall be subject to acceptance by the OWNER.

3.1.3.1 CQC System Manager:

The CQC System Manager shall demonstrate that they have a minimum of 2 years landfill construction experience on construction similar to this contract. The CQC System Manager shall be

assigned as system manager but may also have duties as project superintendent in addition to quality control.

3.1.3.2 Supplemental Personnel

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

3.1.4 Organizational Changes

The CONTRACTOR shall obtain OWNER acceptance before replacing any member of the CQC staff. Requests shall include the names, qualifications, duties, and responsibilities of each proposed replacement.

3.2 EXAMINATION

3.2.1 Existing Conditions

Verify existing site conditions are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.

3.2.2 Specific Conditions

Examine and verify specific conditions described in individual specification sections.

3.3 CONTROL

3.3.1 Construction Quality Control

Construction Quality Control is the means by which the CONTRACTOR ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. The controls shall be adequate to cover all construction operations, including both on-site and offsite fabrication, and will be keyed to the proposed construction sequence. The controls shall be conducted by the CQC System Manager for all definable features of work, as follows:

3.3.1.1

A review of each paragraph of applicable specifications.

3.3.1.2

A review of the contract plans.

3.3.1.3

A check to assure that all materials and/or equipment to be used have been tested, submitted, and approved.

3.3.1.4

A check to assure that provisions have been made to provide required control inspection and testing.

3.3.1.5

Examination of the work area to assure that all required preliminary work has been completed and in compliance with the contract.

3.3.1.6

A physical examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawing or submitted data, and are properly stored.

3.3.1.7

A review of the appropriate activity hazard analysis to assure safety requirements are met.

3.3.1.8

Discussion of procedures for constructing the work including repetitive deficiencies. Document construction tolerances and workmanship standards for the work.

3.3.1.9

A check to ensure that the portion of the plan for the work to be performed has been accepted by the ENGINEER.

3.3.1.10

A check of preliminary work to ensure that it is in compliance with contract requirements. Review minutes of the preparatory meeting.

3.3.1.11

Verification of full contract compliance. Verify required control inspection and testing.

3.3.1.12

Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with sample panels if appropriate.

3.3.1.13

Resolve all differences between parties.

3.3.1.14

Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.

3.3.1.15

The ENGINEER shall be notified at least 24 hours in advance of beginning any actions. A meeting shall be conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. The results of the above actions shall be documented by separate minutes prepared by the CQC System Manager and attached to the daily CQC report. The CONTRACTOR shall instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

3.3.2 Follow-up

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

3.3.3 Additional Requirements

Additional control may be required on the same definable features of work if the quality of ongoing work is unacceptable as determined by the ENGINEER; or if there are changes in the CQC staff or in the onsite production supervision or work crew; or if work on a definable feature is resumed after a substantial period of inactivity, or if other problems develop.

3.4 TESTS

3.4.1 Testing Procedure

The CONTRACTOR shall perform tests specified or required to verify that control measures are adequate to provide a product which conforms to contract requirements. Testing includes operation and/or acceptance tests when specified. The CONTRACTOR shall procure the services of an approved testing laboratory or establish an approved testing laboratory at the project site. Testing laboratories are subject to approval by the ENGINEER as specified in Section 01 45 29, Quality Control Testing Laboratories. A list of CQC tests to be performed shall be by the furnished by the CONTRACTOR as a part of the CQC plan. The list shall give the test name, frequency, specification paragraph containing the test requirements, the personnel and laboratory responsible for each type of test, and an estimate of the number of tests required. The CONTRACTOR shall perform the following activities and record and provide the following data:

3.4.1.1

Verify that testing procedures comply with contract requirements.

3.4.1.2

Verify that facilities and testing equipment are available and comply with testing standards.

3.4.1.3

Check test instrument calibration data against certified standards.

3.4.1.4

Verify that recording forms and the test identification control number system, including all of the test documentation requirements, have been prepared

3.4.1.5

Results of all tests performed, both passing and failing tests, will be recorded on the Quality Control report for the date performed. Tests shall be clearly labeled as passing or failing. Invitation for Bids/Project Manual paragraph reference, location where tests were taken, and the sequential control number identifying the test will be given. An information copy of tests performed by an off-site or commercial test facility will be provided directly to the ENGINEER. Failure to submit timely test reports, as stated, may result in nonpayment for related work performed and disapproval of the test facility for this contract.

3.4.2 Testing Laboratories

3.4.2.1 Capability Check

The ENGINEER reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the contract specifications and to check the laboratory technician's testing procedures and techniques.

3.4.2.2 On-Site Laboratory and Equipment

The OWNER reserves the right to utilize the CONTRACTORəS quality control testing laboratory and equipment to check the CONTRACTOR'S testing procedures, techniques, and test results at no additional cost to the OWNER.

3.5 COMPLETION INSPECTION

At the completion of all work or any increment thereof established by a completion time stated in the Contract or stated elsewhere in the Project Manual, the CQC system manager shall conduct an inspection of the work and develop a "punch list" of items which do not conform to the approved plans and specifications. Such a list of deficiencies shall be included in the CQC documentation, as required by paragraph DOCUMENTATION below, and shall include the estimated date by which the deficiencies will be corrected. The CQC system manager or staff shall make a second inspection to

ascertain that all deficiencies have been corrected and so notify the ENGINEER. These inspections and any deficiency corrections required by this paragraph will be accomplished within the time stated for completion of the entire work or any particular increment thereof if the project is divided into increments by separate completion dates.

END OF SECTION 01 45 00

SECTION 01 45 29

QUALITY CONTROL TESTING LABORATORIES

1.0 GENERAL

1.1 DESCRIPTION

This section specifies materials testing activities and inspection services required during project construction to be provided by a Testing Laboratory retained by the General Contractor.

1.2 REFERENCE SPECIFICATIONS

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

- ASTM D 3740 Standard Practice for Evaluation of Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
- ASTM E 329 Standard Practice for Use in Evaluation of Testing and Inspection Agencies as Used in Construction

1.3 REQUIREMENTS

1.3.1 Accreditation Requirements:

Construction materials testing laboratories must be accredited by a laboratory accreditation authority and will be required to submit a copy of the Certificate of Accreditation and Scope of Accreditation. The laboratory's scope of accreditation must include the appropriate ASTM standards listed in the technical sections of the specifications. Laboratories engaged in Hazardous Materials Testing shall meet the requirements of OSHA and EPA. The policy applies to the specific laboratory performing the actual testing associated with the project.

1.3.2 Inspection and Testing:

Testing laboratory shall inspect materials and workmanship and perform tests described herein and additional tests requested by Engineer. When it appears materials furnished, or work performed by Contractor fail to meet construction contract requirements, Testing Laboratory shall direct attention of Engineer to such failure.

1.3.3 Written Reports

Testing laboratory shall submit test reports to Resident Engineer, Contractor, unless other arrangements are agreed to in writing by the Resident Engineer. Submit reports of tests that fail to meet construction contract requirements.

1.3.4 Verbal Reports

Give verbal notification to Resident Engineer immediately of any irregularity.

1.4 APPROVAL OF LABORATORY

The CONTRACTOR shall submit the Qualifications of his proposed Quality Control Testing Laboratory(s) to the ENGINEER for approval within 14 days after receipt of notice to proceed and prior to initiating work or subcontractor agreements.

1.5 TESTING EQUIPMENT CALIBRATION

1.5.1 Calibration

Calibrated at maximum 12 month intervals or interval specified by applicable ASTM requirement whichever is more frequent. Calibration shall utilize devices of accuracy traceable to either National Institute of Standards and Technology (formerly the National Bureau of Standards) or accepted values of natural physical constants.

1.5.2 Certification

Submit copy of certificate of calibration for all test equipment utilized, made by accredited calibration agency to the ENGINEER for approval.

1.6 SUBMITTALS

1.6.1 Certificate of Compliance of Laboratory Qualifications

CONTRACTOR shall submit the name and address of organization, laboratory qualifications, certificates of calibration for all test equipment, and blank test forms for the following:

- Independent Geosynthetics QC Laboratory
- Independent Soils QC Laboratory
- Manufacturing Quality Control Laboratory

1.7 TEST REPORTS

Promptly submit reports of inspections and tests to ENGINEER within 48 hours of test, including:

- Date issued.
- Project title and number.
- Testing laboratory name and address.
- Name and signature of inspector.

- Date of inspection or sampling.
- Record of temperature and weather.
- Date of test.
- Identification of product and specification section.
- Location in project.
- Type of inspection or test.
- Results of tests and observations regarding compliance with Contract Documents.

2.0 PRODUCTS

Not used.

3.0 EXECUTION

3.1 EARTHWORK

3.1.1 General:

The Testing Laboratory shall provide qualified personnel, materials, equipment, and transportation as required to perform the services identified herein, within the agreed to time frame. The work to be performed shall be as identified herein and shall include but not be limited to the following:

3.1.1.1

Observe fill and subgrades during proof-rolling to evaluate suitability of surface material to receive fill or base course. Provide recommendations to the Engineer regarding suitability or unsuitability of areas where proof-rolling was observed. Where unsuitable results are observed, witness excavation of unsuitable material and recommend to Engineer extent of removal and replacement of unsuitable materials and observe proof-rolling of replaced areas until satisfactory results are obtained.

3.1.1.2

Provide part time observation of fill placement and compaction and field density testing to verify that earthwork compaction obtained is in accordance with contract documents.

3.1.1.3

Provide supervised geotechnical technician to inspect excavation, subsurface preparation, and backfill for structural fill.

END OF SECTION 01 45 29

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

1.0 GENERAL

The requirements of this Section apply to, and are a component of, each section of the specifications. The CONTRACTOR is responsible for furnishing all labor, equipment, materials, and provisions to provide temporary facilities and controls, including but, not limited to the CONTRACTOR'S field office, CONTRACTOR'S storage area(s), utility connections/hookups and permits for water service, electrical service, telephone service, maintenance of traffic, barricades, fences, damage to existing property, security, access roads, drainage, erosion and sediment control measures, parking, and emergencies.

1.1 PROTECTION AND SAFETY

In addition to requirements stated in the General Conditions, Contractor shall:

1.1.1

Not interfere with use of or access to adjacent properties, and maintain free and safe passage to and from the jobsite.

1.1.2

Protect bench marks and existing structures, property corners, roads, paving, and curbs against damage from equipment and vehicular or foot traffic.

1.1.3

Cease operations and notify Engineer immediately if safety of adjacent structures appears to be endangered, and not resume operations until safety is restored.

1.1.4

Reduce movement, settlement, or collapse of adjacent services, structures, trees, etc., assume liability for such movement, settlement, or collapse, and promptly repair damage at no cost to Owner.

1.1.5

In accordance with Paragraph 4.03 of the General Conditions, notify Engineer of differing subsurface or physical conditions.

1.1.6

Verify required environmental protection devices and procedures are in place, properly maintained, and operational.

1.1.7

Coordinate the Work with Owner.

1.2 COORDINATION

1.2.1

Arrangements for access to the Site, workmen's parking locations, sites for storing material, sanitary facilities, utilities during construction, etc., shall be coordinated by Contractor with Owner. Owner agrees to make the Site accessible to Contractor during normal working hours (Monday through Friday 7:00 a.m. to 4:00 p.m.).

1.2.2

Contact Owner to coordinate Site access.

1.3 TELEPHONE SERVICES

Contractor shall ensure all Contractor's personnel have appropriate communication devices.

1.4 FIELD OFFICE

Contractor shall provide and maintain a suitable temporary field office as necessary at the Site for its own use. Contractor shall be responsible for necessary permits to install the temporary office and utilities. The location of the field office shall not interfere with Owner's operations. Contractor responsible for all electrical and telecommunication services.

1.4.1 Existing Facilities

Do not use existing facilities for field offices or for storage.

1.4.2 Storage Areas And Sheds

Size to storage requirements for products of individual Sections, allowing for access and orderly provision for maintenance and for inspection of products

1.4.3 Preparation

Fill and grade sites for temporary structures sloped for drainage away from buildings.

1.4.4 Removal

At completion of Work remove buildings, foundations, utility services, and debris. Restore areas.

1.5 SANITARY FACILITIES

Contractor shall provide and maintain such sanitary accommodations for the use of its employees and those of its Subcontractors as may be necessary to comply with the requirements and regulations of the local and state department of health. These accommodations shall be at Contractor's expense. Existing facility use is not permitted. Provide facilities at time of project mobilization.

1.6 MAINTENANCE OF TRAFFIC

1.6.1

It shall be the sole responsibility of Contractor to furnish and maintain, until the Work has been accepted by Owner, all items necessary for safety.

1.6.2

This is a landfill. At no time shall Contractor impede any operations at any time without appropriate notification to and approval of the Owner.

1.6.3

Traffic control on public roads shall be in accordance with the current Federal Highway Administration Manual on Uniform Traffic Control Devices (MUTCD). Costs for maintenance of traffic control shall be at Contractor's expense.

1.6.4

Contractor shall operate vehicles and equipment in a safe manner.

1.6.5

The Contractor shall promptly remove excavated material or other debris that may be spilled or tracked onto the traveled pavement during the conduct of the Work.

1.6.6

Flagging should only be employed when required to control traffic or when other methods of traffic control are inadequate to warn and direct drivers. At least one lane of traffic shall be maintained at all times. When work is not in progress, traffic is to be returned to the normal fashion.

1.7 TEMPORARY ELECTRICITY

1.7.1

Provide and pay for power service required from utility source as needed for construction operation.

1.7.2

Complement existing power service capacity and characteristics as required for construction operations.

1.8 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

Provide and maintain lighting for construction operations. Maintain lighting and provide routine repairs.

1.9 SECURITY

1.9.1

CONTRACTOR shall be responsible for protection of the site, and all work, materials, equipment and existing facilities thereon, against vandals and other unauthorized persons.

1.9.2

No claim shall be made against the OWNER by reason of any act of an employee or trespasser, and CONTRACTOR shall make good all damage to the OWNER's property resulting from his failure to provide security measures as specified.

1.9.3

Security measures shall be at least equal to those usually provided by OWNER to protect his existing facilities during normal operation, but shall also include such addition security fencing, barricades, lighting and other measures as required to protect the site.

1.10 ACCESS ROADS

CONTRACTOR shall construct, grade, stabilize and maintain temporary access roads to various parts of the site as required to complete the project.

1.11 PARKING

CONTRACTOR shall provide and maintain suitable parking areas for the use of all construction workers and other performing work by furnishing services in connection with the project, as required to avoid any need for parking personnel vehicles where they may interfere with public traffic, OWNER operations, or construction activities.

1.12 WATER CONTROL

Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment. The CONTRACTOR shall keep all natural drainage and water courses unobstructed or provide equal courses effectively placed, and prevent accumulations of surface water.

1.13 DUST CONTROL

Execute Work by methods to minimize raising dust from construction operations.

1.14 NOISE CONTROL

Provide methods, means, and facilities to minimize noise produced by construction operations.

1.15 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

1.15.1

Remove temporary utilities, equipment, facilities, and materials prior to Final Application for Payment inspection.

1.15.2

Clean and repair damage caused by installation or use of temporary work.

1.15.3

Restore existing and permanent facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

2.0 PRODUCTS - NOT USED

3.0 EXECUTION - NOT USED

END OF SECTION 01 50 00

SECTION 01 70 00

EXECUTION AND CLOSEOUT REQUIREMENTS

1.0 GENERAL

1.1.1 Final Inspection

1.1.1.1 Certification

Upon suspected completion of project, submit to CQA Engineer written certification that the work has been completed in accordance with the Contract Documents and is ready for the CQA Engineer's inspection.

1.1.1.2 Inspection

Final Inspection meeting will be held at the site to determine completeness.

1.1.1.3 Punch List

A final "punch list" of items to be completed will be reviewed by the Owner, Engineer, Quality Assurance personnel, and Contractor at this meeting. CQA Engineer will prepare the punch list. Complete items on punch list and notify CQA Engineer of completeness.

1.1.1.4 Cleaning

Schedule a final cleaning as approved by the Engineer to enable the Owner to accept a completely clean project. Clean up debris and dirt.

1.1.2 Application for Final Payment

Owner's payment of final application shall terminate the Contract except as provided for bonds and warranties for the guarantee period.

1.1.3 Submittals

1.1.3.1

Provide one complete set of Contract Drawings and project manual recording changes to the work to indicate actual installation. Addenda items, bulletin drawings, change order items, field changes, and items changed during project meetings shall be included on the marked up drawings. Changes shall be noted in legible red letters at least 1/8 inch high. These records are a specific Contract requirement, and final payment will not be made until these drawings and project manual have been submitted in an acceptable form.

1.1.3.2

At the conclusion of the project, the Contractor shall submit a complete list of Subcontractors, manufacturers, and suppliers who participated in the construction or who furnished materials or equipment. The address of each firm shall be included, together with types of materials or work performed.

1.1.3.3

Statement of payment of taxes.

1.1.3.4

Affidavit of Payment of Debts and Claims.

1.1.3.5

Affidavit of Release of Liens.

1.1.4 Cleaning Requirements

1.1.4.1

Maintain the site in a neat and orderly condition. Do not allow the accumulation of scrap, debris, waste material, and other items not required for construction of this work. Provide adequate storage for items waiting removal from the site. No open accumulation of refuse will be permitted. Debris must be removed from within the project area on a daily basis.

1.1.4.2

Schedule a final cleaning as approved by the CQA Engineer to enable the Owner to accept a completely clean project. Thoroughly remove from premises debris remaining from construction activities and properly dispose. Leave premises in a clean, neat, orderly, and safe condition. Sweep paved areas.

1.1.4.3

Restore areas damaged from construction activities.

1.1.4.4

Remove construction facilities and equipment from the project site.

1.1.5 Disposal Fee

1.1.5.1

A tip fee will not be charged for waste resulting from the Contractor's activities on the site provided that the Contractor delivers the waste to the working area and coordinates his activities with the landfill operator.

2.0 PRODUCTS

Not Used

3.0 EXECUTION

Not Used

END OF SECTION 01 70 00

SECTION 02 21 00

SURVEYING

1.0 GENERAL

1.1 SUMMARY

Section includes requirements for surveying, field engineering, and record documents.

1.2 CONTRACTOR'S SURVEYOR

CONTRACTOR is required to utilize a positioning system and/or an independent surveyor licensed in Virginia to provide field engineering and surveying services as required for layout and construction of the project as indicated on the Drawings and specified herein. The CONTRACTOR's surveyor shall:

- Locate existing features,
- Generate cut sheets,
- Provide construction stake out.

The Owner's surveyor will perform the following:

- Create final Record Drawings,
- Create the Geomembrane Record Drawing,
- Provide survey base maps for record Drawings,
- Provide survey controls, and verify the work as the Owner deems necessary.

1.3 DEFINITIONS

1.3.1 Existing Features

Existing Features include but are not limited to the following:

EXAMPLE LIST ONLY:

- Access Roads
- Buried piping
- Grass lined, rip rap lined, and gabion lined channels
- Groundwater Monitoring wells
- Leachate Systems
- Manholes
- Stormwater Systems (Culverts, ditches, etc.)
- Stormwater Basins

1.3.2 Independent Surveyor:

Employed by an organization which is independent from the CONTRACTOR.

1.4 SUBMITTALS

Within 14 days before commencing work, submit the following items to the ENGINEER for review:

1.4.1 Qualifications of Surveyor

Submit surveyor's name, Virginia license number, and qualifications.

1.4.2 Project Record Documents

Upon Substantial Completion of the Work, notify ENGINEER for development of record documents. Final payment will not be made until satisfactory record documents are recorded by ENGINEER.

1.5 MONTHLY INSPECTIONS

To verify the CONTRACTOR's monthly progress payment requests, the following items shall be made available for monthly inspection by the ENGINEER:

1. Record Documents, including updated construction schedule
2. CONTRACTOR SURVEYOR'S Measurements, Notes, and Cut Sheets

1.6 SITE CONDITIONS

1.6.1 Existing Grades

The Contract Drawings depict approximate current surface elevations. Filling activities, maintenance activities, regrading, and routine settlement have occurred since the original survey.

1.6.2 Existing Features

CONTRACTOR is required to field verify the location of existing features. The OWNER'S record drawings are available to the CONTRACTOR. The existence and location of features are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and existing features. The OWNER and the ENGINEER take no responsibility for the accuracy of these record drawings implied or otherwise.

1.6.3 Field Verification

Prior to construction, verify the location of existing features at points of connection or tie-in to the Work.

1.6.4 Field Conditions and Measurements

The CONTRACTOR shall base all measurements, both horizontal and vertical, from established benchmarks. The CONTRACTOR shall be responsible for field verification of all dimensions and conditions at the job site.

1.6.5 Discrepancies

Should the CONTRACTOR discover any discrepancy between actual conditions and those indicated which prevent following good practice or the intent of the Drawings and Specifications, he shall notify the ENGINEER in writing and request clarification and instructions on how to proceed. The CONTRACTOR shall not proceed with his work until he has received the same from the ENGINEER.

1.6.6 No Additional Payment

No claims shall be made for extra payment or extensions of Contract completion time if the CONTRACTOR fails to notify the ENGINEER of any discrepancy before proceeding with the aspect of the Work.

2.0 PRODUCTS

Not Used

3.0 EXECUTION

3.1 FIELD SURVEY WORK

3.1.1 Control Points

The OWNER will identify existing project control points at the site for the CONTRACTOR. The OWNER will, at the CONTRACTOR'S cost and as soon as possible, replace lost or destroyed project control points to the same accuracy of the existing project control points. Base replacements on the original survey control points. Relate all work to the facility elevation datum and coordinate system. The CONTRACTOR is responsible for all construction layout and staking.

3.1.2 Benchmarks

Establish and maintain a minimum of two permanent benchmarks on the site, referenced to data established by survey control points. Record benchmark locations, with horizontal and vertical data, on Project Record Documents. Do not change or relocate benchmarks or control points without prior written approval by the OWNER. Promptly report lost or destroyed reference points or requirements to relocate reference points because of necessary changes in grades or locations.

3.1.3 Site Improvements

Work from lines and levels established by benchmarks and markers to set lines and levels as needed to properly locate each element of the Project. Locate and lay out site improvements, including stakes for slopes, grading, fill and topsoil placement, utility slopes and invert elevations by

instrumentation and similar appropriate means. Calculate and measure required dimensions within indicated or recognized tolerances. Do not scale Drawings to determine dimensions.

3.1.4 Relocation of Existing Utilities

Furnish information necessary to adjust, move or relocate existing features, structures, utility poles, lines, services or other appurtenances located in, or affected by construction. Coordinate with local authorities having jurisdiction.

3.1.5 Surveyor's Log

Keep neat legible notes of all measurements and calculations made by him while surveying and laying out the work. Maintain a surveyor's log of control and other survey work. Make this log available for reference.

3.2 TOLERANCES

Elevations and 2 foot contour lines shown on the drawings are approximate. However, minimum and maximum slope requirements shown on the drawings and specified herein must be observed at all times. Slopes shall be constructed as indicated.

3.2.1 Liner

3.2.1.1 Earthwork

Earthwork shall be graded to ±0.2 feet of required grade provided required minimum slopes are maintained and minimum thicknesses for components of the liner are obtained.

3.2.1.2 Piping

Piping shall be graded to +0.1 feet provided required slopes are maintained.

3.3 RECORD DOCUMENTS

3.3.1 General

Do not use existing record documents for construction purposes. Protect new record documentation from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the ENGINEER's reference during normal working hours. Store record documents and samples in CONTRACTOR'S field office apart from documents used for construction. Provide files, racks, and secure storage for record documents and samples. Backup electronic documents at least once per week.

3.3.2 Recording

1. Label and file record documents and samples in accordance with Specification Section number listings in Table of Contents of this Invitation for Bids/Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.

2. Preparation of project record documents shall be by personnel skilled as a draftsman competent to prepare the required drawings.
3. Record and update daily record information from field notes, on set of blue line prints, and copy of Invitation for Bids/Project Manual.
4. Record information concurrently (daily) with construction progress. Do not conceal work until required information is recorded.
5. Record deviations from required lines and levels, and advise the ENGINEER when deviations that exceed indicated or recognized tolerances are detected. On Project Record Drawings, record deviations that are accepted and not corrected.

3.3.3 Record Drawings

Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the work as originally shown. Mark whichever drawing is most capable of showing conditions fully and accurately; where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.

Mark record sets with red erasable pencil. Mark new information that is important to the OWNER, but was not shown on Contract Drawings or Shop Drawings. Note related Change Order numbers where applicable. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set. Legibly mark each item to record actual construction, including:

1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
2. Measured locations of liner systems, internal utilities, and appurtenances concealed in construction, referenced to visible and accessible features of construction.
3. Field changes (dimensions and detail)
4. Changes by Modifications made by the ENGINEER or OWNER.
5. Details not on original Contract Drawings.
6. References to related Shop Drawings and Modifications.
7. Depths of various elements of the Work in relation to datum.

3.3.4 Record Specifications

Maintain one complete copy of the Project Manual, including addenda and one copy of other written construction documents such as Change Orders and Field Order issued in printed form during construction. Mark these documents to show substantial variations in actual work performed in comparison with the text of the Specifications, Change Order, and Field Order. Give particular attention to substitutions, selection of options and similar information on elements that are concealed or cannot otherwise be readily discerned later by direct observation. Note related record drawing information and product data. Legibly mark up each Section to record:

1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
2. Changes made by Change Order or Field Order.
3. Other matters not originally specified.

3.3.5 Geomembrane Record Drawing

The OWNER's surveyor shall prepare a geomembrane record drawing. The contractor will coordinate installation of the geomembrane to allow owner's surveyor to record the layout. The CONTRACTOR will not place additional layers until the survey is complete. This drawing shall be signed and sealed by the surveyor. The minimum scale is 1" = 60', and the maximum sheet size is 24" X 36". The following information is mandatory:

1. 2' contours
2. Approximate Location and size of all panels installed and seam welds
3. Label all panel and roll numbers
4. Label destructive sample numbers and geomembrane repair numbers
5. Label and locate the location of each repair, cap strip, liner penetration, pipe boot, and destructive sample.
6. Horizontal and vertical coordinates of the anchor trench
7. Slopes and breaks in grade

3.3.6 Record Product Data

Maintain one copy of each approved Product Data submittal. Mark these documents to show significant variations in actual work performed in comparison with information submitted. Include variations in products delivered to the site, and from the manufacturer's installation instructions and recommendations. Give particular attention to concealed products and portions of the work which cannot be otherwise be readily discerned later by direct observation. Note related Change Orders and mark-up of record drawings and Specifications.

Upon completion of mark-up, submit complete set of record Product Data to the ENGINEER for the OWNER'S records.

3.3.7 Record Sample Submitted

Immediately prior to the date or dates of Substantial Completion, the CONTRACTOR will meet at the site with the ENGINEER and the COUNTY'S personnel to determine which of the submitted samples that have been maintained during progress of the work are to be transmitted to the OWNER for record purposes. Comply with delivery to the OWNER'S sample storage area.

3.3.8 Miscellaneous Record Submittals

Refer to other Specification Sections for requirements of miscellaneous record-keeping and submittals in connection with actual performance of the work. Immediately prior to the date or dates of substantial completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to the ENGINEER for the OWNER'S records. Miscellaneous record submittals include but are not limited to:

- Field test records
- Inspection certificates
- Manufacturer's certificates
- Manufacturer's Warrantees

3.3.9 Inspection

Verify locations of survey control points and existing features prior to starting work. Promptly notify ENGINEER of any discrepancies.

3.3.10 Survey for Measurement and Payment

Measurement for payment calculations shall be performed by the OWNER'S surveyor. Drawings and calculations shall be checked and sealed by the SURVEYOR. In the event of a dispute, Contractor must provide documentation from a Surveyor Licensed in the Commonwealth of Virginia. An Independent Surveyor may be called to verify grades and or volumes in the event of any disagreements.

END OF SECTION 02 21 00

SECTION 03 37 13

SHOTCRETE

1.0 GENERAL

1.1 SUMMARY

Section includes pneumatically applied concrete.

1.2 REFERENCES

1.2.1 American Concrete Institute

- ACI 506.2 - Specification for Shotcrete.

1.2.2 ASTM International

- ASTM A185 - Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
- ASTM A497 - Standard Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.
- ASTM C33 - Standard Specification for Concrete Aggregates.
- ASTM C150 - Standard Specification for Portland Cement.
- ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
- ASTM C330 - Standard Specification for Lightweight Aggregates for Structural Concrete.
- ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.

1.3 SUBMITTALS

1.3.1 Submittal Procedures

Refer to Section 01 33 00 - Submittal Procedures.

1.3.2 Shop Drawings

Indicate dimensions, thickness, tolerances, and contours, reinforcement, and accessories.

1.3.3 Product Data

Submit data on admixtures.

1.3.4 Mix Design

Submit Mix design and test reports.

1.4 QUALITY ASSURANCE

1.4.1 Reference

Perform Work in accordance with ACI 506.2.

1.4.2 Records

Maintain one copy of each document on site.

1.5 QUALIFICATIONS

1.5.1 Applicator

Company specializing in performing the Work of this section with minimum 5 years documented experience.

1.5.2 Designer

Design Work of this section under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of Virginia.

1.6 MOCK-UP

Construct mock-up of sufficient size to indicate special treatment or finish required. Incorporate accepted mockup as part of Work.

1.7 PRE-INSTALLATION MEETINGS

1.7.1 Reference

Convene in accordance with Section 01 30 00 - Administrative Requirements: Pre-installation meeting.

1.7.2 Schedule

Convene minimum one week prior to commencing work of this section.

1.8 ENVIRONMENTAL REQUIREMENTS

1.8.1 Temperatures

Maintain material and surrounding air temperature at minimum 50 degrees F prior to and during installation, and maintain material at this minimum temperature for 7 days after completion of Work. Furnish equipment and cover to maintain minimum temperature.

1.8.2 Precipitation

Suspend shotcrete operations during high winds, rainy weather, or near freezing temperatures when Work cannot be protected.

2.0 PRODUCTS

2.1 MATERIALS

2.1.1 Cement

ASTM C150, Type I; gray color.

2.1.2 Aggregate

Normal weight, ASTM C33 3/8 inch maximum size.

2.1.3 Admixtures

Chemical type conforming to ASTM C494/C494M.

2.1.4 Water

Clean, potable, and not detrimental to shotcrete.

2.2 SHOTCRETE MIX

2.2.1 Requirements

Furnish wet or dry mix design that gives good compaction and low percentage of rebound, is stiff enough not to sag, and conforms to following requirements:

- Compressive Strength (28 day minimum): 3,000 psi
- Aggregate Size (maximum): 3/8 inch.
- Slump (plus or minus 1/2 inch): 1 inch.

2.2.2 Records

Maintain quality control records during production of shotcrete; make records available.

2.3 SOURCE QUALITY CONTROL

2.3.1 Testing

Test and analyze shotcrete for conformance to design mix.

2.3.2 Reference

Test samples in accordance with ACI 506.2.

2.3.3 Modification

Modify mix design as required based on results of testing and inspection.

2.3.4 Repair

Repair core holes after testing, in accordance with ACI 506.2.

3.0 EXECUTION

3.1 EXAMINATION

3.1.1 Existing Conditions

Verify conditions are acceptable and are ready to receive work.

3.1.2 Measurements

Verify field measurements are as shown on Drawings.

3.2 PREPARATION

3.2.1 Cleaning

Clean surfaces to receive shotcrete.

3.2.2 Procedures

Determine operating procedures for placement in close quarters, extended distances, or around unusual obstructions where placement velocities and mix consistency may be adjusted during application.

3.2.3 Porous Surfaces

Clean and wet cementitious or absorptive substrate surfaces prior to receiving shotcrete. Keep porous surfaces damp for several hours prior to placement of shotcrete.

3.2.4 Adjacent Surfaces

Protect adjacent surfaces not receiving shotcrete.

3.3 APPLICATION

3.3.1 Equipment

Use mixing and delivery equipment capable of thoroughly mixing aggregate, cement, and water in sufficient quantity to maintain continuous and uniform placement.

3.3.2 Timing

Do not apply shotcrete more than 45 minutes after adding Portland cement to mix.

3.3.3 Conditions

Do not place shotcrete on surfaces that are frozen, spongy, or where there is free water.

3.3.4 Compaction

Achieve maximum compaction with minimum rebound.

3.3.5 Build-up

Build-up to required thickness in multiple passes to achieve layering. Encase reinforcement with first pass.

3.3.6 Setting

Allow each layer to take initial set before applying succeeding layers.

3.3.7 Sag

Do not permit applied shotcrete to sag, slough, or displace.

3.3.8 Excess Material

After initial set of final layer, remove excess material outside of forms and alignment lines.

3.3.9 Rebound

Remove rebound material which does not fall clear of work. Discard salvaged rebound.

3.3.10 Maintenance

Maintain shotcrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of shotcrete.

3.3.11 Protection

Immediately after placement, protect shotcrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

3.3.12 Voids

Sound test applied material with hammer for voids. Remove void areas and replace with new shotcrete ensuring full bond with adjacent work.

3.4 FIELD QUALITY CONTROL

Construct additional test panels, as specified for mock-up, during course of the work as requested by Engineer.

3.5 PROTECTION OF INSTALLED WORK

Do not permit applied work to damage adjacent surfaces.

END OF SECTION 03 37 13

SECTION 31 00 00

EARTHWORK

1.0 GENERAL

1.1 DESCRIPTION

1.1.1

The work in this section includes all labor, materials, equipment, construction quality control (CQC) testing, and incidentals required to perform earthwork for the sidewall odor mitigation system as shown on the Plans and as specified herein and in General Conditions.

1.1.1.1

Earthwork includes, but is not limited to excavation, filling, backfilling and compacting earthen materials to achieve base grades and final grades for the Sidewall Odor Mitigation System. This includes backfilling of trenches and anchor trenches; sheeting and shoring; subbase test pad construction; dewatering; general backfilling and compacting, and grading around structures; segregating, stockpiling, screening, and other material processing of excavated materials for on-site use; disposing of earth materials, as required to complete construction and associated features shown on the Plans.

1.1.2

The cost of all excavation shall be incorporated into the base bid. No distinction will be made insofar as payment between soil, rock and waste materials if encountered.

1.1.3

CONTRACTOR is responsible for all construction layout and staking.

1.1.4 Related Work Specified Elsewhere

- Section 31 10 00 Clearing and Grubbing
- Section 31 05 16 Aggregates
- Section 31 05 19.16 LLDPE Geomembrane
- Section 31 05 19.23 Geosynthetic Clay Liner

1.2 DEFINITIONS

1.2.1 Excavation

Excavation means the removal of soil, waste, rock, debris and other materials to the proposed grading limits indicated on the PLANS.

1.2.2 Unauthorized Excavation

Unauthorized excavations shall be backfilled and compacted as specified for authorized excavations at no additional cost to the OWNER.

1.2.3 Additional Excavation

When excavation has reached required subgrade elevations, notify the ENGINEER, who will make an inspection of conditions. If the ENGINEER determines that bearing materials at required subgrade elevations are unsatisfactory, continue excavation until satisfactory bearing materials are encountered. Replace excavated material with suitable fill material as directed by the ENGINEER.

1.2.4 Maximum Dry Density

Maximum dry weight in pounds per cubic foot (pcf) of a specific soil material as determined by ASTM D 698.

