

EQUALIZATION TANK SYSTEM

BRISTOL INTEGRATED SOLID WASTE MANAGEMENT FACILITY
BRISTOL, VIRGINIA

INVITATION TO BID PACKAGE

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EXECUTIVE SUMMARY

ITB# **SW-26-002**

January 9, 2026

The City of Bristol, Virginia (the City) is seeking bids from qualified bidders for the construction of the Equalization Tank System at the Bristol Integrated Solid Waste Management Facility (ISWMF) (the Facility) located in Bristol, Virginia described herein.

This invitation does not commit the City to pay any costs incurred in the preparation of bids, nor commits the City to select any bidders that respond.

Geosyntec Consultants Inc. (Geosyntec) has prepared this Project Manual for the City of Bristol, Virginia for the construction of the Equalization Tank System at the Facility.

SUBMITTAL REQUIREMENTS

Bids should be submitted to the City of Bristol for the Equalization Tank System. Five (5) complete sealed copies of bidding documents for the Equalization Tank System must be received at the City of Bristol, Virginia Procurement Department, **Attn: Nikki Asher**, at 300 Lee Street, Bristol, VA 24201, no later than 2:00 p.m. Eastern Standard Time (per time.gov) on February 11, 2026, as listed on the invitation to bid. If proprietary information is included in the bid, then Bidders shall provide one (1) additional copy with all information considered proprietary redacted and suitable for public inspection in accordance with Section 2.2-4342 of the Code of Virginia. Each copy shall be complete and separately bound. Sections shall be identified to facilitate evaluation and to prevent evaluators from unnecessary search or arranging of materials for evaluation purposes. The City of Bristol requires five (5) complete sealed copies of bidding documents. Those wishing to submit electronically may do so via the eVA procurement platform while also submitting the required paper copies to the City by the due date. No FAXED nor emailed bids will be accepted.

The Bid package shall also include one (1) separate unbound copy of the Bid Form to facilitate opening and reading of the Bids. The Bid must be enclosed in a plainly marked package with the Project title, the name and address of the Bidder, and must be accompanied by the Bid Security and other required documents. The sealed envelope containing the Bid must be enclosed in a separate package plainly marked on the outside with the notation "BID ENCLOSED – Invitation to Bid # **SW-26-002** for the Equalization Tank System" A mailed Bid must be addressed to the location designated in the Advertisement.

The public opening of the bids will take place at the Council Chambers at City Hall located at 300 Lee Street, Bristol VA 24201, immediately following the bid due deadline. 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. Bids received after the date and time prescribed for the opening of the 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. The City reserves the right to reject any or all Bids, including, without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. The City also reserves the right to waive all minor Bid informalities not involving price, time, or changes in the Work.

END OF EXECUTIVE SUMMARY

SECTION 00 11 16 – INVITATION TO BID

Project: Equalization Tank System

Owner:

City of Bristol
2655 Valley Drive
Bristol, VA 24201

Engineer:

Geosyntec Consultants Inc.
134 N. La Salle Street, Suite 300
Chicago, IL 60602 USA

Calendar of Events:

Calendar of Events	Date
Issue Date	1/9/2026
Prebid Conference Date (Teams/Virtual Meeting)	1/16/2026
Inquiry Cut-off Date	1/21/2026
Addendum Posted Date	1/28/2026
Bid Due Date	2/11/2026
Award Date	TBD

Prospective Bidders

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

City of Bristol, VA
Attention: Nikki Asher
300 Lee Street Bristol, VA 24201
Bid on Equalization Tank System
Due Date: February 11, 2026

Bids should be submitted to the City of Bristol for the Equalization Tank System. Five (5) complete sealed copies of bidding documents for the Equalization Tank System must be received at the City of Bristol, Virginia Procurement Department, Attn: Nikki Asher, at 300 Lee Street, Bristol, VA 24201, no later than 2:00 p.m. Eastern Standard Time (per time.gov) on February 11, 2026. If proprietary information is included in the bid, then Bidders shall provide one (1) additional copy with all information considered proprietary redacted and suitable for public inspection in accordance with Section 2.2-4342 of the Code of Virginia. Each copy shall be complete and separately bound. Sections shall be identified to facilitate evaluation and to prevent evaluators from unnecessary search or arranging of materials for evaluation purposes. The City of Bristol requires five (5) complete sealed copies of bidding documents. Those wishing to submit electronically may do so via the eVA procurement platform while also submitting the required paper copies to the City by the due date. No FAXED nor emailed bids will be accepted.

The Bid package shall also include one (1) separate unbound copy of the Bid Form to facilitate opening and reading of the Bids. The Bid must be enclosed in a plainly marked package with the Project title, the name and address of the Bidder, and must be accompanied by the Bid Security and other required documents. The sealed envelope containing the Bid must be enclosed in a separate package plainly marked on the outside with the notation "BID ENCLOSED – Invitation to Bid for the Equalization Tank System" A mailed Bid must be addressed to the location designated in the Advertisement.

The public opening of the bids will take place at the Council Chambers at City Hall located at 300 Lee Street, Bristol VA 24201, immediately following the bid due deadline. Bids received after the date and time prescribed for the opening of the 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.

The Owner requires the Project to be substantially completed within 330 days and will be completed and ready for final payment within 365 days.

Electronic Bidding Documents may be obtained from the City of Bristol's website or by emailing Nikki Asher at nikki.asher@bristolva.org.

A Pre-Bid Conference will be held virtually via Microsoft Teams on January 16, 2026 at 11:00 a.m., Eastern Standard Time, coordinated by Laura Helander-Socia, Director- Solid Waste, City of Bristol and Balaji Seshasayee, Principal Engineer, Geosyntec Consultants Inc. Prospective Bidders are encouraged to attend this meeting.

Bidders should submit questions via e-mail to nikki.asher@bristolva.org prior to the Inquiry Cut-off Date of January 21, 2026. Only responses set forth in an Addendum will be binding.

Submit your Bid on the Bid Form provided. Bidders are required to complete Bid Form 00 41 13. 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 - INSTRUCTIONS TO BIDDERS

PART 1. GENERAL

1.1 INTENT

- A. The intent of this Bid request is to obtain an offer to perform work to complete the design, supply and construction of the Equalization Tank System in accordance with Contract Documents.

1.2 DEFINED TERMS

- A. Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:

1.3 ISSUING OFFICE

- A. The office from which the Bidding Documents are to be issued, and which registers plan holders.

1.4 BIDDING DOCUMENTS

Documents supplemented with Advertisement for Bids, Invitation to Bid, Instructions to Bidders, Information Available to Bidders, Bid Form, Bid Securities, and Bidder's Qualifications, identified.

1.5 CONTRACT DOCUMENTS

The Contract Documents consist of all of the following:

- A. The Contract as depicted as an attachment to the terms and conditions.
- B. Bonds:
 - 1. Performance bond (together with power of attorney).
 - 2. Payment bond (together with power of attorney).
- C. Terms and Conditions.
- D. Specifications listed in the table of contents
- E. Drawings listed in the table of contents
- F. The following which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:
 - 1. Notice to Proceed.
 - 2. Work Change Directives.
 - 3. Change Orders.
 - 4. Field Orders.
 - 5. Warranty Bond, if any.
- G. The Contract Documents may only be amended, modified, or supplemented as provided in the Contract.

1.6 BID

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

1.7 BID PRICE

- A. Monetary sum identified by the Bidder in the Bid Form.

PART 2 BIDDING DOCUMENTS

2.1 COMPLETENESS

- A. Bidder must 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 USE

- A. 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 OBTAINING

- A. Electronic Bidding Documents may be obtained from the City's website or by emailing nikki.asher@bristolva.org. Prospective Bidders may view the Bid Documents at the office of the Owner.

2.4 ELECTRONIC DOCUMENTS

- A. When the Bidding Requirements indicate that electronic (digital) copies of the Bidding Documents are available, such documents will be made available to the Bidders as Electronic Documents in the manner specified.
- B. Format of Electronic Documents
 - 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.
- C. Bidder's Reliance on Electronic Documents
 - 1. 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 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.

D. Files in native format

1. Upon request to Bidders during the bid process and after the Contract is awarded, the Owner will provide or direct the Engineer to provide for the use of the Contractor documents that were developed by Engineer as part of the Project design process, as Electronic Documents in native file formats.

E. Documents

1. Electronic Documents that are available in native file format include:
 - i. Contract Drawings CAD Files

F. Release

1. Release of such documents will be solely for the convenience of the Bidder/Contractor. No such document is a Contract Document.

G. Availability

1. Unless the Contract Documents explicitly identify that such information will be available to the Successful Bidder (Contractor), nothing herein will create an obligation on the part of the Owner or Engineer to provide or create such information, and the Contractor is not entitled to rely on the availability of such information in the preparation of its Bid or pricing of the Work. In all cases, the Contractor shall take appropriate measures to verify that any electronic/digital information provided in Electronic Documents is appropriate and adequate for the Contractor's specific purposes.

H. Payment

1. In no case will the Contractor be entitled to additional compensation or time for completion due to any differences between the actual Contract Documents and any related document in native file format.

I. Acknowledgement

1. Prior to release of Electronic Documents, bidders and contractor may be required to sign a separate acknowledgement of additional terms regarding the use of electronic documents in native format.

J. Acceptance

1. Bidder's acceptance and use of the Electronic Files signifies Bidder's consent to be fully bound by the terms of this Agreement, whether or not Bidder signs the acknowledgement.

K. Restrictions on Use

1. Bidder agrees not to use the Electronic Files, in whole or in part, for any purpose other than for the Equalization Tank System ("Project"). Bidder agrees not to transfer the Electronic Files to others without the prior written consent of Geosyntec Consultants.

L. Ownership

1. In accepting and using the Electronic Files provided by Geosyntec, Bidder agrees that all Electronic Files are instruments of service of Geosyntec, and Geosyntec shall be deemed the author, and shall retain all common law, statutory and other rights, including copyrights, in the Electronic Files and any derivative works thereof. By this Agreement Geosyntec grants Bidder only a non-exclusive, non-transferable, limited license to use the

Electronic Files solely for purposes of the Project. Neither this Agreement nor the license hereby granted may be transferred, sold or assigned.

M. Title Block

1. If Geosyntec's name, title block and/or logo appear in the Electronic Files, Bidder agrees to delete same prior to using the Electronic Files.

N. Security

1. Geosyntec and the Owner make no representation or warranty as to the compatibility of the Electronic Files with Bidder's hardware or software, or that the means or media of electronic transfer of the Electronic Files is free of computer virus.

O. Conflicts

1. Bidder is aware that differences may exist between the Electronic Files delivered and the data or hard copy files from which the Electronic Files are derived. It shall be Bidder's responsibility to determine the accuracy, correctness and completeness of the information contained in the Electronic Files and whether any conflicts exist with other data or records.

P. Limitations

1. Bidder acknowledges that the Electronic Files have not been prepared for the purposes of determining exact locations of features or dimensions. Geosyntec and the Owner make no warranties or guarantees, express or implied, as to the accuracy, correctness or completeness of the information contained in the Electronic Files, including any warranty of merchantability or warranty of fitness for a particular purpose. Bidder agrees to independently verify the accuracy, correctness and completeness of the Electronic Files for its needs. Use of the Electronic Files provided herewith is solely at the risk of the Bidder, and Bidder covenants not to sue and waives and releases Geosyntec, its officers, directors, employees and subconsultants from and against any claims or liability resulting from such use, whether in tort, contract or otherwise.

Q. Updates

1. Geosyntec and the Owner shall have no obligation to notify Bidder of, or to provide to Bidder, any revisions or changes to the data or information contained in the Electronic Files.

PART 3 BIDDER QUALIFICATIONS

- A. To demonstrate qualification for performing the Work of this Contract, each Bidder must 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.

PART 4 PRE BID CONFERENCE

- A. Prospective Bidders are encouraged to attend the virtual Pre-Bid Conference. Refer to 00 11 16 Invitation to Bid for the Pre-Bid Conference date, time, and connection information. General contract and major subcontract Bidders and suppliers are invited to attend.
- B. Representatives of the Owner and Engineer will be in attendance.
- C. Summarized minutes of this meeting will be circulated to known Bidders. These minutes will not form part of Contract Documents.

D. Information relevant to Bidding Documents will be issued by Addendum.

PART 5. SITE AND OTHER AREAS

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

5.1 OTHER SITE-RELATED DOCUMENTS

A. Additional Documents

1. Owner will make copies of other Site-related documents available to any Bidder upon request, if applicable.

B. Accuracy

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

C. Relation to Contract

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

D. Review

1. 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.

5.2 SITE VISIT AND TESTING BY BIDDERS

A. Requirements

- If Bidder elects to visit the Site, all visits must be coordinated in advance per Section 5.2.C. During any visit, the Bidder must not disturb any ongoing operations at the Site.

B. Transportation

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

C. Coordination

- All access to the Site must be coordinated through the following Owner contact: Laura Helander-Socia, Director- Solid Waste, City of Bristol, laura.socia@bristolva.org. The Site is located at the Bristol Integrated Solid Waste Management Facility (ISWMF), 2655 Valley Drive, Bristol, VA 24201. Bidder must conduct any Site visit during normal working hours.
- The Site is typically open for examination by Bidders during the following hours: 7:00 AM to 3:00 PM Monday through Friday.

D. Testing

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

E. Additional Examination

- 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.
- F. Regulatory Requirements
- Bidder must comply with all applicable Laws and Regulations regarding excavation and location of utilities, obtain all permits not obtained by the owner as outlined in the contract documents, 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
- G. Restoration
- 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.

5.3 OWNER'S SAFETY PROGRAM

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

5.4 OTHER WORK AT THE SITE

- A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.
- B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner must 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 must provide such information to Contractor.
- C. 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.

PART 6. BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

6.1 EXAMINATION

- A. The Bid Form that each Bidder will submit contains express representations regarding the Bidder's examination of Project documentation, Site visit, and preparation of the Bid, and certifications regarding lack of collusion or fraud in connection with the Bid. Bidder should review these representations and certifications and assure that Bidder can make the representations and certifications in good faith, before executing and submitting its Bid.

6.2 AWARD

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

PART 7 INTERPRETATIONS AND ADDENDA

7.1 ISSUANCE

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

7.2 QUESTIONS

- A. Bidders must submit all questions about the meaning or intent of the Bidding documents in writing via email to nikki.asher@bristolva.org. Questions must be submitted by January 21, 2026, as noted in the Invitation to Bid section (00 11 16). Only responses set forth in an Addendum will be binding.

7.3 INTERPRETATIONS OR CLARIFICATIONS

- A. Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda delivered to all registered plan holders.

7.4 DOCUMENTATION

- A. 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 NOTIFICATION

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

PART 8 BID SECURITY

8.1 AMOUNT AND FORMAT

- A. In accordance with the Virginia Public Procurement Act (VPPA) §2.2-4336, 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.B.1. Such Bid bond will be issued in the form included in the Bidding Documents.
- B. Requirements
 - 1. In accordance with the Virginia Public Procurement Act (VPPA), Contractor must obtain the required bonds from surety companies that are duly licensed or authorized in the Commonwealth of Virginia to issue bonds in the required amounts.

8.2 SUCCESSFUL BIDDER

- A. 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 COMPETITIVE BIDDERS

- A. 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 OTHER BIDDERS

- A. 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.

PART 9 CONTRACT TIMES

9.1 TIME IS OF THE ESSENCE

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

9.2 CONTRACT TIMES

- A. See Sections 00 11 16 and 00 70 00

9.3 MILESTONES

- A. See Sections 00 11 16 and 00 70 00

PART 10 SUBSTITUTE AND "OR EQUAL" ITEMS

10.1 EVALUATION

- A. 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 PRICES

- A. All prices that Bidder sets forth in its Bid must be in United States (US) Currency and 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.