1.2.5 Optimum Moisture Content

The moisture content at which the maximum dry density of a soil material is determined by ASTM D 698.

1.2.6 Compacted Low Permeability Fill

Compacted low permeability fill is used to cover the geotextile overlying the horizontal collector bedding.

1.2.7 General Fill Material

Fill material is material used for trench backfill, structural fill and backfill and embankment.

1.2.8 Filled Areas

Filled areas are areas which have received trench backfill, structural fill or embankment materials, placed and compacted as specified herein.

1.2.9 Borrow Fill

Borrow fill and borrow trench backfill are suitable materials meeting requirements specified herein.

1.2.10 Reference Standards

- ASTM D 698 Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort
- ASTM D1556 Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
- ASTM D2434 Standard Test Method for Permeability of Granular Soils (Constant Head)
- ASTM D 2487 Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)
- ASTM D 4373 Standard Test Method for Calcium Carbonate Content of Soils
- ASTM D 5084 Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter
- ASTM D 6913 Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis
- ASTM D 6938 Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
- ASTM D7928 Standard Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis

1.3 SUBMITTALS

1.3.1

Refer to SECTION 01 33 00 – SUBMITTAL PROCEDURES for submittal requirements.

1.3.2

Sheeting, shoring and bracing shall be designed and signed by a registered professional ENGINEER and submitted for approval.

1.4 SAFETY

All excavation guidelines shall comply with CONTRACTOR'S Health and Safety Plan and the applicable requirements as stated in SECTION 01 35 29 – HEALTH AND SAFETY PLAN.

1.4.1 Federal

OSHA excavation safety standards 29 CFR, s.1926-650, Subpart P.

1.4.2 State and Local

State and County construction safety regulations.

1.4.3 Utility

Contact “Miss Utility” prior to any excavation.

1.5 PROJECT CONDITIONS

1.5.1 Site Information

The CONTRACTOR shall be responsible for having determined to his satisfaction, prior to the submission of his bid, the confirmation of the ground, the characteristics and quality of the substrata, the types and quantities of materials to be encountered, the nature of the groundwater conditions, the prosecution of the work, the general and local conditions and all other matters which can in any way affect the work under this Contract.

Additional test borings and other exploratory operations may be performed by CONTRACTOR, at the CONTRACTOR'S option; however, the OWNER will not pay for such additional exploration.

1.5.2 Existing Structures

Shown on the Plans are certain surface and underground structures adjacent and/or within the work. This information has been obtained from existing records. It is not guaranteed to be correct or complete and is shown for the convenience of the CONTRACTOR. The CONTRACTOR shall explore ahead of the required excavation to determine the exact location of all structures. They shall be supported and protected from injury by the CONTRACTOR. If they are broken or injured, they shall be restored immediately by the CONTRACTOR at his expense.

1.5.3 Protection of Persons and Property

1.5.3.1

Barricade open excavations or trenches occurring as part of this work and post warning signs or lights, as appropriate.

1.5.3.2

CONTRACTOR shall plan and conduct operations to prevent damage or disturbance to existing structures and utilities, buried utilities, existing monitoring wells, roads, signs, trees and bench marks.

1.5.3.3

Protect existing slopes, embankments, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

1.5.3.4

Failure of ENGINEER to order the use of bracing or sheeting or shoring shall not in any way or to any extent relieve the CONTRACTOR of any responsibility concerning the condition of excavations or of his obligations under this Contract.

1.5.3.5

Work is restricted to the area provided for CONTRACTOR'S use.

1.5.3.6

Side slopes shall be maintained in stable condition under all normal anticipated weather conditions for the period that the excavation will be open. The CONTRACTOR shall regrade side slopes to be a more stable configuration if so directed by ENGINEER.

1.5.4 Dust Control

The CONTRACTOR shall conduct operations and maintain the area of his activities, including sweeping and sprinkling of roadways, so as to minimize the creation and dispersion of dust to the satisfaction of the OWNER.

1.5.5 Traffic

Traffic inside and outside the site is anticipated. The CONTRACTOR shall coordinate with the OWNER regarding traffic control during construction. CONTRACTOR shall primarily utilize the access road on the eastern perimeter of the landfill.

1.6 QUALITY CONTROL

1.6.1 Regulations

All materials and labor furnished under this section shall comply with OSHA, ASTM, ANSI and other applicable Federal, State and County codes and regulations including revisions to the date of the Contract. Comply with the pertinent sections of the following standards:

Virginia Erosion and Sediment Control Handbook (VESCH), latest edition

Virginia Department of Transportation (VDOT) Road & Bridge Specifications, latest edition

1.6.2 Specifications

Provide Construction Quality Control (CQC) in accordance with Section 01 45 00 - CONSTRUCTION QUALITY CONTROL.

1.6.3 Workers

Use adequate number of skilled workers who are thoroughly trained and experienced in the specified requirements and the methods needed for proper performance of the work in this Section.

2.0 PRODUCTS

2.1 MATERIALS

2.1.1 General Fill Material

2.1.1.1 Availability On-Site

It is intended that on site soils can be used as fill material. General Fill is available on-site from borrow areas depicted on the plans, leachate pipe trenches, other related excavations, or may be excavated from surrounding areas approved by the ENGINEER.

2.1.1.2 Quality

General Fill shall be inorganic soil, that is not excessively wet or saturated, free of stone, rock or gravel larger than three (3) inches in any dimension, and free of debris, waste, frozen materials, vegetation, organic materials, roots, and other deleterious matter. The CONTRACTOR must provide preconstruction testing as required by the Specifications to demonstrate suitability. The suitable excavated soil materials shall be capable of maintaining its stability on all slopes. Excess or unsuitable material shall be removed and disposed as directed by the ENGINEER to the designated areas on-site stockpiles.

2.1.1.3 Off-site General Fill

If off-site soils are to be used, the CONTRACTOR shall identify the source a minimum of 3 weeks in advance of intent to import. The Owner's Quality Assurance personnel shall be given access to the site to obtain necessary samples for testing and proofing of the soil material. Off-site imported soil must have a minimum of 50% material finer than a No. 200 sieve, a minimum liquid limit of 30 and a maximum plasticity index of 20.

2.1.1.4 Use of General Fill

General Fill shall be used for backfilling and filling as shown on the PLANS, and for areas as otherwise directed by the ENGINEER.

2.1.2 Compacted Low Permeability Fill

The clay fill soil shall have a classification of SC, ML, CL, MH, or CH as defined in the Unified Soil Classification System (ASTM D 2487), or otherwise approved by the ENGINEER. Clay fill soil shall be inorganic soil free of roots, limbs, stone, rock, excessive organics, and deleterious material. Not more than 1 percent by weight of particles larger than 3/8-inch in diameter shall be allowed within the compacted clay fill. Mechanical screening, raking, or other methods to remove oversize particles shall be provided by Contractor as necessary.

2.1.3 Controlled Subgrade Material

Controlled subgrade material is the upper 12 inches of material prior to placement of the geosynthetics clay liner within the disposal cell. Controlled subgrade shall be inorganic soil free of roots, limbs, stone, rock or gravel larger than three (3) inches in any dimension trash, excessive

organics, and deleterious material. The soil shall have a classification of SC, ML, CL, MH, or CH as defined in the Unified Soil Classification System (ASTM D 2487), or otherwise approved by the ENGINEER.

2.1.3.1 Particle Size

Not more than 1 percent by weight of particles larger than 3/8-inch in diameter shall be allowed within the top 6 inches of the Subbase (directly below the 40 mil textured LLDPE geomembrane), or contain sharp or angular stone that may puncture the geomembrane. Mechanical screening, raking or other methods to remove oversize particles shall be provided by CONTRACTOR as necessary.

2.1.3.2 Stability

The satisfactory excavated soil materials shall be capable of maintaining its stability on all slopes. Excess or unsatisfactory material shall be removed and disposed as directed by the ENGINEER to the designated areas on-site designated by the OWNER.

2.1.3.3 Protection of Subgrade

Subbase material shall be protected from excessive heat and desiccation cracking, freezing, or softening by precipitation, after placement and compaction. If disturbed, the subbase shall be recompacted or reworked to meet specifications.

2.1.4 Aggregates, Including, Aggregate Surrounding Horizontal Collector Pumps and Aggregate Surrounding Perforated Horizontal Collection Pipe

Refer to SECTION 31 05 16 - AGGREGATES.

2.1.5 Trench Backfill

2.1.5.1 Open Areas

Fill material for trenches in open areas shall have a maximum density not less than 100 pounds per cubic foot as determined by ASTM D698. The top 12 inches of backfill material shall contain no rocks larger than one inch in the greatest dimension. Material from two feet above pipes to 12 inches below surface shall contain no more than 25 percent rocks, none being larger than four inches in the greatest dimension. Liquid limit shall not exceed 40 and plasticity index shall not exceed 25.

2.1.5.2 Embankments

Fill material for structural fill and embankments higher than four feet shall have a maximum density not less than 100 pounds per cubic foot as determined by ASTM D698, and shall contain no more than 25 percent rocks, none being larger than four inches in the greatest dimension. Liquid limit shall not exceed 25 and plasticity shall not exceed 6.

2.1.6 Bedding for Pipe and Pipe Structures

Soil backfill material shall be clean structural fill free of stones larger than 2 inches, construction debris, refuse, muck, soft clay, loam, sponge material, vegetation/organic matter, or angular rock. Suitable excavation material may be used for backfilling around installed pipe, subject to approval by ENGINEER.

2.1.7 Sheeting and Shoring

Sheeting, shoring and bracing materials shall be timber or steel, designed to retain the earth around structures to prevent cave-in and settlements, and to fulfill all safety requirements.

2.1.7.1 Timber

Timber shall be structural grade with minimum working stress of 1100 psi.

2.1.7.2 Steel

Steelsheet piling shall conform to requirements of ASTM A328, continuous interlocking type.

2.1.8 Other Materials

All other materials, not specifically described, but required for proper completion of the work shall be selected by the CONTRACTOR and approved by the ENGINEER.

3.0 EXECUTION

3.1 PREPARATION

3.1.1 Dewatering

3.1.1.1

The CONTRACTOR shall at all times during construction provide and maintain proper equipment and facilities to remove all water entering excavations, and shall keep such excavations dry so as to obtain a satisfactory foundation condition until the fill, structures or pipes to be built thereon have been completed to such extent that they will not be floated or otherwise damaged by allowing water levels to return to natural levels.

3.1.1.2

Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottom, and soil changes detrimental to stability of subgrades and foundations. Subgrade soils which become soft, loose, "quick", or otherwise unsatisfactory for support of structure as a result of inadequate dewatering or other construction methods shall be removed and replaced by crushed stone as required by the ENGINEER at the CONTRACTOR's expense. The bottom of excavations shall be rendered firm and without standing water before placing structures or pipes. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.

3.1.1.3

Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavations to collecting or runoff areas. Do not use trench excavations as temporary drainage ditches.

3.1.1.4 Disposal of Water Removed by Dewatering System

Dispose of water in such a manner as to cause no inconvenience to the OWNER, the ENGINEER, or others involved in work about the site. Trench excavations shall not be used as temporary drainage ditches.

3.1.1.5 Construction Quality Assurance (By Others)

3.1.1.5.1

The CONTRACTOR shall coordinate his work with the OWNER's CQA Representative to allow testing and monitoring of all work components to proceed.

3.1.1.5.2

There shall be no additional compensations to the CONTRACTOR for any construction delays caused by the CONTRACTOR's failure to plan, coordinate, and schedule work to include all CQA activities.

3.1.1.6 Construction Quality Control

CONTRACTOR shall provide pre-construction material verification and Quality Control testing of earth materials as indicated in Table 31 00 00 and Section 01 45 00 - CONSTRUCTION QUALITY CONTROL.

Table 31 00 00 - 1 Soils and Aggregates Test Frequency

Test	ASTM Designation or Other Test Method	CQC Frequency	CQA Frequency
Compacted Density	D2922, D1556, or D2937	1 per 100 linear ft per lift	1 per 1000 linear ft per lift
Compacted Moisture Content	D3017 or D2216	1 per 100 linear ft per lift	1 per 1000 linear lift
Classification and Atterberg Limits	D2487 and D4318, respectively	1 per 10,000 cy	1 per project
Aggregates	D2922 or D2937	1 per 100 linear feet of system, a minimum of 1 test per lift of select fill	1 per 1000 linear feet of system, a minimum of 1 test per lift of select fill

Low Permeability Soil Placement	Observation, Field Measurement	Continuous observation	Survey Verification
Protective Cover Soil Thickness	Observation, Field Measurement	Continuous observation	Survey Verification
Grain Size Analysis (Borrow Source or in-place material for subgrade)	D6913 and D1140	1 per 10,000 cy	1 per project
Natural Moisture Content (Borrow Source or in-place material for subgrade)	D2216	1 per 10,000 cy	1 per project
Classification (Borrow Source or in-place material for subgrade)	D2487	1 per 10,000 cy	1 per project
Atterberg Limits (Borrow Source or in-place material for subgrade)	D4318	1 per 10,000 cy	1 per project
Moisture-Density Relationship (Borrow Source or in-place material for subgrade)	D698	1 per 10,000 cy and changes in material	1 per project

3.2 GENERAL

3.2.1

The CONTRACTOR shall perform excavations described in whatever substance encountered to dimensions and elevations shown on the Contract Drawings. Excavation shall be unclassified. The CONTRACTOR shall be responsible for verifying the grades and dimensions as shown.

3.2.2 ~~fk~~

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 by the CONTRACTOR at no additional cost to the Owner.

3.2.3

The Owner shall retain a Quality Assurance Officer to monitor Earthwork included in this section. The QAO shall be present on site during subgrade approval and fill and backfill operations.

3.3 EXCAVATION

3.3.1 General

3.3.1.1

Excavation equipment operators and other concerned parties shall be familiar with subsurface obstructions as shown on the PLANS.

3.3.1.2

Excavation work shall be performed in a safe and proper manner with appropriate precautions being taken against hazards and in accordance with the Health and Safety Plan. Excavations shall provide adequate working space and clearances for the work to be performed therein. If walls of the excavation cannot be kept stable, the excavation shall be properly shored and braced.

3.3.1.3

Excavation shall be unclassified and includes excavation to subgrade elevations indicated, regardless of character of materials and obstructions encountered. Well/boring/test pit logs performed on-site are available for information only to the CONTRACTOR.

3.3.1.4

If subgrade "pumping" is encountered during excavation, perform the following:

3.3.1.4.1

Excavate and remove the underlying unsuitable material for a minimum depth of 12 inches.

3.3.1.4.2

Proof-roll and compact by appropriate heavy equipment for at least 6 passes and approve by the ENGINEER.

3.3.1.4.3

Backfill with General Fill or Subbase material as directed by the ENGINEER and compact to a stable condition approved by the ENGINEER.

3.3.1.5

Excavation shall conform to the limits indicated on the PLANS and as specified herein. This work shall include shaping, sloping, grading and other work necessary in bringing the site to the required grade, alignment, and cross-section.

3.3.1.6

Unsatisfactory materials shall be removed to the required depth and replaced to the satisfaction of the ENGINEER with General Fill or Subbase material. Unsatisfactory materials shall be removed and disposed of in the designated areas on-site as directed by the ENGINEER.

3.3.1.7 Stockpiling of Excavated Materials

Satisfactory excavated materials shall be stockpiled in such a manner as to prevent nuisance conditions, including but not limited to endangering work areas or obstructing drive ways and natural water courses. Valve pit covers, valve boxes, or other utility controls shall be left unobstructed and

accessible at all times. The CONTRACTOR shall limit operations to the project areas shown on the drawings unless otherwise approved by the ENGINEER. Surface drainage shall not be hindered.

3.4 TRENCH EXCAVATION FOR AIR, LANDFILL GAS AND FORCEMAIN PIPES, AND LIQUIDS MANAGEMENT STRUCTURES

3.4.1

Trench width shall be minimized to greatest extent practical but shall conform to the following:

- Sufficient to provide room for installing, jointing, and inspecting piping, but in no case wider at top of pipe than pipe barrel outside diameter plus 18 inches unless otherwise depicted on the plans or approved by the ENGINEER.
- Trench enlargements at pipe joints.
- Sufficient for sheeting, bracing, sloping, and dewatering.
- Sufficient to allow thorough compacting of backfill adjacent to bottom half of pipe.

3.4.2

Excavate trenches to depth indicated or required to establish indicated slope and invert elevations and to support bottom of pipe or conduit on undisturbed soil.

3.4.2.1

For pipes less than 6 inches in nominal size, do not excavate beyond indicated depths. Excavate bottom cut to accurate elevations and support pipe on undisturbed soil.

3.4.2.2

For pipes 6 inches or larger in nominal size, shape bottom of trench to fit bottom of pipe. At each pipe joint, dig bell holes to relieve pipe bell of loads and ensure continuous bearing of pipe barrel on bearing surface.

3.4.3

No more than 200 feet of trench within landfill area may be opened in advance of pipe laying operations at one time unless approved by the ENGINEER.

3.4.4

All trenches shall be constructed in a uniform grade, and free of standing water. The CONTRACTOR shall be responsible for maintaining these conditions. Subgrade soils that become soft, loose, or unsatisfactory as a result of inadequate dewatering and cannot be stabilized or recompacted shall be removed and replaced by VDOT Size No. 3 stone or approved equal at the CONTRACTOR'S expense.

3.4.5

Excavation for appurtenances shall maintain a minimum clearance of 12 inches between their outer surfaces and the face of the excavation, or sheeting, if used.

3.4.6

Document the location, elevation, size, material type and function of all new subsurface installations, and utilities encountered during the course of construction and include this information as part of the Record Plans prior to the ENGINEER'S approval of payment for that work.

3.5 STABILITY OF EXCAVATIONS

3.5.1 General

Comply with local codes, ordinances, and requirements of agencies having jurisdiction.

3.5.2 Side Slopes

Slope sides of excavations to comply with local codes, ordinances, and requirements of agencies having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Maintain sides and slopes of excavations in safe condition until completion of backfilling.

3.5.3 Shoring and Bracing

Provide materials for shoring and bracing, such as sheet piling, uprights, stringers, and cross braces, in good serviceable condition. Maintain shoring and bracing in excavations during period excavations will be open. Extend shoring and bracing as excavation progresses.

3.6 STORAGE OF EXCAVATED AND BORROW MATERIALS

Stockpile excavated and borrow materials acceptable for backfill, General Fill, and Subbase, where directed by the ENGINEER. Place, grade, and shape stockpiles for proper drainage.

Comply with all erosion and sediment control requirements by state and local authorities.

3.7 SUBGRADE APPROVAL

Prior to installation, subgrades to receive structures or fill shall be evaluated prior to fill placement by the QAO. Such evaluation may include the observation of subgrade performance during proof-rolling with a loaded tandem dump truck provided by the CONTRACTOR. At least three passes are to be made with a fully loaded tandem dump truck. Areas that are deemed unsuitable (rutting, pumping, etc.) for fill placement by the QAO shall be clearly identified in both horizontal and vertical extent with recommendations for improvements and submitted to the ENGINEER for further action.

3.8 BACKFILL AND FILL

3.8.1 General

Place soil material in layers to required subgrade elevations, for each area classification listed below, using materials specified in Part 2 of this Section.

3.8.1.1 General Site Grading

Use General Fill or Subbase where indicated on the PLANS.

3.8.1.2 Aggregates

Use VDOT designated aggregates and other fill materials as indicated on the PLANS.

3.8.1.2.1

Do not backfill trenches until tests and inspections have been made. Use care in backfilling to avoid damage or displacement of pipe systems. Work which is covered or concealed without the knowledge and consent of the ENGINEER shall be uncovered or exposed for inspection at no cost to the OWNER. Partial backfill may be made to restrain the pipe during pressure testing if pressure test is required. No more than 50 feet of trench with pipe in place shall be partially backfilled at any time.

3.8.2 Timing of Backfill

Backfill excavations as promptly as work permits.

3.8.3 Depth And Mixing Of Fill Layers

Fill and backfill soil shall be placed in layers that when compacted shall not exceed six (6) inches. Each layer shall be spread evenly and shall be thoroughly bladed and mixed during the spreading to obtain uniformity of material in each layer.

3.9 PLACEMENT AND COMPACTION

3.9.1 General

3.9.1.1 Ground Surface Preparation

Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow, strip, or scarify surfaces so that fill materials will bond with existing surfaces.

3.9.1.2 Controlled Subgrade

Material placed, or in-situ, as the controlled subgrade layer shall be compacted to a minimum of 95% of the maximum dry density, as determined by ASTM D698 (Standard Proctor). The surface shall be rolled smooth and be free of rocks or stones in excess of ¾ inches prior to placement of the overlying GCL. The liner installation shall provide written acceptance of the subgrade before installing GCL.

3.9.1.3 Synthetic Liner/Cap Protection

Surfaces to be lined/capped shall be smooth and free of all rocks, stones, sticks, roots, sharp objects or debris of any kind which could damage the synthetic liner/cap. The upper six inches of the prepared area shall contain no particles larger than 3/8 inches in diameter. If needed, the upper layer of foundation soil shall be screened to eliminate particles larger than 3/8 inches. If necessary, the surface shall be groomed by hand to bring the surface up to the desired smoothness. The surface should provide a firm, unyielding foundation for the membrane with no sudden, sharp or abrupt changes or break in the grade. Mo standing water or excessive moisture shall be allowed. Final compaction of the synthetic liner subgrade shall be with smooth steel wheel roller. The liner/cap installation CONTRACTOR shall certify in writing that the surface on which them membrane is to be installed is acceptable before commencing work.

3.9.1.4 Moisture Content

Fill and backfill soil shall be compacted at a moisture content within a range of ±3% of the optimum moisture content, unless otherwise approved by the QAO. As required, fill and backfill soil shall be dried by aerating with a scarifier, disc harrow, blade, or other equipment or by such other means as may be necessary. As required, fill and backfill soil shall be wetted by the use of water trucks or sprinklers. Dried or wetted fill or backfill soil shall be thoroughly mixed to provide a material of uniform moisture content. Do not place backfill or fill material on surfaces that are submerged soft, muddy, frozen, or unstable.

Where subgrade or fill material must be moisture conditioned before compaction:

- Uniformly apply water to surface of subgrade or fill material. Apply water as necessary to prevent free water from appearing on surface during or subsequent to compaction operations. The CONTRACTOR shall process soil materials so that moisture is uniformly mixed into soils.
- Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density and moisture range. Stockpile or spread soil material that has been removed because it is too wet to permit compaction. Assist drying by discing, harrowing, or pulverizing until moisture content is reduced uniformly to a satisfactory value.

3.9.1.5 Nonconforming Material

Recompact areas or lifts if soil density and moisture tests indicate inadequate compaction and/or moisture. No additional compensation shall be given to the CONTRACTOR due to re-working of failed areas. The extent of area for repair shall be determined by the ENGINEER.

3.9.1.6 Filling Adjacent to Structures

Place backfill and fill materials evenly adjacent to structures or piping to required elevations. Prevent wedging action of backfill against structures or displacement of piping by carrying material uniformly around structure or piping to approximately same elevation in each lift.

3.9.1.7 Subbase Lift Bonding

Provide good bond between Subbase Liner lifts by using a sheepsfoot roller, or discing the surface before placing the next loose lift. Unless otherwise approved by the ENGINEER, do not smooth roll the Subbase surface until the final lift has been placed and compacted.

3.9.1.8 Drainage Layer

Aggregates surrounding perforated landfill gas collection pipe shall not be compacted, but shall be placed to achieve lines and grades as shown on the Plans without damaging the underlying geotextile and LLDPE geomembrane.

3.10 COMPACTION OF FILL

Compact fill materials and aggregates not less than the following percentages of maximum dry density in accordance with ASTM D 698 or to a maximum obtainable density as follows:

3.10.1 Compaction

Compaction of each layer, unless otherwise specified, as shown on the Contract Drawings and determined in the field shall be continuous over its entire area and the compaction equipment shall make sufficient trips to verify that the required density has been obtained. After each layer has been placed, mixed and spread evenly, it shall be thoroughly compacted in six (6) inch maximum compacted thickness lifts. The minimum dry density of the soil shall be at least ninety five percent (95) of the maximum dry density as determined by ASTM D698 (standard Proctor) for the low permeability soil, unless otherwise shown on the Contract Drawings. Berms refer to those included in the construction of the landfill disposal area and drainage features, not those involved with landfilling operations.

3.10.2 Compaction Equipment

Compaction equipment shall be of such design that it will be able to compact the fill to the specified density. Prior to placing the fill, at the preconstruction meeting or a minimum of 7 days prior to usage, the CONTRACTOR shall submit to the ENGINEER, for approval, a list of compaction equipment to be used. The ENGINEER shall have 7 days to approve or disapprove the list. The list shall include the type of equipment, manufacturer and size.

3.10.3 Equipment Certification

If, in the opinion of the ENGINEER, the compaction equipment is not acceptable, the CONTRACTOR may demonstrate the suitability of such equipment in a test area within the prepared fill site.

3.10.4 Fill Faces

Fill faces shall be compacted. Compacting operations shall be continued until the slope faces are stable but not too dense for planting and there is no appreciable amount of loose soil on the surface. Compaction efforts should be limited to “walking-in” slopes with a tracked dozer. Compacting of the slopes may be done progressively as the fill is brought to its total height or compacting of the slopes may be done after the fill is brought to its total height.

3.10.4.1 Erosion

CONTRACTOR shall maintain and prevent erosion of Fill at all times during construction. Repair of damages to the Subbase due to inadequate maintenance, and erosion shall be at the CONTRACTOR's own expense.

3.11 QUALITY CONTROL

CONTRACTOR to provide testing in accordance with Table 31 00 00-1 Testing Frequency Summary – Earth Material Construction Quality Control Testing.

3.12 GRADING

Uniformly grade all areas disturbed by the project, at trench locations, excavated and fill areas and adjacent transition areas so that finished surfaces are at the proposed grade or are approximately at preexisting grades, adjusted as required to provide positive drainage.

Fill and excavation areas shall be kept free of standing water with positive drainage maintained. Sloping of the fill surface and drainage ditches shall be provided to carry off water as it collects. Pumping shall be required to remove water from areas that cannot drain naturally.

3.13 SEASONAL LIMITS

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 the moisture content and density of the previously placed fill are as specified. Fill surfaces exposed to inclement weather or standing water shall be scarified to a depth of 6 inches, compacted and tested prior to placing addition fill lifts.

3.14 INTEGRITY OF THE WORK

It shall be the CONTRACTOR's responsibility to maintain the integrity of the work. Work that is damaged by weather or construction activities shall be restored and retested at the CONTRACTOR's expense.

3.14.1 Protection of Graded Areas

Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

3.14.2 Repair

Repair and reestablish grades in settled, eroded, and rutted areas to specified tolerances.

3.14.3 Reconditioning Compacted Areas

Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density and moisture range prior to further construction.

3.14.4 Settling

Where settling is measurable or observable at excavated areas during project, remove surface (pavement, lawn, or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.15 FINISHING WORK

3.15.1 Subbase

After the Subbase has been installed, the CONTRACTOR shall maintain it free of ruts, depressions, and damage resulting from the hauling and handling of any material, equipment, tools, etc.

3.15.2 Drainage Structures

All drainage structures shall be constructed and maintained as necessary along the completed section.

3.15.3 Elevations

Unless otherwise specified by the ENGINEER, the elevation of all constructed grades shall be within 0.2 feet of those shown on the PLANS. The thicknesses of all Sidewall Odor Mitigation System components such as Subbase and Drainage Layers are minimum values.

3.15.4 Finish Grading

After berms, ditches, swales, shoulders, and embankments are completed, the disturbed areas shall be finish graded. Any lumber, undesirable materials, and rocks larger than the 3 inches in size shall be removed from the surface immediately and the surface shall be prepared for final landscaping.

3.16 DISPOSAL OF EXCESS AND WASTE MATERIALS

The Bristol ISWMF does not have an active landfill waste placement operations (“working face”) area and is in the process of installing various remedial measures prior to closure. During this interim period, waste that is excavated during construction activities can be relocated and covered within the landfill.

The CONTRACTOR shall place waste materials encountered during earthwork activities in neat piles adjacent to the work area. Prior to the end of the working day, the CONTRACTOR shall haul the excavated waste materials to a designated area for waste relocation at the site, as directed by the OWNER. The CONTRACTOR shall be responsible for stripping off the existing Intermediate Soil Cover material, unloading and spreading the excavated waste, "tracking it in" with suitable equipment, and replacing and restoring the Intermediate Soil Cover layer.

OWNER shall not require the CONTRACTOR to pay tipping fee for disposal of excavated waste materials encountered during work activities. If odors or emissions from the excavated waste become a nuisance as determined by the OWNER, CONTRACTOR shall increase the frequency of excavated waste removal as directed by the ENGINEER.

END OF SECTION 31 00 00

SECTION 31 05 16

AGGREGATES

1.0 GENERAL

1.1 SUMMARY

The requirements for riprap, pipe bedding aggregates, road base course, leachate collection layer, construction entrance, and other miscellaneous as shown in the PLANS, and are specified herein and General Conditions.

Related Work Specified Elsewhere:

- Section 01 45 00 Construction Quality Control
- Section 31 00 00 Earthwork
- Section 31 05 19.16 LLDPE Geomembrane Liner

1.2 REFERENCE SPECIFICATIONS

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

1.2.1 State Of Virginia

- Virginia Department of Transportation (VDOT) Road and Bridge Specifications (VDOTRBS), April 2020

1.2.2 American Society for Testing and Materials (ASTM) Standard Test Methods/Practice

- ASTM C 88 Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
- ASTM C 131 Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
- ASTM D 75 Sampling Aggregates
- ASTM C 136 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- ASTM D 698 Laboratory Compaction Characteristics Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))

- ASTM D 1556 Density and Unit Weight of Soil in Place by the Sand Cone Method
- ASTM D 2487 Classification of Soils for Engineering Purposes
- ASTM D 3017 Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
- ASTM D 4373 Calcium Carbonate Content of Soils
- ASTM D5856 Standard Test Method for Measurement of Hydraulic Conductivity of Porous Material Using a Rigid-Wall, Compaction-Mold Permeameter
- ASTM E 11 Wire Cloth Sieves for Testing Purposes
- ASTM E329 Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection

1.3 SUBMITTALS

1.3.1 Prequalification

Submit the material source, descriptions, and material specifications certified by the supplier to the ENGINEER for approval.

1.3.2 Approval of Material Sources

The sources of the material to be used for producing aggregates shall be selected not less than thirty (30) days prior to the time the material will be required in the work. Any changes in the source of materials shall be reported to the ENGINEER immediately. The new source shall be approved by the ENGINEER. Allow a minimum of 10 days for review and approval. The CONTRACTOR shall be fully responsible for any delays in construction due to changes in material sources.

1.3.3 Certificate of Compliance

The CONTRACTOR shall submit to the ENGINEER for approval at least 15 days before procurement Certificate of Compliance from the manufacturer that the supplied materials meet the specifications herein.

2.0 PRODUCTS

2.1 GENERAL

2.1.1 Quality

Aggregates shall consist of clean, sound, durable particles of crushed stone, or gravel, and screenings. Slag shall not be used.

2.1.1.1

CONTRACTOR shall obtain materials that meet the specifications and can be used to meet the grade and smoothness requirements specified herein, after all compaction and proof rolling operations have been completed.

2.1.1.2

Aggregates shall be free of silt and clay (as defined by ASTM D 2487), vegetable matter, and other objectionable materials or coatings.

2.1.1.3

Drainage Layer and Type 1 aggregate surrounding perforated landfill gas collection pipe shall contain less than 15% by weight of calcium carbonate as measured by ASTM D4373.

2.1.2 Fine Aggregate

Fine aggregate refers to the portion passing the No. 4 sieve. Fine aggregate may contain angular particles produced by crushing stone, or gravel that meets the requirements for wear and soundness specified by VDOTRBS Section 202. Material designations for the various fine aggregates used on the project shall be as specified on the PLANS.

2.1.3 Coarse Aggregate

2.1.3.1

Coarse aggregate refers to the portion retained on the No. 4 sieve, and shall be angular or rounded particles of uniform density. Coarse aggregate may contain angular particles produced by crushing stone, or gravel that meets the requirements for wear and soundness specified by the VDOTRBS Section 203.

2.1.3.2

The coarse aggregate shall have a loss of density not greater than 10 percent of the weighted average at five cycles when tested for soundness. The coarse aggregate shall have a percentage of wear not exceeding 40 percent after 500 revolutions as determined by the requirements of VDOTRBS Section 203.

2.1.3.3

Material designations for the various coarse aggregates used for the project shall be as specified on the PLANS.

2.1.3.4

The percentage of flat and/or elongated particles shall not exceed 20 in the fraction retained on the 1/2 inch sieve and in the fraction passing the 1/2 inch sieve. A flat particle is one having a ratio of width to thickness greater than 3; an elongated particle is one having a ratio of length to width greater than 3. When the coarse aggregate is supplied from more than one source, aggregate from each source shall meet the requirements set forth herein.

2.2 MATERIALS

2.2.1 VDOT Aggregates

All specified aggregates shall be in accordance with VDOTRBS Section 206.

2.2.2 Horizontal Collector Aggregate

2.2.2.1

VDOT No. 3 aggregate may be used as long as the maximum calcium carbonate content requirements are met.

2.2.2.2

Material shall be composed of sub-rounded to rounded particles, or such that it will not damage or puncture the underlying geotextile and HDPE geomembrane layers.

2.2.2.3

Shall be non-calcareous, with a maximum carbonate content of 15% by weight as measured by ASTM Method D4373

2.2.3 Type 1 Aggregate

2.2.3.1

Type 1 aggregate consists of coarse aggregate surrounding the HDPE pipe on all sides as shown on the Plans.

2.2.3.2

Shall consist of VDOT Size Number 3 coarse aggregate, or equivalent AASHTO-designated material with the following gradation:

Sieve/Particle Size (inches)	Percentage Finer by Weight
2-1/2	100%
2	90-100
1-1/2	35-70
1	0-15
1/2	0-5

2.2.3.3

Material shall be composed of sub-rounded to rounded particles, or such that it will not damage or puncture the underlying geotextile and HDPE geomembrane layers.

2.2.3.4

Shall be non-calcareous, with a maximum carbonate content of 15% by weight as measured by ASTM Method D4373

3.0 EXECUTION

3.1 EQUIPMENT

3.1.1 Weather Limitation

Aggregates shall be placed in accordance with VDOTRBS Section 309. Areas of completed work that are damaged by freezing, rainfall, or other weather conditions shall be corrected to meet specified requirements.

3.1.2 Placement of Aggregate Layer Over Geomembrance Liner

Refer to Section 31 05 19.16- LLDPE GEOMEMBRANE LINER for equipment ground pressure/minimum thickness criteria for placement of the Aggregate Layer over the Geomembrane liner.

3.2 STOCKPILING MATERIAL

Prior to stockpiling of material, storage sites shall be cleared and leveled by the Contractor. All materials, including approved material available from excavation and grading, shall be stockpiled in a manner and at locations approved by the ENGINEER. Aggregates shall be stockpiled on the cleared and leveled areas designated by the OWNER so as to prevent segregation. Materials obtained from different sources shall be stockpiled separately. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

3.2.1 STOCKPILE CLEANUP

Remove stockpile, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.