PART 11 SUBCONTRACTORS, SUPPLIERS, AND OTHERS

11.1 DOCUMENTATION

- A. 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:

- Soils testing firm(s) (if applicable)
- Tank manufacturer with manufacturing lead times
- Tank installer
- Tank foundation installer

11.2 SUPPLEMENTAL INFORMATION

- A. 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 SUBSTITUTION

- A. 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.

PART 12 PREPARATION OF BID

12.1 FORM

- A. The Bid Form is included with the Bidding Documents.
- B. Preparation: 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 lump sum price item, and lump price item listed therein.
- C. Alternates: 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 FORMAT

- A. If Bidder has obtained the Bidding Documents as Electronic Documents, then Bidder must 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 CORPORATE AUTHORIZATION

- A. 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 PARTNERSHIP AUTHORIZATION

- A. 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 LIMITED LIABILITY COMPANY AUTHORIZATION

- A. 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 INDIVIDUAL AUTHORIZATION

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

12.7 JOINT VENTURE AUTHORIZATION

- A. 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 PRINTED NAMES

- A. All names must be printed in ink below the signatures.

12.9 ADDENDA

- A. 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 CONTACT INFORMATION

- A. Postal and email addresses and telephone number for communications regarding the Bid must be shown.

12.11 AUTHORITY

- A. 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 LICENSE

- A. 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.

PART 13. BASIS OF BID

13.1 LUMP SUM

- A. Bid Items Bidders must submit a Bid on a lump sum basis in United States (US) Currency for each item of Work listed in the lump sum section of the Bid Form.

PART 14. SUBMITTAL OF BID

14.1 INSTRUCTIONS

- A. Refer to 00 11 16 Invitation to Bid for bid submission instructions.

PART 15 MODIFICATION AND WITHDRAWAL OF BID

15.1 WITHDRAWAL

- A. 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 MODIFICATION

- A. 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 POST-OPENING WITHDRAWAL

- A. 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.

PART 16 OPENING OF BIDS

- A. 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.

PART 17. BIDS TO REMAIN SUBJECT TO ACCEPTANCE

- A. 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.

PART 18. EVALUATION OF BIDS AND AWARD OF CONTRACT

18.1 REJECTION AND ACCEPTANCE

- A. 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 RESPONSIBLE BIDDER

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

18.3 CONDITIONS AND EXCEPTIONS

- A. 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 AWARD

- A. If Owner awards the contract for the Work, such award will be to the responsible Bidder submitting the lowest responsive Bid based on the total price with base bid items, or if the alternative bid items are accepted, based on total price with alternative bid item.

18.5 EVALUATION OF BIDS

A. Criteria

1. In evaluating Bids, Owner will consider whether the Bids comply with the prescribed requirements, and such alternates, lump sum prices, and other data, as may be requested in the Bid Form or prior to the Notice of Award.

2. Qualifications: 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.

3. Investigations: 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.

PART 19 BONDS AND INSURANCE

19.1 PERFORMANCE AND PAYMENT BOND

- A. In accordance with Virginia Code §2.2-4337, the Contractor shall furnish Performance and Payment Bonds, each in an amount equal to one hundred percent (100%) of the Contract Sum.
- B. Performance and Payment Bonds shall be executed by one or more surety companies authorized to do business in the Commonwealth of Virginia.
- C. Complete requirements for Performance and Payment Bonds are specified in Section 00 61 13 - Performance and Payment Bonds.
- D. Bond forms are provided in:
 - 1. Section 00 61 13.13 - Performance Bond Form
 - 2. Section 00 61 13.16 - Payment Bond Form
- E. Bonds must be furnished within fifteen (15) days after the Notice of Award and prior to commencement of the Work.
- F. Failure to furnish the required bonds within the specified time period will constitute grounds for forfeiture of the Bid Bond and annulment of the Notice of Award.

19.2 BID BOND

- A. In accordance with Virginia Code §2.2-4336, each Bid must be accompanied by a Bid Bond in an amount equal to five percent (5%) of the total Bid amount.
- B. Bid Bond requirements are specified in Section 00 43 10 - Bid Bond.
- C. The Bid Bond form is provided in Section 00 43 13 - Bid Bond Form.

D. Requirements for Bid Security are also addressed in Part 8 of these Instructions to Bidders.

19.3 INSURANCE

A. Insurance requirements are specified in the Contract Documents.

PART 20. SIGNING OF AGREEMENT

A. 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

PART 1. OWNER AND BIDDER

This Bid is submitted to:

City of Bristol, VA
Attention: Nikki Asher
300 Lee St
Bristol, VA 24201

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.

PART 2. ATTACHMENTS TO THIS BID

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

- Required Bid security, including Bid Bond per Section 00 43 10, payment bond & performance bond, and proof of insurance per conditions outlined in Section 00 61 13 and Section 00 70 00 respectively;
- 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.

PART 3. BASIS OF BID—LUMP SUM PRICES

3.1 LUMP SUM PRICE BIDS

- A. Bidders must submit lump sum prices in United States (US) Currency for the construction of the Equalization Tank 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 Bid Lump Sum Price – Equalization Tank System

#	Description	Unit ¹	Lump Sum Price
1	Mobilization/Demobilization	LS	
2	Safety Planning and Accommodations	LS	
3	Excavation for Tank Foundations	LS	
4	Furnish and Install Reinforced Concrete Ringwall Foundations (2 Tanks)	LS	
5	Furnish and Install Primary Tank Concrete Slabs with Glass Floor (2 Tanks)	LS	
6	Furnish Glass-Fused-to-Steel Primary Tank Materials (2 Tanks)	LS	
7	Install Glass-Fused-to-Steel Primary Tanks with Glass-Coated Sidewalls (2 Tanks)	LS	
8	Furnish and Install Tank Appurtenances (Manways, Ladders, Cages, Platforms)	LS	
9	Furnish and Install Aluminum Geodesic Roofs (2 Tanks)	LS	
10	Furnish and Install Tank Nozzles and Piping Connections	LS	
11	Furnish and Install Pressure/Vacuum Relief Devices per Data Sheet	LS	
12	Furnish and Install Passive Cathodic Protection System	LS	
13	Engineering Design and PE Stamped Drawings (Virginia)	LS	
14	Hydrostatic Testing and Commissioning	LS	

¹ LS indicates lump sum price

Total Lump Sum Bid Price

The Total Price is the summation of the bid items in section 3.1.1.

Total Bid Price (US Currency): \$ _____

Note: This bid form is for the EQ Tank System only. Secondary containment walls and foundation, yard piping, aeration systems, mixing systems, and level sensing equipment are excluded from this scope

PART 4. 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 Terms and Conditions.

4.2 LIQUIDATED DAMAGES

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

PART 5. BIDDER’S ACKNOWLEDGEMENTS: ACCEPTANCE PERIOD, INSTRUCTIONS, AND RECEIPT OF ADDENDA

5.1 BID ACCEPTANCE PERIOD

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

5.2 INSTRUCTIONS TO BIDDERS

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

5.3 RECEIPT OF ADDENDA

Bidder hereby acknowledges receipt of the following Addenda:

Addendum Number	Addendum Date

PART 6. BIDDER’S REPRESENTATIONS AND CERTIFICATIONS

6.1 BIDDER’S REPRESENTATIONS

In submitting this Bid, Bidder represents the following:

A. Examination of Documents

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

B. Site Examination

1. Bidder acknowledges that site visits are optional. Bidder has either visited the Site or elected not to visit the Site, and has become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work through available information and documentation.

C. Laws and Regulations

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

D. Background Documents

1. 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 Bid Documents, with respect to the Technical Data in such reports and drawings.

E. Hazardous Environmental Conditions

1. 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 Bid Documents, with respect to Technical Data in such reports and drawings.

F. Other Information

1. 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 any 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.

G. No Further Examinations

1. 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.

H. Nature of Work

1. 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.

I. Notice

1. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies, if any, 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.

J. Sufficiency of Documents

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

Work.

K. Pricing

1. The submission of this Bid constitutes an incontrovertible representation by Bidder that without exception the Bid and all prices in the Bid are in United States (US) Currency and are premised upon performing and furnishing the Work required by the Bidding Documents.

6.2 BIDDER'S CERTIFICATIONS

The Bidder certifies the following:

A. Genuine Bid

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.

B. Solicitation

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

C. Discouragement of Bids

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

D. Corrupt, Fraudulent, Collusive, or Coercive Practices

1. 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:

E. Corrupt

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.

F. Fraudulent

1. 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.

G. Collusive

1. 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.

H. Coercive

1. 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.

PART 7. VIRGINIA STATE CORPORATION COMMISSION (SCC) REGISTRATION INFORMATION

is a corporation or other business entity with the following SCC identification number:

_____ -OR-

- is not a corporation, limited liability company, limited partnership, registered limited liability partnership, or business trust -OR-
- is an out-of-state business entity that does not regularly and continuously maintain as part of its ordinary and customary business any employees, agents, offices, facilities, or inventories in Virginia (not counting any employees or agents in Virginia who merely solicit orders that require acceptance outside Virginia before they become contracts, and not counting any incidental presence of the bidder in Virginia that is needed in order to assemble, maintain, and repair goods in accordance with the contracts by which such goods were sold and shipped into Virginia from bidder's out-of-state location) -OR-
- is an out-of-state business entity that is including with this bid an opinion of legal counsel which accurately and completely discloses the undersigned bidder's current contacts with Virginia and describes why those contacts do not constitute the transaction of business in Virginia within the meaning of § 13.1-757 or other similar provisions in Titles 13.1 or 50 of the Code of Virginia.

****NOTE**** Check the following box if you have not completed any of the foregoing options but currently have pending before the SCC an application for authority to transact business in the Commonwealth of Virginia and wish to be considered for a waiver to allow you to submit the SCC identification number after the due date for bids (the Commonwealth reserves the right to determine in its sole discretion whether to allow such waiver):

Authorized Signature

Date

Printed Name

Printed Company Name

Street Address

City, State, Zip

Telephone Number

Fax Number

Email

Bidder:

(typed or printed name of organization)

By: *(individual's signature)* _____

Name: *(typed or printed):* _____

Title: _____

Date: _____

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: _____

Date: _____

Address for giving notices:

Bidder's Contact:

Name: *(typed or printed)* _____

Title: _____

Phone: _____

Email: _____

Address: _____

Bidder's Contractor License No.:

END OF SECTION 00 41 13

SECTION 00 43 10 - BID BOND

EQUALIZATION TANK SYSTEM PROJECT BRISTOL INTEGRATED SOLID WASTE MANAGEMENT FACILITY

1.1 BID SECURITY REQUIREMENT

A. In accordance with Virginia Code §2.2-4336, each bid shall be accompanied by a Bid Bond from a surety company authorized to do business in the Commonwealth of Virginia in an amount equal to five percent (5%) of the total bid amount.

B. The Bid Bond shall guarantee that if the contract is awarded to the bidder, the bidder will:

1. Enter into the contract for the work specified in the bid
2. Furnish the required Performance and Payment Bonds within fifteen (15) days of Notice of Award
3. Commence work as required by the Contract Documents

C. The Bid Bond shall be made payable to the City of Bristol, Virginia.

1.2 BID BOND FORFEITURE

A. If the successful bidder fails to execute the Contract and furnish the required Performance and Payment Bonds within fifteen (15) days from the date of the Notice of Award, the Bid Bond shall be forfeited to the Owner as liquidated damages.

B. In accordance with Virginia Code §2.2-4336(B), no forfeiture under the Bid Bond shall exceed the lesser of:

1. The difference between the bid for which the bond was written and the next low bid, or
2. The face amount of the Bid Bond.

1.3 BID BOND FORM

A. The Bid Bond shall be submitted on the form provided in Section 00 43 13 - Bid Bond Form, or on a surety company's standard form acceptable to the Owner.

B. The Bid Bond shall be properly executed and accompanied by a current Power of Attorney for the attorney-in-fact who executes the bond on behalf of the surety company.

END OF DOCUMENT 00 43 10

SECTION 00 43 13 - BID BOND FORM

EQUALIZATION TANK SYSTEM PROJECT BRISTOL INTEGRATED SOLID WASTE MANAGEMENT FACILITY

KNOW ALL PERSONS BY THESE PRESENTS, that we

(Name and Address of Bidder)

as Principal, hereinafter called the Principal, and

(Name and Address of Surety)

a corporation duly organized under the laws of the State of _____ as Surety, hereinafter called the Surety, are held and firmly bound unto

CITY OF BRISTOL, VIRGINIA

300 Lee Street

Bristol, Virginia 24201

as Obligee, hereinafter called the Obligee, in the sum of

Dollars (\$ _____), for the payment of which sum well and truly to be made, the Principal and the Surety bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted a bid for:

EQUALIZATION TANK SYSTEM PROJECT BRISTOL INTEGRATED SOLID WASTE MANAGEMENT FACILITY

NOW, THEREFORE, if the Obligee shall accept the bid of the Principal and the Principal shall enter into a Contract with the Obligee in accordance with the terms of such bid, and give such bond or bonds as may be specified in the bidding or Contract Documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof, or in the event of the failure of the Principal to enter such Contract and give such bond or bonds, if the Principal shall pay to the Obligee the difference not to exceed the penalty hereof between the amount specified in said bid and such larger amount for which the Obligee may in good faith contract with another party to perform the Work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect.

In accordance with Virginia Code §2.2-4336(B), the Surety agrees that no forfeiture under this Bid Bond shall exceed the lesser of:

- (1) The difference between the bid for which this bond was written and the next low bid, or
- (2) The face amount of this Bid Bond.

The Surety hereby waives notice of any alteration or extension of time made by the Obligee.

Signed and sealed this _____ day of _____, 20____.

PRINCIPAL:

(Bidder - Typed or Printed Name)

By: _____
(Authorized Signature)

Name: _____
(Typed or Printed)

Title: _____

SURETY:

(Surety Company - Typed or Printed Name)

By: _____
(Signature of Attorney-in-Fact)

Name: _____
(Typed or Printed)

Title: Attorney-in-Fact (ATTACH POWER OF ATTORNEY)

SURETY COMPANY INFORMATION:

Address: _____

Phone: _____

Email: _____

State of Incorporation: _____

Authorized to do business in the Commonwealth of Virginia: YES NO

END OF DOCUMENT 00 43 13

SECTION 00 45 13 - BIDDER'S QUALIFICATIONS

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

PART 2. 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:	

PART 3. 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
<input type="checkbox"/> Disadvantaged Business Enterprise		
<input type="checkbox"/> Minority Business Enterprise		
<input type="checkbox"/> Woman-Owned Business Enterprise		
<input type="checkbox"/> Small Business Enterprise		
<input type="checkbox"/> Disabled Business Enterprise		
<input type="checkbox"/> Veteran-Owned Business Enterprise		
<input type="checkbox"/> Service-Disabled Veteran-Owned Business		
<input type="checkbox"/> HUBZone Business (Historically Underutilized) Business		
<input type="checkbox"/> Other		
<input type="checkbox"/> None		

PART 4. 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

PART 5. 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:		<input type="checkbox"/> Attached	
Date of Business’s most recent audited financial statement:		<input type="checkbox"/> Attached	
Financial indicators from the most recent financial statement			

Contractor's Current Ratio (Current Assets ÷ Current Liabilities)	
Contractor's Quick Ratio ((Cash and Cash Equivalents + Accounts Receivable + Short Term Investments) ÷ Current Liabilities)	

PART 6. 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?	<input type="checkbox"/> Yes <input type="checkbox"/> No		
Is surety listed in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" published in Department Circular 570 (as amended) by the Bureau of the Fiscal Service, U.S. Department of the Treasury?			
<input type="checkbox"/> Yes <input type="checkbox"/> No			
Mailing Address (principal place of business):			
Physical Address (principal place of business):			
Phone (main):		Phone (claims):	

PART 7. 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?		<input type="checkbox"/> Yes <input type="checkbox"/> No	
Does provider have an A.M. Best Rating of A-VII or better?		<input type="checkbox"/> Yes <input type="checkbox"/> No	
Mailing Address (principal place of business):			
Physical Address (principal place of business):			
Phone (main):		Phone (claims):	

PART 8. 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? <input type="checkbox"/> Yes <input type="checkbox"/> No			
Been barred from contracting by any local, state, or federal agency within the last 5 years? <input type="checkbox"/> Yes <input type="checkbox"/> No			
Been released from a bid in the past 5 years? <input type="checkbox"/> Yes <input type="checkbox"/> No			
Defaulted on a project or failed to complete any contract awarded to it? <input type="checkbox"/> Yes <input type="checkbox"/> No			
Refused to construct or refused to provide materials defined in the contract documents or in			

a change order? 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 over \$500,000 currently under contract in Schedule A and provide indicated information.

8.4

List a minimum of two 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.

PART 9. REQUIRED ATTACHMENTS

9.1

Provide the following information with the Statement of Qualifications:

If Business is a Joint Venture, separate Qualifications Statements for each Joint Venturer, as required in Paragraph 1.2.

Diverse Business Certifications if required by Paragraph 3.1.

Certification of Business's safety performance if required by Paragraph 4.1. Financial statements as required by Paragraph 5.1. Attachments providing additional information as required by Paragraph 8.2.

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

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

Schedule C (Key Individuals) and resumes for the key individuals listed, as required by PART 8 .

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:

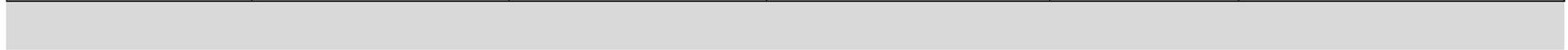
Email:

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					

Name of Organization					
Project Owner				Project Name	
General Description of Project					
Project Cost				Date Project Completed	
Key Project Personnel		Project Manager		Project Superintendent	
Name					
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	
Name					
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	
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General Description of Project	
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Project Cost		Date Project Completed	
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Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager
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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					

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	

Environmental, Health, and 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	

END OF SECTION 00 45 13

SECTION 00 51 00 - NOTICE OF AWARD

Date of Issuance			
Owner:	City of Bristol	Owners' Project No:	
Engineer	Geosyntec Consultants	Engineer's Project No:	CHR8600
Project:	Equalization Tank System		
Contract Name	Equalization Tank System		
Bidder:			
Bidders Address:			

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:

Equalization Tank System

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

END OF SECTION 00 51 00

SECTION 00 55 00 - NOTICE TO PROCEED

Owner: City of Bristol

Engineer: Geosyntec Consultants

Contractor: _____

Project: Equalization Tank System

Owner's Project No. : _____

Engineer's Project No. : CHR8600

Contractor's Project No. : _____

Contract Name: _____

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 date to achieve Substantial Completion is _____; and the date to achieve readiness for final payment is _____.

Owner: City of Bristol

By (signature): _____

Name (printed): _____

Title: _____

Date Issued: _____

Copy: Engineer

END OF SECTION 00 55 00

SECTION 00 61 13 – PERFORMANCE AND PAYMENT BONDS

EQUALIZATION TANK SYSTEM PROJECT BRISTOL INTEGRATED SOLID WASTE MANAGEMENT FACILITY

1.1 PERFORMANCE AND PAYMENT BOND REQUIREMENTS

A. In accordance with Virginia Code §2.2-4337, the Contractor awarded this Contract shall furnish to the Owner the following bonds:

1. A Performance Bond in an amount equal to one hundred percent (100%) of the Contract Sum, conditioned upon the faithful performance of the Contract in strict conformity with the Contract Documents, including all plans, specifications, and conditions.

2. A Payment Bond in an amount equal to one hundred percent (100%) of the Contract Sum, for the protection of all persons who have contracts to supply labor or materials to the Contractor, or to any subcontractors, in furtherance of the Work provided for in the Contract, and conditioned upon the prompt payment for all materials furnished or labor supplied or performed in the furtherance of the Work.

B. Each bond shall be executed by one or more surety companies authorized to do business in the Commonwealth of Virginia and selected by the Contractor.

C. Both bonds shall be made payable to the City of Bristol, Virginia.

D. Each bond shall be filed with the Owner within fifteen (15) days after the date of the Notice of Award and prior to commencement of the Work.

E. The cost of the Performance Bond and Payment Bond shall be included in the Contract Sum.

1.2 SURETY QUALIFICATIONS

A. Each surety company providing bonds must meet the following requirements:

1. Be authorized to transact business in the Commonwealth of Virginia

2. Be listed in the current U.S. Department of Treasury Circular 570

3. Have an A.M. Best rating of A- or better

4. Have underwriting limitations sufficient for the bond amounts required

B. If a surety becomes insolvent or its right to do business is terminated in Virginia, Contractor shall, within fifteen (15) days after notice from Owner, substitute another bond and surety, both of which shall be subject to Owner's approval.

1.3 PERFORMANCE BOND

A. The Performance Bond shall guarantee:

1. Faithful performance of the Contract in accordance with the Contract Documents

2. Completion of all Work within the Contract Times

3. Correction of defective work and completion of warranties

4. Payment of liquidated damages for delayed performance or non-performance
5. Payment of additional legal, design professional, and delay costs resulting from Contractor Default

B. The Performance Bond shall remain in effect until:

1. All Work is complete and accepted by the Owner
2. All warranty periods have expired
3. All obligations under the Contract have been fulfilled

1.4 PAYMENT BOND

A. The Payment Bond shall guarantee:

1. Prompt payment for all labor, materials, and equipment furnished for use in the performance of the Work
2. Protection of all claimants who have contracts directly with the Contractor or with any subcontractors
3. Defense, indemnification, and hold harmless protection for the Owner from claims, demands, liens, or suits by persons or entities seeking payment

B. The Payment Bond shall comply with all applicable Virginia statutes regarding claimant notice requirements and time limitations for filing claims.

1.5 BOND FORMS

A. The Performance Bond shall be submitted on the form provided in Section 00 61 13.13 - Performance Bond Form, or on a surety company's standard form acceptable to the Owner that complies with Virginia Code §2.2-4337.

B. The Payment Bond shall be submitted on the form provided in Section 00 61 13.16 - Payment Bond Form, or on a surety company's standard form acceptable to the Owner that complies with Virginia Code §2.2-4337.

C. Both bonds shall be properly executed and accompanied by a current Power of Attorney for the attorney-in-fact who executes the bonds on behalf of the surety company.

D. The Power of Attorney must be valid for the full amount of the bonds and must not have expired at the time of bond execution.

1.6 SUBMITTALS

A. Within fifteen (15) days after the Notice of Award, the Contractor shall submit to the Owner:

1. Original executed Performance Bond with attached Power of Attorney
2. Original executed Payment Bond with attached Power of Attorney
3. Evidence of surety company authorization in Virginia
4. Certificate of Insurance as required by the Contract Documents

B. Failure to furnish the required bonds within the specified time period will constitute grounds for:

1. Forfeiture of the Bid Bond
2. Annulment of the Notice of Award
3. Award of the Contract to the next lowest responsive, responsible Bidder

1.7 MODIFICATIONS TO CONTRACT SUM

A. When the Contract Sum is increased or decreased by Change Order or other modification, the Contractor shall, if required by Owner, furnish:

1. Consent of Surety to such modifications, or
2. Additional bond coverage to maintain bond amounts at 100% of the adjusted Contract Sum

B. The Owner reserves the right to require increased bond coverage for Contract Sum increases exceeding ten percent (10%) of the original Contract Sum.

1.8 CLAIMS AGAINST BONDS

A. Any claims against the Performance Bond or Payment Bond shall be made in accordance with the terms and conditions of the respective bonds and applicable Virginia statutes.

B. The Owner may make claim against the Performance Bond in the event of Contractor Default as defined in the bond documents.

C. Claimants seeking payment under the Payment Bond must comply with all notice requirements and time limitations specified in the bond and Virginia law.

END OF DOCUMENT 00 61 13

SECTION 00 61 13.13 - PERFORMANCE BOND

<p>Contractor [Full formal name of Contractor] Name: Address: (principal place of business):</p>			
<p>Owner Name: City of Bristol Mailing address (Principal place of business): 300 Lee St Bristo, VA 24201</p>			
<p>Surety [Full formal name of Surety] Name: Address (principal place of business):</p>			
<p>Contract Description (name and location): Equalization Tank System 2655 Valley Drive Bristol, VA 24201 Contract Price: Effective Date of Contract:</p>			
<p>Bond Bond Amount: Date of Bond: (Date of Bond cannot be earlier than Effective Date of Contract) Modifications to this Bond form: <input type="checkbox"/> None <input type="checkbox"/> See Paragraph 16</p>			
<p>Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth in this Performance Bond, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.</p>			
Contractor as Principal		Surety	
By: (Full formal name of contractor)		By: (Full formal name of Surety)	
Name (Print):		Name (Print):	
Title:		Title:	
Attest: (Signature)		Attest: (Signature)	
Name: (Print or type)		Name: (Print or type)	

Title:		Title:	
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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:
 - 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: EJCDC® C-610, Performance Bond. Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved. 00 61 13.13 - 2

5.4. 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 EJCDC® C-610, Performance Bond. Copyright© 2018 National Society of Professional Engineers, American

Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved. 00 61 13.13 - 3 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.

END OF SECTION 00 61 13.13

SECTION 00 61 13.16 - PAYMENT BOND

<p>Contractor</p> <p>Name:</p> <p>Address (<i>principal place of business</i>):</p>	<p>Surety</p> <p>Name:</p> <p>Address (<i>principal place of business</i>):</p>
<p>Owner</p> <p>Name: City of Bristol</p> <p>Mailing address (<i>principal place of business</i>):</p> <p>300 Lee St</p> <p>Bristol, VA 24201</p>	<p>Contract</p> <p>Description (<i>name and location</i>):</p> <p>Equalization Tank System</p> <p>2655 Valley Drive</p> <p>Bristol, VA 24201</p> <p>Contract Price:</p> <p>Effective Date of Contract:</p>
<p>Bond</p> <p>Bond Amount:</p> <p>Date of Bond:</p> <p><i>(Date of Bond cannot be earlier than Effective Date of Contract)</i></p> <p>Modifications to this Bond form:</p> <p><input type="checkbox"/> None <input type="checkbox"/> See Paragraph 18</p>	
<p>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.</p>	
<p>Contractor as Principal</p>	<p>Surety</p>
<p>By: _____</p> <p style="text-align: center;"><i>(Full formal name of Contractor)</i></p>	<p>By: _____</p> <p style="text-align: center;"><i>(Full formal name of Surety) (corporate seal)</i></p>
<p>By: _____</p> <p style="text-align: center;"><i>(Signature)</i></p>	<p>By: _____</p> <p style="text-align: center;"><i>(Signature)(Attach Power of Attorney)</i></p>
<p>Name: _____</p> <p style="text-align: center;"><i>(Printed or typed)</i></p>	<p>Name: _____</p> <p style="text-align: center;"><i>(Printed or typed)</i></p>
<p>Title: _____</p>	<p>Title: _____</p>

Attest: _____ <i>(Signature)</i>	Attest: _____ <i>(Signature)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
<i>Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.</i>	

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.
2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.
3. If there is no Owner Default under the Construction Contract, the Surety’s obligation to the Owner under this Bond will arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner’s property by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety.
4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety’s expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.
5. The Surety’s obligations to a Claimant under this Bond will arise after the following:
 - 5.1. Claimants who do not have a direct contract with the Contractor
 - 5.1.1. have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
 - 5.1.2. have sent a Claim to the Surety (at the address described in Paragraph 13).

- 5.2. Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to the Surety (at the address described in Paragraph 13).
6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.
7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:
 - 7.1. Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and
 - 7.2. Pay or arrange for payment of any undisputed amounts.
 - 7.3. The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 will not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.
8. The Surety's total obligation will not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond will be credited for any payments made in good faith by the Surety.
9. Amounts owed by the Owner to the Contractor under the Construction Contract will be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfying obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.
10. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to or give notice on behalf of Claimants, or otherwise have any obligations to Claimants under this Bond.
11. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
12. No suit or action will be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone

under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit will be applicable.

13. Notice and Claims to the Surety, the Owner, or the Contractor must be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, will be sufficient compliance as of the date received.
14. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement will be deemed deleted here from and provisions conforming to such statutory or other legal requirement will be deemed incorporated herein. When so furnished, the intent is that this Bond will be construed as a statutory bond and not as a common law bond.
15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.
16. Definitions
 - 16.1. *Claim*—A written statement by the Claimant including at a minimum:
 - 16.1.1. The name of the Claimant;
 - 16.1.2. The name of the person for whom the labor was done, or materials or equipment furnished;
 - 16.1.3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;
 - 16.1.4. A brief description of the labor, materials, or equipment furnished;
 - 16.1.5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
 - 16.1.6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
 - 16.1.7. The total amount of previous payments received by the Claimant; and
 - 16.1.8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.
 - 16.2. *Claimant*—An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The

intent of this Bond is to include without limitation in the terms of “labor, materials, or equipment” that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor’s subcontractors, and all other items for which a mechanic’s lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

- 16.3. *Construction Contract*—The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.
 - 16.4. *Owner Default*—Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.
 - 16.5. *Contract Documents*—All the documents that comprise the agreement between the Owner and Contractor.
17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.

END OF SECTION 00 61 13.16

SECTION 00 62 76 – APPLICATION FOR PAYMENT

Contractor's Application for Payment

Owner:	City of Bristol	Owner's Project No.:	_____	
Engineer:	Geosyntec Consultants	Engineer's Project No.:	CHR8600	
Contractor:	_____	Contractor's Project No.:	_____	Project: Equalization Tank System
Contract:	_____			
<hr/>				
Application No.:	_____		Application Date:	_____
Application Period:	From	_____	to	_____
<hr/>				
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. _____ 5% X \$ - Work Completed			\$	-
b. _____ 5% 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

By: _____

Title: _____

Date: _____

Approved by Owner

By: _____

Title: _____

Date: _____

Approved by Funding Agency

By: _____

Title: _____

Date: _____

By: _____

Title: _____

Date: _____

Progress Estimate – Unit Price Work

Owner: <u>City of Bristol</u>	Owner's Project No.:
Engineer: <u>Geosyntec Consultants</u>	Engineer's Project No.: CHR8600
Contractor: _____	Contractor's Project No.:
Project: <u>Equalization Tank System</u>	
Contract: _____	

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

A	B	C	D	E	F	G	H	I
Item No.	Description	Scheduled Value (\$)	Work Completed		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) (\$)
			(D + E) From Previous Application (\$)	This Period (\$)				
Original Contract								



134 N. La Salle Street, Suite 300
 Chicago, Illinois 60602
 PH 312.658.0500
 FAX 312.658.0576
 www.geosyntec.com

Owner: <u>City of Bristol</u>	Owner's Project No.:
Engineer: <u>Geosyntec Consultants</u>	Engineer's Project No.: CHR8600
Contractor: _____	Contractor's Project No.:
Project: <u>Equalization Tank System</u>	
Contract: _____	

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

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

						-		-			-	-
						-		-				
						-		-				
						-		-				
						-		-				
Change Order Totals	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -					
Original Contract and Change Orders												
Project Totals	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -					

END OF SECTION 00 62 76

SECTION 00 63 36 - FIELD ORDER

FIELD ORDER NO.: _____

Owner:	City of Bristol	Owner's Project No.:	
Engineer:	Geosyntec Consultants	Engineer's Project No.:	CHR8600
Contractor:		Contractor's Project No.:	
Project:	Equalization Tank System		
Contract Name			
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

SECTION 00 63 49 – WORK CHANGE DIRECTIVE

WORK CHANGE DIRECTIVE NO.: _____

Owner: City of Bristol Owner's Project No.:
Engineer: Geosyntec Consultants Engineer's Project No.: CHR8600
Contractor: Contractor's Project No.:
Project: Equalization Tank System
Contract Name:
Date Issued: Effective Date of Work Change Directive:

The 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: _____

END OF SECTION 00 63 49

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: _____

END OF SECTION 00 63 63

SECTION 00 65 16 - CERTIFICATE OF SUBSTANTIAL COMPLETION

Owner: City of Bristol Owner's Project No.:
Engineer: Geosyntec Consultants Engineer's Project No.: CHR8600
Contractor: Contractor's Project No.:
Project: Equalization Tank System
Contract Name:

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, environmental compliance, 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

GENERAL TERMS AND CONDITIONS

A. VENDORS MANUAL

This solicitation is subject to the provisions of the Commonwealth of Virginia *Vendors Manual* and any changes or revisions thereto, which are hereby incorporated into this contract in their entirety. The process for filing a complaint about this solicitation is in section 7.13 of the *Vendors Manual*. (Note section 7.13 does not apply to protests of awards or formal contractual claims.) The procedure for filing contractual claims is in section 7.19 of the *Vendors Manual*. A copy of the manual is normally available for review at the purchasing office and is accessible on the Internet at eva.virginia.gov under "I Sell To Virginia".