3.3 PREPARATION OF UNDERLYING COURSE

Prior to constructing the aggregate layer, the underlying course shall be cleaned of all foreign substances. At the time of construction of the course, the underlying course shall contain no frozen material. The underlying course shall conform to Section 31 00 00 - EARTHWORK.

3.4 GRADE CONTROL

During construction, the lines and grades shall be maintained by the CONTRACTOR.

3.5 PLACING

3.5.1 Coarse Aggregate

Coarse aggregate bedding and backfill material shall be placed in accordance with VDOT RBS Section 303 earthwork.

3.5.2 Horizontal Collector Aggregate

Horizontal Collector Aggregate shall not be compacted. Placement to the lines and grades shown on the Plans shall be performed in a manner that will prevent damage to the underlying geotextile and LLDPE geomembrane layers, and meet equipment ground pressure/minimum thickness criteria in Section 31 05 19.16- LLDPE GEOMEMBRANE LINER.

3.6 COMPACTION

3.6.1 Horizontal Collector Aggregate

Drainage Layer and Type 1 aggregates shall not be compacted, but placed in a manner as noted in 3.5.C. above.

3.7 QUALITY CONTROL

Refer to Section 31 00 00 - EARTHWORK for quality control testing requirements for Drainage Layer and Type 1 aggregates.

END OF SECTION 31 05 16

SECTION 31 05 19.13

GEOTEXTILE FABRICS

1.0 GENERAL

1.1 SUMMARY

1.1.1 Scope

This section covers the material, installation and testing of the 16 oz/yd^2 nonwoven geotextile for the sidewall liner system and Sidewall Odor Mitigation System (SOMS) of a municipal solid waste landfill. The nonwoven geotextile fabric shall be furnished by the CONTRACTOR unless otherwise specified. The nonwoven geotextile shall be installed as shown on the plans. The nonwoven geotextile shall be prepared and installed per these specifications, referenced specifications and as detailed on drawings. CONTRACTOR shall provide all labor, materials, equipment, and services necessary for the placement of the nonwoven geotextile. CONTRACTOR shall limit the maximum total force for a vibratory or standard drum roller to 29,400 lbs (assuming a 5 foot wide drum), and the maximum weight of a dozer or tracked loader to 60,000 lbs. on top of the SOMS to place the low permeability and soil cover layers (assuming track contact area of 10 feet by 22 inches).

1.2 RELATED SECTIONS

1.2.1 Intent

The provisions and intent of the AGREEMENT, including the General Condition, Supplemental Conditions and other requirements of the Contract Documents apply to the WORK as specified in this section. WORK related to this section is described throughout the Specifications.

1.3 REFERENCES

The current specifications of American Society for Testing and Materials (ASTM) shall apply as noted for testing and acceptance of materials and construction. Current and applicable ASTM methods were determined by the Geosynthetic Research Institute.

1.3.1 Related Requirements

Comply with applicable codes and regulations as required by regulatory agencies having jurisdiction over this work. Comply with the pertinent sections of the following standards:

American Society for Testing and Materials (ASTM)

American Association of State Highway and Transportation Officials (AASHTO)

Geosynthetic Research Institute (GRI) Test Methods and Standards

1.4 VIRGINIA DEPARTMENT OF TRANSPORTATION (VDOT) STANDARD SPECIFICATIONS, LATEST EDITION SUBMITTALS

1.4.1 Shop Drawings

CONTRACTOR shall submit Shop Drawings and product data for components for approval within 30 calendar days of Notice to Proceed. A change in the manufacturer shall require resubmittal.

1.4.2 Nonwoven Geotextile

Shop Drawings shall include:

1.4.2.1 Seaming or Tying Procedures

Complete description of field seaming or tying procedures

1.4.2.2 Penetration

Manufacturer shall provide Shop Drawings detailing the manner and materials to be used for all nonwoven geotextiles penetrations. This shall include, however is not limited to pipes, manholes and the like.

1.4.2.3 Work Plan

Work Plan for nonwoven geotextile installation, including man power and equipment requirements.

1.4.2.4 Field Testing

Detailed description of field testing methods to be performed, if required.

1.4.3 Affidavit or Compliance

Provide six (6) hard copies or one (1) electronic copy of an affidavit, certifying that all nonwoven geotextile material furnished for this Project (reference Project title) comply with all requirements specified in the Contract Documents. NO nonwoven geotextile material shall be shipped until the affidavits are submitted to CQA Consultant and ENGINEER.

1.4.4 Test Reports

Provide six (6) hard copies or one (1) electronic copy of Factory Quality Control Testing.

1.5 QUALITY ASSURANCE

1.5.1 Single Source

All nonwoven geotextile material provided by the contractor shall be obtained from a single material supplier and all nonwoven geotextile sheets shall be manufactured by a single manufacturer unless approved by the ENGINEER.

1.5.2 Manufacturer's Qualification and Experience

Manufacturer shall be a specialist in the manufacture of nonwoven geotextile material and shall have at least 3 years' experience in the manufacture of nonwoven geotextile material. Manufacturer shall have manufactured and have installed, successfully, at least 5 million square feet nonwoven geotextile material during the last 3 years.

1.5.3 Installer's Qualification and Experience

Installer shall be a specialist in the installation of nonwoven geotextile material and shall have at least 3 years' experience in the installation of nonwoven geotextile material. Installer shall have installed at least 5 million square feet of nonwoven geotextile material during the last 3 years. Installer shall submit a list of similar projects (preferably in Virginia). At a minimum the list shall include installation type, completion date, contact person name, address and telephone number. Installer shall provide continuous on-site supervision; a complete resume of the on-site supervisor shall be included as part of the Bid package. CONTRACTOR shall adhere to the experience levels outlined above when installing the nonwoven geotextile material.

1.5.4 Installer's Filed Services and Reports

Retain services of a nonwoven geotextile material installer's factory trained representative with demonstrated ability and experience in field seaming or tying, testing and all other pertinent aspects of the installation to perform the services listed below:

1.5.4.1 Inspection/Supervision

Inspect the nonwoven geotextile material and supervise any corrective work required. Prepare an inspection report to be submitted to CQA Consultant and ENGINEER weekly.

1.5.4.2 Handling

Supervise the unloading, handling, and storage of all nonwoven geotextile material.

1.5.4.3 Placement

Supervise the handling, unrolling, and placement of all nonwoven geotextile material.

1.5.4.4 Seaming/Tying

Perform all seaming or tying of all nonwoven geotextile material.

1.5.4.5 Repairs

Perform all repairs to damaged nonwoven geotextile material.

1.5.4.6 Granular Drainage Material

Coordinate work with the CONTRACTOR during the placement of the granular drainage material over the nonwoven geotextile material.

1.5.4.7 Project Report

Prepare a written report at the completion of the Project which includes the following:

1.5.4.7.1

Complete identification of nonwoven geotextile material, including but not limited to, material type, physical properties and other pertinent data.

1.5.4.7.2

Complete description of field seaming/tying system used including material, method, seam overlap width and seaming/tying material.

1.5.4.7.3

"As-built" Drawings showing actual layout of nonwoven geotextile sheets, pipe penetration details and anchor trench/material run-out details.

1.5.4.7.4

An affidavit of compliance from the nonwoven geotextile material installer containing the following wording:

"I (name and title), as the duly authorized representative of (Company Name), hereby certify that the installation of the nonwoven geotextile material has been completed in accordance with the terms and conditions of the Contract Documents.

By:_____

(signature)

Witness:_____

(signature)

Date:_____

1.5.5 Quality Control during Manufacture

CONTRACTOR shall provide a Quality Control Manual.

1.5.6 Manufacturer's Certifications

CONTRACTOR shall provide ENGINEER and CQA Consultant with certified copies of test results.

1.5.7 Independent Testing

OWNER and/or ENGINEER may employ and pay for an independent Testing Laboratory to perform additional testing of the nonwoven geotextile material. CONTRACTOR, shall, at no additional cost,

provide samples to ENGINEER and/or Independent Testing Laboratory for the quality of the material provided.

1.5.8 Acknowledgement

CONTRACTOR shall be solely responsible to the OWNER for the quality of the material provided. Should any of the tests performed on the material yield unsatisfactory results, CONTRACTOR will be responsible for replacing the material with satisfactory material without delaying the total Project time and without any cost to OWNER.

1.6 DELIVERY, STROAGE, AND HANDLING

1.6.1 General

Manufacturer and CONTRACTOR shall follow the guidelines stated in ASTM D4873 - Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples.

1.6.2 Labeling

Each roll of nonwoven geotextile material delivered to the site shall be labeled by the manufacturer identifying the manufacturer's name, product identification, lot number, roll number, and roll dimensions.

1.6.3 Protection

Filter fabric and/or geonet/filter fabric composite shall be protected from ultraviolet light exposure, precipitation, or other damage from the natural elements, mud, dirt, dust, puncture, cutting or any other damaging or deleterious conditions. Nonwoven geotextile rolls shall be shipped and stored in relatively opaque and watertight wrappings.

1.6.4 Delivery Inspection

CONTRACTOR shall provide all labor and equipment required to assist OWNER and ENGINEER in inspection of materials upon deliver to the site.

2.0 PRODUCTS

2.1 NONWOVEN GEOTEXTILES

2.1.1 Manufacturer

Geotextile used for filtration shall be manufactured by SKAPS Industries, Inc. or approved equal. Manufacturer shall submit a certificate to the ENGINEER stating the name of the manufacturer, the chemical composition of the filaments or yarns, and other pertinent information so as to fully describe the geotextiles. At a minimum the other pertinent data shall include Grab Strength, Elongation, Puncture Strength, and Apparent Opening Size. The manufacturer shall include in the certificate a guarantee stating that the geotextile that is furnished meets the requirements of GRI Test Methods GT 12a and GT 13.

2.1.2 Performance

All geotextile shall be a continuous filament needle punched or needle punched with staple fabric, or nonwoven fabric composed of synthetic filaments which are formed into a stable network such that the filaments retain their relative position. They shall be inert to biological degradation and naturally encountered chemicals, alkalis and acids. Geotextiles shall conform to the following minimum values:

Table 1. Geotextile Performance Standards

16 oz/yd² Nonwoven Geotextile					
Test Method	Fabric Property	Geotextile Values1	Unit	MQC Testing Frequency	Conformance Testing Frequency
ASTM D4533	Trapezoidal Tear Strength	145	lbs	200,000 ft²	-
ASTM D4632	Grab Tensile Strength	370	lbs	200,000 ft²	200,000 ft²
ASTM D3786	Burst Strength	500	Psi	200,000 ft²	
ASTM D4632	Grab Tensile Elongation	50	%	200,000 ft²	-
ASTM D5261	Mass per unit area	16	oz/yd²	200,000 ft²	200,000 ft²
ASTM D6241	Puncture Strength	900	lbs	200,000 ft²	200,000 ft²
ASTM D7238	UV resistance2	70	%	200,000 ft²	-
ASTM D4751	AOS	#100	Sieve #	200,000 ft²	-
ASTM D4491	Permittivity	0.2	sec^{-1}	200,000 ft²	-

2.1.3 Manufacturing Quality Control

The separation geotextile shall be subjected to MQC testing for the characteristics listed in Table 1. The MQC tests shall be performed according to the test methods and frequencies listed in Table 1.

1 All values are MARV except UV resistance; it is a minimum value.
2 Evaluation to be on 2.0 inch strip tensile specimens per ASTM D 5035 after 500 lt. hrs. exposure.

Test results shall be compared to the values and qualifiers listed in Table II for purposes of evaluating acceptable products.

2.1.4 CONFORMANCE TESTING

The separation geotextiles shall be subjected to conformance testing for the characteristics listed in Table IV. The conformance tests shall be performed according to the test methods and frequencies listed in Table 1. The test results shall be compared to the values and qualifiers listed in Table 1 for purposes of evaluating acceptable products.

2.1.5 Packaging

The geotextile shall be uniformly rolled onto a core, and shall be wrapped in plastic to protect the material from moisture and damage during shipment. Protective wrapping shall be left on the geotextile until installation. Rolls shall be externally tagged for easy field identification. External tagging shall include the following:

- Name of Manufacturer
- Product Type
- Product Grade
- Lot Number
- Physical Dimensions (length, width & weight)

The geotextile shall not be exposed to precipitation prior to being installed. The geotextile shall not be exposed to sunlight for more than 15 days unless otherwise specified and guaranteed in writing by the geotextile manufacturer.

3.0 EXECUTION

3.1 PREPARATION FOR NONWOVEN GEOTEXTILE

3.1.1 LLDPE Geomembrane Liner

Prepare the geomembrane liner surface to receive the nonwoven geotextile material in accordance with manufacturer's recommendations.

3.1.2 Inspection

The geomembrane liner surface shall be inspected and approved by the ENGINEER and CQA Consultant and nonwoven geotextile installer prior to placement of the nonwoven geotextile material.

3.1.3 Anchor Trench

The anchor trench shall be excavated to the line, grade, and width shown on the Drawings, prior to nonwoven geotextile material placement. Installer, ENGINEER and CQA Consultant shall verify that the anchor trench has been constructed according to the contract plans.

3.1.4 Desiccation

If the anchor trench is located in a clay susceptible to desiccation, no more than the amount of trench required for the nonwoven geotextile to be anchored in 1 day shall be excavated to minimize desiccation of the anchor trench soils.

3.1.5 Corners

Slightly rounded corners shall be provided in the trench where the nonwoven geotextile adjoins the trench so as to avoid sharp bends in the nonwoven geotextile.

3.1.6 Backfilling of Anchor Trench

The anchor trench shall be backfilled and compacted by CONTRACTOR, as approved by CQA consultant. Backfill material shall consist of select foundation soil material. Trench backfill material shall be placed in 8 inch thick loose lifts and compacted by a method and equipment type approved by CQA Consultant. Material shall be compacted to a minimum of 95 percent of the maximum dry density as determined by ASTM D 698.

3.1.7 Protection

Care shall be taken when placing granular drainage material over the nonwoven geotextile to prevent any damage to the nonwoven geotextile material. At no time shall construction equipment come into direct contact with the nonwoven geotextile material. If damage occurs, it shall be repaired prior to the completion of placing the granular drainage material.

3.2 NONWOVEN GEOTEXTILE PLACEMENT

3.2.1 Installation-General

CONTRACTOR shall meet all manufacturer's Specifications and comply with the following unless approved in writing by CQA Consultant, ENGINEER, and manufacturer.

3.2.1.1 Placement

Geotextile shall be placed smoothly and in direct contact with the underlying medium. Excessive wrinkles shall not be acceptable. Care should be taken when placing geotextile on textured liner. Excessive shitting of the material when trying to place on textured liner could result in rejection of the material. Tears shall not be acceptable even when patched. Equipment shall never be run directly on the geotextile.

3.2.1.2 Ballasting

All nonwoven geotextile shall be weighted with sandbags or the equivalent when required. Such sandbags shall be installed during placement and shall remain until removed and replaced with cover material or adjoining nonwoven geotextile.

3.2.1.3 Compliance

All nonwoven geotextile shall be installed to meet all manufacturer's specifications and as indicated in the specifications an as shown on the Drawings.

3.2.1.4 Projections/Debris

Prior to placing the nonwoven geotextile, care shall be taken not to entrap stone, excessive dust, or moisture that could damage the nonwoven geotextile , generate clogging, or hamper subsequent seaming or tying of the nonwoven geotextile.

3.2.1.5 Damage

CONTRACTOR shall take any necessary precautions to prevent damage to the underlying geomembrane liner during placement of the nonwoven geotextile.

3.2.1.6 Contamination

During placement of nonwoven geotextile, care shall be taken not to entrap stone, excessive dust, or moisture that could damage the nonwoven geotextile, generate clogging, or hamper subsequent seaming or tying of the nonwoven geotextile.

3.2.1.7 Protection

Nonwoven geotextile shall not be exposed to precipitation prior to being installed, and shall not be exposed to direct sunlight for more than 15 days.

3.2.2 Seaming/Tying

Perform seaming/tying operations as follows:

3.2.2.1 Slopes Greater than 10:1

On slopes steeper than ten (10) horizontal: one (1) vertical, all nonwoven geotextile material shall be seamed or tied. Seaming shall be by sewing, fusion, ties or other approved means. All seams shall be continuously seamed using the double stitch prayer or flat seam (SSa-2), spot seaming is not allowed. If ties are to be used, prior approval of the tie material and placement pattern must be obtained during the submittal review process prior to installation of the nonwoven geotextile. Nonwoven geotextile shall be overlapped 6 inches prior to seaming. Cross seams at an angle of 45° or greater from horizontal shall be allowed on slopes steeper than ten (10) horizontal: one (1) vertical. The number of cross seams shall be kept to a minimum and shall be staggered or separated by a minimum of ten (10) feet between adjoining panels. No horizontal seams shall be allowed on slopes steeper than ten (10) Horizontal: one (1) vertical. On slopes 4H:1V (i.e. 20%) or greater, seams shall be continuously sewn.

3.2.2.2 Slopes Less than 10:1

On slopes less than ten (10) horizontal: one (1) vertical, nonwoven geotextile shall be either seamed/tied as indicated above, or overlapped 12 inches. Spot seaming/tying may be considered

as a measure against wind uplift. Overlaps shall be oriented in the direction of protective soil placement.

3.2.2.3 Thread

Any sewing shall be done using polymeric thread with chemicals properties equal to or exceeding those of the nonwoven geotextile.

3.2.3 Protection from Damage

Geotextiles should be secured from the wind until final cover is placed. Geotextiles shall be covered within two weeks of installation. The CONTRACTOR is responsible for damage that occurs to the geotextile during installation and will replace the damaged geotextile at no additional cost. The CONTRACTOR shall replace geotextile that is left exposed for more than two weeks.

3.2.4 Geotextile Repair

CONTRACTOR shall repair any damage, as follows:

3.2.4.1 Holes/Tears

Any holes or tears in the fabric shall be repaired as follows:

a. On slopes: A fabric patch shall be sewn into place using a double sewn lock stitch (1/4 in. to 3/4 in. apart and no closer than 1 inch from any edge) with a minimum of 24 inches of overlap in all directions. Should any tear exceed 10 percent of the width of the roll, that roll shall be removed from the slope and replaced.

b. Non-slopes: A fabric patch shall be spot-seamed in place with a minimum of 24 inches of overlap in all directions.

3.2.4.2 Penetrations

Care shall be taken to remove any soil, granular material, or material which may have penetrated through the torn nonwoven geotextile.

3.2.4.3 Daily Placement

The amount of nonwoven geotextile unrolled and laid daily shall be limited to the amount of nonwoven geotextile that can be properly seamed during a 1 day operation. Tack or spot seaming does not constitute a completed seam.

3.3 INSPECTION

3.3.1 Initial Inspection

The nonwoven geotextile material shall be placed after the receiving surface has been property prepared and inspected and approved by the CQA Consultant. No nonwoven geotextile material shall be placed in the absence of the CQA Consultant.

3.3.2 Inspection

Any nonwoven geotextile material placed without CQA Consultant inspection and approval prior to the installation shall be removed in a manner to avoid damage or disturbance to the existing approved work, and nonwoven geotextile material shall be replaced as specified herein, at no additional cost to OWNER.

If an acceptable nonwoven geotextile layer is not obtained because of improper control of placement or seaming/tying procedures, or because of inadequate or improperly functioning equipment, CONTRACTOR shall perform whatever work is required to provide an acceptable nonwoven geotextile layer at no additional cost to O'WNER. This WORK shall include complete removal of unacceptable material area and replacement until an acceptable nonwoven geotextile layer is provided.

4.0 PAYMENT

Payment for work covered in this section shall be included for payment in the CONTRACTOR's lump sum bid price, as shown on the Bid Proposal.

END OF SECTION 31 05 19.13

SECTION 31 05 19.16

LLDPE GEOMEMBRANE LINER

1.0 GENERAL

1.1 SCOPE

The work covered in this Section includes the manufacturing, fabrication, testing, supply and installation of Linear Low-Density Polyethylene (LLDPE) geomembrane for the sidewall odor mitigation system (SOMS). The CONTRACTOR shall furnish all labor, materials, transportation, handling, storage, supervision, tools, equipment and other incidentals necessary to install, test, and quality control the geomembrane as required by the Contract Documents.

1.1.1

These specifications describe Linear Low-Density Polyethylene (LLDPE) geomembranes. The supply and installation of these materials shall be in strict accordance with this specification, and be subject to the terms and conditions of the Contract.

1.1.2

The sidewall odor mitigation system geomembrane within the disposal area shall be LLDPE with a nominal thickness of 40 mils. Material shall be textured on both sides.

1.2 DEFINITIONS

1.2.1 Owner

The Owner or his designated representative.

1.2.2 Engineer

The Engineer who is acting as the Design Engineer and Owner's designated representative.

1.2.3 QAO

The Quality Assurance Officer who is the on-site project representative.

1.2.4 QAE

The Quality Assurance Engineer, who is in direct supervision of the QAO.

1.3 QUALITY ASSURANCE AND CONTROL DURING INSTALLATION

The ENGINEER or OWNER third party Construction Quality Assurance (CQA) Consultant will observe geomembrane installation and construction and certify that construction is in accordance with Contract Documents. All tests and test frequencies specified in this section are Construction Quality Control (CQC) tests, and these tests are the responsibility of the CONTRACTOR or his representative unless otherwise noted.

1.4 REFERENCES

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) STANDARD TEST METHODS/PRACTICE:

- ASTM D 792 Specific Gravity (Relative Density) and Density of Plastics by Displacement
- ASTM D 1004 Initial Tear Resistance of Plastic Film and Sheeting
- ASTM D 1204 Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperature
- ASTM D 1238 Flow Rates of Thermoplastics by Extrusion Plastometer
- ASTM D 1248 Polyethylene Plastics Molding and Extrusion Materials
- ASTM D 1505 Density of Plastics by the Density-Gradient Technique
- ASTM D 1603 Carbon Black in Olefin Plastics
- ASTM D 3895 Test Method for Oxidative Induction Time of Polyolefins by Thermal Analysis
- ASTM D 4218 Test Method for Determination of Carbon Black Content in Polyethylene Compounds by the Muffle-Furnace Technique
- ASTM D 4833 Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
- ASTM D 5199 Measuring Nominal Thickness of Geotextiles and Geomembranes
- ASTM D 5321 Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by the Direct Shear Method
- ASTM D 5323 Practice for Determination of 2% Secant Modulus for Polyethylene Geomembranes
- ASTM D 5596 Standard Test Method For Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics
- ASTM D 5617 Test Method for Multi-Axial Tension Test for Geosynthetics
- ASTM D 5721 Practice for Air-Oven Aging of Polyolefin Geomembranes
- ASTM D 5885 Test method for Oxidative Induction Time of Polyolefin Geosynthetics by High Pressure Differential Scanning Calorimetry

- ASTM D 6392 Standard Test Method for Determining the Integrity of Non-reinforced Geomembrane Seams Produced Using Thermo-Fusion Methods
- ASTM D 6693 Test Method for Determining Tensile Properties of Non-reinforced Polyethylene and Non-reinforced Flexible Polypropylene Geomembranes
- ASTM D 7238 Test Method for Effect of Exposure of Unreinforced Polyolefin Geomembrane Using Fluorescent Condensation Device
- ASTM D 7466 Test Method for Measuring the Asperity Height of Textured Geomembranes
- ASTM D 8117 Standard Test Method for Oxidative Induction Time of Polyolefin Geosynthetics by Differential Scanning Calorimetry

GEOSYNTHETICS RESEARCH INSTITUTE (GRI) STANDARD PRACTICE FOR:

- GRI GM-6 Pressurized Air Channel Test for Dual Seamed Geomembranes
- GRI GM-17 Test Methods, Test Properties and Testing Frequency for Linear Low Density Polyethylene (LLDPE) Smooth and Textured Geomembranes
- GRI GM-19a Specification for Seam Strength and Related Properties of Thermally Bonded Homogeneous Polyolefin Geomembranes/Barriers

1.5 SUBMITTALS

The CONTRACTOR or Geosynthetic INSTALLER shall submit the following information to the ENGINEER for approval at least 30 days (unless otherwise specified) prior to procurement of the geomembrane:

1.5.1 Proof of Manufacturer's Qualifications:

- The Manufacturer must have at least two (2) years documented experience in the manufacture of the geomembrane and/or documented experience totaling 10,000,000 ft^2 of the manufactured geomembrane for at least ten (10) completed facilities.
- Manufacturer's Brochure: Submit complete manufacturer's specifications, descriptive drawings, and literature for the geomembrane, including the product identification and supplier of the polymer resin and recommended method for handling and storage of all materials prior to installation. Include information on plant size, equipment, personnel, number of shifts per day and capacity per shift.
- Manufacturer Quality Control (MQC) Program: Submit a complete description of the geomembrane manufacturer's formal quality control programs for manufacturing, fabricating, testing, quality control, defects repair, handling, and shipping. The description shall include, but not be limited to, polymer resin supplier(s) and product identification, acceptance testing, production sampling and testing, installation testing, documentation of changes, alterations, repairs, retests, and acceptance.

- Prior to Purchasing material the following conformance testing is required: Submit independent quality control laboratory test results demonstrating compliance with material properties listed herein, including *Table 31 05 19.16 – 3* Resin Properties (Without Carbon Black) and *Table 31 05 19.16 - 4*. The independent laboratory tests are to be performed once by an approved laboratory independent of the manufacturer. In addition, the manufacturer must provide a certificate of compliance which states that the material to be installed will use the same resin type and formulation as that for which test results are submitted.

1.5.1.1 Manufacturer Quality Control Certificates:

The Geosynthetic Installer shall submit test reports to the ENGINEER prior to geomembrane shipment. The tests and frequencies are specified in Part 2 - "Manufacturer Quality Control Tests" and material properties.

The following information must be submitted for approval prior to shipping the material:

Resin:

- Batch number, lot number, or identification number and production date(s).
- A certification by a qualified individual employed by the manufacturer that the quality of the resin used to manufacture the geomembrane rolls assigned to this project meets specified properties measured using test methods indicated in the specifications, or equivalent;
- Copy of quality control certificates issued by the Resin Supplier.
- Certified statement that no reclaimed polymer was added to the resin during the manufacture of the actual geomembrane to be used in this project.

Geomembrane:

- Roll numbers, production dates, and identification;
- A certification by a qualified individual employed by the manufacturer that the geomembrane roll assigned to this project meets specified properties measured using test methods indicated in the specifications, or equivalent;
- A list of quantities and descriptions of materials other than the base polymer which comprise the geomembrane.

Factory Visit:

At the request of the OWNER or the ENGINEER, submit contact names, telephone numbers, addresses, and production schedule information for purposes of scheduling an OWNER or ENGINEER'S plant visit during production.

1.5.2 Proof of Geosynthetic INSTALLER'S Qualifications:

- List at least ten (10) completed facilities totaling a minimum 10,000,000 ft^2, for which the Geosynthetic Installer has manufactured the proposed geomembrane, including thickness, amount, date(s) and intended usage. (See Part 2).

- Show a minimum of two years continuous experience and list completed facilities for which the Geosynthetic Installer has installed geomembrane, totaling a minimum of 10,000,000 ft^2.

- The name or names of the field superintendents who will be proposed for the project and a list of completed facilities for which the field superintendent has installed the selected geomembrane totaling a minimum of 10,000,000 ft^2.

- The name or names of the Master Seamer(s) who will be proposed for the project and a list of completed facilities for which the Master Seamer(s) has installed the selected geomembrane totaling a minimum of 2,000,000 ft^2.

- Construction Quality Control Program: Submit a complete description of the Geosynthetic Installer's formal quality control programs for handling, installing, testing, quality control, and defect repair. The description shall include, but not be limited to installation testing, documentation of changes, alterations, repairs, retests, and acceptance. The document shall include a complete description of seaming by extrusion welding and hot wedge welding.

- Panel Layout Drawing: As a minimum, PLANS shall include an approximate panel deployment sequence, panel orientation, type of weld to be used for each seam, incorporate restrictions on panel and seam orientation, methods of deployment, and details of each step in the construction of any penetrations. The panel layout drawing shall be drawn to scale, and shall indicate areas where horizontal seams will be utilized.

- Proposed schedule of installation showing the critical path of installation.

- Licensed Installer: The Geosynthetic Installer shall be approved and/or licensed by the geomembrane manufacturer.

- Warranty: Submit an advance (sample) copy of the warranty.

1.5.3 Instructions and Drawings Required After Contract Award

1.5.3.1 Storage, Handling, Installation, and Seaming

The Contractor shall furnish complete written instructions to the Engineer for the storage, handling, installation, and seaming of the membrane in compliance with this specification and the condition of his warranty.

1.5.3.2 Repairs

The material supplier shall furnish complete written instructions for the repair of geomembrane material to the Engineer no less than 30 days prior to installation.

1.5.3.3 Layouts

The Contractor shall furnish panel layouts and seam details as required for the membrane installation. The goal of the plan will be to minimize the required number of seams. Care should be taken to reduce areas of stress concentration. Horizontal seams are not allowed unless the slope length exceeds roll lengths. In that event, the horizontal seam will be installed on a 45 degree diagonal across the slope. Details of placement around penetrations, if any, such as pipes shall be provided. The above details must be approved by the Engineer prior to liner installation. Material left outside shall not be exposed to sunlight for more than 30 days.

1.5.4 Shop Drawing Submittals

1.5.4.1 Samples and Specifications

In order to qualify as an approved lining material, the Contractor shall submit material samples and minimum specifications to the Engineer. The specification sheet shall give full details of minimum physical properties and test methods used, site seaming methods, and a certificate confirming compliance of the material with the minimum specifications. A list of similar projects completed in which the manufactured material has been successfully used shall be submitted.

1.5.4.2 Certification

The Contractor shall submit a certification from the manufacturer of the sheeting, stating that the sheeting meets physical property requirements for the intended application, and that the membrane meets the physical requirements of the Geosynthetic Research Institute for the manufacture and installation of LLDPE membrane.

1.5.4.3 Certification Delivery

Upon delivery of the rolls of geomembrane, provide a copy of the certification from the manufacturer certifying the batch delivered to the site meets the minimum specifications and was QC inspected. The certificate shall be signed by a person with authority to bind the manufacturer.

1.5.4.4 Test Results

The Contractor shall submit results of confirmation testing showing that the material lot of the resin used in the membrane supplied meets the material requirements for the resin. A description of the quality control steps used during manufacture shall also be provided.

1.5.5 During Construction Conformance Test Results:

Submit conformance test results to the ENGINEER for approval within 3 days of completed testings. See Part 1.5.C. for conformance testing requirements and frequency.

1.5.6 List of Personnel:

The CONTRACTOR or Geosynthetic Installer shall submit a list of proposed seaming personnel and their experience records. All personnel shall be approved by the ENGINEER before they perform seaming operations.

1.5.7 Submittals Required for Project Closeout

Record Drawings:

Submit geomembrane record drawings to the ENGINEER.

Geomembrane Warranty

Submit geomembrane warranty to the ENGINEER.

1.6 DELIVERY, STORAGE, AND HANDLING

1.6.1 Handling

The Geosynthetic Installer's personnel shall handle the material with care, shall use adequate equipment and shall take all precautions necessary to prevent damaging the geomembrane.

1.6.2 Inspection upon Delivery

Upon delivery at the site, the Geosynthetic Installer, in the presence of a CQA Representative, conduct a visual inspection of rolls or factory panels for defects and for damage. This inspection shall be conducted without unrolling rolls or unfolding factory panels unless, in the Geosynthetic Installer's or CQA Representative's opinion, defects or damages are found or suspected.

Defects or flaws in the materials shall be brought to the attention of the CQA Representative. Rolls, factory panels, or portions thereof, which have unacceptable flaws shall be recorded by the CQA Representatives and Geosynthetic Installer, rejected and shall be removed from the site.

Rejected materials shall be replaced by the CONTRACTOR at no additional cost to the OWNER. No time extension will be allowed in the case of rejected materials.

1.6.3 During Construction Conformance Testing

At the direction of the CQA Representative, the Geosynthetic INSTALLER shall take samples from the delivered lot or factory seams retained (delivered along with the lot) and sent to the CQA Geosynthetic Laboratory for conformance testing. The cost for laboratory conformance testing shall be paid by the OWNER. The conformance tests and minimum frequency outlined in *Table 31 05 19.16 - 1* are required prior to installation.

Table 31 05 19.16 - 1 Conformance Testing Requirements

Properties	Test Method	Test Value	Testing Frequency (minimum)
Thickness (min. ave.) – mils • lowest individual for 8 out of 10 values - % • lowest individual for any of the 10 values - %	D 5994	nom -5% (38) -10% (36) -15% (34)	per roll
Tensile Properties • break strength – lb/in. • break elongation - %	D 6693 Type IV	60 300	45,000 ft^2

Properties	Test Method	Test Value	Testing Frequency (minimum)
Puncture Resistance (min. ave.) - lb	D 4833	50	45,000 ft^2
Tear Resistance (min. ave.) - lb	D 1004	22	45,000 ft^2
Carbon Black Content (range)	D 4218[1]	2.0% - 3.0%	45,000 ft^2
Carbon Black Dispersion	D 5596	[2]	45,000 ft^2

All conformance test results shall be reviewed and approved by the ENGINEER prior to any placement. If a conformance test result fails the specifications, at least two additional conformance tests shall be performed on samples taken immediately from adjacent numbered rolls. If both additional conformance test results pass the specifications, the entire lot or 45,000 square feet shall be accepted except that roll from which the failed sample is taken. If any of the conformance test results fails for the two (minimum) additional samples, the entire lot or 45,000 square feet shall be rejected by the ENGINEER.

1.6.4 Storage

The Geosynthetic Installer shall be responsible for ensuring that the stored materials are protected from rain, snow, ice, dirt, ultra violet light, shock, theft, vandalism, passage of vehicles, and other sources of damage. The CONTRACTOR is responsible for clearing, grubbing, and grading necessary to prepare the storage area. Provide for surface water control, access and storage area surfacing, and lighting necessary for adequate unloading of highway transport vehicles and access by construction equipment.

1.7 Warranty

Provide a twenty (20) year material warranty and workmanship defects for a period of one (1) year following the date of final completion of the work under this contract. The warranty required herein shall be provided in addition to any warranty required by the General Conditions.

2.0 PRODUCTS

2.1 MANUFACTURING PLANT VISIT

The Manufacturer shall allow the ENGINEER, CQA Representative, OWNER, or designated alternates to visit the manufacturing plant for a project specific visit. The ENGINEER, OWNER or designated alternate shall be allowed to review the manufacturing process, quality control, laboratory facilities and testing procedures as necessary to verify that:

- Properties guaranteed by the Manufacturer meet all specifications;
- Measurements of properties by the Manufacturer are properly documented and test methods used are acceptable;

[1] Other methods such as D 1603 (tube furnace) or microwave methods are acceptable if an appropriate correlation to D 4218 (muffle furnace) can be established.
[2] Carbon black dispersion (only near spherical agglomerates) for 10 different views: 9 in Categories 1 or 2 and 1 in Category 3

- Rolls of geomembrane are free of holes, blisters, or any sign of contamination by foreign matter;
- Packaging and transportation procedures do not damage the geomembrane;
- Roll packages are labeled to indicate the name of the manufacturer, the type of geomembrane, the roll thickness and the roll number; and
- That extrusion rods and/or beads are derived from the same base resin type as the geomembrane.