B. APPLICABLE LAWS AND COURTS

This solicitation and any resulting contract shall be governed in all respects by the laws of the Commonwealth of Virginia, without regard to its choice of law provisions, and any litigation with respect thereto shall be brought in the circuit courts of the Commonwealth. The agency and the contractor are encouraged to resolve any issues in controversy arising from the award of the contract or any contractual dispute using Alternative Dispute Resolution (ADR) procedures (Code of Virginia, § 2.2-4366). ADR procedures are described in Chapter 9 of the *Vendors Manual*. The contractor shall comply with all applicable federal, state and local laws, rules and regulations.

C. ANTI-DISCRIMINATION

By submitting their bids, bidders certify to the Commonwealth 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, veteran status, status as military family, 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 Commonwealth 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.

D. ETHICS IN PUBLIC CONTRACTING

By submitting their bids, bidders certify that their bids are made without collusion or fraud and that they have not offered or received any kickbacks or inducements from any other bidder, supplier, manufacturer or subcontractor in connection with their bid, and that they have not conferred on any public employee having official responsibility for this procurement transaction any payment, loan, subscription, advance, deposit of money, services or anything of more than nominal value, present or promised, unless consideration of substantially equal or greater value was exchanged.

E. IMMIGRATION REFORM AND CONTROL ACT OF 1986:

Applicable for all contracts over \$10,000:

By entering into a written contract with the Commonwealth of Virginia, the Contractor certifies that the Contractor does not, and shall not during the performance of the contract for goods and services in the Commonwealth, knowingly employ an unauthorized alien as defined in the federal Immigration Reform and Control Act of 1986.

F. DEBARMENT STATUS

By participating in this procurement, the vendor certifies that they are not currently debarred by the Commonwealth of Virginia 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.

If a vendor is created or used for the purpose of circumventing a debarment decision against another vendor, the non-debarred vendor will be debarred for the same time period as the debarred vendor.

G. ANTITRUST

By entering into a contract, the contractor conveys, sells, assigns, and transfers to the Commonwealth of 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 Commonwealth of Virginia under said contract.

H. MANDATORY USE OF STATE FORM AND TERMS AND CONDITIONS FOR ITBs

Failure to submit a bid on the official state form provided for that purpose shall be a cause for rejection of the bid. Modification of or additions to any portion of the Invitation for Bids may be cause for rejection of the bid; however, the Commonwealth reserves the right to decide, on a case by case basis, in its sole discretion, whether to reject such a bid as nonresponsive. As a precondition to its acceptance, the Commonwealth may, in its sole discretion, request that the bidder withdraw or modify nonresponsive portions of a bid which do not affect quality, quantity, price, or delivery. No modification of or addition to the provisions of the contract shall be effective unless reduced to writing and signed by the parties.

I. CLARIFICATION OF TERMS:

If any prospective bidder has questions about the specifications or other solicitation documents, the prospective bidder should contact the buyer whose name appears on the face of the solicitation no later than five working days before the due date. Any revisions to the solicitation will be made only by addendum issued by the buyer.

J. PAYMENT

1. To Prime Contractor:

- a. Invoices for items ordered, delivered and accepted shall be submitted by the contractor directly to the payment address shown on the purchase order/contract. All invoices shall show the state contract number and/or purchase order number; social security number (for individual contractors) or the federal employer identification number (for proprietorships, partnerships, and corporations).
- b. Any payment terms requiring payment in less than 30 days will be regarded as requiring payment 30 days after invoice or delivery, whichever occurs last. This shall not affect offers of discounts for payment in less than 30 days, however.
- c. All goods or services provided under this contract or purchase order, that are to be paid for with public funds, shall be billed by the contractor at the contract price, regardless of which public agency is being billed.
- d. The following shall be deemed to be the date of payment: the date of postmark in all cases where payment is made by mail, or when offset proceedings have been instituted as authorized under the Virginia Debt Collection Act.
- e. **Unreasonable Charges.** Under certain emergency procurements and for most time and material purchases, final job costs cannot be accurately determined at the time orders are placed. In such cases, contractors should be put on notice that final payment in full is contingent on a determination of reasonableness with respect to all invoiced charges. Charges which appear to be unreasonable will be resolved in accordance with Code of Virginia, § 2.2-4363 and -4364. Upon determining that invoiced charges are not reasonable, the Commonwealth shall notify the contractor of defects or improprieties in invoices within fifteen (15) days as required in Code of Virginia, § 2.2-4351.,. The provisions of this section do not relieve an agency of its prompt payment obligations with respect to those charges which are not in dispute (Code of Virginia, § 2.2-4363).

2. To Subcontractors:

- a. Within seven (7) days of the contractor's receipt of payment from the Commonwealth, a contractor awarded a contract under this solicitation is hereby obligated:
 - i. To pay the subcontractor(s) for the proportionate share of the payment received for work performed by the subcontractor(s) under the contract; or
 - ii. To notify the agency and the subcontractor(s), in writing, of the contractor's intention to withhold payment and the reason.
- b. The contractor is obligated to pay the subcontractor(s) interest at the rate of one percent per month (unless otherwise provided under the terms of the contract) on all amounts owed by the contractor that remain unpaid seven (7) days following receipt of payment from the Commonwealth, except for

amounts withheld as stated in (2) above. The date of mailing of any payment by U. S. Mail is deemed to be payment to the addressee. These provisions apply to each sub-tier contractor performing under the primary contract. A contractor's obligation to pay an interest charge to a subcontractor may not be construed to be an obligation of the Commonwealth.

3. Each prime contractor who wins an award in which provision of a SWaM procurement plan is a condition to the award, shall deliver to the contracting agency or institution, on or before request for final payment, evidence and certification of compliance (subject only to insubstantial shortfalls and to shortfalls arising from subcontractor default) with the SWaM procurement plan. Final payment under the contract in question may be withheld until such certification is delivered and, if necessary, confirmed by the agency or institution, or other appropriate penalties may be assessed in lieu of withholding such payment.
4. The Commonwealth of Virginia encourages contractors and subcontractors to accept electronic and credit card payments.

K. PRECEDENCE OF TERMS

The following General Terms and Conditions VENDORS MANUAL, APPLICABLE LAWS AND COURTS, ANTI-DISCRIMINATION, ETHICS IN PUBLIC CONTRACTING, IMMIGRATION REFORM AND CONTROL ACT OF 1986, DEBARMENT STATUS, ANTITRUST, MANDATORY USE OF STATE FORM AND TERMS AND CONDITIONS, CLARIFICATION OF TERMS, PAYMENT shall apply in all instances. In the event there is a conflict between any of the other General Terms and Conditions and any Special Terms and Conditions in this solicitation, the Special Terms and Conditions shall apply.

L. QUALIFICATIONS OF BIDDERS

The Commonwealth may make such reasonable investigations as deemed proper and necessary to determine the ability of the bidder to perform the services/furnish the goods and the bidder shall furnish to the Commonwealth all such information and data for this purpose as may be requested. The Commonwealth reserves the right to inspect bidder's physical facilities prior to award to satisfy questions regarding the bidder's capabilities. The Commonwealth further reserves the right to reject any bid if the evidence submitted by, or investigations of, such bidder fails to satisfy the Commonwealth that such bidder is properly qualified to carry out the obligations of the contract and to provide the services and/or furnish the goods contemplated therein.

M. TESTING AND INSPECTION

The Commonwealth reserves the right to conduct any test/inspection it may deem advisable to assure goods and services conform to the specifications.

N. ASSIGNMENT OF CONTRACT

A contract shall not be assignable by the contractor in whole or in part without the written consent of the Commonwealth.

O. CHANGES TO THE CONTRACT

Changes can be made to the contract in any of the following ways:

1. The parties may agree in writing to modify the terms, conditions, or scope of the contract. Any additional goods or services to be provided shall be of a sort that is ancillary to the contract goods or services, or within the same broad product or service categories as were included in the contract award. Any increase or decrease in the price of the contract resulting from such modification shall be agreed to by the parties as a part of their written agreement to modify the scope of the contract.
2. The Purchasing Agency may order changes within the general scope of the contract at any time by written notice to the contractor. Changes within the scope of the contract include, but are not limited to, things such as services to be performed, the method of packing or shipment, and the place of delivery or installation. The contractor shall comply with the notice upon receipt, unless the contractor intends to claim an adjustment to compensation, schedule, or other contractual impact that would be caused by complying with such notice, in which case the contractor shall, in writing, promptly notify the Purchasing Agency of the adjustment to be sought, and before proceeding to comply with the notice, shall await the Purchasing Agency's written decision affirming, modifying, or revoking the prior written notice. If the Purchasing Agency decides to issue a notice that requires an adjustment to compensation, the contractor shall be compensated for any additional costs incurred as the result of such order and shall give the Purchasing Agency a credit for any savings. Said compensation shall be determined by one of the following methods:
 - a. By mutual agreement between the parties in writing; or
 - b. By agreeing upon a unit price or using a unit price set forth in the contract, if the work to be done can be expressed in units, and the contractor accounts for the number of units of work performed, subject to the Purchasing Agency's right to audit the contractor's records and/or to determine the correct number of units independently; or
 - c. By ordering the contractor to proceed with the work and keep a record of all costs incurred and savings realized. A markup for overhead and profit may be allowed if provided by the contract. The same markup shall be used for determining a decrease in price as the result of savings realized. The contractor shall present the Purchasing Agency with all vouchers and records of expenses incurred and savings realized. The Purchasing Agency shall have the right to audit the records of the contractor as it deems necessary to determine costs or savings. Any claim for an adjustment in price under this provision must be asserted by written notice to the Purchasing Agency within thirty (30) days from the date of receipt of the written order from the Purchasing Agency. If the parties fail to agree on an amount of adjustment, the question of an increase or decrease in the contract price or time for performance shall be resolved in accordance with the procedures for resolving disputes provided by the Disputes Clause of this contract or, if there is none, in accordance with the disputes provisions of the Commonwealth of Virginia

Vendors Manual. Neither the existence of a claim nor a dispute resolution process, litigation or any other provision of this contract shall excuse the contractor from promptly complying with the changes ordered by the Purchasing Agency or with the performance of the contract generally.

P. DEFAULT

In case of failure to deliver goods or services in accordance with the contract terms and conditions, the Commonwealth may terminate this agreement after verbal or written notice without penalty. Upon termination the Commonwealth may procure the goods or services contracted for from other sources and hold the contractor responsible for any resulting additional purchase and administrative costs. This remedy shall be in addition to any other remedies which the Commonwealth may have.

Q. TAXES

Sales to the Commonwealth of Virginia are normally exempt from State sales tax. State sales and use tax certificates of exemption, Form ST-12, will be issued upon request. Deliveries against this contract shall usually be free of Federal excise and transportation taxes. The Commonwealth's excise tax exemption registration number is 54-73-0076K.

If sales or deliveries against the contract are not exempt, the contractor shall be responsible for the payment of such taxes unless the tax law specifically imposes the tax upon the buying entity and prohibits the contractor from offering a tax-included price.

R. USE OF BRAND NAMES

Unless otherwise provided in this solicitation, the name of a certain brand, make or manufacturer does not restrict bidders to the specific brand, make or manufacturer named, but conveys the general style, type, character, and quality of the article desired. Any article which the public body, in its sole discretion, determines to be the equivalent of that specified, considering quality, workmanship, economy of operation, and suitability for the purpose intended, shall be accepted. The bidder is responsible to clearly and specifically identify the product being offered and to provide sufficient descriptive literature, catalog cuts and technical detail to enable the Commonwealth to determine if the product offered meets the requirements of the solicitation. This is required even if offering the exact brand, make or manufacturer specified. Normally in competitive sealed bidding only the information furnished with the bid will be considered in the evaluation. Failure to furnish adequate data for evaluation purposes may result in declaring a bid nonresponsive. Unless the bidder clearly indicates in its bid that the product offered is an equivalent product, such bid will be considered to offer the brand name product referenced in the solicitation.

S. TRANSPORTATION AND PACKAGING

By submitting their bids, all bidders certify and warrant that the price offered for FOB destination includes only the actual freight rate costs at the lowest and best rate and is based upon the actual weight of the goods to be shipped. Except as otherwise specified herein, standard commercial packaging, packing and shipping containers shall be used.

All shipping containers shall be legibly marked or labeled on the outside with purchase order number, commodity description, and quantity.

T. INSURANCE

By signing and submitting a bid under this solicitation, the bidder certifies that if awarded the contract, it will have the following insurance coverage at the time the contract is awarded. For construction contracts, if any subcontractors are involved, the subcontractor will have workers' compensation insurance in accordance with §§ 2.2-4332 and 65.2-800 et seq. of the Code of Virginia. The bidder further certifies that the contractor and any subcontractors will maintain these insurance coverages during the entire term of the contract and that all coverage will be provided by companies authorized to sell insurance in Virginia by the Virginia State Corporation Commission.

MINIMUM INSURANCE COVERAGES AND LIMITS:

1. Workers' Compensation - Statutory requirements and benefits. Coverage is compulsory for employers of three or more employees, to include the employer. Contractors who fail to notify the Commonwealth of increases in the number of employees that change their workers' compensation requirements under the Code of Virginia during the course of the contract shall be in noncompliance with the contract.
2. Employer's Liability - \$100,000
3. Commercial General Liability - \$1,000,000 per occurrence and \$2,000,000 in the aggregate. Commercial General Liability is to include bodily injury and property damage, personal injury and advertising injury, products and completed operations coverage. The Commonwealth of Virginia shall be added as an additional insured to the policy by an endorsement.
4. Automobile Liability - \$1,000,000 combined single limit. (Required only if a motor vehicle not owned by the Commonwealth is to be used in the contract. Contractor must assure that the required coverage is maintained by the Contractor (or third party owner of such motor vehicle.)

Profession/Service

Limits

Accounting	\$1,000,000 per occurrence, \$3,000,000 aggregate
Architecture	\$2,000,000 per occurrence, \$6,000,000 aggregate
Asbestos Design, Inspection or Abatement Contractors	\$1,000,000 per occurrence, \$3,000,000 aggregate
Health Care Practitioner (to include Dentists, Licensed Dental Hygienists, Optometrists, Registered or Licensed Practical Nurses, Pharmacists, Physicians, Podiatrists, Chiropractors, Physical Therapists, Physical Therapist Assistants, Clinical Psychologists, Clinical Social Workers, Professional Counselors, Hospitals, or	

Health Maintenance Organizations.)	<i>Code of Virginia § 8.01-581.15</i>
	https://law.lis.virginia.gov/vacode/title8.01/chapter21.1/section8.01-581.15/
Insurance/Risk Management	\$1,000,000 per occurrence, \$3,000,000 aggregate
Landscape/Architecture	\$1,000,000 per occurrence, \$1,000,000 aggregate
Legal	\$1,000,000 per occurrence, \$5,000,000 aggregate
Professional Engineer	\$2,000,000 per occurrence, \$6,000,000 aggregate
Surveying	\$1,000,000 per occurrence, \$1,000,000 aggregate

U. ANNOUNCEMENT OF AWARD

Upon the award or the announcement of the decision to award a contract as a result of this solicitation, the purchasing agency will publicly post such notice on the City website within 10 business days.

V. DRUG-FREE WORKPLACE

Applicable for all contracts over \$10,000:

During the performance of this contract, the contractor agrees to (i) provide a drug-free workplace for the contractor'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 contractor'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 contractor that the contractor 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 subcontractor 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 a contractor, the employees of whom are prohibited from engaging in the unlawful manufacture, sale, distribution, dispensation, possession or use of any controlled substance or marijuana during the performance of the contract.

W. NONDISCRIMINATION OF CONTRACTORS

A bidder or contractor shall not be discriminated against in the solicitation or award of this contract because of race, religion, color, sex, sexual orientation, gender identity, national origin, age, disability, faith-based organizational status, any other basis prohibited by state law relating to discrimination in employment or because the bidder employs ex-offenders unless the state agency, department or institution has made a written determination that employing ex-offenders on the specific contract is not in its best interest. If the award of this contract is made to a faith-based organization and an individual, who applies for or receives goods, services, or disbursements provided pursuant to this contract objects to the religious character of the faith-based organization from which the individual receives or would receive the goods, services, or disbursements, the public body shall offer the individual, within a reasonable period of

time after the date of his objection, access to equivalent goods, services, or disbursements from an alternative provider.

X. AVAILABILITY OF FUNDS

It is understood and agreed between the parties herein that the agency shall be bound hereunder only to the extent that the legislature has appropriated funds that are legally available or may hereafter become legally available for the purpose of this agreement.

Y. BID PRICE CURRENCY

Unless stated otherwise in the solicitation, bidders shall state bid/offer prices in US dollars.

Z. AUTHORIZATION TO CONDUCT BUSINESS IN THE COMMONWEALTH

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.

AA. FORCED OR INDENTURED CHILD LABOR

Applicable in all solicitations and contracts over \$10,000:

During the performance of this contract the use of forced or indentured child labor is prohibited. Any Prime Contractor shall include such prohibition in every subcontract that exceeds \$10,000 and shall be binding upon each subcontractor or vendor.

For the purposes of this section, “forced or indentured child labor” means all work or service exacted from any person younger than 18 years of age under the menace of any penalty for the nonperformance of such work or service and for which such person does not offer himself voluntarily or performed by any person younger than 18 years of age pursuant to a contract the enforcement of which can be accomplished by process or penalties.

BB. STATE CORPORATION COMMISSION IDENTIFICATION NUMBER

Pursuant to Code of Virginia, §2.2-4311.2 subsection B, a contractor organized or authorized to transact business in the Commonwealth pursuant to Title 13.1 or Title 50 is required to include in its bid or proposal the identification number issued to it by the State Corporation Commission (SCC). Any contractor that is not required to be authorized to transact business in the Commonwealth as a foreign business entity under Title 13.1 or Title 50 or as otherwise required by law is required to include in its bid or proposal a

statement describing why the contractor is not required to be so authorized. Indicate the above information on the SCC Form provided. Contractor agrees that the process by which compliance with Titles 13.1 and 50 is checked during the solicitation stage (including without limitation the SCC Form provided) is streamlined and not definitive, and the Commonwealth's use and acceptance of such form, or its acceptance of contractor's statement describing why the contractor was not legally required to be authorized to transact business in the Commonwealth, shall not be conclusive of the issue and shall not be relied upon by the contractor as demonstrating compliance.

SPECIAL TERMS AND CONDITIONS

AWARD

An award will be made to the lowest responsive and responsible bidder. Evaluation will be based on net prices. Unit prices, extensions and grand total must be shown. In case of arithmetic errors, the unit price will govern. If cash discount for prompt payment is offered, it must be clearly shown in the space provided. Discounts for prompt payment will not be considered in making awards. The City reserves the right to reject any and all bids in whole or in part, to waive any informality, and to delete items prior to making an award.

BID PRICES

Bid shall be in the form of a firm unit price for each item during the contract period.

BID ACCEPTANCE PERIOD

Any bid in response to this solicitation shall be valid for ninety (90) days. At the end of the days the bid may be withdrawn at the written request of the bidder. If the bid is not withdrawn at that time it remains in effect until an award is made or the solicitation is canceled.

CANCELLATION OF CONTRACT

The City may cancel the contract without penalty when it is determined to be in the best interest of the City (termination for the convenience of the City). Any contract cancellation notice shall not relieve the contractor of the obligation to deliver and/or perform on all outstanding orders issued prior to the effective date of cancellation.

SECTION 01 11 00 SUMMARY OF WORK

PART 1. GENERAL

1.1 SECTION INCLUDES

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

1.2 WORK SUMMARY

The work to be performed under these contract documents includes, but is not limited to, the following:

- A. Mobilization and demobilization
- B. Providing temporary field offices, storage, sanitary facilities, and communication equipment as needed
- C. Environmental, health and safety planning accommodations
- D. Establishment and maintenance of erosion and sediment control within tank construction area
- E. Construction layout and surveying, Construction Quality Control (CQC) testing, record drawings and related documentation
- F. Contractor will control dust generated by the Contractor's operations
- G. Earthwork to prepare tank foundation area as shown in plans and specifications, which will include excavation per Geotechnical Report
- H. Installation of (2) bolted steel landfill leachate Equalization Tanks including:
 - a. Tank foundation (ringwall and floor slab)
 - b. Required excavation and aggregate base
 - c. Tank dome
 - d. Tank coatings
 - e. Tank connection points and nozzles
 - f. Safety ladders and appurtenances
 - g. Pressure/vacuum relief devices
 - h. Passive cathodic protection system
- I. Hydrostatic testing and commissioning
- J. Repair/replacement of existing features impacted during construction
- K. Temporary and permanent seeding and establishment of grass on all disturbed areas within the limits of construction

1.3 OWNER SUPPLIED PRODUCTS

The following items Furnished by Owner for Installation by Contractor:

- a. N/A

1.3 OWNER SUPPLIED PRODUCTS

- A. The following items Furnished by Owner for Installation by Contractor:
 - i. N/A

1.4 CONTRACTOR'S USE OF SITE AND PREMISES

- A. Schedule
 - a. 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. excluding holidays observed by the City or Bristol Virginia). 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.
 - b. Contact Owner to coordinate Site access.
- B. Areas
 - a. Construction operations limited to areas noted on Drawings.
- C. Cooperation
- D. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
 - a. Contractor must 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 must be at Contractor's expense.

1.5 OWNER OCCUPANCY

- A. Term
 - i. The Owner will occupy the property during the entire period of construction
- B. Conflict
 - i. Cooperate with Owner to minimize conflict, and to facilitate Owner's operations.
- C. Schedule
 - i. Schedule the Work to accommodate Owner occupancy.

1.6 PROGRESS MEETINGS

- A. 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

PART 1. GENERAL

1.1 APPLICATIONS FOR PAYMENT

- A. Payment Terms
 - 1. Payments must be made in accordance with the procedures in the Terms and Conditions.
- B. Application Form
 - 1. Submit three (3) paper copies or one (1) electronic copy of each application on Section 00 62 76 of the Project Manual.
- C. Content and Format
 - 1. Utilize Bid Items for listing items in Application for Payment.
- D. Payment Period
 - 1. Submit at intervals stipulated in the Agreement.
- E. Substantiating Data
 - 1. When Engineer requires substantiating information, submit data justifying dollar amounts in question. Include the following with Application for Payment:
- F. Construction Quality Control Data
 - 1. Current soil and geosynthetic quality control test results, data, and daily reports. Test results and product specifications should be provided for all stored materials.
- G. Record Documents
 - 1. Record documents as specified in the project specifications, for review by Owner which will be returned to Contractor.

PART 2. PRODUCTS - NOT USED

PART 3. EXECUTION

3.1 MEASUREMENT AND PAYMENT – LUMP SUM PAY ITEMS

A. MOBILIZATION AND DEMOBILIZATION

- 1. Measurement for Mobilization and Demobilization will not be made for payment and all items must be included in the Contract Lump Sum Price. Mobilization must be compensated as indicated on the bid form. Mobilization must consist of the performance of construction preparatory operations, including 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 must also include bonds (not included in another bid item); permits (not included in another bid item); utility services; placement of project identification signs, sanitary facilities; 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 basis of payment must 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 must 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.

B. Environmental, Health, and Safety Planning and Accommodations

1. Measurement for Environmental, Health, and Safety Planning and Accommodations will not be made for payment and all items must be included in the contract Lump Sum Price.
2. Payment for Health and Safety Planning and Accommodations must be made at the Lump Sum Price, which price and payment must be full compensation for all labor, equipment, and incidentals
3. required to provide a Health and Safety Plan that addresses respiratory protection procedure to adequately protect employees from site emissions as outlined in the Specifications; safe work procedures, including work procedures in the vicinity of overhead power lines; personal protective equipment; laboratory testing; field testing equipment; safety meetings; safety training; environmental compliance; environmental best practices; and environmental planning. This item includes preparing and implementing the program including documentation, testing, analysis, and safety equipment. The CONTRACTOR will maintain this program for the duration of the project, which should be included in the Lump Sum Price.

C. Clearing, Grubbing, and Stripping

1. Measurement for site Clearing, Grubbing, and Stripping will not be made for payment and all items must be included in the contract Lump Sum Price.
2. Payment for site clearing and grubbing must be made at the Lump Sum Price, which price

and payment must be full compensation for all labor, equipment, materials, and incidentals required for removal, including off-site disposal as needed, of surface debris, rocks, boulders, trees, shrubs, existing pavement, existing stockpiles, and all other construction items complete and in-place in accordance with the plans and specifications.

D. Erosion and Sediment Control

1. Measurement for Erosion and Sediment Control will not be made for payment and all items must be included in the contract Lump Sum Price.
2. Payment for Erosion and Sediment Control must be made at the Lump Sum Price, which price and payment must be full compensation for all labor, equipment, and incidentals required to provide erosion and sediment control including temporary seeding, silt fence, erosion matting; all temporary erosion and sediment controls; 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. Also include the cost of obtaining a Land Disturbance Permit as the Responsible Land Disturber as required by the City of Bristol and posting the Erosion and Sediment Control Bond to the City.
3. Furnish Equalization Tank Materials
 - a. Measurement for Furnishing bolted steel Equalization Tank materials must not be made for payment and all items must be included in the contract Lump Sum Price.
 - b. Payment for Furnishing Equalization Tank Materials must be made at the Lump Sum Price, which price and payment must be full compensation for all materials, transportation, equipment, testing, storing, and maintaining storage, incidentals, and all else as required by the plans and
 - c. specifications, including Tank connections, and materials needed for. No additional payment will be made for replacement of rejected material, testing, or change in material supplier.
4. Install Equalization Tanks
 - a. Measurement for Installing Equalization Tanks must not be made for payment and all items must be included in the contract Lump Sum Price. Payment for Installing Equalization Tanks must be made at the Lump Sum Price, which price and payment must be full compensation for all labor, materials, equipment, testing, and incidentals required for construction, including excavation, filling, compaction, and erection 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

PART 1. 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

- A. 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

- A. Equipment and Contractors
 1. 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.
- B. Reference Points
 1. Owner will locate and protect survey control and reference points. Promptly notify Engineer of discrepancies discovered.
- C. Horizontal Datum
 1. Horizontal control datum for survey is NAD 83 (Virginia State Plane South projection).
- D. Vertical Datum
 1. Vertical control datum for survey is NAVD88.
- A. Set Backs
 1. Verify set-backs and easements; confirm drawing dimensions and elevations.
- B. Surveying Services
 1. Provide field engineering services. Establish elevations, lines, and levels, utilizing recognized engineering survey practices.
- C. Protection of Control Points
 1. protect survey control points prior to starting site work; preserve permanent reference points during construction.
- D. Loss of Control Points
 1. Promptly report to Engineer loss or destruction of reference point or relocation required because of changes in grades or other reasons.
- E. Dislocated Control Points
 1. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Engineer.

1.4 PRECONSTRUCTION MEETING

A. Coordination

1. Engineer will schedule meeting after Notice of Award.

B. Attendance

1. Attendance Required: Owner, Engineer, and Contractor.

C. 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 Blower-Flare Installation.

D. Minutes

1. Engineer will record minutes and distribute copies within 5 business days after meeting to participants, with electronic copies to Contractor, Owner, and those affected by decisions made.

1.5 SITE MOBILIZATION MEETING

A. Coordination

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

B. Attendance

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

C. Agenda

1. Use of premises by Owner and Contractor.
2. Owner's requirements.
3. Construction facilities and controls provided by Owner.
4. Temporary utilities provided by Owner.
5. Survey and layout.
6. Security and housekeeping procedures.
7. Schedules.
8. Application for payment procedures.
9. Procedures for testing.
10. Procedures for maintaining record documents.

11. Requirements for start-up of equipment.
12. Inspection and acceptance of equipment put into service during construction period.

D. Minutes

1. Engineer will record minutes and distribute copies within 5 business days after meeting to participants, with electronic copies to Contractor, Owner, and those affected by decisions made.

1.6 PROGRESS MEETINGS

A. Meeting Schedule

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

B. Coordination

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

C. Attendance

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

D. Agenda

1. Review minutes of previous meetings.
2. Safety and environmental review
3. Review of work progress.
4. Field observations, problems, and decisions.
5. Review of submittals schedule and status of submittals.
6. Maintenance of progress schedule.
7. Planned progress during succeeding work period.
8. Other business relating to Work.

E. Minutes

1. Engineer will record minutes and distribute copies within 5 business days after meeting to participants, with electronic copies to Contractor, Owner, and those affected by decisions made.

1.7 PRE-INSTALLATION MEETINGS

A. Scheduling

1. Prior to blower-flare installation, or when required in individual specification sections, convene pre- installation meetings at Project site prior to commencing work of specific section.

B. Attendance

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

C. Scheduling

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

D. Agenda and Coordination

1. Engineer will prepare agenda and preside at meeting:
2. Review conditions of installation, preparation and installation procedures.
3. Review coordination with related work.

E. Minutes

1. Engineer will record minutes and distribute copies within 5 business days after meeting to participants, with electronic copies to Contractor, Owner, and those affected by decisions made.

PART 2. PRODUCTS - NOT USED

PART 3. EXECUTION – NOT USED

END OF SECTION 01 30 00

SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1. GENERAL

1.1 SECTION INCLUDES

- Submittal procedures
- Construction progress schedules
- Proposed products list
- Product data
- Shop drawings
- Samples
- Design data
- Test reports
- Certificates
- Manufacturer's instructions
- Manufacturer's field reports
- Erection drawings
- Construction photographs

1.2 SUBMITTAL PROCEDURES

- A. Form
 - Transmit each submittal with a Submittal Form.
- B. Numbering
 - Sequentially number transmittal forms. Mark revised submittals with original number and sequential alphabetic suffix.
- C. Details
 - Identify Project, Contractor, subcontractor and supplier; pertinent drawing and detail number, and specification section number, appropriate to submittal.
- D. Certification
 - 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
 - Schedule submittals to expedite Project, and deliver to Engineer electronically. Coordinate submission of related items.
- F. Review
 - For each submittal for review, allow 15 working days excluding delivery time to and from Contractor.
- G. Variations
 - Identify variations from Contract Documents and product or system limitations which may be detrimental to successful performance of completed Work.
- H. Space
 - Allow space on submittals for Contractor and Engineer review stamps.
- I. Revisions

- When revised for resubmission, identify changes made since previous submission.
- J. Copies
 - Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.
- K. Excess
 - Submittals not requested will not be recognized or processed.
- L. Submission
 - All submittals must be submitted electronically.