2.2 GEOMEMBRANES

2.2.1 Single Source

All geomembrane sheets and extrudate material for the construction of the project shall be obtained from a single material supplier and manufacturer. It must be certified and warranted that the sheets, extrudate, and pipe boots are compatible with one another. The Geosynthetic Installer shall provide manufacturer's warranties for the sheets, extrudate material, and pipe boots.

2.3 MATERIAL PROPERTIES

2.3.1 Geomembrane

The membrane shall be comprised of LLDPE material manufactured of new, first quality products designed and manufactured as a component of a hydraulic barrier in landfills or similar structures. The membrane shall have a minimum thickness required by the plans. The raw polymer shall meet or surpass the minimum standards as set forth in the Geosynthetic Research Institute's (GRI) Test Method GM17 "Test Methods, Test Properties, and Testing Frequency for Linear Low Density Polyethylene (LLDPE) Smooth and Textured Geomembranes" and GRI Test Method GM19 "Seam Strength and Related Properties of Thermally Bonded Polyolefin Geomembranes".

The membrane shall meet or exceed the requirements of Table 31 05 19.16 - 3. Geomembrane shall meet or exceed the requirements of *Table 31 05 19.16 - 4*. Equivalent test methods are subject to the approval of the ENGINEER.

Table 31 05 19.16 - 2 Resin Properties (without Carbon Black)

Properties	Test Method	Test Value
Minimum Polymer Composition (% polyethylene)	Thermal Gravimetric Analysis (TGA)	95
Geomembrane sheet density (g/cc)	D 1505 / D 792 Method B	≥0.93
Maximum Polymer Melt Index (g/10 min)	D 1238 Condition E	<1.0

2.3.2 Extrudate

Extrudate shall be the same resin as the geomembrane. The manufacturer shall provide documentation and shall certify that the extrudate meets this requirement.

2.3.3 Material Composition

The geomembrane shall consist of new, first-quality products designed and manufactured specifically for the purpose of this project, as satisfactorily demonstrated by prior use. The geomembrane shall be unmodified containing no plasticizer, fillers, chemical additives, reclaimed polymers, or extenders. Approximately 2 percent carbon black shall be added to the resin for ultraviolet resistance. The only other allowable compound elements shall be anti-oxidants and heat stabilizers, of which up to 1.5 percent total, as required for manufacturing, may be added.

2.3.4 Defects

The membrane material shall be so produced as to be free of holes, blisters, undispersed raw materials, or sign of contamination by foreign matter. Defects discovered in the field shall be repaired by cutting out the defect and welding a new piece of membrane material in its place. The weld shall be placed in accordance with the requirements for field welded seams. Seams for repairs shall be tested in accordance with the required field seam test procedures.

2.3.5 Labels

Labels on each roll shall identify the thickness, length, width, and manufacturer's mark number. The roll shall also indicate the date, lot, and batch number of the roll, the square feet in the roll, and the total roll weight as measured after manufacture. Should the total weight not meet the minimum weight based upon the minimum material density of 0.93 g/cc, the material thickness, and square footage provided, then the delivered material will be rejected for use.

2.3.6 Transportation, Handling, and Storage

Transportation, handling, and storage of the membrane shall be in accordance with written instructions from the manufacturer. These instructions shall be supplied prior to delivery of the material. In general, equipment used shall be adequate to handle the rolls of membrane without risk of damage to the material. Extreme care will be taken whenever handling the material. The rolls of membrane shall be stored on a surface free of sticks, rocks, roots, or other matter that may damage the material. Upon delivery, QC and QA personnel shall inspect each roll of material for damage. This inspection shall be recorded and included in the QA/QC reports.

2.3.7 Seams

There shall be no factory seams. Seams shall be welded in the field by factory trained technicians using a non-destructive hot-wedge fusion or extrusion process. Edges of rolled material shall be trimmed at the factory to remove non-conforming material. The first three feet of material on selected rolls shall be used for confirmation testing of the characteristics of the membrane material. Sampling and testing shall be performed by the QAO. Additional tests shall be conducted for each 5,000 square yards of material placed.

2.4 MANUFACTURER QUALITY CONTROL TESTS

2.4.1 Test Reports

Submit all test reports to the ENGINEER for review and approval.

2.4.2 Manufacturer Quality Control (MQC) Tests:

2.4.2.1 Resin

Resin shall be tested at a frequency of one test per resin batch. One batch is defined as one rail car load of resin. As a minimum perform tests for Density and Melt Index. Compliance with the Polymer Composition test requirement shall be established with a manufacturer's certificate of compliance. The finished rolls shall be identified by a roll number corresponding to the resin batch used.

2.4.2.2 Geomembrane

Geomembrane shall be tested for properties required by *Table 31 05 19.16 - 4*. The minimum test frequencies in *Table 31 05 19.16 - 4* shall be observed.

Table 31 05 19.16 - 3 Manufacturer Quality Control Testing Requirements

Properties	Test Method	Test Value	Testing Frequency (minimum)
Thickness (min. ave.) – 40 mils • lowest individual for 8 out of 10 values - % • lowest individual for any of the 10 values - %	D 5994	nom -5% (38) -10% (36) -15% (34)	per roll
Asperity Height (min. ave.) – mils	D 7466	16	Every 2nd roll[3]
Formulated Density (max.) – g/cc	D 1505 / D 792	0.939	50,000 ft²
Tensile Properties[4] • break strength – lb/in. • break elongation[5] - %	D 6693 Type IV	60 300	50,000 ft²
Puncture Resistance (min. ave.) - lb	D 4833	50	50,000 ft²
Tear Resistance (min. ave.) - lb	D 1004	22	50,000 ft²
Carbon Black Content, %	D 4218[6]	2.0 - 3.0	50,000 ft²
Carbon Black Dispersion	D 5596	[7]	50,000 ft²
Oxidative Induction Time[8] (OIT) (min. ave.) Standard OIT – min. - or – High Pressure OIT – min.	D 8117 D 5885	100 400	100,000 ft²
Oven Aging at 85°C[9] Standard OIT (min. ave.) - % retained after 90 days - or –	D 5721 D 8117	35	per formulation

[3] Alternate the measurement side for double sided textured sheet.
[4] Machine direction (MD) and cross machine direction (XMD) average values should be on the basis of 5 test specimens each direction.
[5] Break elongation is calculated using a gage length of 2.0 in. at 2.0 in. /min.
[6] Other methods such as D 1603 (tube furnace) or D 6370 (TGA) are acceptable if an appropriate correlation to D 4218 (muffle furnace) can be established.
[7] Carbon black dispersion (only near spherical agglomerates) for 10 different views: 9 in Categories 1 or 2 and 1 in Category 3
[8] The manufacturer has the option to select either one of the OIT methods listed to evaluate the antioxidant content in the geomembrane.
[9] It is also recommended to evaluate samples at 30 and 60 days to compare with the 90 day response.

High Pressure OIT (min. ave.) - % retained after 90 days	D 5885	60	
UV Resistance[10] High Pressure OIT (min. ave.) - % retained after 1600 hrs[11]	D 7238 D5885	 35	per formulation

3.0 INSTALLATION

3.1 GENERAL REQUIREMENTS

3.1.1 Superintendent

Installation shall be performed under the direction of a qualified field superintendent who shall remain on site and be in charge throughout the entire geomembrane installation (including subbase acceptance, geomembrane layout, panel placement, seaming, testing and repairs) and all other activities performed by the Geosynthetic Installer. The Geosynthetic INSTALLER'S field superintendent shall have previously installed or supervised the installation of a minimum of 10,000,000 ft^2 of the selected geomembrane.

3.1.2 Seaming Personnel

All personnel performing seaming operations shall be qualified by experience and by successfully passing trial seam tests and shall be approved by the CQA Representative prior to installing the geomembrane.

3.1.3 Master Seamer

Actual seaming shall be performed under the direction of a "Master Seamer" who may be the same person as the field superintendent, and who has seamed a minimum of 2,000,000 ft^2 of the selected geomembrane using the type of seaming apparatus as that proposed for use for this project. The Master Seamer must be on site whenever installation and/or seaming is being performed.

3.1.4 Wind

The CONTRACTOR shall provide sufficient ballast and temporary anchorage to protect the material from wind damage or displacement. The CONTRACTOR is responsible for protecting the material from damage due to weather at all times.

3.2 INSTALLATION EQUIPMENT

3.2.1 Seaming Methods

Approved processes for field seaming are extrusion welding and fusion (wedge) welding. Solvent or adhesive welding is prohibited unless approved by the ENGINEER. Proposed alternate processes shall be documented and submitted to the ENGINEER for approval PRIOR to installation. Only apparatus which have been specifically approved by make and model shall be used.

[10] The condition of the test should be 20 hr. UV cycle at 75°C followed by 4 hr. condensation at 60°C
[11] UV resistance is based on percent retained value regardless of the original HP-OIT value.

3.2.2 Welding Equipment

The Geosynthetic Installer shall provide welding equipment with gauges showing temperatures at the nozzle or barrel (extrusion welder) and at the wedge (fusion welder). The fusion-welding apparatus must be automated self-propelled devices, and shall be equipped with gauges giving the important temperatures and pressures. Equipment shall be maintained in good condition and in adequate number to avoid delaying work in the event of equipment failure or malfunction, and shall be supplied by a power source capable of providing constant voltage under a combined line load. At least one spare operable seaming apparatus of each type used shall be maintained on-site. Equipment used for seaming shall be handled so as to avoid damaging the geomembrane. The welding apparatus shall be able to produce a "double hot wedge" with void for non-destructive testing.

3.2.3 Field Tensiometer

The Geosynthetic Installer shall provide a field tensiometer for on-site peel and shear testing of geomembrane seams. The tensiometer shall be calibrated prior to arrival at the site, capable of performing testing according to ASTM D 6392, and be accompanied by evidence of current valid calibration. The tensiometer shall be motor driven and have jaws capable of traveling at a maximum measured rate of 2 inches per minute. The tensiometer shall be equipped with a gauge that measures the force exerted between the jaws in pounds and have a digital readout.

3.2.4 Punch Press

The Geosynthetic Installer shall provide a punch press for the on site preparation of specimens for testing. The press shall be capable of cutting specimens in accordance with ASTM D 6392.

3.3 PREPARATION

3.3.1 Surface Preparation

Prior to geomembrane panel deployment, the Geosynthetic Installer shall inspect the surface upon which the geomembrane will be placed. The surface shall be smooth, free of rocks, soil particles greater than 3/8-inch, protrusions, sharp objects, and deleterious material that could puncture or abrade the geomembrane. Edges of excavations and grade breaks shall be rounded to preclude sharp corners. As necessary, the surface shall be groomed by hand to bring the surface up to the desired smoothness. The surface should provide a firm, unyielding foundation to provide continuous contact between the surface and the membrane with no sudden, sharp or abrupt changes or break in grade. No standing water or excessive moisture shall be allowed.

3.3.2 Certification of Subgrade Acceptance

The CONTRACTOR shall be responsible for preparing the subgrade soil according to the Contract Documents and geomembrane manufacturer's recommendations. Prior to geomembrane installation the Geosynthetic Installer shall certify in writing that the surface upon which the geomembrane will be installed is acceptable. The Certificate of Acceptance shall be given by the Geosynthetic Installer to the CQA Representative prior to commencement of geomembrane installation in the area under consideration (an example certificate is provided in this section). Commencement of geomembrane installation by the Geosynthetic Installer shall mean acceptance and approval was accomplished.

After the subgrade soil has been accepted by the Geosynthetic Installer, it shall be the Geosynthetic Installer's responsibility to indicate to the CONTRACTOR changes in the subgrade soil condition that require repair work. The CONTRACTOR shall ensure that the subgrade soil is repaired.

3.3.3 Contractor Approval

The installation of the membrane shall be done with labor and equipment provided by the installer of the membrane material. The installer shall provide the proper extrusion or hot-wedge fusion welding equipment for the installation. Only installation methods approved by the manufacturer and the QAO shall be used.

3.3.4 Damaged Subgrade

Prior to geomembrane panel deployment, the CONTRACTOR shall repair damage to the subgrade which has occurred due to his or the Geosynthetic Installer's activities.

3.3.5 Anchor trench

Geomembrane anchor trenches shall be constructed to the lines and grades shown on the PLANS. The geomembrane in the anchor trench shall be constructed as shown on the PLANS, and backfilled as indicated with care not to damage the geomembrane. When the anchor trench will be excavated in soil susceptible to desiccation, no more than the amount of trench required for geomembrane to be anchored in one day shall be excavated. The anchor trench shall be maintained clean and dry prior to backfilling.

3.4 PANEL DEPLOYMENT

3.4.1 Identification

Each field panel shall be given a unique "identification code" (numbers or letters and numbers) consistent with the layout plan.

3.4.2 Installation Sequence

The Geosynthetic Installer shall be responsible for the final installation sequence of geomembrane panels. Geomembrane panels shall not be deployed unless they can be seamed within 8 hours of deployment or earlier.

3.4.3 Orientation

Panels shall be oriented perpendicular to the line of the slope crest. Seams parallel to or less than a 45 degree angle from any crest or toe of slope are defined as horizontal seams. Horizontal seams are prohibited on slopes greater than 10:1 (H:V) and shall be at least 5 feet from the crest or toe of slopes greater than 10:1.

3.4.4 Wrinkles

Geomembrane panels shall be unrolled using methods that will minimize wrinkles and will not damage, stretch, or crimp the geomembrane and shall protect the underlying subsurface from damage. All wrinkles higher than they are wide (across their base) shall be removed by repair methods. The CONTRACTOR and/or Geosynthetic Installer shall also remedy wrinkles which develop during subsequent placement of overlying layers.

3.4.5 Bridging

Material shall be installed to allow for temperature related shrinkage and to avoid bridging of the geomembrane.

3.4.6 Seam Layout

Panels shall be placed such that the seam layout conforms as closely as practicable to the approved panel layout drawing. No panels may be seamed in the field without the CQA Representative's approval. In addition, panels not specifically shown on the seam layout drawing may not be used without the CQA Representative's prior approval. Seams shall be identified using the identification codes shown on the panel and seam layout drawing.

3.5 FIELD SEAMS

3.5.1 Seam Strength

All field seams shall meet or exceed the requirements of *Table 31 05 19.16 - 5* for Geomembrane Seam Properties.

Table 31 05 19.16 - 4 LLDPE Geomembrane Seam Properties

Properties	Test Value[12]
Hot Wedge Seams[13]	
• shear strength, lb/in.	60
• shear elongation at break[14], %	50
• peel strength, lb/in.	50
• peel separation, %	25
Extrusion Fillet Seams	
• shear strength, lb/in.	60
• shear elongation at break[15],%	50
• peel strength, lb/in.	44
• peel separation, %	25

3.5.2 Installation Rate

Contractor shall install membrane at a rate that does not exceed his capacity for patching and testing all field welds each day. Patches and repairs shall be completed and tested (including visual, air pressure and vacuum) each day on the geomembrane material installed. Destructive test samples shall be obtained daily on the LLDPE material installed.

[12] Test Values are provided for 40mil LLDPE geomembrane. For all other material thicknesses refer to GRI-GM19a.
[13] Also for hot air and ultrasonic seaming methods.
[14] Elongation measurements should be omitted for field testing
[15] Elongation measurements should be omitted for field testing

3.5.3 Overlapping

Panels of geomembrane must have a finished overlap of a minimum of three (3) inches for extrusion welding and four (4) inches for fusion welding, but in any event, sufficient overlap shall be provided to allow peel tests to be performed on the seam.

Field seams shall have a minimum width of one (1) inch.

The procedure used to temporarily bond adjacent panels together shall not damage the geomembrane; in particular, the temperature of hot air at the nozzle of any spot welding apparatus shall be controlled such that the geomembrane is not damaged.

3.5.4 Weather Conditions for Seaming

Unless authorized in writing by the ENGINEER or CQA Representative, no seaming shall be attempted at ambient temperatures below 32°F (0°C) or above 95°F (35°C). If seaming is authorized at temperatures below 32°F (0°C), pre-heating devices shall be placed on all welding machines. Trial seams shall be prepared and tested every two to three hours. Additionally, if the air temperature drops more than 10°F from the time the trial seam(s) were produced, additional trial seams shall be performed as required by the QA Representative.

3.5.4.1 Cold Weather Seaming

Between ambient temperatures of 32°F (0°C) and 50°F (10°C), seaming may be carried out if the geomembrane is preheated by either the sun or a hot air device, and if there is not excessive cooling resulting from the wind.

3.5.4.2 Warm Weather Seaming

Above an ambient temperature of 50°F (10°C), no preheating is required.

3.5.4.3 Inclement Weather Seaming

In all cases, the geomembrane shall be dry and protected from wind damage. Seaming shall not proceed during precipitation, in the presence of excessive moisture (e.g., fog, dew), in an area of ponded water, in an area of saturated soil, in the presence of wind speeds exceeding 20 mph (32 km/hr), or in an area of free water.

3.5.5 General Seaming Procedures

Prior to seaming, the seam area shall be clean and free of moisture, dust, dirt, debris of any kind, and foreign material.

Seams shall be aligned with the fewest possible number of wrinkles and "fishmouths." Fishmouths or wrinkles at the seam overlaps shall be cut along the ridge of the wrinkle 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 six (6) inches (150 mm) beyond the cut in all directions.

As deemed necessary by the Geosynthetic Installer, CONTRACTOR, or CQA Representative, a movable protective layer shall be used below each overlap of geomembrane that is to be seamed to prevent buildup of moisture between the sheets. Upon completion of welding, the movable protective layer shall be removed entirely.

For seams which are to be extrusion welded, and as necessary for fusion welds, the seam overlap shall be grinded in accordance with the Manufacturer's instructions, within one hour of the seaming operation and in a way that does not damage the geomembrane. The grind shall not extend more than 0.25 inches past the weld and shall not be excessively deep. The composition of the extrudate used shall be identical to the membrane material.

Welding speed and pressure, preheating temperature, nozzle (die) temperature, ambient air and sheet temperatures, and extrudate bead thickness shall not deviate from the Manufacturer's recommendations or welding criteria established during start-up operations unless approved by the ENGINEER and approved and certified in writing by the Fabricator that such deviation will not result in any short or long term damage to the geomembrane.

The edge of cross seams shall be grinded to a smooth incline (top and bottom) prior to welding.

For extrudate seams, the extrusion welding device shall be purged prior to beginning a seam and until all heat-degraded extrudate has been removed from the barrel.

In locations where a firm substrate does not exist, a flat board, or a similar hard surface shall be provided directly under the seam overlap to achieve proper support.

Seaming shall extend to the outside edge of panels to be placed in anchor trenches.

3.6 PROTECTION

3.6.1 Protection of the Geomembrane

- Providing a smooth insulating plate or fabric beneath hot welding apparatus before and after usage.
- Providing additional protection over the geomembrane in heavily trafficked areas.
- Protecting the geomembrane from ultraviolet exposure. The geomembrane shall not be left exposed (uncovered) to the elements for any period longer than 30 days unless otherwise approved by the ENGINEER.
- Positioning overlaps of panels to facilitate drainage prior to seaming.
- Preventing damage to the geomembrane by scraping, scarring, scuffing, scratching, gouging, handling, trafficking, excessive heat, vibration, leakage of hydrocarbons or any other means.
- Assuring that the prepared surface underlying the geomembrane has not deteriorated or changed significantly since acceptance, and is still acceptable at the time of geomembrane placement.
- Assuring that the surfaces underlying the geomembrane are clean and free of debris.
- Preventing personnel working on the geomembrane from smoking, wearing damaging shoes, or engaging in other activities which could damage the geomembrane.

- Using methods to unroll the panels that do not cause scratches or crimps in the geomembrane and do not damage the underlying surfaces.

- Using methods to place the panels that minimize wrinkles (especially differential wrinkles between adjacent panels). Temperature changes should be considered in scheduling of panel deployment and seaming to minimize shrinkage and expansion problems.

- Adequately anchoring the geomembranes before and after deployment to prevent wind damage.

- Minimizing direct contact with geomembrane; (i.e., protecting the geomembrane with geotextiles, extra geomembrane, or other suitable materials) in areas where excessive traffic may be expected.

- Preventing all wheeled and tracked equipment from driving directly on the geomembrane. See Section 3.11 "PLACEMENT OF GEOCOMPOSITE DRAINAGE NET AND VEGETATIVE SUPPORT LAYER MATERIALS" for required minimum protective cover to allow use of equipment.

- Not allowing the geomembrane surface to be used as a work area for preparing patches, storing tools and supplies, etc.

- Ensuring that sharp objects are not left on the surface of the geomembrane.

3.7 FIELD QUALITY CONTROL TRIAL SEAMS

Trial seams shall be performed in the presence of the CQA Representative. Trial seams shall be made on scrap pieces of geomembrane under the same conditions that production seaming will be performed to verify that seaming conditions are satisfactory. Trial seams shall be made, at a minimum, at the beginning, middle, and end of each work day, and at least once every four hours or as directed by the CQA Representative for each seaming apparatus used that day. Also, each seamer shall make at least one trial seam each day. (Note extra requirements for seaming in cold weather)

The trial seam sample shall be at least three (3) feet long by one (1) foot wide (after seaming) with the seam centered lengthwise. The sample shall be marked with date, ambient temperature, and welding machine number. Four adjoining specimens, each one (1) inch (25 mm) wide, shall be cut from the trial seam sample by the Geosynthetic Installer at locations selected randomly by the CQA Representative. Two of the specimens shall be tested in peel and two tested in shear; none should fail in the seam. If a specimen fails in the seam, the entire trial seam procedure shall be repeated. If an additional specimen fails, the seaming apparatus or seamer shall not be accepted and shall not be used for seaming until the deficiencies are corrected and two (2) consecutive successful full trial seams are achieved.

3.8 FIELD NONDESTRUCTIVE SEAM TESTING

To check for seam continuity, the Geosynthetic Installer shall nondestructively test 100 percent of field seams over their entire length using a vacuum test unit, air pressure test, or other approved method. Air pressure testing is only applicable to those processes which produce a double seam with an enclosed space, and shall follow GRI GM6, Pressurized Air Channel Test for Dual Seamed Geomembranes. Tests must include visual inspection of seams. A detailed test protocol must be submitted for approval a minimum of 30 days prior to installation of the liner.

Continuity testing shall be performed as the seaming work progresses, not at the completion of all field seaming.

3.8.1 Vacuum Testing Equipment

Test equipment, including but not limited to the following shall be furnished by the Geosynthetic Installer:

- The vacuum box (1 to 3 feet long by 1 foot wide) shall have a transparent viewing window on top and a soft, closed cell neoprene gasket attached to the bottom. The housing shall be rigid and equipped with a bleed valve and vacuum gauge. A separate vacuum source shall be connected to the vacuum box. The equipment shall be capable of inducing and holding a vacuum of 5 psig (10 in of Hg vacuum). The viewing window shall be replaced if it becomes excessively scratched.
- A steel vacuum tank and pump assembly equipped with a pressure controller and pipe connections; mounted on a cushion to protect the geomembrane.
- A rubber pressure/vacuum hose with fittings and connections.
- A bucket and wide paint brush.
- A soapy solution.

3.8.2 Vacuum Test Procedure

- Energize the vacuum pump and adjust the tank vacuum to approximately 5 psig (10 in. of Hg vacuum) (35 kPa absolute).
- Apply soapy solution to wet a strip of geomembrane approximately 12 inches by 48 inches (0.3 m by 1.2 m).
- Place the box over the wetted area.
- Close the bleed valve and open the vacuum valve.
- Ensure that a leak tight seal is created by the gasket.
- For a period of not less than 10 seconds, examine the geomembrane through the viewing window for the presence of soap bubbles.
- If no bubbles appear after 10 seconds, close the vacuum valve and open the bleed valve, move the box over the next adjoining area with a minimum 3 inches (75 mm) overlap, and repeat the process.
- All areas where soap bubbles appear indicate leaks or poor seam continuity and shall be marked, repaired and retested.

3.8.3 Air Pressure Test Equipment (GRI GM-6)

- An air pump (manual or motor driven) equipped with pressure gauge capable of generating and sustaining a pressure between 25 and 30 psi (160 and 200 kPa) and mounted on a cushion to protect the geomembrane.
- A rubber hose with fittings and connections.
- A sharp hollow needle, or other approved pressure feed device.

3.8.4 Air Pressure Test Procedure

- Seal both ends of the seam to be tested (to a maximum length of 500 feet unless other approved by the ENGINEER).
- Insert needle or other approved pressure feed device into the channel created by the dual track fusion weld.
- Energize the air pump to a pressure between 25 and 30 psi (160 and 200 kPa), close valve, and sustain pressure for a minimum of 5 minutes.
- If pressure drop exceeds 2 psi (15 kPa), or does not stabilize, locate the faulty area, repair and retest.
- Remove needle or other approved pressure feed device and seal ends and needle puncture with extrudate.

3.9 FIELD DESTRUCTIVE SEAM TESTING

3.9.1 Test Location

To establish that there is adequate seam strength, destructive seam tests shall be performed at selected locations. Test locations shall be determined after seaming, at the CQA Representative's discretion, and may be prompted by suspicion of excess crystallinity, contamination, offset welds, or any other potential cause of inadequate welding. The Geosynthetic Installer shall not be informed in advance of the locations where the seam samples will be taken.

3.9.2 Test Frequency

As a minimum, one test location shall be selected per 500 feet of seam length produced by each welding machine. (This minimum frequency is to be determined as an average taken throughout the entire facility.) Seam strength testing shall be performed as the seaming work progresses, not at the completion of the seaming.

3.9.3 Test Procedure

A three foot minimum sample is taken by the Geosynthetic Installer from the seam and cut into three individual one foot samples. Individual samples go to the Installer CQC Organization, the CQA Representative and the OWNER. The Installer CQC Organization and CQA Representative each cut their respective samples into 5 shear and 5 peel (alternating adjacent) test specimens and conduct the tests in accordance with ASTM D 4437. The remaining sample is archived by the OWNER. The OWNER will be responsible for storing the archive samples.

All holes in the geomembrane resulting from destructive seam sampling shall be immediately repaired in accordance with specified repair procedures. The continuity of the new seams in the repaired area shall be tested and repaired if necessary.

3.9.4 Geosynthetic Laboratory Testing

If destructive seam testing is to be performed off-site, packaging and shipping of destructive test samples shall be conducted in a manner which will not damage the test sample. The CQA Representative shall verify that packaging and shipping conditions are acceptable. This procedure shall be fully outlined prior to construction.

Testing shall include "Shear Testing" and "Peel Testing" (ASTM Designation D 6392). The minimum acceptable values to be obtained in these tests are those indicated in *Table 31 05 19.16 - 5*. At least 5 specimens shall be tested for each test method. Specimens shall be selected alternately by test from the samples (i.e., peel, shear, peel, shear). At least 4 of the 5 specimens tested shall meet or exceed the requirements indicated in *Table 31 05 19.16 - 5*. The failed specimen must not be so significantly different in failure load (>80% of average failure load of the other four specimens) so as to be "suspect" of other problems.

The Geosynthetic Installer's laboratory test results shall be presented in writing to the CQA Representative, ENGINEER and the OWNER as required by ASTM D 6392.

3.9.5 Procedures for Destructive Test Failures

All failed seams must be bounded by two locations from which samples passing laboratory destructive tests have been taken. In cases exceeding 150 feet (50 m) of reconstructed seam, a sample taken from the zone in which the seam has been reconstructed must pass destructive testing.

The CONTRACTOR is responsible for providing quality seams. For all QA retests due to destructive failures exceeding 10% of all tests, the CONTRACTOR shall be charged to QA time and lab costs.

The following procedures shall apply whenever a sample fails a destructive test, whether that test is conducted by the CQA Representative, the Geosynthetic Installer, the CONTRACTORS independent CQC laboratory, or by field tensiometer. The Geosynthetic Installer has two options:

- The Geosynthetic Installer can reconstruct the seam between any two passing test locations;

- The Geosynthetic Installer can trace the welding path to an intermediate location (at 3 m (10 feet) minimum from the point of the failed test in each direction) and take a single specimen for an additional field test at each location. If these additional specimens pass the test, then full samples are taken. If these samples pass the tests, then the seam is reconstructed between these locations. If either sample fails, then the process is repeated, in that direction, to establish the zone in which the seam should be reconstructed.

3.10 DEFECTS AND REPAIRS

3.10.1 Identification

The entire geomembrane, including seams, shall be visually examined by the CQA Representative for identification of visual defects, holes, blisters, undispersed raw materials and signs of contamination by foreign matter. The surface of the geomembrane shall be clean at the time of examination. The geomembrane surface shall be swept or washed by the Geosynthetic Installer if dust, mud or other matter inhibits examination. All areas having defects and/or requiring repairs shall be repaired at no additional cost to the OWNER.

Work shall not proceed with any materials which will cover locations which have been repaired until the CQA Representative has re-examined the repaired area and applicable laboratory test results with passing values are available. Panels or portions or panels which, in the opinion of the CQA Representative, are damaged beyond repair shall be removed from the site and replaced.

3.10.2 Repair Procedures

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 QA Representative, Geosynthetic Installer, and ENGINEER. The procedures available include:

3.10.2.1 Patching

Patching will be used to repair large holes, tears, areas of undispersed raw materials, and contamination by foreign matter.

3.10.2.2 Grinding and Rewelding

Grinding and rewilding will be used to repair small defective sections of extruded seams less than one foot in length.

3.10.2.3 Spot Welding

Spot Welding will be used to repair small tears, pinholes, or other minor, localized flaws.

3.10.2.4 Capping

Capping will be used to repair large lengths of failed seams; (maximum allowable cap width is three feet).

3.10.2.5 Removal

Removing a bad seam and replacing with a strip of new material welded into place -- used with large lengths of fusion seams.

3.10.2.6 Other methods

Other methods approved by the ENGINEER.

3.10.2.7 Repair Provisions

In addition, the following provisions shall be satisfied:

Surfaces of the geomembrane which are to be repaired by extrusion welding shall be abraded no more than one hour prior to the repair.

- All surfaces must be clean and dry at the time of the repair.
- All seaming equipment used in repairing procedures must be approved.
- The repair procedures, materials, and techniques shall be approved in advance of the specific repair by the CQA Representative.
- Patches or caps shall extend at least six (6) inches (150 mm) beyond the edge of the defect, and all corners of the patches shall be rounded with a radius of at least three (3) inches (75 mm).
- The geomembrane below large caps should be appropriately cut or removed to avoid water or gas collection between the two sheets.

3.10.3 Labeling

Repaired field defects, patches, reworked seams, repaired fishmouths and other non-standard field seams shall have the following information marked on the liner with a marker suitable for the purpose:

- Initials of Welder
- Date of Weld
- Initials of QC Technician
- Date of QC Test
- Indication of Pass/Fail

3.10.4 Verification of Repairs

Each repair shall be nondestructively tested. Repairs which pass the non-destructive test shall be taken as an indication of an adequate repair. At the discretion of the QA Representative, large repairs may require destructive test sampling. In the case of failed tests, the repair shall be redone and retested until a passing test result is obtained. The CQA Representative shall observe all non-destructive testing of repairs and shall record the identification of each repair, date, technician, and test outcome. The liner may not be covered until defects, patches, etc. have been properly tested, logged, and marked.

3.10.5 Wrinkles

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 Representative shall indicate which wrinkles shall be cut and reseamed by the Geosynthetic Installer. The seam thus produced shall be tested like any other seam. Wrinkle size shall be evaluated during the time of day and under conditions similar to those expected when overlying protective cover/drainage layer material is to be placed. All wrinkles higher than they are wide (across their base) shall be removed by repair methods.

3.10.6 Bridging

The geomembrane shall be continuously supported on the accepted subgrade. Bridging (unsupported geomembrane) is not permissible. Geosynthetic Installer shall take necessary steps to prevent bridging and repair or replace any geomembrane so affected.

3.11 PLACEMENT OF GEOCOMPOSITE DRAINAGE NET AND VEGETATIVE COVER LAYER MATERIALS

3.11.1 Weather Conditions

Placement of the geocomposite drainage net and overlying vegetative cover layer soils on the geomembrane shall not proceed at an ambient temperature below 40°F (5°C) nor above 95°F (35°C) unless otherwise approved by the CQA Representative.

3.11.2 Material Exposure

The geomembrane shall not be left exposed (uncovered) to the elements including UV light, for any period more than thirty (30) days.

3.11.3 Soils

All soils installed in direct contact with the geomembrane shall have a maximum particle size of 3/8 inches.

3.11.4 Equipment

All protective cover/drainage layer materials placed over geomembrane (and other geosynthetics) shall be installed without damaging the geosynthetics. Equipment used for placing soil shall not be driven directly on the geomembrane. A minimum thickness of one (1) foot of soil is required between a light dozer (such as a low ground pressure Caterpillar D-3 or lighter) and the geomembrane. Placement of material overlying the geosynthetics shall be in conformance with the guidelines for equipment ground pressure in

Table 31 05 19.16 - 5 Soil Thickness for Equipment Operating over Geomembrane

Equipment Ground Pressure (psi)	Minimum Soil Thickness (inches)
<4	12
4-6	15
6-8	18
8-11	24

3.11.5 Heavily Trafficked Areas

In heavily trafficked areas such as access ramps, soil cover thickness shall be at least three (3) feet.

3.12 DOCUMENTATION OF CONSTRUCTION

3.12.1 Report

- Upon project completion, the CQA Representative shall prepare a Construction Certification/Documentation Report. This report will document that the work was accomplished according to the Construction Contract Documents, and summarize quality control and quality assurance tests and inspection. If appropriate, supplementary information such as modifications approved by the ENGINEER shall be included to justify deviations from the original contract documents. Justification for all such deviations must be fully documented in the Report. At a minimum, the report shall contain the following information:

- Identification of parties and their roles and responsibilities with signatures of key personnel and an officer of their employer's company.

- Scope of work.

- Summary of the project construction activities.

- Construction Quality Assurance methodology.

- Test and inspection results.

  – Results of prequalification testing (including extrudate);

  – The results of all non-destructive seam tests.

  – Subgrade acceptance forms.

- Construction Quality Assurance certification statement, sealed and signed by a licensed professional ENGINEER.

- Geomembrane record drawings.

- Panel and seam layout record drawing.

- Sample location drawing.

- Sample tags with duplicates.

- Inventory of amount of material used versus amount delivered to the site.

- CQA and CQC records regarding panel deployment, seaming, and repairs.

  – The Geosynthetic Installer shall provide necessary signatures, test results, record drawings, and inspection results as described by aforementioned Part 3.12

- The results of the test and monitoring reports shall be turned over to the ENGINEER for review on a daily basis. Reports shall be complete within 24 hours of the installation of

the panel, seam, repair, etc. Test results and corrections shall be completed prior to placement of cover material.

3.13 LANDFILL GAS CONTROL DURING INSTALLATION

The CONTRACTOR shall be responsible for temporary control and extraction of landfill gas during installation of the geomembrane to avoid formation of "bubbles" underneath the geomembrane.

3.14 SANDBAGS

Liner shall be adequately weighted down with sand bags to limit wind uplift. Unless otherwise noted, sandbags shall remain the property of the Owner upon completion.

3.15 PAYMENT

Payment by the Owner for installation of the membrane shall not be made until testing is completed and the test results reviewed and approved.