1.3 CONSTRUCTION PROGRESS SCHEDULES

- A. Submittal
 - 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. Revisions
 - Submit revised Progress Schedules with each Application for Payment.
- C. Copies
 - Distribute copies of reviewed schedules to Project site file, subcontractors, suppliers, and other concerned parties.
- D. Concerns
 - Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.
- E. Format
 - Submit computer generated horizontal bar chart with separate line for each major portion of Work, identifying first work day of each week.
- F. Sequence
 - 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. Progress
 - Indicate estimated percentage of completion for each item of Work at each submission.
- H. Additional Schedules
 - 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. Delivery Dates
 - Indicate delivery dates for Owner furnished products and products identified under Allowances.
- J. Revisions To Schedules
- K. Progress
 - Indicate progress of each activity to date of submittal, and projected completion date of each activity.
- L. Modifications

- Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.

M. Narrative

- 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. List Submission

- 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. Referenced Products

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

C. Safety Data Sheets

- All Safety Data Sheets for materials/products must be submitted to the City for review and retention for compliance.

1.5 PRODUCT DATA

A. Submission

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

B. Method

- Submit product data electronically.

C. Data

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

D. Characteristics

- 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. 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. Submission

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

B. Identification

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

C. Number

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

D. References

- 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

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. Manufacturer
- When specified in individual specification sections, submit certification by manufacturer, installation/application subcontractor, or Contractor to Engineer, in quantities specified for Product Data.
- B. Data
- Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Relevance
- Certificates may be recent or previous test results on material or Product, but must be acceptable to Engineer.

1.11 MANUFACTURER'S INSTRUCTIONS

- A. Submittal
- 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. Special Methods
- Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.12 INSTALLATION DRAWINGS

- A. Submittal
- Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.
- B. Data
- Data indicating inappropriate or unacceptable Work may be subject to action by Engineer or Owner.

PART 2. PRODUCTS - NOT USED

PART 3. EXECUTION

- Repeated failure to present acceptable submittals or excessive services required of Engineer due to repeated presentation of unacceptable submittals must 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 43 - ENVIRONMENTAL PROCEDURES

PART 1. GENERAL

1.1 DESCRIPTION

A. Scope

1. Contractor's Responsibility

- a. The Contractor shall be responsible for furnishing all necessary items for fulfilling the work described herein for Environmental Protection including prevention and control of erosion and sedimentation that results directly or indirectly from the project as set forth in these Specifications.

B. General

1. The General Assembly of the Commonwealth of Virginia has determined that the lands and waters comprising the watersheds of the State are great natural assets and resources; that as a result of erosion and sediment deposition on lands and in waters within the watersheds of the State, the waters are being polluted and despoiled to such a degree that fish, marine life, and recreational use of the waters are being adversely affected.

C. Related Work Specified Elsewhere

1. Section 31 00 00 Earthwork
2. Section 31 05 16 Aggregates
3. Section 31 23 33 Trenching, Backfilling, and Compacting
4. Section 31 25 00 Erosion and Sediment Control

1.2 DEFINITIONS

A. Environmental Protection and Restoration

B. Description

1. This Work shall consist of the protection of the environment and natural resources. It includes cleanup and restoration of the construction site to prevent accidents involving any person, to protect all work in place, to restore all disturbed areas, removal of all evidence of construction activities, and to effect completion of the contract in an orderly manne

C. Preservation of Natural Resources

1. Land Disturbance is defined as any earth movement and land changes including but not limited to tilling, clearing, grading, excavating, stripping, filling and related activities. All land disturbance resulting from construction operations, contract work, clean-up and the condition of the adjacent terrain upon completion of the Work shall fully comply with all applicable regulations and laws concerning the preservation of natural resources.

1.3 PROVISIONS

A. Private Agreements

1. CONTRACTOR shall make no agreements with property owners adjacent to the project site. Any arrangements involving private agreements between the CONTRACTOR and property owners beyond those set forth in the Contract Documents shall not involve the CITY and shall be at the CONTRACTOR'S expense.

B. Method of Measurement

1. Measurement for the work addressed under this section will be in accordance with the appropriate sections of these specifications as referenced in the Contract Documents. Where no such reference is made, no measurement will be made for this Work.
- C. Basis of Payment Referenced
 1. Work performed under the requirements of this section will be paid for as measured above in accordance with the appropriate sections of these specifications or as otherwise set for in the Contract Documents.
- D. Unreferenced
 1. Where no such measurement is provided for and where no bid item is set forth in the contract, the Work shall be considered incidental to the several bid items required to construct the project.

1.4 ENVIRONMENTAL PROTECTION PLAN

- A. Prior to beginning work the contractor must prepare and submit an Environmental Protection Plan which will include but not be limited to the following sections:
 1. Spill Prevention
 - a. Oil
 - b. Chemical
 2. Waste Handling and Disposal
 - a. Brush
 - b. Chemicals
 - c. Oils
 - d. Municipal Solid Waste
 - e. Construction Debris
 3. Fueling Procedures
 4. Fugitive Emissions
 5. Stormwater Control
 6. Concrete
 - a. Wastewater
 - b. Other Concrete Waste

PART 2. PRODUCTS – Not use

PART 3. EXECUTION

3.1 PREVENTION OF WATER POLLUTION

Precautions

- A. The Contractor shall take all such precautions in the conduct of his operations as may be necessary to avoid contaminating the water in adjacent watercourses or water storage areas including wells whether natural or man-made.
- B. Earthwork
- C. All earthwork, moving of equipment, water control of excavations, and other operations likely to create silting, shall be conducted so as to prevent pollution of watercourses or water storage areas.
- D. Water
- E. Water used during the Contract work which has become contaminated with landfill leachate, oil, bitumens, harmful or objectionable chemicals, sewage or other pollutants shall be disposed of so as to avoid affecting all nearby waters and lands. Under no circumstances shall the Contractor discharge pollutants into a watercourse or water storage area. Water used in aggregate processing, concrete curing, foundation and concrete lift cleanup or any other waste shall not be permitted to enter a stream. When water from adjacent sources is used in the contract Work, intake methods shall be such as to avoid contaminating the source of supply or becoming a source of erosion.

3.2 DUST CONTROL

- A. Throughout the entire construction period, maintain dust control by use of water truck, water sprinklers or chemical dust control binder as may be approved by the ENGINEER.

3.3 RESTORATION

- A. Cleanup
 - 1. Construction cleanup must proceed as construction progresses and must consist of the removal of all mud, oil, soil, gravel, trash, debris and any other materials that are unsightly.
- B. Disturbed Areas
 - 1. All areas disturbed by the Contractor's operations, including staging and stockpiling areas, construction strips, access roads, and areas within the acquired right-of-way must be restored and restabilized as specified in these Specifications.
- C. Restabilization
 - 1. Unless otherwise indicated, provide seeding on all disturbed areas which supported a previously established stand of turf. Seed slopes of 3:1 and as otherwise directed by the ENGINEER. Provide seeding on all other disturbed and filled areas. Restabilization shall be done in accordance with Virginia Stormwater Management Handbook Specifications Section C-SSM-09 and C-SSM-10.
- D. Signs, Markers, Etc.
 - 1. Preserve public and private signs, markers, guardrails and fences and maintain in their original condition unless written permission is obtained for their removal and replacement. Remove and properly store such items when in conflict with grading operations. Store in a manner to keep them clean and dry and re-erect at such new locations to prevent damage to underground or overhead public utility structures. Such items lost or damaged as a result of the Contractor's failure to properly protect or store them will result in replacement by the City with cost deducted from the Contractor's retainage.
- E. Gravel Surface and Shoulders

1. Gravel surface and shoulders shall be restored equal to or better than their original condition. Do not reuse shoulder material if contaminated by foreign material. In such case, replace with new material of equal quality and gradation. Material and methods of construction shall be in accordance with these Specifications and applicable permits secured for this Contract.
- F. Final Restoration
1. Final restoration and restabilization including seeding, sodding and paving when season permits, must proceed immediately after construction activity is completed in a given area. The Contractor must tear down and remove all temporary construction facilities constructed by him and leave the site in an orderly condition.
- G. Disposal of Waste Materials
1. Construction waste materials shall be disposed of in an authorized disposal area. Waste material disposed of in an unauthorized area shall be removed by the Contractor and the area shall be restored to its original condition, at no cost to the City.

END OF SECTION 01 35 29

SECTION 01 35 29 – HEALTH AND SAFETY PLAN

PART 1. GENERAL

1.1 STOP WORK

- A. Actions that potentially endanger workers must 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

- A. Preparation
 1. The CONTRACTOR must 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 must include as a minimum, the following:
- B. Organizational Structure
 1. Organizational Structure to include general supervision, Health, Safety, and Environmental officer, lines of authority, and responsibility and communication. The Health, Safety, and Environmental Officer must be a worker who will be present at all times during site construction, in addition to his/her other site duties.
- C. Comprehensive Work Plan
 1. Comprehensive Work Plan to include the work tasks and objectives, resources needed, and training requirements for workers (health, safety, and environmental, machine operations license, etc.). This must also include a section on safety procedures to be followed for excavation and well drilling (if applicable) in landfill waste and work in areas where exposure to landfill gas, condensate, and/or leachate is likely.
- D. Health and Safety
 1. 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.
- E. Emergency Response Plans
 1. Emergency Response Plans to include all emergency telephone numbers (including communication tree), a highlighted map showing the quickest route to the nearest emergency care facility and written directions to such facility.
- F. Air Monitoring Procedures
 1. 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 must be recorded with the date and time of sample, and the sampler's name.
 2. Sampling must be done by a CONTRACTOR's worker trained in the use of the gas sampling equipment. These trained workers must be designated in the CONTRACTOR's Plan.
- G. Respiratory Protection Program

1. 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.
- H. Well Drilling Installation and Excavation Safety Procedures
 1. Well Drilling Installation and Excavation Safety Procedures to include prevention of fall hazards and controlled access zones (if applicable).
- I. Signature Page
 1. A signature page for all site workers covered by the Plan (CONTRACTOR and Subcontractor site workers).
- J. Acceptance
 1. 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.
- K. Considerations
 1. The CONTRACTOR must 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.
- L. References
 1. 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), 2020" or latest edition.

1.3 SITE OPERATIONS

- A. Location
 1. 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.
- B. Safety Meeting
 1. 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.
- C. Lighting
 1. Site operations will take place in conditions of adequate light only.
- D. Landfill gas
 1. 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 by the CONTRACTOR. 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.
- E. Excavation

1. No workers will be allowed in any trench or excavation while excavation of the area is in progress. Entry into the excavation must 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.
- F. Skin Protection
1. 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 if applicable.
- G. Start-up and Shut-down
1. Start-up and shutdown of engines will not be done in areas of excavated refuse or where elevated landfill gas emissions have been documented.

PART 2. PRODUCTS Not used.

PART 3. EXECUTION Not Used

END OF SECTION 01 35 29

SECTION 01 45 00 - CONSTRUCTION QUALITY CONTROL

PART 1. GENERAL

1.1 SECTION INCLUDES

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

1.2 QUALITY CONTROL REQUIREMENTS

A. Construction Quality Control

1. The CONTRACTOR is responsible for construction quality control (CQC or QC) and must establish and maintain an effective quality control system in compliance with the Contract Documents. The construction quality control system must consist of plans, procedures, tests and observation, and organization necessary to produce an end product which complies with the contract requirements. The system must cover all construction and manufacturing operations, both on-site and off-site, and must be keyed to the proposed construction sequence.
2. Contractor will be required to provide, coordinate and oversee the following activities on the Project in accordance with the Specifications:

B. Materials Testing

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

C. Operational Testing

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

D. Surveying

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

E. Construction Quality Assurance

1. The Owner is responsible for and will provide Construction Quality Assurance (CQA or QA), which will provide independent monitoring and verification of compliance with all construction and CQC requirements. The CQA Representative (also referred to as the Quality Assurance Officer or QAO) is the on-site project representative for CQA. The CQA Engineer (also referred to as the Quality Assurance Engineer) is in direct supervision of the CQA Representative (QAO).
2. Minimum testing requirements are included in applicable Specification sections. Owner will provide the following testing on the Project:

F. Materials Testing

1. Owner may provide limited testing as outlined in the project specifications.
2. All tests which fail to comply with the minimum requirements must be retested at Contractor's expense using Owner's contracted representatives. Owner reserves the right to direct additional testing and sampling.

G. Surveying

1. Provision of construction quality assurance surveying.
- H. Drawings
- I. Record drawings.
- J. Results
- K. Results of all analyses must 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 must 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. Submittal of results will be required for payment of applicable pay items.

1.3 MEASUREMENT AND PAYMENT

- A. 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 must be included within the applicable work item on the bid form. Payment of bid items may be withheld until documentation of quality control has been submitted.

1.4 QUALITY CONTROL AND CONTROL OF INSTALLATION

- A. Sub-Contractors
 1. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Manufacturer's Instructions
 1. Comply with manufacturers' instructions, including each step in sequence.
- C. Conflicts
 1. When manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.
- D. Standards
 1. 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.
- E. Qualifications
 1. Perform Work by persons qualified to produce required and specified quality.
- F. Measurements
 1. Verify field measurements are as indicated on Shop Drawings or as instructed by manufacturer.
- G. Anchorage
 1. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.5 TOLERANCES

- A. Observations
- B. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- C. Manufacturer's Tolerances
- D. Comply with manufacturers' tolerances. When manufacturers' tolerances conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- E. Adjustment

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

1.6 REFERENCES

- A. Standards
 - a. 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.
- B. Version
 - a. Conform to reference standard by date of issue current on date of Contract Documents, except where specific date is established by code.
- C. Copies
 - a. Obtain copies of standards where required by product specification sections.
- D. Conflicts
 - a. When specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.
- E. Contract
 - a. Neither contractual relationships, duties, nor responsibilities of parties in Contract nor those of Engineer will be altered from Contract Documents by mention or inference otherwise in reference documents.

1.7 TESTING AND INSPECTION SERVICES

- A. Outside Services
 - 1. The Contractor may employ a third party firm to support construction quality control on the project.
- B. Laboratory
 - 1. 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.
- C. Tests
 - 1. The independent firm will perform tests, inspections, and other services specified in individual specification sections and as required by Engineer.
- D. Location
 - 1. Testing, inspections and source quality control may occur on or off project site. Perform off-site testing as required by Engineer.
- E. Reports
 - 1. 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.
- F. Cooperation
 - 1. Contractor must cooperate with independent firm; furnish samples of materials, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
- G. Notification
 - 1. Notify Engineer and independent firm 48 hours prior to expected time for operations requiring services.
- H. Additional Tests
 - 1. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.

PART 2. PRODUCTS

2.1 CONSTRUCTION QUALITY CONTROL PLAN

- A. Content of the CQC Plan
 - 1. The CQC plan must 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:
- B. Organizational Chart
 - 1. A description of the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff must implement the three phase control system for all aspects of the work specified. The staff must include a CQC System Manager who must report to the Site Superintendent or someone higher in the CONTRACTOR's organization. Site Superintendent in this context must mean the individual with responsibility for the overall management of the project including quality and production.
- C. Resumes
 - 1. A description of the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff must implement the three phase control system for all aspects of the work specified. The staff must include a CQC System Manager who must report to the Site Superintendent or someone higher in the CONTRACTOR's organization. Site Superintendent in this context must mean the individual with responsibility for the overall management of the project including quality and production.
- D. Letter of Authorization
 - 1. 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 must 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.
- E. Testing
 - 1. 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.
- F. Inspection
 - 1. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.
- G. Deficiencies
 - 1. Procedures for tracking construction deficiencies from identification through acceptable corrective action. These procedures will establish verification that identified deficiencies have been corrected.
- H. Daily Report and Monthly Report
 - 1. Reporting procedures, including proposed reporting formats.
- I. A list of the definable features of work.
 - 1. 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.