3.16 CERTIFICATE

CERTIFICATE OF ACCEPTANCE OF SOIL SUBGRADE BY GEOSYNTHETIC INSTALLER	
INSTRUCTIONS: This part of the certificate should be completed by the CONTRACTOR.	
Contractor	Project
Name:	Location:
Address:	Project:
Location of Soil Subgrade Surface to be Utilized (Include Sketch, if Needed):	
Contractor Authorized Representative:	
Name:	
Title:	
Signature/Date:	
INSTRUCTIONS: This part of the certificate should be completed by the Geomembrane Geosynthetic Installer.	
I the undersigned, duly authorized representative of:	
	(Geomembrane Installation Company)
Do hereby accept the soil subgrade (soil supporting the geomembrane) and shall be responsible for its integrity and suitability, in accordance with the specifications from this date to completion of the installation.	
Geosynthetic Installer Authorized Representative:	
Name:	
Title:	
Signature/Date:	

END OF SECTION 31 05 19.16

SECTION 31 05 19.26

GEONET/GEOTEXTILE COMPOSITE DRAINAGE MEDIUM

1.0 GENERAL

1.1 SUMMARY

The work covered in this Section includes the manufacture, fabrication, testing, supply and installation of the Geocomposite Drainage Net. The CONTRACTOR shall furnish all labor, materials, transportation, handling, storage, supervision, tools, incidentals and other equipment that may be necessary install and test the Geocomposite Drain as specified by the Contract Documents. All testing specified in this section is quality control (QC) testing and is the CONTRACTOR's responsibility unless otherwise noted.

1.2 REFERENCES

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) STANDARD TEST METHODS/PRACTICE:

ASTM D 792	Test Methods for Density and Specific Gravity of Plastics by Displacement
ASTM D 1505	Density of Plastics by the Density-Gradient Technique
ASTM D 1603	Carbon Black in Olefin Plastics
ASTM D 4218	Test Method for Determination of Carbon Black Content in Polyethylene Compounds by the Muffle-Furnace Technique
ASTM D 4354	Practice for Sampling of Geosynthetics and Rolled Erosion Control (RECPs)
ASTM D 4355	Test Method for Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus)
ASTM D 4491	Water Permeability of Geotextiles by Permittivity
ASTM D 4533	Trapezoid Tearing Strength of Geotextiles
ASTM D 4632	Grab Breaking Load and Elongation of Geotextiles
ASTM D 4716	Constant Head Hydraulic Transmissivity (In-Plane Flow) of Geotextiles and Geotextile Related Products
ASTM D 4751	Determining the Apparent Opening Size of a Geotextile
ASTM D 4873	Guide for Identification, Storage and Handling of Geosynthetic Rolls and Samples
ASTM D 5035	Test Method for Breaking Force and Elongation of Textile Fabrics (Strip Method)

ASTM D 5199	Measuring Nominal Thickness of Geotextiles and Geomembranes
ASTM D 5261	Measuring Mass per Unit Area of Geotextiles
ASTM D 5321	Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by the Direct Shear Method
ASTM D 6241	Standard Test Method for Static Puncture Strengths of Geotextiles and Geotextile-Related Products Using a 50-mm Probe
ASTM D 6364	Standard Test Method for Determining Short-Term Compression Behavior of Geosynthetics
ASTM D 7005	Test Method for Determining the Bond Strength (Ply Adhesion) of Geocomposite
ASTM D 7179	Standard Test Method for Determining Geonet Breaking Force
ASTM D 7238	Standard Test Method for Effect of Exposure of Unreinforced Polyolefin Geomembranes Using Fluorescent UV Condensation Apparatus

1.3 SUBMITTALS

1.3.1 Product Information

The CONTRACTOR or Geocomposite Drainage Net Installer shall submit the following product information to the ENGINEER for approval at least 30 days (unless otherwise specified) prior to procurement of the product:

1.3.1.1 Prequalification

Independent laboratory test results demonstrating compliance with the material properties listed in Table 31 05 19.26 - 3; Table 31 05 19.26 - 4; and Table 31 05 19.26 - 5. The independent laboratory tests are to be performed once for each material. In addition, the manufacturer must provide a certificate of compliance which states that the material to be installed will use the same manufacturing techniques, resin type, and formulation as that for which test results are submitted.

1.3.1.2 Roll Layout Drawings

As a minimum, include a roll layout drawing and installation details. The roll layout drawing shall be drawn to scale, and shall be coordinated with the geomembrane panel layout. Installation details shall include cross sections of toe drains, temporary anchorage, key trench and other terminations, and pipe penetrations.

1.3.1.3 Protection from Wind and Weather

Submit plans to protect the Geocomposite Drainage Net from wind, dirt, and direct sunlight.

1.3.1.4 Material Data

Complete manufacturer's specifications, descriptive drawings, and literature for the geocomposite, including the product identification and suppliers of the polymer resin and recommended methods

for handling and storage of all materials prior to installation. Describe the manufacturer's methodology to comply with the requirements specified for manufacturing quality control.

1.3.1.5 Manufacturing Quality Control (MQC)

Complete description of the manufacturer's formal quality control/quality assurance programs for manufacturing, fabricating, handling, installing, and testing. The description shall include, but not be limited to, polymer resin supplier and product identification, acceptance testing, production testing, installation inspection, installation techniques, repairs, and acceptance. The document shall include a complete description of methods for both roll end and roll side joining.

1.3.1.6 Installation Instructions

Samples of the Geocomposite Drain with a complete set of specifications, and manufacturer's complete written instructions for storage, handling, installation, and joining.

1.3.1.7 Qualifications

Manufacturer's qualifications for the Geocomposite Drainage Net, geotextile, and geocomposite.

1.3.1.8 Resin

The name of the resin supplier, the production plant, the brand name, and name of resin used to manufacture the product.

1.3.1.9 Factory Visit

Upon request, arrange with the geocomposite manufacturer to allow the OWNER or representative to visit to the manufacturing plant during the manufacture of material for this project, for the purpose of observing the manufacturing process and quality control procedures. Submit contact names, telephone numbers, addressed, and production schedule information.

1.3.1.10 Compatibility

Suppliers and/or manufacturers shall certify that geonet and geotextile are compatible with one another when bonded into the Geocomposite Drainage Net.

1.3.2 Manufacturing Quality Control

The CONTRACTOR shall submit quality control test reports within 48 hours of completion of tests. Submit the following manufacturing quality control information to the ENGINEER prior to material shipment:

1.3.2.1 Production Dates

Submit statement of production dates for the Geocomposite Drainage Net.

1.3.2.2 Test Reports

See Part 2 for tests and test frequencies.

1.3.3 Proof of INSTALLER'S Qualifications

The name or names of the field superintendents who will be proposed for the project and a list of completed facilities for which the field superintendent has installed geocomposite drainage net totaling a minimum of 2,000,000 ft^2.

2.0 PRODUCTS

2.1 MANUFACTURER'S QUALIFICATIONS

Manufacturer shall have manufactured a minimum of 5,000,000 ft^2 of Geocomposite Drainage Net. The manufacturer of the drainage material described hereunder shall have previously demonstrated his ability to produce this geonet by having successfully manufactured similar material for hydraulic conductance installations.

2.1.1 Single Source

All HDPE drainage net used for construction of the Geocomposite Drainage Net must be obtained from a single material supplier or manufacturer. All nonwoven geotextile fused to the geonet and used for the construction must be obtained from a single material supplier. All fusion of HDPE drainage net to non-woven geotextile must be accomplished by a single material supplier or manufacturer. Suppliers and/or manufacturers shall certify that the geonet and geotextile will be compatible with one another.

2.2 HDPE DRAINAGE NET

The HDPE drainage net component of the Geocomposite Drainage Net shall be manufactured by extruding strands of material into a counter-rotating die to form a three dimensional structure to provide planar water flow.

2.2.1 Material Properties

HDPE drainage net shall meet the requirements of Table 31 05 19.26 - 3.

2.2.2 Material Composition

The HDPE drainage net shall consist of new, first-quality products designed and manufactured specifically for the intended purpose designated in this contract, as satisfactorily demonstrated by prior use. The drainage net shall contain stabilizers to prevent ultraviolet light degradation. The HDPE shall be unmodified HDPE containing no plasticizer, fillers, chemical additives, reclaimed polymers, or extenders. Carbon black shall be added to the resin for ultraviolet resistance. The only other allowable compound elements shall be anti-oxidants and heat stabilizers, of which up to one (1) percent total, as required for manufacturing, may be added.

2.2.3 Defects

The net strands shall be so produced as to be free of holes, blisters, undispersed raw materials, or sign of contamination by foreign matter. Defects discovered in the field shall be repaired by cutting out the defect and joining a new piece of net material in its place. The joint shall be placed in accordance with the requirements for field joints.

2.2.4 Labels

Labels on each roll shall identify the thickness, length, width, and manufacturer's mark number. The roll shall also indicate the date, lot and batch number of the roll, the square feet in the roll, and the total roll weight as measured after manufacture.

2.2.5 Joints

Joints shall be made in the field by factory-trained technicians using approved methods. Edges of rolled material shall be trimmed at the factory to remove nonconforming material.

2.2.6 Warranty

The net material shall meet the specification values according to the specification sheet for HDPE geonet. It shall have a warranty of a minimum 20 years relative to materials, and 1 year on installation.

2.3 GEOTEXTILE

2.3.1 General

Geotextile shall be of the type specified on the drawings or an approved equal. Manufacturer shall submit a certificate to the Engineer stating the name of the manufacturer, the chemical composition of the filaments or yarns, and other pertinent information so as to fully describe the geotextiles. At a minimum the other pertinent data shall include Grab Strength, Elongation, Puncture Strength, and Apparent Opening Size.

2.3.2 Material Properties

The geotextile component of the composite geonet shall meet the requirements of Table 31 05 19.26 - 4.

2.4 GEOCOMPOSITE DRAINAGE NET

The material shall meet the requirements of Table 31 05 19.26 - 5. It is comprised of three layers: a lower geotextile, a middle HDPE drainage net, and an upper geotextile. The lower and upper geotextiles shall be heat bonded to the middle HDPE drainage net.

2.4.1 Manufacture

The Geocomposite Drainage Net shall be fabricated by heat bonding the geotextile to both sides of the HDPE drainage net. Heat bonding shall prevent flattening of filter fabric and surface. Glues and adhesives shall not be permitted to bond materials. No burn through of geotextiles will be permitted. No glue or adhesive shall be permitted. The bond between the geotextile and the HDPE drainage net shall meet the requirements of Table 31 05 19.26 - 5.

2.4.2 Labels

Geocomposite Drainage Net shall be supplied in rolls, marked or tagged with the following information:

- Manufacturer's name

- Product identification
- Lot number
- Roll number
- Roll dimensions

2.4.3 Certification

Contractor shall provide the manufacturer's certificate prior to delivery of the material. The manufacturer shall certify in writing that the material supplied meets the minimum specifications. The certificate shall be signed by a person with authority to bind the manufacturer and shall be notarized.

2.4.4 Roll Dimensions

The HDPE drainage net shall be supplied as a continuous sheet with no factory seams. During installation, the roll length shall be maximized to provide the largest manageable roll for the fewest field seams. Rolls shall be wound on a core which shall be stable enough to support the rolls during handling and shipping.

2.5 MANUFACTURING QUALITY CONTROL TESTING

All of the specified tests are the CONTRACTOR's responsibility. Testing during manufacturing shall be accomplished by the manufacturer's laboratory.

HDPE resin shall be tested at a frequency of one test per resin batch for compliance with Table 31 05 19.26 - 2, HDPE Drainage Net Properties. One batch is defined as one rail car load of resin. The finished rolls of the drainage net shall be identified by a roll number corresponding to the resin batch used. The following minimum test frequencies shall be observed:

Table 31 05 19.26 - 1 HDPE Drainage Net Resin Properties

Properties	Test Method	Test Value	Testing Frequency (minimum)
Minimum Polymer Density, g/cm^3	D 1505 / D 792 Method B	0.950	per batch
Maximum Polymer Melt Index, g/10 max	D 1238, Condition E	1.0	per batch

HDPE drainage net shall be tested during manufacturing for compliance with Table 31 05 19.26 - 3. The minimum test frequencies in Table 31 05 19.26 - 3 shall be observed.

Table 31 05 19.26 - 2 HDPE Drainage Net Properties (before lamination)

Properties	Test Method	Test Value	Testing Frequency (minimum)
Thickness, mils (min. ave.)	D 5199	270	50,000 ft^2

Properties	Test Method	Test Value	Testing Frequency (minimum)
Density[1], g/cc (min. ave.)	D 1505 / D 792 Method B	0.94	20,000 ft^2
Carbon Black Content, % (range)	D 1603 / D 4218	2 to 3.5	40,000 ft^2
Tensile Strength[2], lb. (min. ave.)	D 7179	60	50,000 ft^2
Compressive Strength[3], lb/in.^{2} (min. ave.)	D 6364	120	100,000 ft^2

Geotextile shall be tested during manufacturing for the compliance with Table 31 05 19.26 - 4. The minimum test frequencies in Table 31 05 19.26 - 4 shall be observed.

Table 31 05 19.26 - 3 Geotextile Properties (before lamination)

Properties	Test Method	Test Value	Testing Frequency (minimum)
Mass/Unit Area, oz/sy (MARV)	D 5261	8	200,000 ft^2
Grab Strength, lb. (MARV)	D 4632	210	200,000 ft^2
Grab Elongation, % (MARV)	D 4632	50	200,000 ft^2
Tear Stength, lb. (MARV)	D 4533	80	200,000 ft^2
Puncture Strength, lb. (MARV)	D 6241	430	200,000 ft^2
Permittivity, sec^{-1} (MARV)	D 4491	0.2	200,000 ft^2
AOS, mm (MaxARV)	D 4751	0.30	200,000 ft^2
UV Stability, % ret. (500 hr.)	D 4355	70	200,000 ft^2

Geocomposite Drainage Net shall be tested during manufacturing for compliance with Table 31 05 19.26 - 5. The minimum test frequencies in Table 31 05 19.26 - 5 shall be observed:

Table 31 05 19.26 - 4 Geocomposite Properties

Properties	Test Method	Test Value	Testing Frequency (minimum)
Transmissivity[4], m^2/sec (min.-ave.)	D 4716	4.5 x 10^{-4}	200,000 ft^2
Ply Adhesion[5], lb./in. (min. ave.)	D 7005	1	90,000 ft^2

[1] Density is of the formulated material; the base resin will be slightly lower.
[2] This is the average peak value for five equally spaced machine direction tests across the roll width.
[3] Test to be conducted using Section 6.3, the movable plate method.
[4] Geocomposite drainage net should be tested using flexible boundaries at a hydraulic gradient of 1.0; a pressure of 10,000 lb./ft^2 , and a seating dwell time of 15 min.. Test values are for machine direction only.
[5] This is the average of five equally spaced machine direction tests across the roll width per side of the geocomposite.

The CONTRACTOR shall inspect every roll for bonding integrity between the HDPE drainage net and the geotextile. All poorly bonded and/or delaminated material shall be rejected.

2.6 SHOP DRAWINGS SUBMITALS

2.6.1 Material Properties

In order to qualify as an approved drainage material, the Contractor shall submit material samples, minimum specifications and warranty to the Engineer. The specification sheet shall give full details of minimum physical properties and test methods used, joining methods, and a certificate confirming compliance of the material with the minimum specifications. A list of similar projects completed in which the manufactured material has been successfully used shall be submitted to the Engineer.

2.6.2 Physical Requirements

The Contractor shall submit a certification from the manufacturer of the geonet, stating that the geonet meets physical property requirements for the intended application, and that the geonet meets the physical requirements for the manufacture and installation of HDPE landfill drainage media.

2.6.3 Minimum Specifications

At the time of delivery, the manufacturer shall certify in writing that the material supplied meets the minimum specifications. The certificate shall be signed by a person with authority to bind the manufacturer and shall be notarized.

2.6.4 Resin

The manufacturer shall submit results of confirmation testing showing that the material lot of the resin used in the geonet supplied meets the material requirements for the resin. A description of the quality control steps used during manufacture shall also be provided.

2.7 INSTRUCTIONS AND DRAWINGS REQUIRED AFTER CONTRACT AWARD

2.7.1 Storage, Handling, Installation, and Joining

The Contractor shall furnish complete written instructions for the storage, handling, installation, and joining of the net in compliance with this specification and the condition of his warranty.

2.7.2 Repair

The manufacturer shall furnish complete written instructions for the repair of HDPE geonet material.

2.7.3 Layouts

The manufacturer or his designated representative shall furnish layouts and details as required for the net installation. Details of placement around net penetrations such as pipes shall be provided as well. The above details must be approved by the CQA Engineer prior to net installation. Material left outside shall be covered to reduce accumulation of dust in the net and to protect it from ultraviolet light.

3.0 INSTALLATION

3.1 STORAGE

3.1.1 Storage Area

Storage of the rolls shall be the responsibility of the installer. A dedicated storage area shall be selected at the job site that is away from high traffic areas and is level, dry, and well drained. The Owner shall approve the storage area.

3.1.2 Stability

Rolls shall be stored in a manner that prevents sliding or rolling from the stacks and may be accomplished by the use of chock blocks or by use of the dunnage shipped between rolls. Rolls shall be stacked at a height no higher than that at which the lifting apparatus can be safely handled (typically no higher than four).

3.1.3 Protection

Stored materials must be off of the ground and be covered with a plastic sheet or tarpaulin until their installation.

3.1.4 Labels

The integrity and legibility of the labels shall be preserved during storage.

3.2 FIELD QUALITY CONTROL

3.2.1 Field Joining

The CONTRACTOR shall inspect all roll end joints and roll edges. The results of these inspections shall be documented in the daily reports. Field joints shall comply with the requirements of Table 31 05 19.26 - 6.

Table 31 05 19.26 - 5 Geocomposite Drainage Net Joining Methods

Location	Layer	Joining Method	Minimum Overlap	Tying Frequency
Roll End	Upper Geotextile Geonet Lower Geotextile	Machine Sewing Nylon Ties Overlap	4” 12” 6”	N/A 2’ on Center N/A
Roll Side	Upper Geotextile Geonet Lower Geotextile	Machine Sewing Nylon Ties Overlap	4” 4” 6”	N/A 5’ on Center N/A
Repair of Minor Damage[6]	Upper Geotextile Geonet	Machine Sewing N/A	4” N/A	N/A N/A

[6] Minor damage is defined in paragraph 123.5.2

3.2.2 Quality Control Reporting Procedures

All information regarding the installation of the Geocomposite Drainage Net shall be recorded in the CONTRACTOR's daily report. This information shall include:

- Reference to product submittals, certifications, substitutions and approvals;
- Dates of installation;
- Location and quantity of materials installed;
- Statement whether materials were installed in accordance with the Technical Specifications;
- All product certifications, filed appropriately for future reference; and
- Additional information as required.

3.3 CLEANLINESS

Both Geocomposite Drainage Net and the underlying Geomembrane shall be clean, dry, and free of dirt and dust during installation. If dirt, dust, or water is present, the CONTRACTOR shall clean the work area. Geocomposite Drainage Net which is wet, dirty or muddy shall be discarded and shall not be installed.

3.4 ROLL JOINING METHODS

Table 31 05 19.26 - 6 summarizes acceptable roll joining methods.

3.4.1 Lap Seams

The bottom layer of geotextile shall be lap seamed. Lap seaming is accomplished by overlapping adjacent geotextile a minimum of 6 inches.

3.4.2 Nylon Ties

The GDN material shall be overlapped and fastened with nylon ties. Nylon ties shall be yellow or white in color to facilitate inspection.

3.4.3 Machine Sewn Seams

Sewing shall be accomplished with a chain-stitching sewing machine. The thread shall be polymeric thread which complies with geotextile manufacturer's recommendations and is a color which contrasts with the color of the geotextile. The seam shall be placed a minimum of 4 inches from the geotextile edges. The finished seam shall be folded to one side ("J" seam) and be secured with a double row of stitches. There shall be no horizontal seams except at roll ends on slopes greater than 5 (horizontal) to 1 (vertical).

3.4.4 Roll Ends

At roll ends the material shall be overlapped a minimum of 1 foot. Roll ends shall be shingled; the uphill roll end shall be overlapped one foot over the downhill roll end. At roll ends, the drainage net

shall be tied every 2 feet (on centers) at a minimum. The bottom layer of geotextile shall be overlapped a minimum of six (6) inches. The upper layer of geotextile shall be machine sewn.

3.4.5 Adjacent Roll Sides

At roll sides the material shall be overlapped a minimum of 4 inches. The bottom geotextile shall be lap seamed. The HDPE drainage net shall be overlapped and tied a minimum of 5 feet on center. The upper layer of geotextile shall be machine sewn.

3.5 INSTALLATION

The Geocomposite Drainage Net shall be installed in accordance with the manufacturer's recommendations and as specified herein. In case of a conflict between requirements, the more stringent shall apply.

3.5.1 Methods

The installation of the HDPE geonet shall be done with labor and equipment provided by an approved Contractor. The manufacturer shall provide the proper cutting equipment for the installation. Only installation methods approved by the manufacturer and the Engineer in accordance with this specification shall be used.

3.5.2 Instructions

The composite drainage layer shall be installed in accordance with manufacturer's instructions.

3.5.3 Cleanliness

The composite drainage layer shall be free of dirt and dust when installed. If dirt or dust is present, the Contractor shall wash the geonet until clean as directed by the QAO.

3.5.4 Grading

Composite drainage layers shall be unrolled and installed to the lines and grades shown on the Drawings.

3.5.5 Anchoring

Composite drainage layer shall be anchored at the top of slopes in an anchor trench as shown on the drawings. Care shall be taken not to entrap small stones, from the anchor trench excavation, in the net channels.

3.5.6 Wrinkles

After being secured in the anchor trench, the drainage layer shall be stretched to minimize wrinkle formation.

3.5.7 Orientation

Geocomposite Drainage Net shall be rolled down the slope in such a manner as to continually keep the material in tension. If necessary, the material shall be positioned by hand after unrolling to minimize wrinkles. The material shall not be unrolled horizontally (i.e., across the slope).

3.5.8 Wind

The CONTRACTOR shall provide sufficient ballast and temporary anchorage to protect the material from wind damage or displacement. The CONTRACTOR is responsible for protecting the material from damage due to weather at all times.

3.5.9 Physical Damage

3.5.9.1 Personnel Traffic

Personnel walking on the material shall not engage in activities or wear footwear that could damage the material. Smoking shall not be permitted on or near the geosynthetics.

3.5.9.2 Vehicular Traffic

Vehicular traffic shall not be permitted on the geosynthetics. Equipment shall not damage the material by handling, trafficking, or leakage of hydrocarbons. The surface shall not be used as a work area for preparing patches, storing tools and supplies, or other uses.

3.5.10 Bridging

The material shall be installed to avoid bridging.

3.5.11 Corners

In corners, where overlaps between rolls are staggered, an extra roll shall be installed from the top to the bottom of the slope to provide a smooth, protected surface.

3.5.12 Weather Protection

Geocomposite Drainage Net shall be protected from direct sunlight or precipitation prior to installation. After installation this material shall have minimal exposure to direct sunlight and shall be completely protected from direct sunlight within 30 days of installation. Material which is exposed to direct sunlight for 30 days or more shall be replaced at the CONTRACTOR's expense.

It is the CONTRACTOR's responsibility to provide all labor and materials for protection of the Geocomposite Drain during the period of time prior to installation of overlying materials. The CONTRACTOR's protection method is subject to the approval of the ENGINEER.

3.6 REPAIRS

3.6.1 Limitations

Damaged, soiled, or delaminated Geocomposite Drainage Net shall be removed and discarded.

3.6.2 Minor Damage

Minor damage is defined as a defect or hole in the material that is smaller than 2 inches in its lesser dimension. Minor damage may be repaired by snipping out any protruding drainage net and machine sewing a geotextile patch over the hole. The patch shall be a minimum of 24 inches larger that the damaged area in all directions.

3.6.3 Major Damage

Major damage is defined as a defect or hole in the material that is 2 inches or larger in its lesser dimension. Major damage shall be repaired by replacing the entire Geocomposite Drain panel width. Geotextile fabric shall be continuously sewn on large repairs.

3.7 FIELD DAMAGE

3.7.1 Protection

The Contractor shall take every precaution to protect the net from damage due to natural and field conditions. As the panels are placed, they shall be secured to limit excessive movement.

3.7.2 Wind Damage

Panels moved by the wind shall be inspected and, if damaged, shall be replaced or repaired as required in the judgment of the QAO. Similarly, panels that have developed excessive wrinkles, particularly at the toe of slopes shall be inspected and repaired or replaced as necessary.

3.8 PLACEMENT OF COVER MATERIAL

3.8.1 Protection

Cover material such as soil, stone, or geomembrane liners that is placed over geonets shall be placed in such a manner as to verify that the geonet is not damaged.

3.8.2 Slippage

Care shall be taken to minimize slippage of the geonet and to verify that no tensile stress is induced in the geonet.

3.9 RECORDS AND QUALITY ASSURANCE

3.9.1 Records

The installation of the geocomposite shall be monitored by QAO provided by the Owner. The purpose of the third-party monitoring shall be to document the installation of the geonet. The following records shall be kept by the installer as part of the installation process:

- Panel Placement Checklist
- Repair and Patching Checklist

3.9.2 Documentation of Defects

The geocomposite may not be covered until defects, patched, etc. have been properly logged.

3.9.3 Report Submission

The reports shall be turned over to the QAO for review on a daily basis. Reports shall be complete within 24 hours of the installation of the panel, joint, repair, etc.

3.9.4 Warranty

The manufacturer/installer shall provide a written warranty for materials for a period of no less than 10 years. A written warranty for 1 year shall also be provided for quality of workmanship.

END OF SECTION 31 05 19.26

SECTION 31 23 33

TRENCHING, BACKFILLING, AND COMPACTING

1.0 GENERAL

1.1 DESCRIPTION

The work in this section includes all labor, materials, equipment and incidentals required to perform all trenching filling, backfilling, compaction, grading, stockpiling, and disposing of earth and waste materials required for the purpose of erosion control, site grading, constructing access roads, diversion berms, drainage pipe trenches and bedding, storm drainage structures, sediment basins and related structures, landfill gas system and appurtenances as shown on the PLANS, specified herein and General Conditions.

1.2 REQUIREMENT INCLUDED

Provide personnel, equipment, and materials to excavate and backfill trenches for all underground pipelines and related structures only.

1.3 REFERENCE SPECIFICATIONS

Reference specifications applicable to work under this section are referred to by abbreviation as follows:

1.3.1 American Society for Testing and Materials (ASTM)

- ASTM E 11 Wire Cloth Sieves for Testing Purposes
- ASTM C 88 Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
- ASTM C 131 Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
- ASTM D 75 Sampling Aggregates
- ASTM D 698 Laboratory Compaction Characteristics Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))
- ASTM D 1556 Density and Unit Weight of Soil in Place by the Sand Cone Method
- ASTM D 2434 Permeability of Granular Soils (Constant Head)
- ASTM D 2487 Classification of Soils for Engineering Purposes

- ASTM D 3740 Standard Practice for Evaluation of Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
- ASTM D 5084 Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter
- ASTM D 6913 Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis
- ASTM D 6938 Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
- ASTM D7928 Standard Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis
- ASTM E 329 Standard Practice for Use in Evaluation of Testing and Inspection Agencies as Used in Construction

1.4 GENERAL NOTES

1.4.1 OSHA

The CONTRACTOR shall perform 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.

1.4.2 DOLI

The CONTRACTOR shall perform all construction operations in accordance with the "Rules and Regulations Governing the Safety and Health of Employees Engaged in Construction" as adopted by the Safety and Health Codes Commission of the Commonwealth of Virginia and all latest revisions thereto and issued by the Department of Labor and Industry.

1.4.3 Explosives

Use of explosives is not permitted unless authorized in writing by the Engineer. Store and use explosives in accordance with Federal, State and local regulations. The CONTRACTOR shall be responsible for and shall satisfactorily correct all damage resulting from use of explosives.

1.4.4 Existing Structures

Protect structures, roadways, utilities, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by trenching operations.

1.4.5 Subsurface Materials

All excavation is unclassified and no additional payment will be allowed regardless of materials encountered.

1.4.6 Owners Operations

The CONTRACTOR recognizes that this construction is adjacent to an existing municipal solid waste landfill. As such, there is the potential for methane gas and other gases to migrate from the landfill and concentrates in confined spaces such as trenches. The CONTRACTOR shall take all appropriate precautions and measures to protect his workforce from the dangers of this environment.

1.5 DEFINITIONS

1.5.1 General Fill Material

Soil materials obtained from on-site and off-site borrow sources having unspecified soil classification suitable for filling, backfilling, and grading within designated locations.

1.5.2 Select Backfill Material

Granular commercial sources having specified characteristics and designated or reserved for use for specified purposes.

1.5.3 Soil Barrier Layer Material

Soil materials obtained from on-site and off-site borrow sources having specified soil classification and a maximum hydraulic conductivity of $1x10^{-5}$ cm/sec, suitable for use as the hydraulic barrier component for landfill cap system.

1.5.4 Low Permeability Soil Material

Soil materials obtained from on-site and off-site borrow sources having specified soil classification and/or maximum hydraulic conductivity requirements suitable for use as core and cut-off trenches of basin embankments, soil liners, stormwater diversion berms, and other uses at designated locations.

1.5.5 Topsoil

A fertile, natural or amended soil, typical of locality, free from large stones, roots, sticks, clay, weeds, and sod, and suitable for use as a growing medium for vegetation.

1.5.6 Maximum Dry Density

Maximum Dry Density: Maximum dry weight in pounds per cubic foot (pcf) of a specific soil material as determined by ASTM D 698 (Standard Proctor).

1.5.7 Optimum Moisture Content

The moisture content at which the maximum dry density of a soil material is determined by ASTM D 698 (Standard Proctor).

1.6 QUALITY CONTROL

1.6.1 Qualifications

1.6.1.1

Products used in the work of this section shall be produced by those who are regularly engaged in the production and/or supply of similar items for at least five (5) years and which have a history of successful production, acceptable to the Engineer.

1.6.1.2

Use adequate number of skilled workmen who are thoroughly trained and experienced in the specified requirements and the methods needed for proper performance of the work in this Section.

1.7 SUBMITTALS

1.7.1 Compaction Equipment

The CONTRACTOR shall supply data on the compaction equipment to the ENGINEER not less than five (5) days prior to the intended use of this equipment and the equipment shall be approved by the ENGINEER prior to commencing compaction operations. The approval of the ENGINEER shall be construed merely to mean that at the time the ENGINEER knows of no good reason for objecting thereto; and no such approval shall release the CONTRACTOR from his full responsibility for the accurate and complete performance of the Work in accordance with the Contract Documents.

1.7.2 Materials

Refer to individual specification sections for material requirements.

1.7.3 Shop Drawings

Refer to individual specification sections for shop drawings requirements.

1.8 PROJECT CONDITIONS

1.8.1 Existing Structures

Shown on the PLANS are surface and underground structures adjacent to the work. Included, but not limited to, the active landfill area leachate manholes and trunk lines, groundwater monitoring well locations, utilities, and drainage culverts. This information has been obtained from existing records and is shown for the convenience of the CONTRACTOR. The CONTRACTOR shall explore ahead of the work to determine the exact location of all structures. They shall be supported and protected from injury by the CONTRACTOR. If they are broken or injured, they shall be restored immediately by the CONTRACTOR at his expense.

1.8.2 Dust Control

The CONTRACTOR shall conduct all operations and maintain the area of his activities, including sweeping and sprinkling of roadways, so as to minimize the creation and dispersion of dust.

1.8.3 Traffic

Traffic inside the site is anticipated. The CONTRACTOR shall coordinate with the OWNER regarding traffic control during construction. CONTRACTOR shall be responsible to maintain accessibility to the working face of the active landfill and for all landfill operations.

2.0 PRODUCTS

2.1 PIPE BEDDING FILL

Granular backfill shall meet requirements for coarse aggregates, Section 203 Virginia Department of Transportation Specification, Size No. 3.

2.2 SELECT BACKFILL

Clean earth fill shall be approved material free from debris, frozen materials, organic materials, rock or gravel larger than one inch in any dimension, or other harmful matter.

2.3 GENERAL FILL

2.3.1 Quality

General Fill shall be free of stone, rock or gravel larger than three (3) inches in any dimension, debris, waste, frozen materials, vegetation, organic materials, roots, and other deleterious matter. The satisfactory excavated soil material shall be capable of maintaining its stability on proposed slopes. Excess or unsatisfactory material shall be removed, disposed, and stabilized as approved by the ENGINEER to the designated areas on-site.

2.3.2 Placement

General Fill shall be used for backfilling and filling as shown on the PLANS, including 12-inch thick intermediate cover over waste in landfill top areas were waste excavation is required to obtain drainage channel slopes, and for other areas as directed by the ENGINEER.

2.4 OTHER MATERIALS

All other materials, not specifically described, but required for proper completion of the work shall be selected by the CONTRACTOR and approved by the ENGINEER.

3.0 EXECUTION

3.1 EXAMINATION

Examine the areas and conditions under which work of this section will be performed. Correct conditions detrimental to proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected and approved by the ENGINEER.

3.2 UTILITIES

Locate existing utilities, culverts, and structures above or below ground before any excavation starts. Coordinate work with Miss Utility and individual utility companies. Protect, maintain service, and prevent damage to utilities not designated to be removed. When utilities are encountered and are not shown on the Contract Drawings, or when locations differ from those shown on the Contract Drawings, notify ENGINEER for instructions before proceeding.

3.3 HIGHWAY RIGHTS-OF-WAY

Work within existing or proposed Virginia State Rights-of-Way shall meet requirements of the Virginia Department of Transportation.

3.4 PREPARATION

Remove water to prevent softening of foundation bottom, and soil changes detrimental to stability of subgrades and foundations. Subgrade soils which become soft, loose, "quick", or otherwise unsatisfactory for support of structure as a result of inadequate dewatering or other construction methods shall be removed, replaced, and compacted to a density equal to or greater than the requirements for the subsequent fill material at the CONTRACTOR's expense.

3.5 UNAUTHORIZED EXCAVATION

Where unauthorized excavations have been carried beyond points required, restore these areas to the elevations and dimensions shown on the plans with clean earth fill. Work shall be performed at no additional cost to the OWNER.

3.6 UNSATISFACTORY MATERIAL

Where removal of unsatisfactory material is due to fault or negligence of the CONTRACTOR, by inadequate shoring or bracing, dewatering, material storage or other failure to meet specified requirements, work shall be performed at no additional cost to the OWNER.

3.7 EXCAVATION

3.7.1

Excavate to the dimensions and elevations shown on the plans.

Open trenches only so far in advance of pipe laying as permitted by ENGINEER. In no case shall more than 200 feet of trench be opened at one time. Trenches shall be backfilled at the end of each working day except where otherwise permitted.

3.7.2

Unless otherwise depicted on the plans, the width of the trench at and below the top of the pipe shall not exceed the outside diameter of the pipe plus 18 inches except that for pipe 12 inches or less in diameter, the trench width shall not exceed 33 inches. Where this width is exceeded, CONTRACTOR shall provide for increased pipe loading as directed by the ENGINEER. The minimum clear width of the trench, sheeted or unsheeted measured at the springline of the pipe should be one foot greater than the outside diameter of the pipe.

3.7.3

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. All trenching, bracing, shoring, and sheeting shall be performed in accordance with OSHA requirements.

3.7.4

Excavate trenches for gravity lines to elevations shown on Contract Drawings. Excavate trenches for pressure lines to elevations shown on Contract Drawings or to depths specified in other sections of this Division.

3.7.5

The bottom of the trench for gravity lines shall be as specified herein under "Pipe Bedding."

3.7.6

The bottom of the trench for pressure lines shall be shaped to fit the bottom of the pipe as specified herein under "Pipe Bedding."

- Excavate for bell holes at each joint.
- Where rock is encountered, excavate a minimum of 6 inches below the bottom of the pipe for bedding.

3.7.7

Dewater excavation as necessary to provide proper protection. If deemed necessary, the ENGINEER may require continuous dewatering 24 hours per day by adequate pumping or well-points until backfilling is completed. The method and equipment used for dewatering shall be subject to the approval of the ENGINEER.

3.7.8

Where unsuitable soil is encountered, excavate to depth determined by ENGINEER and replace with select backfill thoroughly and uniformly compacted. Material such as clay mass, frozen materials,

cinders, ashes, refuse, and vegetable or organic material shall be construed as unsuitable material for backfill.

3.7.9

Where underground streams or springs are found, provide temporary drainage and notify ENGINEER.

3.7.10

Continuously remove from the project site and dispose of material unsatisfactory for backfill and all excess material with the progress of the Work.

3.7.11

Remove shoring and all form materials unless ordered to remain.

3.7.12

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 8 inches of compacted granular material shall be provided below bottom of footings.

3.7.13

Blasting for the excavation of trenches shall require prior written approval by the ENGINEER.

3.7.14

Provide a minimum of 8 inches between rock excavation and sides of structures.

3.8 SHEETING

3.8.1

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.

3.8.2

Establish requirements for trench shoring and bracing to comply with local codes and authorities having jurisdiction.

3.8.3

All costs of providing sheeting and shoring shall be borne by the CONTRACTOR.

3.8.4

Maintain sheeting, shoring and bracing in excavations regardless of time period excavation will be open. Carry down sheeting, shoring, and bracing as excavation progresses in accordance with the proper authority.

3.8.5

Sheeting, shoring and bracing left in-place shall be cut off to a depth of not less than 18 -inches below grade.

3.9 PIPE BEDDING

3.9.1

Bed all pipe in accordance with bedding details as shown on the Contract Drawings.

3.9.2

Except where otherwise shown on the Contract Drawings, all gravity lines using rigid pipe such as concrete, etc. shall be Class C bedding as a minimum.

3.9.3

Except where otherwise shown on the Contract Drawings, all gravity lines using flexible pipe such as HDPE, etc. shall be Class B-1 bedding as a minimum.

3.9.4

Compact pipe bedding by tamping or rodding to prevent settlement. Pipe bedding shall be an approved granular material compacted to a minimum 95% of theoretical maximum density as determined by ASTM D698. The bedding shall have a minimum thickness of six inches under the barrel and shall extend to four inches over the crown of the pipe.

3.9.5

Fine aggregate bedding shall meet requirements for fine aggregates, VDOT Road and Bridge Specifications, latest edition.

3.9.6

Coarse aggregate bedding shall meet requirements for coarse aggregates, VDOT Road and Bridge Specifications, latest edition.

3.10 BACKFILL

3.10.1

Trenches shall be backfilled immediately after the pipes and appurtenances are laid therein. Backfill trench to a compacted depth of 1 foot over the pipe with select backfill in accordance with the details shown on the Contract Drawings. Backfill shall be placed by hand, uniformly on each side of the pipe and compacted in layers not exceeding 6 inches in compacted thickness. Do not backfill on muddy or frozen soil, or with muddy or frozen soil.

3.10.2

Backfill trench from 1 foot above the pipe to grade with clean earth fill free of stones not larger than 5 inches or 1/2 the layer thickness, whichever is smaller. Layers shall not exceed 12 inches in compacted thickness, except that under road shoulders and under existing or future paved areas, layers shall not exceed 6 inches in compacted thickness. Backfill shall be compacted to the density specified for the areas in which it is located except that minimum compaction in any area shall be to the density of the adjacent soil.

3.10.3

For excavation depressions caused by removal of stumps or other clearing operations to firm subgrade, fill with clean earth fill and compact as specified.

3.10.4

Place backfill materials evenly adjacent to structures. Take care to prevent wedging action of the backfill against structures by carrying the material uniformly around the structure to approximately the same elevation in each lift.

3.10.5

Compact soil materials using equipment suitable for materials to be compacted in the specific work areas locations. Use power-driver hand tampers for compacting materials adjacent to structures.

3.10.6

Compact aggregate fill placed around manholes or other structures to required density.

3.10.7

For horizontal landfill gas trenches, backfill trench to within 12 inches of surface with stone. Backfill by machine.

3.10.8

Trenches for pressure lines shall include inert polyethylene locating tape having a metallic foil core. Tape shall be placed above the centerline of pipes at a depth not exceeding two feet below ground surface.

3.11 COMPACTION

Percentage of maximum density requirements.

- Compact each layer of fill or backfill no less than the following percentages of the maximum density at optimum moisture ± 3% content as determined by Standard Proctor ASTM D698 (AASHTO T99).
    - 95% beneath and within 25 feet of buildings and structures, including those shown for future construction.
    - 95% beneath pavements, walks, and road shoulders, including those shown for future construction.
    - 95% beneath areas to receive soil or geosynthetic liner, unless otherwise approved by the ENGINEER.
    - 90% in all other unpaved areas unless otherwise indicated on the Contract Drawings.

3.12 GRADING

3.12.1

Uniformly grade all areas within the limits designated on the Contract Drawings, including adjacent transition areas. Finish surfaces within specified tolerances with uniform levels of slopes between points where elevations are shown and existing grades.

3.12.2

Finish all surfaces free from irregular changes. Lumber, earth clods, or rocks larger than four inches and other undesirable materials shall be removed from the site at the completion of construction.

3.12.3

Finish subgrade areas to receive topsoil to within 0.20 foot of required subgrade elevations.

3.12.4

All utility lines not in streets, shall be mulched with hay or straw and seeded within 15 days after backfill.

3.12.5

Any disturbed area not paved, sodded or built upon between within 14 days shall receive temporary seeding.

3.12.6

Protect graded areas from the action of the elements. Settlement or other damage that occurs prior to acceptance of the work shall be repaired and grades satisfactorily reestablished.

3.12.7

Repair after cleanup. Upon completion of construction work and after spoils and debris have been removed, regrade any areas disturbed by operations.

3.12.8

The CONTRACTOR shall return all gates, fences, culverts, lawn areas, paved areas, etc. to the same condition existing prior to construction. Any culverts damaged during construction shall be replaced with new culverts at no cost to the OWNER.

END OF SECTION 31 23 33

SECTION 33 23 10

HORIZONTAL COLLECTOR WELLHEADS

1.0 GENERAL

1.1 DESCRIPTION

1.1.1 Scope of Work:

The CONTRACTOR shall provide all equipment and labor needed to connect horizontal collector wellheads as specified herein and as indicated on the Drawings.

1.1.2 Landfill Gas

It is expected that combustible methane gas, hydrogen sulfide, and other hazardous components may be venting from the quarry sidewall. The CONTRACTOR'S bid price shall include provision for all equipment and procedures necessary to safely install wellheads under this condition.

1.1.3 Qualification

All work shall be performed by qualified workers in accordance with the best standards and practices available.

1.1.4 Leachate

The CONTRACTOR shall make provisions for containment of discharged leachate if emitting from borehole.

1.1.5 Housekeeping

The CONTRACTOR shall keep the premises free from accumulation of waste materials or rubbish caused by his operations. Upon completion of each day's work, he shall dispose of all drill tailings at the designated area for waste relocation at the landfill, as well as secure all his tools, construction equipment, machinery and surplus materials from the site.

1.1.6 Odors

CONTRACTOR shall make every attempt to minimize odors from the wells during construction, by covering borehole between active operations, and as soon as well is completed, by covering or removing any drill tailings and temporarily capping the well riser pipe.

1.1.7 Related Work Described Elsewhere

Section 33 51 10: LFG Pipe and Pipe Fittings

1.2 SUBMITTALS

1.2.1 Materials

The CONTRACTOR shall prepare and submit to the ENGINEER for review and approval catalog cuts on materials furnished, and manufacturer's brochures containing complete information and instructions pertaining to the storage, handling, installation, and inspection of wellhead assemblies and other appurtenances furnished.

1.2.2 Samples

The CONTRACTOR shall submit to the ENGINEER for review and approval samples of all backfill materials and the name of the vendor(s) and source of materials furnished.

1.2.3 Shop Drawings

The CONTRACTOR shall prepare and submit to the ENGINEER for review and approval Shop Drawings showing dimensions, materials, and configuration of the wellhead assembly.

1.3 JOB CONDITIONS

Certain areas in the southern and middle portions of the Quarry Landfill have demonstrated atypical temperatures, pressures, and landfill gas composition. Contractor shall exercise caution related to subsurface temperature and pressure when drilling wells.

2.0 PRODUCTS

2.1 MATERIALS

2.1.1 Rigid and Flexible PVC Pipe

Rigid and flexible PVC pipe shall be as specified in Section 33 51 10.

2.1.2 Wellhead Assembly

Wellhead Assembly consists of a 2-inch globe valve, 2-inch union disconnect, a quick change orifice plate housing with a collar and set of interchangeable orifice plates suitable for flow measurements, adapter bushing or Fernco reducer fitting, stabilizing well cap with support ring, temperature gauge, multiple barbed hose monitoring ports, and dust caps. Wellhead assembly is mounted to the horizontal collector adaptor and connected to lateral piping located within the waste limits as shown on the Drawings. Wellhead assembly is manufactured by QED Environmental Systems, Dexter, MI (800-810-9908).

The globe valve is constructed of Type 1, Grade 1, PVC with socket fittings stainless steel valve stem and handle. The valve meets the requirements of ASTM D-1784 for rigid PVC compounds. The

"globe" is a tapered cylindrical plug design made of PVC, thickly lined with Viton material, flanged, stem with position high visibility indicator.

2.1.3 Well Caps

Well caps shall be dual extraction type with flexible couplings and adapter fittings that allow for connection of pneumatic supply and dewatering forcemain lines. Dual extraction well caps shall be manufactured by Pump One or approved equal.

2.2 SPARE PARTS

No spare parts are included in this work.

3.0 EXECUTION

3.1 WELLHEAD INSTALLATION

3.1.1 Wellhead Assembly

Wellhead assembly shall be installed on the vertical wells in accordance with the manufacturer's recommendations. Care shall be taken not to damage the impact the orifice plate during installation. If an orifice plate is damaged during installation, CONTRACTOR shall replace it at no cost to the OWNER.

3.1.2 Wellhead Connection

The wellhead shall be connected to the lateral via flexible PVC pipe, as shown on the Drawings. Install flexible PVC pipe so that no sags are formed.

END OF SECTION 33 23 10

SECTION 33 51 10

LFG PIPE AND PIPE FITTINGS

1.0 GENERAL

1.1 DESCRIPTION

The CONTRACTOR shall supply all materials, equipment, and labor needed to install complete and ready for use all pipe, pipe fittings, and valves as specified herein and as indicated on the PLANS for the Sidewall Odor Mitigation Control System.

Related Work Described Elsewhere:

Section 31 00 00:	Earthwork
Section 31 23 33:	Trenching, Backfilling, and Compacting

1.2 SUBMITTALS

1.2.1 Certification

The CONTRACTOR shall prepare and submit to the ENGINEER, for review and approval, certificates of compliance on materials furnished and manufacturer's brochures containing complete information and instructions pertaining to the storage, handling, installation, inspection, maintenance, and repair of each type of pipe and pipe fitting furnished.

1.2.2 Shop Drawings

The CONTRACTOR shall prepare and submit Shop Drawings to the ENGINEER for review and approval. The Shop Drawings shall show all dimensions, slopes, and invert elevations at connections. All tie-ins to the existing system shall be field-verified and shown on the Shop Drawings. The CONTRACTOR shall show coordination between proposed piping and all existing and proposed features.

1.3 REFERENCE

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

1.3.1 AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) STANDARD TEST METHODS/PRACTICE:

- ASTM D 1248 Specification for Polyethylene Plastics Molding and Extrusion Materials
- ASTM D 1784 Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
- ASTM D 1785 Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
- ASTM D 2321 Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe
- ASTM D 2466 Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings Sch 40.
- ASTM D 2467 Specification for Socket-Type Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
- ASTM D 2513 Specification for Thermoplastic Gas Pressure Pipe Tubing and Fittings
- ASTM D 2564 Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems
- ASTM D 2774 Practice for Underground Installation of Thermoplastic Pressure Piping
- ASTM D 2855 Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings
- ASTM D 3350 Specification for Polyethylene Plastics Pipe and Fittings Materials

1.3.2 AMERICAN NATIONAL STANDARD INSTITUTE (ANSI)

- ANSI B 31.8 Code for Pressure Piping, Appendix N

1.3.3 PLASTICS PIPING INSTITUTE (PPI)

- PPI TR-31/9-79 Technical Report

2.0 PRODUCTS

2.1 SCHEDULE 80 PVC PIPE

All PVC pipe and pipe fittings shall be Schedule 80 PVC conforming to ASTM D 1784, ASTM D 1785 (for pipe), and ASTM D 2467 (for fittings). Perforated pipe shall be slotted in accordance with the PLANS. Acceptable manufacturers include Plastinetics, Inc. Chemtrol, CertainTeed, ASAHI/America, or approved equal.

The pipe shall be Schedule 80 PVC conforming to ASTM D 1785, PVC 1120. Pipe joints shall be solvent welded.

2.1.1 PVC Fittings

Fittings shall be of the same material and manufacturer as the pipe they are to be attached to. PVC fittings shall conform to ASTM D 2466.

2.1.2 PVC Flanges

2.1.2.1 Type

Flanges shall be Schedule 80 PVC and shall be plate type, ANSI Class 150 pounds.

2.1.2.2 Hardware

The bolts, studs, nuts, and washers for the flanges shall be hot dipped galvanized steel. Below-grade flanges shall be wrapped in 5-mil polyethylene sheeting, just after installation and prior to backfilling, to help prevent corrosion.

2.1.2.3 Gaskets

Flange gaskets shall be full-face Neoprene. Other elastomers, such as Nitrile or Buna-N may be submitted to the ENGINEER for consideration.

2.1.3 Flexible PVC Pipe

2.1.3.1 Manufacturer

Flexible PVC pipe shall be as manufactured by Kanaflex Corporation, Compton, California (310-637-1616), Series 101-PS, or approved equal.

2.1.3.2 Fasteners

Fasteners for flexible PVC pipe shall be Kanaflex 101-PS power lock clamps, or approved equal.

2.1.4 Compound Properties

PVC pipe and pipe fittings shall be manufactured from a compound which meets the requirements of Type 1, Grade 1, Polyvinyl Chloride PVC 1120, Class 12454-B, as outlined in ASTM D 1784. A Type 1, Grade 1 compound is characterized as having the highest requirements for mechanical properties and chemical resistance.

- Compound from which pipe is produced shall have a design stress rating of 2000 psi at 73 degrees F, listed by the Plastic Piping Institute.
- Materials from which pipe and pipe fittings are manufactured shall have been tested and approved by NSF International.
- Pipe shall conform to the requirements of ASTM D-2241. Pipe shall be homogenous throughout and shall be free from cracks, holes, foreign inclusions, and other defects.

2.1.5 PVC Pipe Storage:

PVC pipe shall be stored or stacked so as to prevent damage by marring, crushing, or piercing. Maximum stacking height shall be limited to 6 feet. For storage over 5 days, a location shall be chosen out of direct sunlight or the piping and fittings will be covered.

2.2 HIGH DENSITY POLYETHYLENE (HDPE) PIPE

All HDPE pipe and fittings greater than 3-inch-diameter as indicated on the Drawings shall be at least Standard Dimension Rating (SDR) 17 high density polyethylene pipe using a 3408 type resin, or approved equal. Thicker SDR pipe may be specified on the drawing. HDPE pipe and fittings that are 3-inch-diameter and less shall be SDR 11.

Pipe shall be extruded from a Type III, Class C, Category 5, Grade P34 compound as described in ASTM D 1248. It shall be classified as cell 345434C according to ASTM D 3350 and have the material designation of PE 3408. The pipe shall be manufactured to meet the requirements of ASTM D 2513. Manufacturer's literature shall be adhered to when "manufacturer's recommendations" are specified. All pipe and fittings shall be provided by one manufacturer. Acceptable manufacturers include Plexco (630-350-3700), Driscopipe (800-527-0662), or approved equal.

Perforations shall be 1/2 inch in diameter at ¼ points around the perimeter of the pipe. Rows of holes shall be space approximately 6 inches along the length of the pipe. Every other row shall be offset by 3 inches.

3.0 EXECUTION

3.1 PVC PIPE HANDLING

PVC pipe and pipe fittings shall be handled carefully in loading and unloading. They shall be lifted by hoists and lowered on skidways in such a manner as to avoid shock. Derricks, ropes, or other suitable equipment shall be used for lowering the pipe into the extraction well borings. Pipe and pipe fittings shall not be dropped or dumped.

3.2 PVC PIPE INSTALLATION

PVC pipe installation shall conform to these specifications, the manufacturer's recommendations, and as outlined in ASTM D 2774.

3.3 JOINING OF PVC PIPE

Joining of pipe shall be in accordance with ASTM D 2855.

3.3.1 Preparation

All pipe shall be inspected for cuts, scratches, or other damage prior to installation. Pipe with imperfections shall not be used. All burrs, chips, etc. shall be removed from pipe interior and exterior. All loose dirt and moisture shall be wiped from the interior and exterior of the pipe end and the interior of the fitting. All pipe cuts shall be square, perpendicular to the center line of pipe. Pipe

ends shall be beveled prior to applying primer and solvent cement so that the cement does not get wiped off during insertion into the fitting socket.

3.3.2 Solvent Welding

A coating of primer as recommended by pipe supplier shall be applied to the entire interior surface of the fitting socket and to an equivalent area on the exterior of the pipe prior to applying solvent cement. The solvent cement shall comply with the requirements of ASTM D 2564 and shall be applied in strict accordance with manufacturer's specifications. Pipe shall not be primed or solvent welded when it is raining, when atmospheric temperature is below 40 degrees F, or above 90 degrees F.

3.3.3 Curing

After solvent welding, the pipe shall remain undisturbed until cement has thoroughly set. As a guideline for joint setting time, use 1 hour for ambient temperatures 60-90 degrees F, or 2 hours when ambient temperature is 40-60 degrees F.

3.3.4 Alignment

Pipe and pipe fittings shall be selected so that there will be as small a linear deviation as possible at the joints, and so that inverts present a smooth surface. Pipe and fittings which do not fit together to form a tight fitting will be rejected.

3.4 FLEXIBLE PVC PIPE CONNECTIONS

Connections to pipe shall be made with clamps as indicated on the PLANS and in accordance with manufacturer's recommendations and step by step procedures. Connections to PVC pipe shall be solvent welded in accordance with Paragraph 3.03 above.

3.5 HDPE PIPE HANDLING

HDPE pipe shall not be bent more than the minimum radius recommended by the manufacturer for type, grade, and SDR. Care shall be taken to avoid imposing strains that will overstress or buckle the HDPE piping or impose excessive stress on the joints.

Joining HDPE Pipe:

Only two methods shall be utilized to joining HDPE pipe: heat fusion and mechanical joining.

3.5.1 Mechanical Joining

Mechanical Joining shall be accomplished with HDPE flange adapters, neoprene gaskets, and ductile iron back-up flanges, and shall be used only where shown on the Drawings. Refer also to Part 3.7.

3.5.2 Heat Fusion

Heat Fusion joints shall be made in accordance with manufacturer's step by step procedures and recommendations. Fusion equipment and a trained operator shall be provided by the Contractor. Pipe fusion equipment shall be of the size and nature to adequately weld all pipe sizes and fittings

necessary to complete the project. Branch saddle fusions shall be made in accordance with manufacturer's recommendations and step by step procedures. Branch saddle fusion equipment will be of the size to facilitate saddle fusion within the pipe trench. Heat fusion shall be performed outside of the trench whenever practical. Before heat fusing pipe, each length shall be inspected for the presence of dirt, sand, mud, shavings, and other debris. Any foreign material shall be completely removed. At the end of each day, all open ends of fused pipe shall be capped or otherwise covered to prevent entry by animals or debris.

3.5.3 Shelter

As per the manufacturer's instructions, no fusion shall be performed in precipitation unless a shelter is provided.

3.6 HDPE PIPE INSTALLATION

Pipe installation shall comply with the requirements of ASTM D 2321, PPI TR-31/9-79, and the manufacturer's recommendations. Lengths of fused pipe to be handled as one segment shall not exceed 400 feet. The Engineer shall be notified prior to any pipe being installed in the trench in order for him/her to have an opportunity to inspect the following items:

- All butt and saddle fusions.
- Pipe integrity.
- Trench excavation for rocks and foreign material.
- Proper trench slope.
- Trench contour to ensure the pipe will have uniform and continuous support.

Any irregularities found by the Engineer during this inspection must be corrected before lowering the pipe into the trench. Pipe shall be allowed sufficient time to adjust to trench temperature prior to any testing, segment tie-ins, and/or backfilling.

Tie-ins shall be made out of the trench whenever possible. When tie-ins are to be made only in the trench, a bell hole shall be excavated large enough to ensure an adequate and safe work area.

Below grade piping shall be marked with metallic locator/warning tape to be buried in the trench above the pipe as indicated on the drawings.

3.7 SEGMENT TESTING

3.7.1 Test Method

The HDPE pipeline shall be subjected to an air test per ASTM F-1417 and as described herein to detect any leaks in the piping. Testing shall be performed abovegrade. The CONTRACTOR shall accept the responsibility for locating, uncovering (if previously backfilled), and repairing any leaks detected during testing.

3.7.2 Test Segment

Like sizes of polyethylene piping shall be butt welded together into testing segment not to exceed 1000 feet. Segments shall be connected to a testing apparatus on one end and fitted with fusion-welded caps on all openings. The segment to be tested should be allowed time to achieve constant and/or ambient temperature before initiating the test.

3.7.3 Timing

The test should be performed during a period when the pipe segment will be out of direct sunlight when possible; i.e., early morning, late evening, or cloudy days. This will minimize the pressure changes which will occur during temperature fluctuations.

3.7.4 Pressure

The test pressure shall be 5 psig.

3.7.5 Pressure Drop

Pressure drop during the test shall not exceed one percent of the testing gauge pressure over a period of one hour. This pressure drop shall be corrected for temperature changes before determining pass or failure. (See Section 3.10 for test failures). The ENGINEER shall sign off on a test form to indicate test compliance.

3.7.6 Notification

The ENGINEER shall be notified prior to commencement of the testing procedure and shall be present during the test.

3.7.7 Equipment

Equipment for this testing procedure will be furnished by the CONTRACTOR. This shall consist of a polyethylene flange adaptor with a PVC blind flange. Polyethylene reducers shall be utilized to adapt test flange to size of pipe being tested. Tapped and threaded into the blind flange shall be a temperature gauge 0 to 100 degrees C, a "Schraeder tire valve" to accommodate an air compressor hose, a ball valve to release pipe pressure at completion of test, and a pressure measuring device. The pressure measuring device shall be a digital manometer capable of measuring positive pressures of air and other non-corrosive gases over a range of 0 to 199.9 in-w.c. Model No. 475-3 as manufactured by Dwyer Instruments, Inc. (770-427-9406), or approved equal.

3.8 TEST FAILURE

3.8.1 Remedial Actions

The following steps shall be performed when a pipe segment fails the one percent - 1 hour test described in this Section.

3.8.2 Inspection

The pipe and all fusions shall be inspected for cracks, pinholes, or perforations.

3.8.3 Terminations

All blocked risers and capped ends shall be inspected for leaks.

3.8.4 Location

Leaks shall be located and/or verified by applying a soapy water solution and observing soap bubble formation.

END OF SECTION 33 51 10

SECTION 33 51 20

LFG SYSTEM VALVES

1.0 GENERAL

1.1 DESCRIPTION

1.1.1 Scope of Work

The CONTRACTOR shall provide all materials, equipment, and labor needed to install and make ready all valves as specified herein and as indicated on the Drawings.

1.1.2 Related Work Described Elsewhere

Section 33 23 10:	Horizontal Collector Wellheads
Section 31 51 10:	LFG Pipe and Pipe Fittings

1.2 SUBMITTALS

1.2.1 Certification

The CONTRACTOR shall prepare and submit to the ENGINEER, for review and approval, manufacturer's brochures containing complete information and instructions pertaining to the storage, handling, installation, inspection, maintenance, operation, and repair of each type of valve furnished. Shop drawings shall be submitted for butterfly valve assemblies requiring spacers per these SPECIFICATIONS.

2.0 PRODUCTS

2.1 GENERAL

2.1.1 Components

All valves shall be complete with all necessary operators, actuators, handwheels, chain wheels, extension stems, floor stands, worm and gear operators, operating nuts, chains, wrenches, and other accessories or appurtenances which are required for the proper completion of the work. Operators, actuators, and other accessories shall be sized and furnished by the valve supplier and factory mounted.

2.1.2 Intended Service

Valves shall be suitable for the intended service. Renewable parts including discs, packing, and seats shall be of types recommended by valve manufacturer for intended service, but not of a lower quality than specified herein.

2.1.3 Installation Conditions

Valves and operators shall be suitable for buried or exposed conditions, as applicable. Valves shall have all safety features required by OSHA.

2.1.4 Sizing

Unless otherwise shown on the Drawings, valves shall be the same size as the adjoining pipe.

2.1.5 Monitoring

Monitoring parts and hoses shall be provided at each buried isolation valve. Ports threaded into header shall be Swagelock 1/4" SS-420-1-4 x1/4" MPT, or approved equal. Monitoring hose shall be stainless steel teflon-lined hose with Swagelock tube ends, model SS-4BHT-36, or approved equal, of adequate length to extend above grade (above-specified length is for 3-foot long tubing section). Sampling end shall have a 1/4" female connector SS-420-7-4 with a quick-connect polypropylene monitoring port by Ryan Herco, Part No. 0812-002.

2.2 BUTTERFLY VALVES

Header isolation valves shall be butterfly bubble tight, wafer design, with a PVC body, nitrile seat, and compatible with a flat face flange, as manufactured by Asahi/America or equal. Stem extensions shall be stainless steel in an epoxy coated carbon steel outer housing with a gear box assembly and visual valve position indicator mounted on top and equipped with a removable manual operating wheel. Monitoring ports at the butterfly valves shall be quick-connects as specified above and shown on the Drawings.

3.0 EXECUTION

3.1 INSTALLATION

3.1.1 Methods

Valves shall be installed in accordance with the manufacturer's recommendations and the following:

3.1.1.1 Butterfly Valves

Butterfly valves shall be installed between two flanges as shown on the Drawings; care shall be taken to avoid stripping bolts when tightening.

3.1.1.2 Flanges

Flanges shall be joined with hot dipped galvanized steel studs and nuts. All below grade studs and nuts shall be coated with anti-seize compound, or approved equivalent, after installation and prior to backfilling. Stud and nut diameters shall be sized as recommended by the manufacturer for each size valve. Stud lengths shall accommodate the required distance between flanges including spacers, if necessary.

3.1.2 Protection

The CONTRACTOR shall wrap and tape the valve, flanges, and bolts in 5-mil polyethylene sheeting prior to backfilling to help protect the valve assembly from corrosion.

3.1.3 Spacers and Adapters

Flanged butterfly valves may require spacers between the flange adapters and the valve body in order to allow full travel of the internal disk. If spacers are necessary for any butterfly valve, the CONTRACTOR will install valve spacers subject to the approval by the ENGINEER.

END OF SECTION 33 51 20

SECTION 43 21 40

HORIZONTAL COLLECTOR PUMPS

1.0 GENERAL

1.1 DESCRIPTION

1.1.1 Scope of Work

The CONTRACTOR shall provide all materials, equipment, and labor needed to install the submersible pneumatic dewatering pumps and appurtenances in accordance with the Contract Drawings.

1.1.2 Related Work Described Elsewhere

Section 31 51 10: LFG Pipe and Pipe Fittings

1.2 SUBMITTALS

1.2.1 Certification

The CONTRACTOR shall prepare and submit to the ENGINEER for review and approval manufacturer's literature, shop drawings, or other information pertaining to the assembly, operation, lubrication, adjustments, and other maintenance and repairs of equipment installed under this Section, together with detailed parts lists, plans, and/or photographs.

2.0 PRODUCTS

2.1 SUBMERSIBLE PNEUMATIC HORIZONTAL COLLECTOR DEWATERING PUMPS

2.1.1 Components

The unit shall be a stand alone device with all components rated for service in harsh and explosive environments.

2.1.2 Capability

The well pumps shall be capable of handling a minimum of 3 gpm of liquid at a depth of 80 feet with 6-inches of submergence with 70 psig air pressure provided to the pump.

2.1.3 Power Source

The pumps shall be of controllerless pneumatic displacement design. The pumps shall function properly over an operating pressure range of 5 psig to 120 psig.

2.1.4 Type

The horizontal collector pumps shall be One Pump, bottom-loading, short pumps as manufactured by Pump One or approved equal. Materials of construction shall be as follows:

2.1.4.1 Pump Body

Fiberglass

2.1.4.2 Pump Ends

Stainless Steel

2.1.4.3 Internal Components

Stainless Steel

2.1.4.4 Hose Fittings

Stainless Steel

2.1.4.5 Hose Fitting Type

Quick-Connects

2.1.5 Hoses

Submersible pneumatic pump hoses shall be manufactured by Pump One or approved equal. Hoses shall be bundled together within an outer wrap. Materials of construction shall be as follows:

2.1.5.1 Hose Material

Nitrile

2.1.5.2 Liquid Discharge Hose Size

¾-inch inner diameter

2.1.5.3 Air Supply Hose Size

3/8-inch inner diameter

2.1.5.4 Air Exhaust Hose Size

½-inch inner diameter

2.1.6 Suspension

Submersible pneumatic pumps shall be suspended in well using a stainless steel cable, and shall not be suspended using pump hoses.

2.1.7 Cycle Counter

A pump cycle counter and air inlet supply gauge shall be provided with each pump.

3.0 EXECUTION

3.1 INSTALLATION

Submersible pneumatic pump, hoses, and accessories shall be installed in accordance with the manufacturer's instructions and recommendations.

3.2 TESTING

Upon completion of the installation, tests shall be performed by the Contractor with the assistance of the manufacturer's representative, in the presence of the Engineer. These tests shall demonstrate startup, shutdown, operation, and maintenance of the submersible pneumatic well pumps. Equipment and other requirements necessary to perform the tests shall be furnished by the contractor.

END OF SECTION 43 21 40

Appendix A

Existing Conditions Photos

The following photos were taken by SCS Field Staff on October 21, 2022. These photos provide a general representation of the conditions of the sidewall and liner system. Conditions may have changed since these photos were taken and bidders should perform their own field reconnaissance. Photo numbers correspond to the numbers of locations labeled and Offset Data Points shown on Sheet 1 of the Drawings.