- J. Samples
 - 1. Samples of all daily report and inspection forms.
- K. Laboratories
 - 1. The name and address of all quality control laboratories.
- L. Acceptance of Plan
 - 1. 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.
- M. Notification of Changes
 - 1. After acceptance of the CQC plan, the CONTRACTOR must 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.

PART 3. EXECUTION

3.1 CONSTRUCTION QUALITY CONTROL ORGANIZATION

- A. CQC System Manager
 - 1. The CONTRACTOR must identify an individual within his organization at the site of the work who must be responsible for overall management of CQC and have the authority to act in all CQC matters for the CONTRACTOR. This CQC System Manager must 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.
- B. CQC Organizational Staffing
 - 1. The CONTRACTOR must provide a CQC staff which must 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.
- C. CQC Staff
 - 1. 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 must be subject to acceptance by the OWNER.

- D. CQC System Manager:
 - 1. The CQC System Manager must demonstrate that they have a minimum of 2 years landfill gas construction experience on construction similar to this contract. The CQC System Manager must be
- E. assigned as system manager but may also have duties as project superintendent in addition to quality control.
- F. Supplemental Personnel
 - 1. A staff must 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.
- G. Organizational Changes
 - 1. The CONTRACTOR must obtain OWNER acceptance before replacing any member of the CQC staff. Requests must include the names, qualifications, duties, and responsibilities of each proposed replacement.

3.2 EXAMINATION

- A. Existing Conditions
 - 1. Verify existing site conditions are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.
- B. Specific Conditions
 - 1. Examine and verify specific conditions described in individual specification sections.

3.3 CONTROL

- A. Construction Quality Control
 - 1. 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 must 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 must be conducted by the CQC System Manager for all definable features of work, as follows:
- B. Specifications
 - 1. A review of each paragraph of applicable specifications.
- C. Plans
 - 1. A review of the contract plans.
- D. Materials
 - 1. A check to assure that all materials and/or equipment to be used have been tested, submitted, and approved.
- E. Inspection
 - 1. A check to assure that provisions have been made to provide required control inspection and testing.
- F. Examination
 - 1. Examination of the work area to assure that all required preliminary work has been completed and in compliance with the contract.
- G. Confirmation

1. 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.
- H. Hazards
1. A review of the appropriate activity hazard analysis to assure safety requirements are met.
- I. Procedures
1. Discussion of procedures for constructing the work including repetitive deficiencies. Document construction tolerances and workmanship standards for the work.
- J. Acceptance
1. A check to ensure that the portion of the plan for the work to be performed has been accepted by the ENGINEER.
- K. Preliminary Work
1. A check of preliminary work to ensure that it is in compliance with contract requirements. Review minutes of the preparatory meeting.
- L. Contract Compliance
1. Verification of full contract compliance. Verify required control inspection and testing.
- M. Workmanship
1. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with sample panels if appropriate.
- N. Conflicts
1. Resolve all differences between parties.
- O. Safety
1. Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.
- P. Coordination
1. The ENGINEER must be notified at least 48 hours in advance of beginning any actions. A meeting must 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 must be documented by separate minutes prepared by the CQC System Manager and attached to the daily CQC report. The CONTRACTOR must instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.
- Q. Follow-up
1. Daily checks must be performed to assure continuing compliance with contract requirements, including control testing, until completion of the particular feature of work. The checks must be made a matter of record in the CQC documentation. Final follow-up checks must 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 must not build upon or conceal non-conforming work.
- R. Additional Requirements
1. 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

A. Testing Procedure

1. The CONTRACTOR must 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 must 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 must be by the furnished by the CONTRACTOR as a part of the CQC plan. The list must 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 must perform the following activities and record and provide the following data:

B. Contract

1. Verify that testing procedures comply with contract requirements.

C. Equipment

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

D. Calibration

1. Check test instrument calibration data against certified standards.

E. Records

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

F. Results

1. Results of all tests performed, both passing and failing tests, will be recorded on the Quality Control report for the date performed. Tests must 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.

G. Testing Laboratories Capability Check

1. 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.

H. On-Site Laboratory and Equipment

1. The OWNER reserves the right to utilize the CONTRACTORS 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

- A. 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 must 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 must be included in the CQC documentation, as required by paragraph DOCUMENTATION below, and must include the estimated date by which the deficiencies will be corrected. The CQC system manager or

- staff must make a second inspection to
- B. 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

PART 1. GENERAL

1.1 DESCRIPTION

- A. 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

- A. 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.
1. ASTM D3740 Standard Practice for Evaluation of Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
 2. ASTM E329 Standard Practice for Use in Evaluation of Testing and Inspection Agencies as Used in Construction

1.3 REQUIREMENTS

- A. Accreditation Requirements:
1. 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 must meet the requirements of OSHA and EPA. The policy applies to the specific laboratory performing the actual testing associated with the project.
- B. Inspection and Testing:
1. Testing laboratory must 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 must direct attention of Engineer to such failure.
- C. Written Reports
1. Testing laboratory must 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.
- D. Verbal Reports
1. Give verbal notification to Resident Engineer immediately of any irregularity.

1.4 APPROVAL OF LABORATORY

- A. The CONTRACTOR must 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

- A. Calibration
1. Calibrated at maximum 12-month intervals or interval specified by applicable ASTM requirement whichever is more frequent. Calibration must 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.

B. Certification

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

1.6 SUBMITTALS

A. Certificate of Compliance of Laboratory Qualifications

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

B. Independent Soils QC Laboratory

1.7 TEST REPORTS

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

1. Date issued.
2. Project title and number.
3. Testing laboratory name and address.
4. Name and signature of inspector.
5. Date of inspection or sampling.
6. Record of temperature and weather. Date of test.
7. Identification of product and specification section.
8. Location in project.
9. Type of inspection or test.
10. Results of tests and observations regarding compliance with Contract Documents.

PART 2. PRODUCTS - NOT USED

PART 3. EXECUTION

1.8 EARTHWORK

A. General:

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

B. Observations

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.
- C. Fill
1. 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.
- D. Technician
1. Provide supervised geotechnical technician to inspect excavation, subsurface preparation, and backfill for fill.

END OF SECTION 01 45 29

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1. GENERAL

A. 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, curity, access roads, drainage, erosion and sediment control measures, parking, and emergencies.

1.1 PROTECTION AND SAFETY

A. In addition to requirements stated in the Term and Conditions, Contractor must:

B. Access

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

C. Benchmarks

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

D. Structures

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

E. Movement

1. 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.

F. Existing Conditions

1. Notify ENGINEER of differing subsurface or physical conditions.

G. Environmental Devices

1. Verify required environmental protection devices, best management practices (BMPs), and procedures are in place, properly maintained, and operational.

H. Coordination

1. Coordinate the Work with OWNER.

1.2 COORDINATION

A. Site Access

1. Arrangements for access to the Site, workmen's parking locations, sites for storing material, sanitary facilities, utilities during construction, etc., must 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.).

B. Contact

1. Contact OWNER to coordinate Site access.

1.3 COMMUNICATION

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

1.4 FIELD OFFICE

- A. Contractor must provide and maintain a suitable temporary field office as necessary at the Site for its own use. Contractor must be responsible for necessary permits to install the temporary office and utilities. The location of the field office must not interfere with OWNER's operations. Contractor responsible for all electrical and telecommunication services.
- B. Existing Facilities
 - a. Do not use existing facilities for field offices or for storage.
- C. Storage Areas and Sheds
 - a. Size to storage requirements for products of individual Sections, allowing for access and orderly provision for maintenance and for inspection of products
- D. Preparation
 - a. Fill and grade sites for temporary structures sloped for drainage away from buildings. Removal
- E. At completion of Work remove buildings, foundations, utility services, and debris. Restore areas.

1.5 SANITARY FACILITIES

- A. Contractor must 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 must be at Contractor's expense. Existing facility use is not permitted. Provide facilities at time of project mobilization.

1.6 MAINTENANCE OF TRAFFIC

- A. Safety
 - 1. It must be the sole responsibility of Contractor to furnish and maintain, until the Work has been accepted by OWNER, all items necessary for safety.
- B. Interference
 - 1. This site includes landfills with ongoing maintenance activities. At no time will Contractor impede any operations at any time without appropriate notification to and approval of the OWNER.
- C. Traffic Control
 - 1. Traffic control on public roads must be in accordance with the current Federal Highway Administration Manual on Uniform Traffic Control Devices (MUTCD). If applicable, costs for maintenance of traffic control must be at Contractor's expense.
- D. Operation
 - 1. Contractor must operate vehicles and equipment in a safe manner.
- E. Waste
 - 1. The Contractor must promptly remove excavated material or other debris that may be spilled or tracked onto the traveled pavement during the conduct of the Work. Waste and debris must be disposed of in accordance with Section 01 35 43 of the Project Specifications, Environmental Procedures.
- F. Flagging
 - 1. 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 must

be maintained at all times. When work is not in progress, traffic is to be returned to the normal fashion.

1.7 TEMPORARY ELECTRICITY

- A. Service
 - 1. Provide and pay for power service required from utility source as needed for construction operation.
- B. Supplemental Power
 - 1. Complement existing power service capacity and characteristics as required for construction operations.

1.8 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

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

1.9 SECURITY

- A. Protection
 - 1. CONTRACTOR must be responsible for protection of the site, and all work, materials, equipment and existing facilities thereon, against vandals and other unauthorized persons.
- B. Claims
 - 1. No claim must be made against the OWNER by reason of any act of an employee or trespasser, and CONTRACTOR must make good all damage to the OWNER's property resulting from his failure to provide security measures as specified.
- C. Minimums
 - 1. Security measures must be at least equal to those usually provided by OWNER to protect his existing facilities during normal operation, but must also include such addition security fencing, barricades, lighting and other measures as required to protect the site.

1.10 ACCESS ROADS

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

1.11 PARKING

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

1.12 DUST CONTROL

- A. Fugitive dust is not allowed on site. Execute Work by methods to minimize raising dust from construction operations.

1.13 NOISE CONTROL

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

1.14 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Schedule
 - 1. Remove temporary utilities, equipment, facilities, and materials prior to Final Application for Payment inspection.
- B. Repair
 - 1. Clean and repair damage caused by installation or use of temporary work.
- C. Restoration
 - 1. Restore existing and permanent facilities used during construction to original condition.
Restore permanent facilities used during construction to specified condition.

PART 2. PRODUCTS - NOT USED

PART 3. EXECUTION - NOT USED

END OF SECTION 01 50 00

SECTION 01 70 00 - EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1. GENERAL

1.1 FINAL INSPECTION CERTIFICATION

- A. 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.

1.2 INSPECTION

- A. Final Inspection meeting will be held at the site to determine completeness.
- B. Punch List
 - a. 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.

1.3 CLEANING

- A. Schedule a final cleaning as approved by the Engineer to enable the OWNER to accept a completely clean project. Clean up debris and dirt. Debris and dirt should be disposed of as outlined in Section 01 35 43 of the Project Specifications.

1.4 APPLICATION FOR FINAL PAYMENT

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

1.5 SUBMITTALS DRAWINGS

- A. 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.

1.6 SUBCONTRACTOR LIST

- A. 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.

1.7 AFFIDAVIT OF PAYMENT OF DEBTS AND CLAIMS.

- Affidavit of Release of Liens.

1.8 CLEANING REQUIREMENTS MAINTENANCE

- A. 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.

1.9 FINAL CLEANING

- A. 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, safe, and environmentally compliant condition. Sweep paved areas.

1.10 RESTORATION

- A. Restore areas damaged from construction activities to their original condition.

1.11 FACILITIES AND EQUIPMENT

- A. Remove construction facilities and equipment from the project site and restore area used by facilities and equipment to their original condition.

PART 2. PRODUCTS - Not Used

PART 3. EXECUTION - Not Used

END OF SECTION 01 70 00

SECTION 02 21 00 – SURVEYING AND RECORD DOCUMENTS

PART 1. 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 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 must:

- Locate existing features,
- Generate cut sheets,
- Provide construction stake out and field surveying
- Survey installed infrastructure to verify position, elevation, and slope requirements and share data with OWNER/ENGINEER
- Verify final locations and elevations on all Work,
- Create final Record Drawings (as required by OWNER),
- Provide survey base maps for record Drawings. The OWNER's surveyor will perform the following:
- 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:

- Access Roads
- Extensive buried piping, including landfill gas piping
- Grass lined, rip rap lined, and gabion lined channels
- Groundwater Monitoring wells, Gas Monitoring Probes, and LFG collection wells
- Landfill gas system valves
- Leachate Systems
- Manholes and Sumps
- Settlement Plates
- Stormwater Systems (Drop inlets, slope drains, Culverts, ditches, etc.)
- Stormwater Basins
- Temperature Probes

1.3.2 Independent Surveyor:

Employed by an organization which is independent from the CONTRACTOR.

1.4 SUBMITTALS

1.4.1 Qualifications of Surveyor

Within 14 days before commencing work, submit the following items to the ENGINEER for review: surveyor's name, Virginia license number, and qualifications.

1.4.2 Project Record Documents

Upon Substantial Completion of the Work, deliver record documents to the ENGINEER. Final payment will not be made until satisfactory record documents are received by ENGINEER. Accompany record documents with transmittal letter containing:

- Date.
- Project title and number.
- CONTRACTOR'S name and address.
- Title and number of each record document.
- Certification that each document as submitted is complete and accurate.
- Signature of CONTRACTOR, or his authorized representative.

1.5 MONTHLY INSPECTIONS

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

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

1.6 SITE CONDITIONS

1.6.1 Existing Grades

The Contract Drawings depict approximate surface elevations from historical survey data. Filling activities, maintenance activities, regrading, and routine settlement may have occurred since the original survey. Rapid settlement is ongoing within the quarry landfill.

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 must base all measurements, both horizontal and vertical, from established benchmarks. The CONTRACTOR must 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 must notify the ENGINEER in writing and request clarification and instructions on how to proceed. The CONTRACTOR must not proceed with his work until he has received the same from the ENGINEER. CONTRACTOR must be aware of and anticipate ongoing settlement within the quarry landfill.

1.6.6 No Additional Payment

No claims must 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.

PART 2. PRODUCTS – Not used

PART 3. EXECUTION

3.1 FIELD SURVEY WORK

3.1.1 Controls 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 must be constructed as indicated.

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

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.

Preparation of project record documents must be by personnel skilled as a draftsman competent to prepare the required drawings.

Record and update daily record information from field notes, on set of blue line prints, and copy of Invitation for Bids/Project Manual.

Record information concurrently (daily) with construction progress. Do not conceal work until required information is recorded.

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.

3.3.2 Record Drawings

CONTRACTOR must 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:

Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.

Changes made by Change Order or Field Order.

Other matters not originally specified.

Equalization Tank Record Drawing:

The OWNER's surveyor or ENGINEER will prepare an Equalization Tank record drawing using data provided by the CONTRACTOR. The following information is recommended:

1. 2-foot contours
2. Pipe sizing and inverts at 50-foot intervals
3. Locations and inverts of fittings, vaults, control valves, wells

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, if required, must be performed by the CONTRACTOR'S surveyor and verified by the ENGINEER. Drawings and calculations must be checked and sealed by the SURVEYOR. An Independent Surveyor may be called to verify grades and or volumes in the event of any disagreements.

END OF SECTION 02 21 00

DIVISION 03 - CONCRETE
SCOPE NOTE FOR EQ TANKS BID PACKAGE

APPLICABLE WORK

The following concrete specifications (Sections 03 10 00, 03 20 00, and 03 30 00) apply to EQ Tanks foundation work only:

- A. INCLUDED IN THIS BID:
1. Concrete ringwall foundations (2 tanks)
 2. Concrete floor slabs with glass-coated bottom (2 tanks)
 3. All formwork, reinforcing steel, concrete placement, finishing, and curing
 4. All concrete testing and quality control
- B. EXCLUDED FROM THIS BID (By Others):
1. Secondary containment walls and foundations
 2. General site concrete work
 3. Utility structures
 4. Site paving

END OF SCOPE NOTE

SECTION 031000 - CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Formwork for cast-in-place concrete.
2. Shoring, bracing, and anchorage.
3. Form accessories.
4. Form stripping.