Figures

Figure 1. Data Point #1

Figure 2. Data Point #2

Figure 3. Data Point #3

Figure 4. Data Point #4

Figure 5. Data Point #5

Figure 6. Data Point #6

Figure 7. Data Point #7

Figure 8. Data Point #8

Figure 9. Data Point #9

Figure 10. Data Point #10

Figure 11. Data Point #1

Figure 12. Data Point #12

Figure 13. Data Point #13

Figure 14. Data Point #14

Figure 15. Data Point #15

Figure 16. Data Point #16

Figure 17. Data Point #17

Figure 18. Data Point #18

Figure 19. Data Point #19

Figure 20. Data Point #20

Figure 21. Data Point #21

Figure 22. Data Point #22

Figure 23. Data Point #23

Figure 24. Data Point #24

Figure 25. Data Point #25

Figure 26. Data Point #26

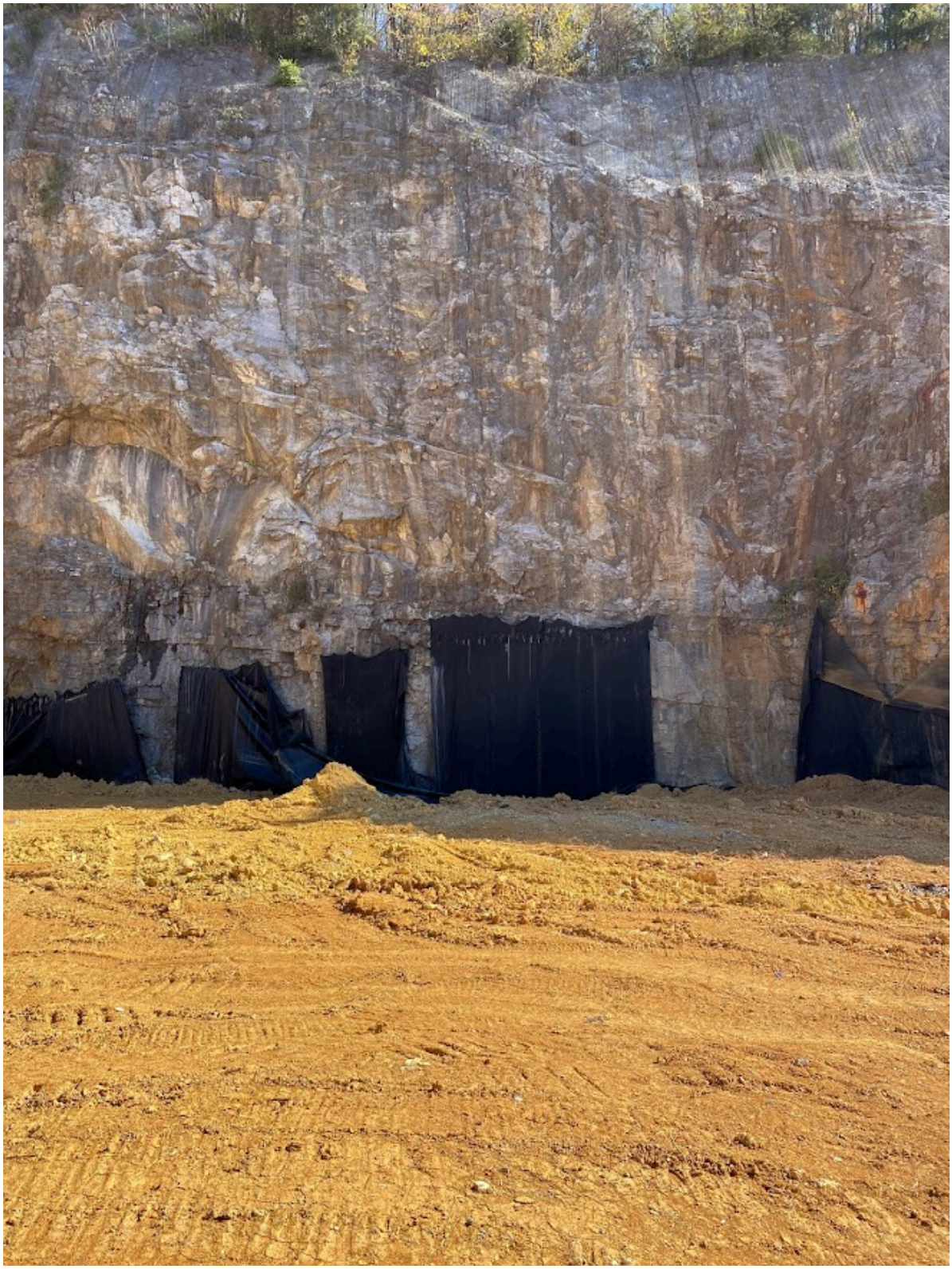

Figure 27. Data Point #27

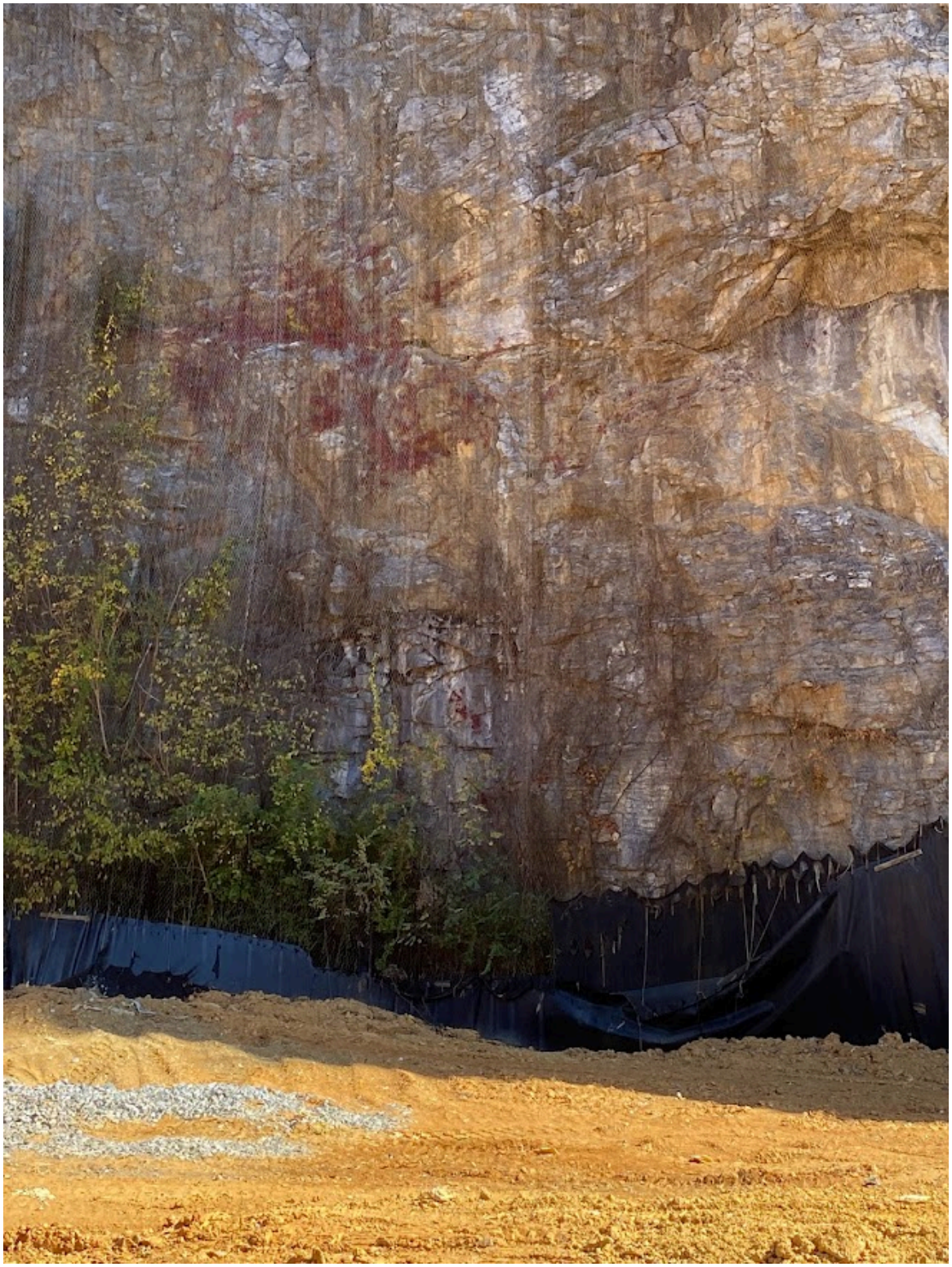

Figure 28. Data Point #28

Figure 29. Data Point #29

Figure 30. Data Point #30

Figure 31. Data Point #31

Figure 32. Data Point #32

Figure 33. Data Point #33

Figure 34. Data Point #34

Figure 35. Data Point #35

Figure 36. Data Point #36

Figure 37. Data Point #37

Figure 38. Data Point #38

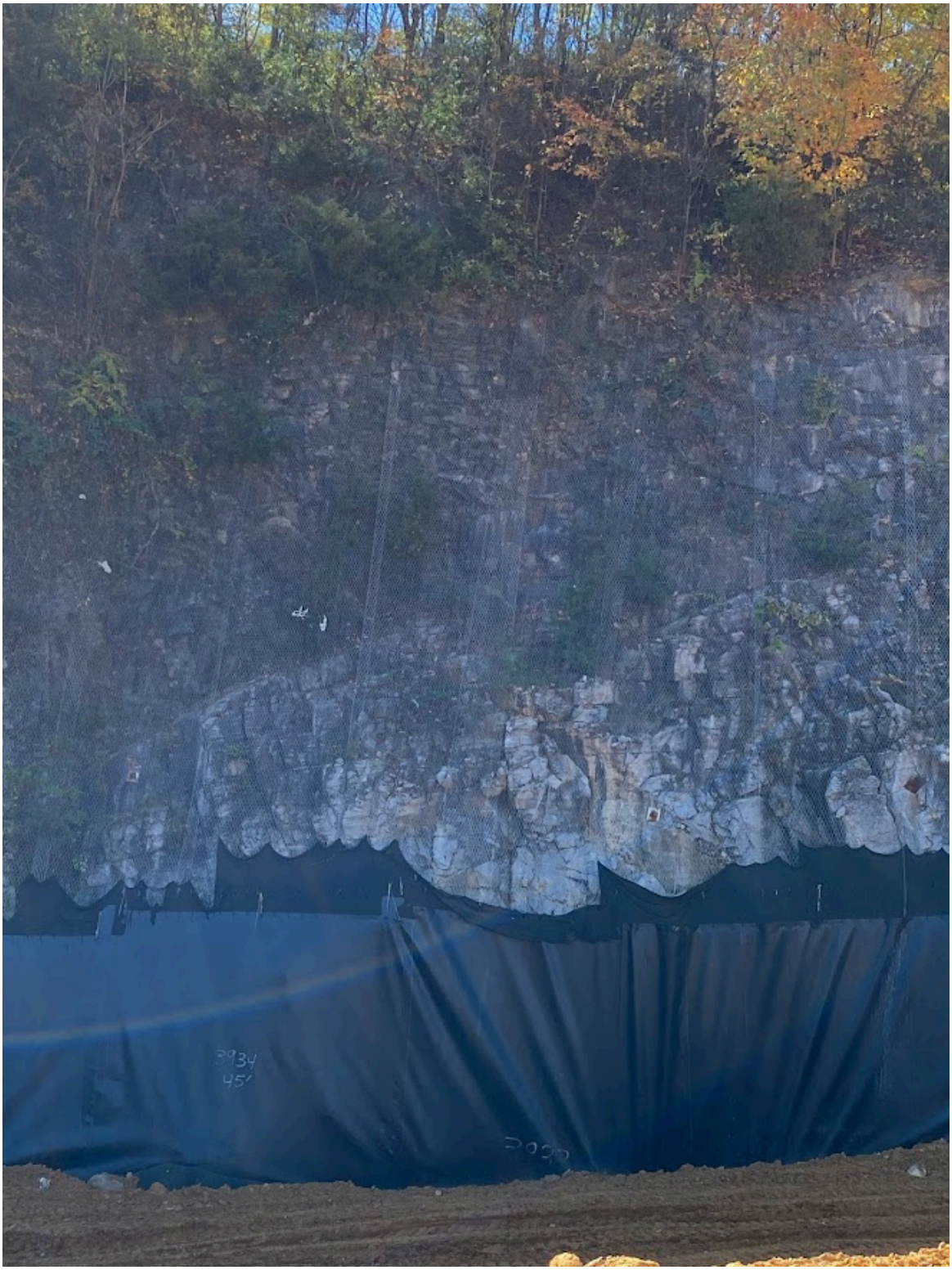

Figure 39. Data Point #39

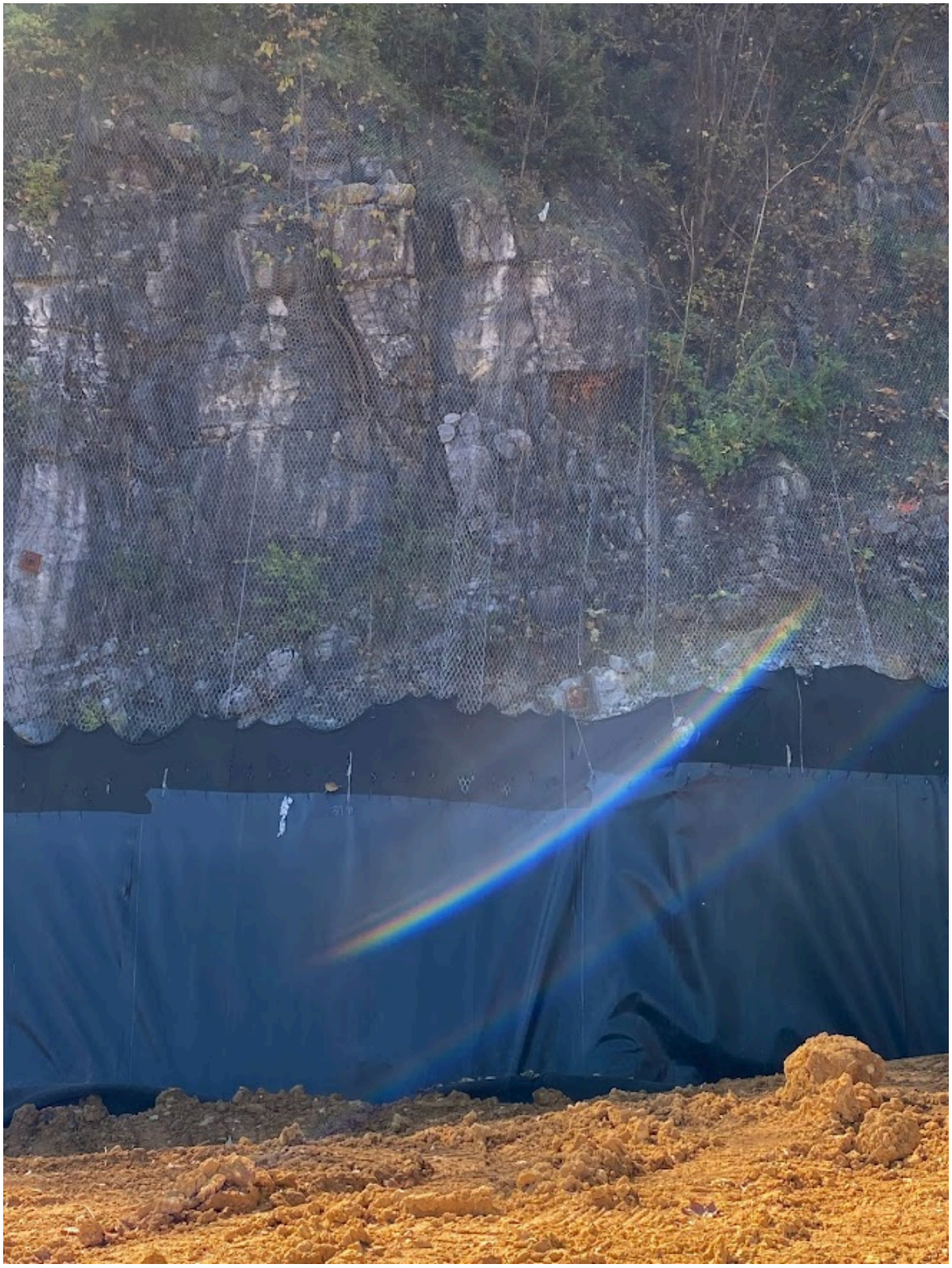

Figure 40. Data Point #40

Figure 41. Data Point #41

Figure 42. Data Point #42

Figure 43. Data Point #43

Figure 44. Data Point #44

Figure 45. Data Point #45

Figure 46. Data Point #46

Appendix B

Western Chimney Landfill Gas Pilot Mitigation Program Letter

The following letter and attachments prepared by Draper Aden Associates are provided as background information about the previous trial odor mitigation system installed on the site and the analysis of the gas emissions from the sidewall. The letter is dated January 31, 2022. The condition of the equipment and the quality of the gas may have changed since the letter was prepared. Bidders should make their own assessments of existing conditions. Bidders should take their own samples and perform their own analysis when planning for Health and Safety during construction.

Draper Aden Associates
Engineering • Surveying • Environmental Services

2206 South Main Street
Blacksburg, Virginia 24060
540.552.0444
www.daa.com

January 31, 2022

Ms. Crystal Bazyk
Enforcement and Air Compliance/Monitoring Manager
Virginia Department of Environmental Quality
Southwest Regional Office
355-A Deadmore Street
Abingdon, VA 24210

RE: Bristol Virginia Integrated Solid Waste Management Facility – Registration No. 11184
Western Chimney Landfill Gas Pilot Mitigation Program
Draper Aden Associates Project No. B11145B-14D

Dear Ms. Bazyk:

On behalf of the Bristol Virginia Integrated Solid Waste Management Facility (Facility), Draper Aden Associates is providing an update on a pilot project the facility is undertaking to mitigate the landfill gas (LFG) emanating from a void space between the sidewall liner and the quarry wall on the western side of the quarry landfill (heretofore called the western chimney).

Background

The western chimney became significantly noticeable during the summer of 2021. Water vapor contained in the LFG could be seen flowing up between the liner and the quarry wall on the western side of the quarry wall in a small localized area **(Photo No. 1).** Facility staff has noticed that the LFG from the chimney produces significant odors. In an effort to mitigate the impacts of the chimney odors, the staff has developed a project to attempt to capture and treat the LFG. There are several other chimneys located elsewhere along the quarry walls. As the mitigation project for the western chimney is the first; and may be duplicated at other chimneys as appropriate, this is considered a pilot project.

The intent of this project is to collect the chimney LFG behind the liner; direct it to a blower through a gas header system and direct the exhaust from the blower to a solar powered flare for treatment.

Gas Header Connections Through the Liner

As the LFG from the chimney produces significant odors and potential health and safety concerns, it was determined that access to the LFG would be best at points through the liner below the discharge point. **Photo No.'s 2 and 3** show trial connections to test the concept, using PVC fittings. After the

trial showed that the connections were relatively air-tight, holes slightly smaller than 2 inches were cut into the sidewall liner just above the level of the waste. Two-inch PVC fittings were inserted through the holes cut in the liner. A total for four connections were installed just above the waste level on the slope beneath the chimney exhaust.

Installation of Gas Headers up the Quarry Wall

The four connections were connected to two, 2-inch PVC gas headers that were then connected to 2-inch flexible hoses that were extended up the quarry wall to a flat area at the top **(Photo No.'s 4 and 5).**

Blower and Solar Powered Flare Installation

On top of the wall, the two 2-inch headers were connected to one 4-inch PVC header, which delivers the LFG to the inlet of a blower. The blower is an explosion proof, 2 HP, Rotron regenerative blower. The blower exhaust is directed to an LCS CF-10 solar powered flare. **Photo No. 6** presents the blower and the flare base before the flare was installed. The system was tested to show that the blower would collect the LFG and direct gas to the flare, and the results are shown in **Photo No. 7**, which shows LFG from the chimney being exhausted from the flare base. **Photo No. 8** presents the installed flare.

Current Considerations and Future Actions

Low Methane - The flare has not yet been started. Attachment No. 2 includes the analytical results of a sample of the LFG taken from the chimney on January 19th. This sample was taken before the blower was started, so the sample may have been diluted by air. However, the analysis indicates a very low methane concentration of 1.68% by volume. This low concentration indicates that the chimney LFG will not burn on its own. Therefore, it is being considered that the staff will install a system to augment the methane with propane.

Not Collecting all the LFG from the Chimney – Since operation of the blower began, the staff has noted that not all of the LFG from the chimney is being collected by the collection system. Some LFG is still escaping from the top of the chimney. Draper Aden Associates and the Facility staff are considering additional actions to capture more the gas. This may include draping a section of liner over the top of the chimney with an expansion of the gas collection system beneath it.

Draper Aden Associates and the Facility staff will continue to inform you of the progress with this pilot project. Please let me know if you have any questions, comments or require additional information.

Sincerely,
Draper Aden Associates

Don Marickovich

Don Marickovich, PE
Senior Design Engineer

Attachments

CC: Randall Eads, Bristol City Manager
Sam Hess, Bristol Solid Waste Manager
Ernie Hoch – Draper Aden Associates

ATTACHMENT NO. 1

Photos

Photo No. 1 – Western Chimney

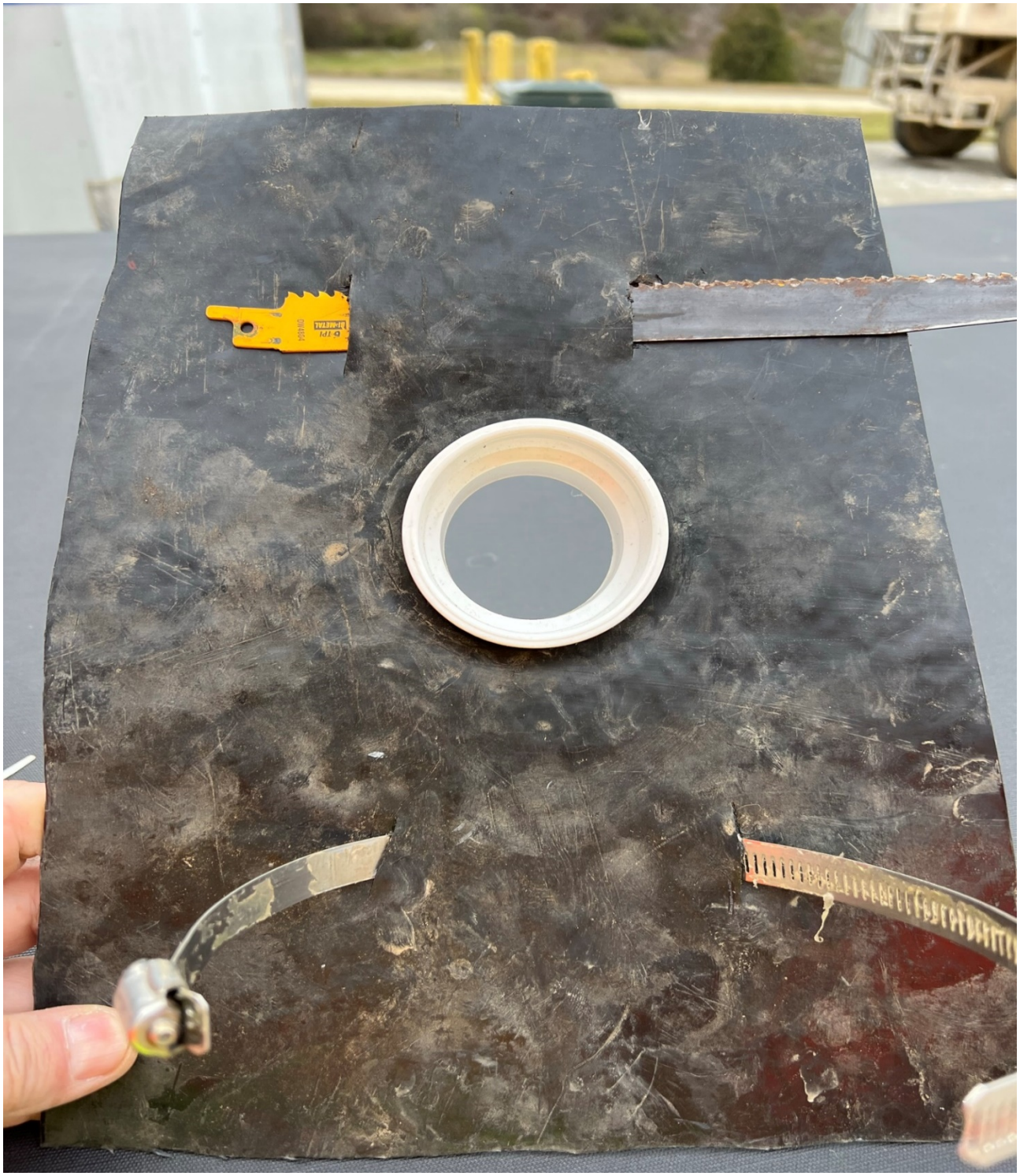

Photo No. 2 – Trial Liner Connection

Photo No. 3 – Trial Liner Connection

Photo NO. 4 – First Lateral – Two Liner Connections

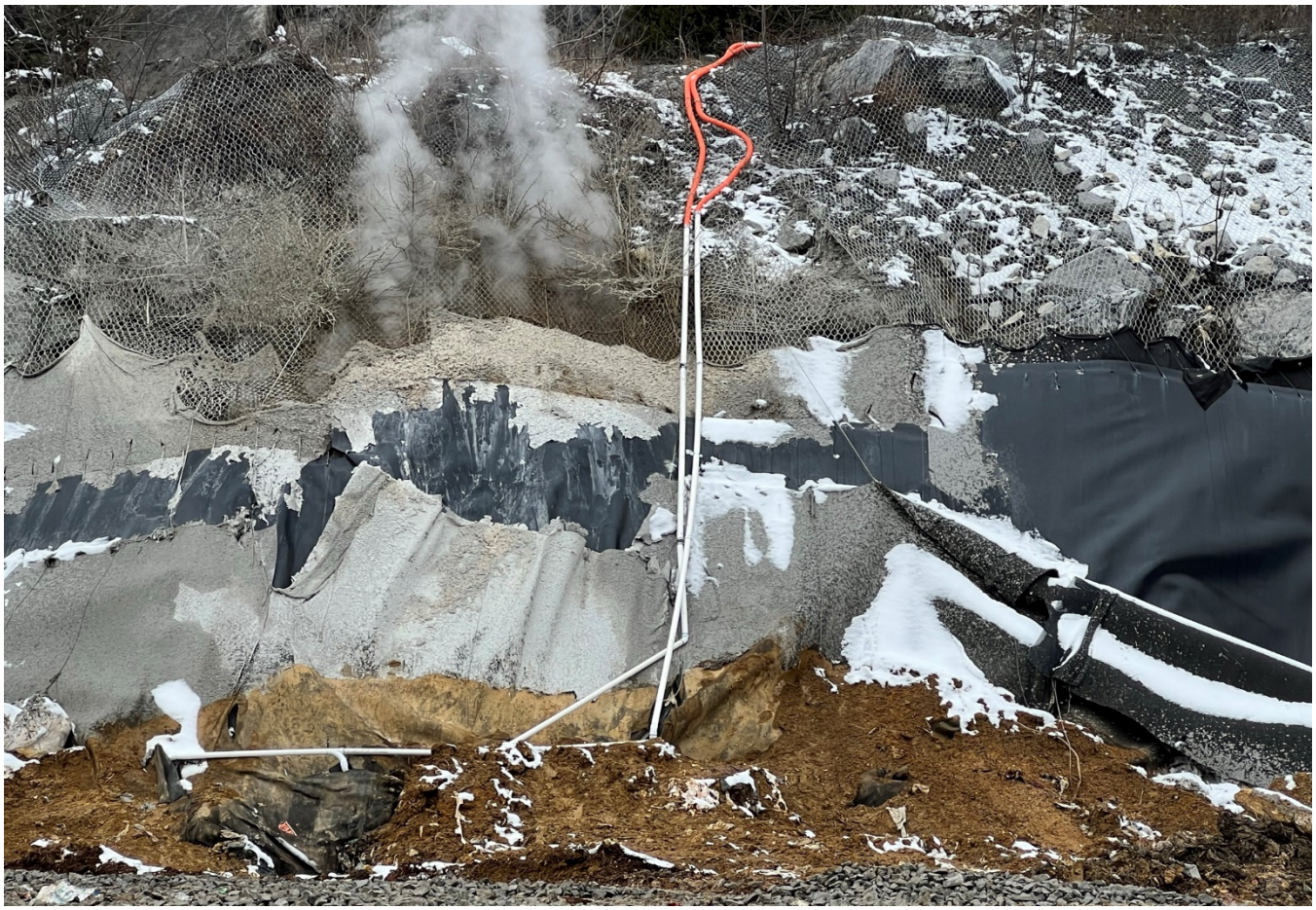

Photo No. 5 – Both Laterals – Four Connections

Photo No. 6 – Inlet Header to Blower – Exhaust Header to Solar Powered Flare Base

Photo No. 7 – Captured LFG Exhausting from the Flare Base

Photo No. 8 – Solar Powered Flare

ATTACHMENT NO. 2

January 19, 2022 Chimney LFG Analysis Results

1941 Reymet Road ● Richmond, Virginia 23237 ● Tel: (804)-358-8295 Fax: (804)-358-8297

Certificate of Analysis

Final Report

Laboratory Order ID 22A0884

Client Name:	SCS Field Services - Harrisburg, PA	Date Received:	January 20, 2022 13:55
	4330 Lewis Road, Suite 1	Date Issued:	January 25, 2022 17:11
	Harrisburg, PA 17111	Project Number:	[none]
Submitted To:	Scott Schoffner	Purchase Order:	07-SO04251
Client Site I.D.:	Bristol LF Chimney		

Enclosed are the results of analyses for samples received by the laboratory on 01/20/2022 13:55. If you have any questions concerning this report, please feel free to contact the laboratory.

Sincerely,

Ted Soyars

Technical Director

End Notes:

The test results listed in this report relate only to the samples submitted to the laboratory and as received by the Laboratory.

Unless otherwise noted, the test results for solid materials are calculated on a wet weight basis. Analyses for pH, dissolved oxygen, temperature, residual chlorine and sulfite that are performed in the laboratory do not meet NELAC requirements due to extremely short holding times. These analyses should be performed in the field. The results of field analyses performed by the Sampler included in the Certificate of Analysis are done so at the client's request and are not included in the laboratory's fields of certification nor have they been audited for adherence to a reference method or procedure.

The signature on the final report certifies that these results conform to all applicable NELAC standards unless otherwise specified. For a complete list of the Laboratory's NELAC certified parameters please contact customer service.

TNI Accredited
VELAP ID 460021

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	4330 Lewis Road, Suite 1	Date Issued:	January 25, 2022 17:11
	Harrisburg, PA 17111	Project Number:	[none]
Submitted To:	Scott Schoffner	Purchase Order:	07-SO04251

Client Site I.D.: Bristol LF Chimney

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Western Chimney	22A0884-01	Air	01/19/2022 13:34	01/20/2022 13:55

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Certificate of Analysis

Final Report

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Client Name:	SCS Field Services - Harrisburg, PA 4330 Lewis Road, Suite 1 Harrisburg, PA 17111	Date Received: Date Issued:	January 20, 2022 13:55 January 25, 2022 17:11
Submitted To:	Scott Schoffner	Project Number:	[none]
Client Site I.D.:	Bristol LF Chimney	Purchase Order:	07-SO04251

ANALYTICAL RESULTS

Project Location:

Field Sample #: Western Chimney

Sample ID: 22A0884-01

Sample Matrix: Air

Sampled: 1/19/2022 13:34

Sample Type: LF

Sample Description/Location:

Sub Description/Location:

Canister ID: 11079

Canister Size: 1.4

Initial Vacuum(in Hg): 30

Final Vacuum(in Hg): 3.4

Receipt Vacuum(in Hg): 3.4

Flow Controller Type: Passive

Flow Controller ID: LFGST004

Sulfur Volatile Organic Compounds by GCMS
EPA TO-15

Analyte	ppbv Results	ppbv MDL	ppbv LOQ	Flag/Qual	ug/M³ Results	ug/M³ MDL	ug/M³ LOQ	Dilution	PF	Date/Time Analyzed	Analyst
Carbon Disulfide, as received	ND	16200	16200		ND	50000	50000	1620	1	1/24/22 21:16	DFH
Hydrogen Sulfide, as received	ND	16200	16200		ND	23000	23000	1620	1	1/24/22 21:16	DFH
1-Propanethiol, as received	ND	16200	16200		ND	50000	50000	1620	1	1/24/22 21:16	DFH
2-Propanethiol, as received	ND	16200	16200		ND	50000	50000	1620	1	1/24/22 21:16	DFH
Carbonyl sulfide, as received	ND	16200	16200		ND	40000	40000	1620	1	1/24/22 21:16	DFH
Dimethyl sulfide, as received	189000	48600	48600		480000	120000	120000	4860	1	1/25/22 10:03	DFH
Ethyl mercaptan, as received	ND	16200	16200		ND	41000	41000	1620	1	1/24/22 21:16	DFH
Methyl mercaptan, as received	ND	16200	16200		ND	32000	32000	1620	1	1/24/22 21:16	DFH
Total Reduced Sulfurs, as received	189000	48600	48600		260000	68000	68000	4860	1	1/25/22 10:03	DFH

Surrogate(s)	% Recovery	% Recovery Limits	Date/Time Analyzed
1,4-Difluorobenzene (Surr), as received	95.9	80-120	1/24/22 21:16
1,4-Difluorobenzene (Surr), as received	93.4	80-120	1/25/22 10:03

Volatile Organic Compounds by GC/TCD - Unadjusted, as received basis
EPA 3C

Analyte	Vol% Result	Vol% MDL	Vol% LOQ	Flag/Qual	Dilution	PF	Date/Time Analyzed	Analyst
Methane, as received	1.68	0.45	0.45		9	1	1/20/22 15:25	DFH
Carbon dioxide, as received	7.95	0.45	0.45		9	1	1/20/22 15:25	DFH
Oxygen (O2), as received	17.3	0.45	0.45		9	1	1/20/22 15:25	DFH
Hydrogen (H2), as received	1.26	0.18	0.18		9	1	1/20/22 15:25	DFH
Nitrogen (N2), as received	62.0	0.90	0.90		18	1	1/20/22 16:27	DFH
Carbon Monoxide, as received	ND	0.009	0.009		9	1	1/20/22 15:25	DFH

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Certificate of Analysis

Final Report

Laboratory Order ID 22A0884

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Submitted To:	Scott Schoffner	Project Number:	[none]
Client Site I.D.:	Bristol LF Chimney	Purchase Order:	07-SO04251

ANALYTICAL RESULTS

Project Location:

Field Sample #: Western Chimney

Sample ID: 22A0884-01

Sample Matrix: Air

Sampled: 1/19/2022 13:34

Sample Type: LF

Sample Description/Location:

Sub Description/Location:

Canister ID: 11079

Canister Size: 1.4

Initial Vacuum(in Hg): 30

Final Vacuum(in Hg): 3.4

Receipt Vacuum(in Hg): 3.4

Flow Controller Type: Passive

Flow Controller ID: LFGST004

Volatile Organic Compounds by GCMS
EPA TO-15

	ppbv				ug/M³						
Analyte	Results	MDL	LOQ	Flag/Qual	Results	MDL	LOQ	Dilution	PF	Date/Time Analyzed	Analyst
1,1,1-Trichloroethane	ND	86.4	216		ND	470	1200	432	1	1/21/22 13:08	RJW
1,1,1,2-Tetrachloroethane	ND	86.4	216		ND	590	1500	432	1	1/21/22 13:08	RJW
1,1,2,2-Tetrachloroethane	ND	86.4	216		ND	590	1500	432	1	1/21/22 13:08	RJW
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	86.4	216		ND	660	1700	432	1	1/21/22 13:08	RJW
1,1,2-Trichloroethane	ND	86.4	216		ND	470	1200	432	1	1/21/22 13:08	RJW
1,1-Dichloroethane	ND	86.4	216		ND	350	870	432	1	1/21/22 13:08	RJW
1,1-Dichloroethylene	ND	86.4	216		ND	340	860	432	1	1/21/22 13:08	RJW
1,2,4-Trimethylbenzene	134	86.4	216	J	660	420	1100	432	1	1/21/22 13:08	RJW
1,2-Dibromoethane (EDB)	ND	86.4	216		ND	660	1700	432	1	1/21/22 13:08	RJW
1,2-Dichlorobenzene	ND	86.4	216		ND	520	1300	432	1	1/21/22 13:08	RJW
1,2-Dichloroethane	ND	86.4	216		ND	350	870	432	1	1/21/22 13:08	RJW
1,2-Dichloropropane	ND	86.4	216		ND	400	1000	432	1	1/21/22 13:08	RJW
1,2-Dichlorotetrafluoroethane	ND	86.4	216		ND	600	1500	432	1	1/21/22 13:08	RJW
1,3,5-Trimethylbenzene	ND	86.4	216		ND	420	1100	432	1	1/21/22 13:08	RJW
1,3-Butadiene	ND	86.4	216		ND	190	480	432	1	1/21/22 13:08	RJW
1,3-Dichlorobenzene	ND	86.4	216		ND	520	1300	432	1	1/21/22 13:08	RJW
1,4-Dichlorobenzene	ND	86.4	216		ND	520	1300	432	1	1/21/22 13:08	RJW
1,4-Dioxane	955	86.4	216		3400	310	780	432	1	1/21/22 13:08	RJW
2-Butanone (MEK)	21800	259	648		64000	760	1900	1300	1	1/21/22 18:29	RJW
4-Methyl-2-pentanone (MIBK)	324	86.4	216		3700	990	2500	432	1	1/21/22 13:08	RJW
Allyl chloride	ND	86.4	216		ND	270	680	432	1	1/21/22 13:08	RJW
Benzene	35300	518	1300		110000	1700	4100	2590	1	1/24/22 11:32	RJW
Benzyl Chloride	ND	86.4	216		ND	450	1100	432	1	1/21/22 13:08	RJW
Bromodichloromethane	ND	86.4	216		ND	580	1400	432	1	1/21/22 13:08	RJW
Bromoform	ND	86.4	216		ND	890	2200	432	1	1/21/22 13:08	RJW
Bromomethane	ND	86.4	216		ND	340	840	432	1	1/21/22 13:08	RJW
Carbon Disulfide	ND	216	216		ND	670	670	432	1	1/21/22 13:08	RJW

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Certificate of Analysis

Final Report

Laboratory Order ID 22A0884

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Submitted To:	Scott Schoffner	Project Number:	[none]
Client Site I.D.:	Bristol LF Chimney	Purchase Order:	07-SO04251

ANALYTICAL RESULTS

Project Location:

Field Sample #: Western Chimney

Sample ID: 22A0884-01

Sample Matrix: Air

Sampled: 1/19/2022 13:34

Sample Type: LF

Sample Description/Location:

Sub Description/Location:

Canister ID: 11079

Canister Size: 1.4

Initial Vacuum(in Hg): 30

Final Vacuum(in Hg): 3.4

Receipt Vacuum(in Hg): 3.4

Flow Controller Type: Passive

Flow Controller ID: LFGST004

Volatile Organic Compounds by GCMS
EPA TO-15

	ppbv				ug/M³						
Analyte	Results	MDL	LOQ	Flag/Qual	Results	MDL	LOQ	Dilution	PF	Date/Time Analyzed	Analyst
Carbon Tetrachloride	ND	86.4	216		ND	540	1400	432	1	1/21/22 13:08	RJW
Chlorobenzene	ND	86.4	216		ND	400	990	432	1	1/21/22 13:08	RJW
Chloroethane	259	86.4	216		680	230	570	432	1	1/21/22 13:08	RJW
Chloroform	ND	86.4	216		ND	420	1100	432	1	1/21/22 13:08	RJW
Chloromethane	644	86.4	216		1300	180	450	432	1	1/21/22 13:08	RJW
cis-1,2-Dichloroethylene	ND	86.4	216		ND	340	860	432	1	1/21/22 13:08	RJW
cis-1,3-Dichloropropene	ND	86.4	216		ND	390	980	432	1	1/21/22 13:08	RJW
Cyclohexane	ND	86.4	216		ND	300	740	432	1	1/21/22 13:08	RJW
Dichlorodifluoromethane	ND	216	216		ND	1100	1100	432	1	1/21/22 13:08	RJW
Ethyl acetate	588	86.4	216		2100	310	780	432	1	1/21/22 13:08	RJW
Ethylbenzene	795	86.4	216		3500	380	940	432	1	1/21/22 13:08	RJW
Heptane	112	86.4	216	J	460	350	890	432	1	1/21/22 13:08	RJW
Hexane	99.4	86.4	216	J	350	300	760	432	1	1/21/22 13:08	RJW
Isopropylbenzene	ND	86.4	216		ND	420	1100	432	1	1/21/22 13:08	RJW
m+p-Xylenes	484	173	432		2100	750	1900	432	1	1/21/22 13:08	RJW
Methyl methacrylate	ND	86.4	216		ND	350	880	432	1	1/21/22 13:08	RJW
Methylene chloride	ND	216	432		ND	750	1500	432	1	1/21/22 13:08	RJW
Methyl-t-butyl ether (MTBE)	ND	86.4	216		ND	310	780	432	1	1/21/22 13:08	RJW
Naphthalene	177	86.4	216	J	930	450	1100	432	1	1/21/22 13:08	RJW
o-Xylene	156	86.4	216	J	680	380	940	432	1	1/21/22 13:08	RJW
Propylene	7140	86.4	216		12000	150	370	432	1	1/21/22 13:08	RJW
Styrene	ND	86.4	216		ND	370	920	432	1	1/21/22 13:08	RJW
TBA	860	216	216		2600	650	650	432	1	1/21/22 13:08	RJW
Tetrachloroethylene (PCE)	ND	86.4	216		ND	590	1500	432	1	1/21/22 13:08	RJW
Tetrahydrofuran	9100	86.4	216		27000	250	640	432	1	1/21/22 13:08	RJW
Toluene	1620	86.4	216		6100	330	810	432	1	1/21/22 13:08	RJW
trans-1,2-Dichloroethylene	ND	86.4	216		ND	340	860	432	1	1/21/22 13:08	RJW

ENTHALPY ANALYTICAL

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Certificate of Analysis

Final Report

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Submitted To:	Scott Schoffner	Project Number:	[none]
Client Site I.D.:	Bristol LF Chimney	Purchase Order:	07-SO04251

ANALYTICAL RESULTS

Project Location:

Field Sample #: Western Chimney

Sample ID: 22A0884-01

Sample Matrix: Air

Sampled: 1/19/2022 13:34

Sample Type: LF

Sample Description/Location:

Sub Description/Location:

Canister ID: 11079

Canister Size: 1.4

Initial Vacuum(in Hg): 30

Final Vacuum(in Hg): 3.4

Receipt Vacuum(in Hg): 3.4

Flow Controller Type: Passive

Flow Controller ID: LFGST004

Volatile Organic Compounds by GCMS
EPA TO-15

	ppbv				ug/M³						
Analyte	**Results**	**MDL**	**LOQ**	**Flag/Qual**	**Results**	**MDL**	**LOQ**	**Dilution**	**PF**	**Date/Time Analyzed**	**Analyst**
trans-1,3-Dichloropropene	ND	86.4	216		ND	390	980	432	1	1/21/22 13:08	RJW
Trichloroethylene	ND	86.4	216		ND	460	1200	432	1	1/21/22 13:08	RJW
Trichlorofluoromethane	ND	216	216		ND	1200	1200	432	1	1/21/22 13:08	RJW
Vinyl acetate	ND	86.4	216		ND	300	760	432	1	1/21/22 13:08	RJW
Vinyl bromide	ND	86.4	216		ND	380	940	432	1	1/21/22 13:08	RJW
Vinyl chloride	ND	86.4	216		ND	220	550	432	1	1/21/22 13:08	RJW
Xylenes, Total	639	259	648	J	2800	1100	2800	432	1	1/21/22 13:08	RJW

Surrogate(s)	% Recovery	% Recovery Limits	
4-Bromofluorobenzene (Surr)	105	80-120	1/21/22 13:08
4-Bromofluorobenzene (Surr)	103	80-120	1/21/22 18:29
4-Bromofluorobenzene (Surr)	103	80-120	1/24/22 11:32

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Submitted To:	Scott Schoffner	Project Number:	[none]
Client Site I.D.:	Bristol LF Chimney	Purchase Order:	07-SO04251

Analytical Summary

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Sulfur Volatile Organic Compounds by GCMS			**Preparation Method:**	**No Prep VOC Air**	
22A0884-01	100 mL / 100 mL	EPA TO-15	BFA0685	SFA0669	AL10057
22A0884-01RE1	100 mL / 100 mL	EPA TO-15	BFA0685	SFA0670	AL10057

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Volatile Organic Compounds by GC/TCD - Unadjusted, as received basis			**Preparation Method:**	**No Prep VOC GC Air**	
22A0884-01	1.00 mL / 1.00 mL	EPA 3C	BFA0569	SFA0546	AG00026
22A0884-01RE1	1.00 mL / 1.00 mL	EPA 3C	BFA0569	SFA0546	AG00026

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Volatile Organic Compounds by GCMS			**Preparation Method:**	**No Prep VOC Air**	
22A0884-01	400 mL / 400 mL	EPA TO-15	BFA0601	SFA0577	AF10138
22A0884-01RE1	400 mL / 400 mL	EPA TO-15	BFA0601	SFA0577	AF10138
22A0884-01RE2	400 mL / 400 mL	EPA TO-15	BFA0601	SFA0624	AF10138

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Certificate of Analysis

Final Report

Laboratory Order ID 22A0884

Client Name:	SCS Field Services - Harrisburg, PA 4330 Lewis Road, Suite 1 Harrisburg, PA 17111	Date Received: Date Issued:	January 20, 2022 13:55 January 25, 2022 17:11
Submitted To:	Scott Schoffner	Project Number:	[none]
Client Site I.D.:	Bristol LF Chimney	Purchase Order:	07-SO04251

Volatile Organic Compounds by GCMS - Quality Control

Enthalpy Analytical

Analyte	Result		Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BFA0601 - No Prep VOC Air											
Blank (BFA0601-BLK1)					Prepared & Analyzed: 01/21/2022						
1,1,1-Trichloroethane		<	0.50	ppbv							
1,1,1,2-Tetrachloroethane		<	0.50	ppbv							
1,1,2,2-Tetrachloroethane		<	0.50	ppbv							
1,1,2-Trichloro-1,2,2-trifluoroethane		<	0.50	ppbv							
1,1,2-Trichloroethane		<	0.50	ppbv							
1,1-Dichloroethane		<	0.50	ppbv							
1,1-Dichloroethylene		<	0.50	ppbv							
1,2,4-Trimethylbenzene		<	0.50	ppbv							
1,2-Dibromoethane (EDB)		<	0.50	ppbv							
1,2-Dichlorobenzene		<	0.50	ppbv							
1,2-Dichloroethane		<	0.50	ppbv							
1,2-Dichloropropane		<	0.50	ppbv							
1,2-Dichlorotetrafluoroethane		<	0.50	ppbv							
1,3,5-Trimethylbenzene		<	0.50	ppbv							
1,3-Butadiene		<	0.50	ppbv							
1,3-Dichlorobenzene		<	0.50	ppbv							
1,4-Dichlorobenzene		<	0.50	ppbv							
1,4-Dioxane		<	0.50	ppbv							
2-Butanone (MEK)		<	0.50	ppbv							
4-Methyl-2-pentanone (MIBK)		<	0.50	ppbv							
Allyl chloride		<	0.50	ppbv							
Benzene		<	0.50	ppbv							
Benzyl Chloride		<	0.50	ppbv							
Bromodichloromethane		<	0.50	ppbv							
Bromoform		<	0.50	ppbv							
Bromomethane		<	0.50	ppbv							
Carbon Disulfide		<	0.50	ppbv							
Carbon Tetrachloride		<	0.50	ppbv							
Chlorobenzene		<	0.50	ppbv							
Chloroethane		<	0.50	ppbv							
Chloroform		<	0.50	ppbv							

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Submitted To:	Scott Schoffner	Project Number:	[none]
Client Site I.D.:	Bristol LF Chimney	Purchase Order:	07-SO04251

Volatile Organic Compounds by GCMS - Quality Control

Enthalpy Analytical

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BFA0601 - No Prep VOC Air										
Blank (BFA0601-BLK1)				Prepared & Analyzed: 01/21/2022						
Chloromethane	<	0.50	ppbv							
cis-1,2-Dichloroethylene	<	0.50	ppbv							
cis-1,3-Dichloropropene	<	0.50	ppbv							
Cyclohexane	<	0.50	ppbv							
Dichlorodifluoromethane	<	0.50	ppbv							
Ethyl acetate	<	0.50	ppbv							
Ethylbenzene	<	0.50	ppbv							
Heptane	<	0.50	ppbv							
Hexane	<	0.50	ppbv							
Isopropylbenzene	<	0.50	ppbv							
m+p-Xylenes	<	1.00	ppbv							
Methyl methacrylate	<	0.50	ppbv							
Methylene chloride	<	1.00	ppbv							
Methyl-t-butyl ether (MTBE)	<	0.50	ppbv							
Naphthalene	<	0.50	ppbv							
o-Xylene	<	0.50	ppbv							
Propylene	0.36	0.50	ppbv							
Styrene	<	0.50	ppbv							
TBA	<	0.50	ppbv							
Tetrachloroethylene (PCE)	<	0.50	ppbv							
Tetrahydrofuran	<	0.50	ppbv							
Toluene	<	0.50	ppbv							
trans-1,2-Dichloroethylene	<	0.50	ppbv							
trans-1,3-Dichloropropene	<	0.50	ppbv							
Trichloroethylene	<	0.50	ppbv							
Trichlorofluoromethane	<	0.50	ppbv							
Vinyl acetate	<	0.50	ppbv							
Vinyl bromide	<	0.50	ppbv							
Vinyl chloride	<	0.50	ppbv							
Xylenes, Total	<	1.50	ppbv							
Surr: 4-Bromofluorobenzene (Surr)	*5.08*		ppbv	*5.00*		*102*	*80-120*			

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Final Report

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Client Name:	SCS Field Services - Harrisburg, PA 4330 Lewis Road, Suite 1 Harrisburg, PA 17111	Date Received: Date Issued:	January 20, 2022 13:55 January 25, 2022 17:11
Submitted To:	Scott Schoffner	Project Number:	[none]
Client Site I.D.:	Bristol LF Chimney	Purchase Order:	07-SO04251

Volatile Organic Compounds by GCMS - Quality Control

Enthalpy Analytical

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BFA0601 - No Prep VOC Air										
LCS (BFA0601-BS1)				Prepared & Analyzed: 01/21/2022						
1,1,1-Trichloroethane	5.21	0.5	ppbv	5.00		104	70-130			
1,1,2,2-Tetrachloroethane	5.59	0.5	ppbv	5.00		112	70-130			
1,1,2-Trichloro-1,2,2-trifluoroethane	5.11	0.5	ppbv	5.00		102	70-130			
1,1,2-Trichloroethane	5.44	0.5	ppbv	5.00		109	70-130			
1,1-Dichloroethane	5.25	0.5	ppbv	5.00		105	70-130			
1,1-Dichloroethylene	5.10	0.5	ppbv	5.00		102	70-130			
1,2,4-Trimethylbenzene	5.67	0.5	ppbv	5.00		113	70-130			
1,2-Dibromoethane (EDB)	5.75	0.5	ppbv	5.00		115	70-130			
1,2-Dichlorobenzene	5.75	0.5	ppbv	5.00		115	70-130			
1,2-Dichloroethane	5.34	0.5	ppbv	5.00		107	70-130			
1,2-Dichloropropane	5.53	0.5	ppbv	5.00		111	70-130			
1,2-Dichlorotetrafluoroethane	5.02	0.5	ppbv	5.00		100	70-130			
1,3,5-Trimethylbenzene	5.54	0.5	ppbv	5.00		111	70-130			
1,3-Butadiene	4.64	0.5	ppbv	5.00		92.8	70-130			
1,3-Dichlorobenzene	5.61	0.5	ppbv	5.00		112	70-130			
1,4-Dichlorobenzene	5.75	0.5	ppbv	5.00		115	70-130			
1,4-Dioxane	5.41	0.5	ppbv	5.00		108	70-130			
2-Butanone (MEK)	5.23	0.5	ppbv	5.00		105	70-130			
4-Methyl-2-pentanone (MIBK)	5.49	0.5	ppbv	5.00		110	70-130			
Allyl chloride	4.57	0.5	ppbv	5.00		91.4	70-130			
Benzene	5.53	0.5	ppbv	5.00		111	70-130			
Benzyl Chloride	4.73	0.5	ppbv	5.00		94.6	70-130			
Bromodichloromethane	5.26	0.5	ppbv	5.00		105	70-130			
Bromoform	5.67	0.5	ppbv	5.00		113	70-130			
Bromomethane	5.02	0.5	ppbv	5.00		100	70-130			
Carbon Disulfide	4.60	0.5	ppbv	5.00		92.0	70-130			
Carbon Tetrachloride	5.10	0.5	ppbv	5.00		102	70-130			
Chlorobenzene	5.41	0.5	ppbv	5.00		108	70-130			
Chloroethane	4.86	0.5	ppbv	5.00		97.2	70-130			
Chloroform	4.96	0.5	ppbv	5.00		99.2	70-130			
Chloromethane	4.68	0.5	ppbv	5.00		93.6	70-130			
cis-1,2-Dichloroethylene	5.43	0.5	ppbv	5.00		109	70-130			
cis-1,3-Dichloropropene	5.29	0.5	ppbv	5.00		106	70-130			

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Final Report

Laboratory Order ID 22A0884

Client Name:	SCS Field Services - Harrisburg, PA 4330 Lewis Road, Suite 1 Harrisburg, PA 17111	Date Received: Date Issued:	January 20, 2022 13:55 January 25, 2022 17:11
Submitted To:	Scott Schoffner	Project Number:	[none]
Client Site I.D.:	Bristol LF Chimney	Purchase Order:	07-SO04251

Volatile Organic Compounds by GCMS - Quality Control

Enthalpy Analytical

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BFA0601 - No Prep VOC Air										
LCS (BFA0601-BS1)					Prepared & Analyzed: 01/21/2022					
Cyclohexane	5.25	0.5	ppbv	5.00		105	70-130			
Dichlorodifluoromethane	4.84	0.5	ppbv	5.00		96.8	70-130			
Ethyl acetate	4.94	0.5	ppbv	5.00		98.8	70-130			
Ethylbenzene	5.71	0.5	ppbv	5.00		114	70-130			
Heptane	5.35	0.5	ppbv	5.00		107	70-130			
Hexane	5.31	0.5	ppbv	5.00		106	70-130			
m+p-Xylenes	11.1	1	ppbv	10.0		111	70-130			
Methylene chloride	4.91	1	ppbv	5.00		98.2	70-130			
Methyl-t-butyl ether (MTBE)	5.10	0.5	ppbv	5.00		102	70-130			
Naphthalene	5.85	0.5	ppbv	5.00		117	60-140			
o-Xylene	5.47	0.5	ppbv	5.00		109	70-130			
Propylene	5.69	0.5	ppbv	5.00		114	70-130			
Styrene	5.79	0.5	ppbv	5.00		116	70-130			
Tetrachloroethylene (PCE)	5.67	0.5	ppbv	5.00		113	70-130			
Tetrahydrofuran	5.78	0.5	ppbv	5.00		116	70-130			
Toluene	5.54	0.5	ppbv	5.00		111	70-130			
trans-1,2-Dichloroethylene	5.36	0.5	ppbv	5.00		107	70-130			
trans-1,3-Dichloropropene	5.20	0.5	ppbv	5.00		104	70-130			
Trichloroethylene	5.24	0.5	ppbv	5.00		105	70-130			
Trichlorofluoromethane	4.83	0.5	ppbv	5.00		96.6	70-130			
Vinyl acetate	3.82	0.5	ppbv	5.00		76.4	70-130			
Vinyl bromide	5.15	0.5	ppbv	5.00		103	70-130			
Vinyl chloride	4.73	0.5	ppbv	5.00		94.6	70-130			
Surr: 4-Bromofluorobenzene (Surr)	*5.33*		ppbv	*5.00*		*107*	*70-130*			
LCS Dup (BFA0601-BSD1)					Prepared & Analyzed: 01/21/2022					
1,1,1-Trichloroethane	5.19	0.5	ppbv	5.00		104	70-130	0.385	25	
1,1,2,2-Tetrachloroethane	5.53	0.5	ppbv	5.00		111	70-130	1.08	25	
1,1,2-Trichloro-1,2,2-trifluoroethane	5.04	0.5	ppbv	5.00		101	70-130	1.38	25	
1,1,2-Trichloroethane	5.40	0.5	ppbv	5.00		108	70-130	0.738	25	
1,1-Dichloroethane	5.26	0.5	ppbv	5.00		105	70-130	0.190	25	
1,1-Dichloroethylene	5.02	0.5	ppbv	5.00		100	70-130	1.58	25	
1,2,4-Trimethylbenzene	5.71	0.5	ppbv	5.00		114	70-130	0.703	25	

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Certificate of Analysis

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Submitted To:	Scott Schoffner	Project Number:	[none]
Client Site I.D.:	Bristol LF Chimney	Purchase Order:	07-SO04251

Volatile Organic Compounds by GCMS - Quality Control

Enthalpy Analytical

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BFA0601 - No Prep VOC Air										
LCS Dup (BFA0601-BSD1)					Prepared & Analyzed: 01/21/2022					
1,2-Dibromoethane (EDB)	5.71	0.5	ppbv	5.00		114	70-130	0.698	25	
1,2-Dichlorobenzene	5.75	0.5	ppbv	5.00		115	70-130	0.00	25	
1,2-Dichloroethane	5.41	0.5	ppbv	5.00		108	70-130	1.30	25	
1,2-Dichloropropane	5.51	0.5	ppbv	5.00		110	70-130	0.362	25	
1,2-Dichlorotetrafluoroethane	5.07	0.5	ppbv	5.00		101	70-130	0.991	25	
1,3,5-Trimethylbenzene	5.53	0.5	ppbv	5.00		111	70-130	0.181	25	
1,3-Butadiene	4.59	0.5	ppbv	5.00		91.8	70-130	1.08	25	
1,3-Dichlorobenzene	5.61	0.5	ppbv	5.00		112	70-130	0.00	25	
1,4-Dichlorobenzene	5.80	0.5	ppbv	5.00		116	70-130	0.866	25	
1,4-Dioxane	5.42	0.5	ppbv	5.00		108	70-130	0.185	25	
2-Butanone (MEK)	5.24	0.5	ppbv	5.00		105	70-130	0.191	25	
4-Methyl-2-pentanone (MIBK)	5.54	0.5	ppbv	5.00		111	70-130	0.907	25	
Allyl chloride	4.58	0.5	ppbv	5.00		91.6	70-130	0.219	25	
Benzene	5.52	0.5	ppbv	5.00		110	70-130	0.181	25	
Benzyl Chloride	4.78	0.5	ppbv	5.00		95.6	70-130	1.05	25	
Bromodichloromethane	5.23	0.5	ppbv	5.00		105	70-130	0.572	25	
Bromoform	5.56	0.5	ppbv	5.00		111	70-130	1.96	25	
Bromomethane	4.95	0.5	ppbv	5.00		99.0	70-130	1.40	25	
Carbon Disulfide	4.76	0.5	ppbv	5.00		95.2	70-130	3.42	25	
Carbon Tetrachloride	5.16	0.5	ppbv	5.00		103	70-130	1.17	25	
Chlorobenzene	5.46	0.5	ppbv	5.00		109	70-130	0.920	25	
Chloroethane	4.75	0.5	ppbv	5.00		95.0	70-130	2.29	25	
Chloroform	4.94	0.5	ppbv	5.00		98.8	70-130	0.404	25	
Chloromethane	4.66	0.5	ppbv	5.00		93.2	70-130	0.428	25	
cis-1,2-Dichloroethylene	5.38	0.5	ppbv	5.00		108	70-130	0.925	25	
cis-1,3-Dichloropropene	5.34	0.5	ppbv	5.00		107	70-130	0.941	25	
Cyclohexane	5.29	0.5	ppbv	5.00		106	70-130	0.759	25	
Dichlorodifluoromethane	4.82	0.5	ppbv	5.00		96.4	70-130	0.414	25	
Ethyl acetate	5.04	0.5	ppbv	5.00		101	70-130	2.00	25	
Ethylbenzene	5.69	0.5	ppbv	5.00		114	70-130	0.351	25	
Heptane	5.41	0.5	ppbv	5.00		108	70-130	1.12	25	
Hexane	5.31	0.5	ppbv	5.00		106	70-130	0.00	25	
m+p-Xylenes	11.1	1	ppbv	10.0		111	70-130	0.540	25	
Methylene chloride	4.90	1	ppbv	5.00		98.0	70-130	0.204	25	

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Submitted To:	Scott Schoffner	Project Number:	[none]
Client Site I.D.:	Bristol LF Chimney	Purchase Order:	07-SO04251

Volatile Organic Compounds by GCMS - Quality Control

Enthalpy Analytical

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BFA0601 - No Prep VOC Air										
LCS Dup (BFA0601-BSD1)					Prepared & Analyzed: 01/21/2022					
Methyl-t-butyl ether (MTBE)	5.09	0.5	ppbv	5.00		102	70-130	0.196	25	
Naphthalene	5.95	0.5	ppbv	5.00		119	60-140	1.69	25	
o-Xylene	5.48	0.5	ppbv	5.00		110	70-130	0.183	25	
Propylene	5.69	0.5	ppbv	5.00		114	70-130	0.00	25	
Styrene	5.81	0.5	ppbv	5.00		116	70-130	0.345	25	
Tetrachloroethylene (PCE)	5.70	0.5	ppbv	5.00		114	70-130	0.528	25	
Tetrahydrofuran	5.79	0.5	ppbv	5.00		116	70-130	0.173	25	
Toluene	5.48	0.5	ppbv	5.00		110	70-130	1.09	25	
trans-1,2-Dichloroethylene	5.34	0.5	ppbv	5.00		107	70-130	0.374	25	
trans-1,3-Dichloropropene	5.26	0.5	ppbv	5.00		105	70-130	1.15	25	
Trichloroethylene	5.25	0.5	ppbv	5.00		105	70-130	0.191	25	
Trichlorofluoromethane	4.71	0.5	ppbv	5.00		94.2	70-130	2.52	25	
Vinyl acetate	3.93	0.5	ppbv	5.00		78.6	70-130	2.84	25	
Vinyl bromide	5.10	0.5	ppbv	5.00		102	70-130	0.976	25	
Vinyl chloride	4.72	0.5	ppbv	5.00		94.4	70-130	0.212	25	
Surr: 4-Bromofluorobenzene (Surr)	*5.29*		ppbv	*5.00*		*106*	*70-130*			

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Submitted To:	Scott Schoffner	Project Number:	[none]
Client Site I.D.:	Bristol LF Chimney	Purchase Order:	07-SO04251

Volatile Organic Compounds by GC/TCD - Unadjusted, as received basis - Quality Control

Enthalpy Analytical

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BFA0569 - No Prep VOC GC Air										
Blank (BFA0569-BLK1)					Prepared & Analyzed: 01/20/2022					
Methane	<	0.05	Vol%							
Carbon dioxide	<	0.05	Vol%							
Oxygen (O2)	<	0.05	Vol%							
Hydrogen (H2)	<	0.02	Vol%							
Nitrogen (N2)	<	0.05	Vol%							
Carbon Monoxide	<	0.001	Vol%							
LCS (BFA0569-BS1)					Prepared & Analyzed: 01/20/2022					
Methane	4570	0.05	ppmv	5000		91.4	70-130			
Carbon dioxide	4100	0.05	ppmv	5000		82.0	70-130			
Oxygen (O2)	4830	0.05	ppmv	5000		96.6	70-130			
Hydrogen (H2)	5060	0.02	ppmv	5100		99.2	70-130			
Nitrogen (N2)	4990	0.05	ppmv	5000		99.8	70-130			
Carbon Monoxide	4690	0.001	ppmv	5000		93.9	70-130			
Duplicate (BFA0569-DUP1)				**Source: 22A0884-01**	Prepared & Analyzed: 01/20/2022					
Methane	1.68	0.45	Vol%		1.68			0.110	5	
Carbon dioxide	7.93	0.45	Vol%		7.95			0.263	5	
Oxygen (O2)	17.3	0.45	Vol%		17.3			0.217	5	
Hydrogen (H2)	1.23	0.18	Vol%		1.26			2.10	5	
Carbon Monoxide	<	0.009	Vol%		<0.009			NA	5	

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Client Name:	SCS Field Services - Harrisburg, PA 4330 Lewis Road, Suite 1 Harrisburg, PA 17111	Date Received: Date Issued:	January 20, 2022 13:55 January 25, 2022 17:11
Submitted To:	Scott Schoffner	Project Number:	[none]
Client Site I.D.:	Bristol LF Chimney	Purchase Order:	07-SO04251

Sulfur Volatile Organic Compounds by GCMS - Quality Control

Enthalpy Analytical

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BFA0685 - No Prep VOC Air										
Blank (BFA0685-BLK1)				Prepared & Analyzed: 01/24/2022						
Carbon Disulfide	<	10.0	ppbv							
Hydrogen Sulfide	<	10.0	ppbv							
1-Propanethiol	<	10.0	ppbv							
2-Propanethiol	<	10.0	ppbv							
Carbonyl sulfide	<	10.0	ppbv							
Dimethyl sulfide	<	10.0	ppbv							
Ethyl mercaptan	<	10.0	ppbv							
Methyl mercaptan	<	10.0	ppbv							
Total Reduced Sulfurs	<	10.0	ppbv							
Surr: 1,4-Difluorobenzene (Surr)	*18.5*		ppbv	*20.0*		*92.6*	*80-120*			
LCS (BFA0685-BS1)				Prepared & Analyzed: 01/24/2022						
Carbon Disulfide	25.8	10	ppbv	20.0		129	70-130			
Hydrogen Sulfide	18.2	10	ppbv	20.0		91.0	70-130			
1-Propanethiol	22.0	10	ppbv	20.0		110	70-130			
2-Propanethiol	26.8	10	ppbv	20.0		134	70-130			L
Carbonyl sulfide	29.0	10	ppbv	20.0		145	70-130			L
Dimethyl sulfide	24.9	10	ppbv	20.0		125	70-130			
Ethyl mercaptan	27.4	10	ppbv	17.3		158	70-130			L
Methyl mercaptan	25.4	10	ppbv	17.7		144	70-130			L
Surr: 1,4-Difluorobenzene (Surr)	*19.3*		ppbv	*20.0*		*96.6*	*70-130*			

ENTHALPY ANALYTICAL

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Certificate of Analysis

Final Report

Laboratory Order ID 22A0884

Client Name:	SCS Field Services - Harrisburg, PA 4330 Lewis Road, Suite 1 Harrisburg, PA 17111	Date Received: Date Issued:	January 20, 2022 13:55 January 25, 2022 17:11
Submitted To:	Scott Schoffner	Project Number:	[none]
Client Site I.D.:	Bristol LF Chimney	Purchase Order:	07-SO04251

Certified Analytes included in this Report

Analyte	Certifications
EPA 3C in Air	
Methane	VELAP
Oxygen (O2)	VELAP
Nitrogen (N2)	VELAP
EPA TO-15 in Air	
Carbon Disulfide	VELAP
1,1,1-Trichloroethane	VELAP
1,1,1,2-Tetrachloroethane	VELAP
1,1,2,2-Tetrachloroethane	VELAP
1,1,2-Trichloro-1,2,2-trifluoroethane	VELAP
1,1,2-Trichloroethane	VELAP
1,1-Dichloroethane	VELAP
1,1-Dichloroethylene	VELAP
1,2,4-Trimethylbenzene	VELAP
1,2-Dibromoethane (EDB)	VELAP
1,2-Dichlorobenzene	VELAP
1,2-Dichloroethane	VELAP
1,2-Dichloropropane	VELAP
1,2-Dichlorotetrafluoroethane	VELAP
1,3,5-Trimethylbenzene	VELAP
1,3-Butadiene	VELAP
1,3-Dichlorobenzene	VELAP
1,4-Dichlorobenzene	VELAP
1,4-Dioxane	VELAP
2-Butanone (MEK)	VELAP
4-Methyl-2-pentanone (MIBK)	VELAP
Allyl chloride	VELAP
Benzene	VELAP
Benzyl Chloride	VELAP
Bromodichloromethane	VELAP
Bromoform	VELAP
Bromomethane	VELAP
Carbon Disulfide	VELAP
Carbon Tetrachloride	VELAP
Chlorobenzene	VELAP
Chloroethane	VELAP
Chloroform	VELAP
Chloromethane	VELAP
cis-1,2-Dichloroethylene	VELAP
cis-1,3-Dichloropropene	VELAP
Cyclohexane	VELAP
Dichlorodifluoromethane	VELAP
Ethyl acetate	VELAP
Ethylbenzene	VELAP
Heptane	VELAP
Hexane	VELAP
Isopropylbenzene	VELAP
m+p-Xylenes	VELAP
Methyl methacrylate	VELAP
Methylene chloride	VELAP
Methyl-t-butyl ether (MTBE)	VELAP
Naphthalene	VELAP
o-Xylene	VELAP
Propylene	VELAP
Styrene	VELAP
TBA	VELAP
Tetrachloroethylene (PCE)	VELAP
Tetrahydrofuran	VELAP
Toluene	VELAP
trans-1,2-Dichloroethylene	VELAP
trans-1,3-Dichloropropene	VELAP
Trichloroethylene	VELAP
Trichlorofluoromethane	VELAP
Vinyl acetate	VELAP
Vinyl bromide	VELAP
Vinyl chloride	VELAP
Xylenes, Total	VELAP

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Code	Description	Laboratory ID	Expires
MADEP	Massachusetts DEP	M-VA913	06/30/2022
MdDOE	Maryland DE Drinking Water	341	12/31/2022
NC	North Carolina DENR	495	07/31/2022
NCDEQ	North Carolina DEQ	495	12/31/2022
NCDOH	North Carolina Department of Health	51714	07/31/2022
NHDES	NELAP-New Hampshire Certificate #224221	2242	02/25/2022
NJDEP	NELAP-New Jersey DEP	VA015	06/30/2022
NYDOH	New York DOH Drinking Water	12096	04/01/2022
PADEP	NELAP-Pennsylvania Certificate #007	68-03503	10/31/2022
VELAP	NELAP-Virginia Certificate #11539	460021	06/14/2022
WVDEP	West Virginia DEP	350	02/28/2022

Qualifiers and Definitions

J	The reported result is an estimated value.
L	LCS recovery is outside of established acceptance limits
RPD	Relative Percent Difference
Qual	Qualifers
-RE	Denotes sample was re-analyzed
PF	Preparation Factor
MDL	Method Detection Limit
LOQ	Limit of Quantitation
ppbv	parts per billion by volume
TIC	Tentatively Identified Compounds are compounds that are identified by comparing the analyte mass spectral pattern with the NIST spectral library. A TIC spectral match is reported when the pattern is at least 75% consistent with the published pattern. Compound concentrations are estimated and are calculated using an internal standard response factor of 1.

All EPA method 3C results are reported as normalized values when the sum total of all evaluated constituents is outside ± 10% of the absolute.

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Air Chain of Custody Record

Lab No:

Page: 1 of 1

Turn Around Time (rush by advanced notice only)

Standard:		5 Day:		3 Day:	✓
2 Day:		1 Day:	X	Custom TAT:	

#N/A

#N/A

CUSTOMER INFORMATION

Company:	SCS Engineers
Report To:	Brandon King / Ernie Hoch
Email:	bking@scsengineers.com
Address:	
Phone:	864-840-7846
Fax:	

PROJECT INFORMATION

Name:	Bristol LF chimney
Number:	
P.O. #:	
Address:	
Global ID:	
Sampled By:	D. Brandon King

Special Instructions:

low priority on sulfurs
make sure enough sample is there
for Method 3C & TO-15

	Sample ID	Type [I] Indoor [A] Ambient [SV] Soil Vapor [S] Source	Equipment Information: Canister ID	Size (1L, 3L, 6L, 15L)	Flow Controller ID	Sampling Information: Sample Start Date	Sample Start Time	Vacuum Start "Hg	Sample End Date	Sample End Time	Vacuum End "Hg	Analysis Requested: Method 3C	TO-15	Sulfurs
1	Western Chimney	LF6	11079	1.4	LF6-5604	1/19/22	13:32	-24	1/19/22	13:39	-6	X	X	X
2														
3														
4														
5														
6														
7														
8														
9														
10														

	Signature	Print Name	Company / Title	Date / Time
[1] Relinquished By:	D. Brandon King	D. Brandon King	SCS / PM	1/25/22 9:56
[1] Received By:		Brian Taylor	EA / courier	1/20/22 10:51
[2] Relinquished By:		Brian Taylor	EA / courier	1/20/22 1355
[2] Received By:	JH		EA	1-20-22 1355
[3] Relinquished By:				
[3] Received By:				

notice no seal ~~27~~ JH 310 19.6C

22A0884

SCS Field Services 22A0884
Carbon Monoxide Monitoring - Br
Recd: 01/20/2022 Due: 01/25/2022

v130325002

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Sample Conditions Checklist

Samples Received at:	**19.60°C**
How were samples received?	AWS Courier
Were Custody Seals used? If so, were they received intact?	No
Are the custody papers filled out completely and correctly?	Yes
Do all bottle labels agree with custody papers?	Yes
Is the temperature blank or representative sample within acceptable limits or received on ice, and recently taken?	Yes
Are all samples within holding time for requested laboratory tests?	Yes
Is a sufficient amount of sample provided to perform the tests included?	Yes
Are all samples in appropriate containers for the analyses requested?	Yes
Were volatile organic containers received?	No
Are all volatile organic and TOX containers free of headspace?	NA
Is a trip blank provided for each VOC sample set? VOC sample sets include EPA8011, EPA504, EPA8260, EPA624, EPA8015 GRO, EPA8021, EPA524, and RSK-175.	NA
Are all samples received appropriately preserved? Note that metals containers do not require field preservation but lab preservation may delay analysis.	Yes

Work Order Comments