1.2 SUBMITTALS

A. Product Data: Manufacturer information on void form materials and installation requirements.

B. Shop Drawings:

1. Formwork, shoring, and reshoring.
2. Pertinent dimensions, openings, methods of construction, types of connections, materials, joint arrangement and details, ties and shores, location of framing, studding and bracing, and temporary supports.
3. Means of leakage prevention for concrete exposed to view in finished construction.
4. Sequence and timing of erection and stripping, assumed compressive strength at time of stripping, height of lift, and height of drop during placement.
5. Vertical, horizontal, and special loads according to ACI 347, and camber diagrams if applicable.
6. Notes to formwork erector showing size and location of conduits and piping embedded in concrete according to ACI 318.
7. Procedure and schedule for removal of shores and installation and removal of reshores.

C. Manufacturer's Certificate: Products meet or exceed specified requirements.

D. Delegated Design Submittals:

1. Submit signed and sealed Shop Drawings with design calculations and assumptions for formwork and shoring.
2. Indicate loads transferred to structure during process of concreting, shoring, and reshoring.
3. Include structural calculations to support design.

E. Field Quality-Control Submittals: Indicate results of tests and inspections.

F. Qualifications Statement:

1. Qualifications for licensed professional.

1.3 QUALITY ASSURANCE

- A. Perform Work according to ACI 347, 301, and 318.
- B. For wood products furnished for Work of this Section, comply with AF&PA.
- C. Licensed Professional: Professional engineer experienced in design of specified Work and licensed in State of the Project.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store materials off ground in ventilated and protected manner to prevent deterioration from moisture.

PART 2 - PRODUCTS

2.1 PERFORMANCE AND DESIGN CRITERIA

- A. Design, engineer, and construct formwork, shoring, and bracing according to ACI 347 and ACI 301 to conform to design and applicable ACI 318 code requirements to achieve concrete shape, line, and dimension as indicated in Drawings.

2.2 WOOD FORM MATERIALS

- A. Form Materials: At discretion of Contractor.

2.3 PREFABRICATED FORMS

- A. Manufacturers:
 1. EFCO - Economy Forms Corp.
 2. Molded Fiber Glass Construction Products.
 3. Sonoco Products Co.
 4. Substitutions: Permitted.
- B. Preformed Steel Forms:
 1. Description: Matched, tightly fitted, and stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
 2. Minimum Thickness: 16 gage.

- C. FRP Forms: Matched, tightly fitted, and stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished concrete surfaces.
- D. Pan:
 - 1. Material: Steel
 - 2. Configuration: Size and profile as required.
- E. Void Forms:
 - 1. Moisture-resistant treated paper faces; biodegradable.
 - 2. Structurally sufficient to support weight of wet concrete mix until initial set.
 - 3. Thickness: 2 inches.
 - 4. Manufacturers:
 - a. Molded Fiber Glass Construction Products.
 - b. Sonoco Products Co.
 - c. Symons by Dayton Superior.
 - d. Substitutions: Permitted.
- F. Steel Forms:
 - 1. Description: Sheet steel, suitably reinforced.
 - 2. Design: For particular use as indicated.
- G. Form Liners: Smooth, durable, grainless, and non-staining hardboard unless otherwise indicated on Drawings.
- H. Framing, Studding, and Bracing: Stud or No. 3 structural light-framing grade.

2.4 FORMWORK ACCESSORIES

- A. Form Ties:
 - 1. Type: Removable or Snap off.
 - 2. Material: Galvanized.
 - 3. Length: Fixed or Adjustable.
 - 4. Back Break Dimension: 1 inch.
 - 5. Free of defects capable of leaving holes larger than 1-inch in concrete surface.
 - 6. Manufacturers:
 - a. Heckmann Building Products, Inc.
 - b. Symons by Dayton Superior.
 - c. Wall-Ties & Forms, Inc.
 - d. Substitutions: Permitted.
- B. Spreaders:

1. Description: Standard, non-corrosive metal-form clamp assembly, of type acting as spreaders and leaving no metal within 1 inch of concrete face.
 2. Wire ties, wood spreaders, or through bolts are not permitted.
- C. Form Release Agent:
1. Description: Colorless mineral oil that will not stain concrete or absorb moisture or impair natural bonding or color characteristics of coating intended for use on concrete.
 2. Manufacturers:
 - a. Architectural Concrete Chemicals, LLC.
 - b. Nox-Crete Products Group.
 - c. Substitutions: Permitted.
- D. Corners:
1. Type: Chamfer
 2. Size: $\frac{3}{4}$ by $\frac{3}{4}$ inches.
 3. Lengths: Maximum possible.
 4. Manufacturers:
 - a. BoMetals, Inc.
 - b. Wall-Ties & Forms, Inc.
 - c. Substitutions: Permitted.
- E. Vapor Retarder:
1. Description: Polyethylene sheet.
 2. Thickness: 10 mils.
- F. Bituminous Joint Filler: Comply with ASTM D1751.
- G. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Size, strength, and character to maintain formwork in place while placing concrete.
- H. Waterstop:
1. Material: As noted on the drawings.
 2. Tensile Strength: Minimum 2000 psi.
 3. Working Temperature Range: Minus 35 to plus 120 degrees F.
 4. Width: 6 inches or as indicated on Drawings.
 5. Lengths: Maximum possible.
 6. Profile: Ribbed.
 7. Corner Sections: Preformed.
 8. Jointing: Heat welded.
 9. Manufacturers:
 - a. JP Specialties, Inc.
 - b. Sika Greenstreak.

- c. WESTEC Barrier Technologies, Inc.
- d. Substitutions: Permitted.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify lines, levels, and centers before proceeding with formwork.
- B. Verify that dimensions agree with Drawings.
- C. If formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement, request instructions from Engineer before proceeding.

3.2 INSTALLATION

- A. Earth Forms:
 - 1. Trench earth forms at least 6 inches wider than footing widths indicated on Drawings.
 - 2. Construct wood edge strips at top of each side of trench to secure reinforcing and to prevent trench from sloughing.
- B. Formwork:
 - 1. Provide top form for sloped surfaces steeper than 1.5 horizontal to 1 vertical to hold shape of concrete during placement, unless it can be demonstrated that top forms can be omitted.
 - 2. Positioning:
 - a. Verify horizontal and vertical positions of forms.
 - b. Correct misaligned or misplaced forms before placing concrete.
 - 3. Complete wedging and bracing before placing concrete.
 - 4. Erect formwork, shoring, and bracing to achieve design requirements according to ACI 301 and 347.
 - 5. Stripping:
 - a. Arrange and assemble formwork to permit dismantling and stripping.
 - b. Permit removal of remaining principal shores.
 - 6. Obtain approval of Engineer before framing openings in structural members not indicated on Drawings.
 - 7. Install chamfer strips on external corners of beams, columns, footings, and mat slabs.
 - 8. Install void forms according to manufacturer instructions.
 - 9. Do not reuse wood, plywood, or lumber formwork more than 3 times.
 - 10. Do not patch formwork.

11. Leave forms in place for minimum number of days according to ACI 347.

C. Form Removal:

1. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads, and removal has been approved by Architect/Engineer.
2. Form Release Agent:

- a. Apply according to manufacturer instructions.
- b. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- c. Do not apply form release agent if concrete surfaces are indicated to receive special finishes or applied coverings that may be affected by agent.
- d. Soak inside surfaces of untreated forms with clean water, and keep surfaces coated prior to placement of concrete.

3. Form Cleaning:

- a. Clean formed cavities of debris prior to placing concrete.
- b. Flush with water or use compressed air to remove remaining foreign matter.
- c. During cold weather, remove ice and snow from within forms without using de-icing salts, and use compressed air or other dry method to remove foreign matter.

4. Reuse and Coating of Forms:

- a. Thoroughly clean forms and reapply form coating before each reuse.
- b. For exposed Work, do not reuse forms with damaged faces or edges.
- c. Apply form coating to forms according to manufacturer instructions.
- d. Do not coat forms for concrete indicated to receive "scored finish."
- e. Apply form coatings before placing reinforcing steel.

D. Form Ties:

1. Provide sufficient strength and quantity to prevent spreading of forms.
2. Place ties at least 1 inch away from finished surface of concrete.
3. Leave inner rods in concrete when forms are stripped.
4. Space form ties equidistant, symmetrical, and aligned vertically and horizontally unless indicated otherwise on Drawings.

E. Arrange formwork to allow proper erection sequence and to permit form removal without damage to concrete.

F. Construction Joints:

1. Install surfaced pouring strip where construction joints intersect on exposed surfaces to provide straight line at joints.
2. Just prior to subsequent concrete placement, remove strip and tighten forms to conceal shrinkage.
3. Appearance:

- a. Show no overlapping of construction joints.
- b. Construct joints to present same appearance as butted plywood joints.

G. Embedded Items:

1. Make provisions for pipes, sleeves, anchors, inserts, reglets, anchor slots, nailers, waterstops, and other features.
2. Do not embed wood or uncoated aluminum in concrete.
3. Obtain installation and setting information for embedded items furnished under other Sections.
4. Securely anchor embedded items in correct location and alignment prior to placing concrete.
5. Ensure that conduits and pipes, including those made of coated aluminum, meet requirements of ACI 318 regarding size and location limitations.

H. Openings for Items Passing through Concrete:

1. Frame openings in concrete where indicated on Drawings.
2. Establish exact locations, sizes, and other conditions required for openings and attachment of Work specified under other Sections.
3. Coordinate Work to avoid cutting and patching of concrete after placement.
4. Perform cutting and repairing of concrete required as result of failure to provide required openings.

I. Screeds:

1. Set screeds and establish levels for tops of and finish on concrete slabs.
2. Slope slabs to drain as required or as indicated.

J. Screenshot Supports:

1. For concrete over waterproof membranes and vapor retarder membranes, use cradle-, pad-, or base-type screed supports that will not puncture membrane.
2. Staking through membrane is not permitted.

K. Cleanouts and Access Panels:

1. Provide removable cleanout sections or access panels at bottoms of forms to permit inspection and effective cleaning of loose dirt, debris, and waste material.
2. Thoroughly blow out forms with compressed air just before concrete is placed.

3.3 TOLERANCES

A. Construct formwork to maintain tolerances according to ACI **301**

B. Camber:

1. According to ACI 301 and ACI 318.

3.4 FIELD QUALITY CONTROL

A. Inspection:

1. Inspect erected formwork, shoring, and bracing to ensure that Work complies with formwork design and that supports, fastenings, wedges, ties, and items are secure.
2. Notify Architect/Engineer after placement of reinforcing steel in forms but prior to placing concrete.
3. Schedule concrete placement to permit formwork inspection before placing concrete.

END OF SECTION 031000

SECTION 032000 - CONCRETE REINFORCING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Reinforcing bars.
2. Welded wire fabric.
3. Reinforcement accessories.

1.2 UNIT PRICES

A. Bar Reinforcement:

1. Basis of Measurement: By ton.
2. Basis of Payment: Includes reinforcement, placement, and accessories.

B. Welded Wire Fabric Reinforcement:

1. Basis of Measurement: By square foot.
2. Basis of Payment: Includes welded wire reinforcement, placement, and accessories.

1.3 SUBMITTALS

A. Shop Drawings:

1. Bar sizes, spacings, locations, splice locations, and quantities of reinforcing steel and welded wire fabric.
2. Bending and cutting schedules.
3. Supporting and spacing devices.

B. Manufacturer's Certificate: Products meet or exceed specified requirements.

C. Submit certified copies of mill test report of reinforcement materials analysis.

D. Welder Certificates: Certify welders and welding procedures employed on Work, verifying AWS qualification within previous 12 months.

E. Qualifications Statement:

1. Welders: Qualify procedures and personnel according to AWS D1.1/D1.1M.

1.4 QUALITY ASSURANCE

- A. Perform Work according to ACI 301, and ACI 318.
- B. Prepare Shop Drawings according to ACI SP-66.
- C. Welders: AWS qualified within previous 12 months for employed weld types.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials according to manufacturer instructions.
- B. Protection:
 - 1. Protect materials from moisture by storing in clean, dry location remote from construction operations areas.
 - 2. Provide additional protection according to manufacturer instructions.

1.6 EXISTING CONDITIONS

- A. Field Measurements:
 - 1. Verify field measurements prior to fabrication.
 - 2. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 REINFORCEMENT

- A. Reinforcing Steel:
 - 1. Comply with ASTM A615.
 - 2. Yield Strength: 60 ksi.
 - 3. Billet Bars: **Deformed**.
 - 4. Finish: As noted on the drawings.

2.2 FABRICATION

- A. Fabricate concrete reinforcement according to CRSI 10-MSP and ACI 318.
- B. Form standard hooks for **180-degree bends, 90-degree bends, stirrups and tie hooks, and seismic hooks** according to ACI 318.
- C. Form reinforcement bends with minimum diameters according to ACI 318.

- D. Fabricate column reinforcement with offset bends at reinforcement splices.
- E. Form ties and stirrups from following:
 - 1. Bars No. 10 and Smaller: No. 3 deformed bars.
 - 2. Bars No. 11 and Larger: No. 4 deformed bars.
- F. Weld reinforcement according to AWS D1.4.
- G. Galvanized Reinforcement: Clean surfaces, weld, and re-protect welded joint according to CRSI 10PLACE.
- H. Splicing:
 - 1. If not indicated on Drawings, locate reinforcement splices at point of minimum stress.
 - 2. Obtain approval of splice locations from Engineer.

2.3 SHOP FINISHING

- A. Galvanized Finish for Steel Bars:
 - 1. Comply with ASTM A767 Class 2.
 - 2. Hot-dip galvanized after fabrication.
- B. Epoxy-Coated Finish for Steel Bars: Comply with ASTM A775 and A934.
- C. Epoxy-Coated Finish for Steel Wire: Comply with ASTM A884, Class A.

2.4 ACCESSORY MATERIALS

- A. Tie Wire:
 - 1. Minimum 16 gage (1.6 mm), annealed type.
- B. Chairs, Bolsters, Bar Supports, and Spacers:
 - 1. Size and Shape: To strengthen and support reinforcement during concrete placement conditions.
 - 2. Furnish load-bearing pad on bottom to prevent vapor retarder puncture.
- C. Special Chairs, Bolsters, Bar Supports, and Spacers Adjacent to Weather-Exposed Concrete Surfaces:
 - 1. Material: **Plastic-coated or Stainless** steel.
 - 2. Size and Shape: To meet Project conditions.
- D. Reinforcing Splicing Devices:
 - 1. Type: Mechanical **set screwfull tension and compression**.

2. Size: To fit joined reinforcing.
3. Manufacturers:
 - a. Dur-O-Wal; a Hohmann & Barnard company.
 - b. ERICO; nVent.
 - c. Symons by Dayton Superior.
 - d. Substitutions: **Permitted**

E. Epoxy Coating Patching Material: Type as recommended by coating manufacturer.

2.5 SOURCE QUALITY CONTROL

- A. Provide shop inspection and testing of completed assembly.
- B. Certificate of Compliance:
 1. If fabricator is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at fabricator's facility conforms to Contract Documents.
 2. Specified shop tests are not required for Work performed by approved fabricator.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Place, support, and secure reinforcement against displacement.
- B. Do not weld crossing reinforcement bars for assembly except as permitted by Engineer.
- C. Spacing:
- D. As indicated on Drawings. Conform to ACI 318 code for concrete cover over reinforcement.
- E. Splice reinforcing where indicated on Drawings according to manufacturer instructions.

3.2 TOLERANCES

- A. Install reinforcement within following tolerances for flexural members, walls, and compression members:
 1. Reinforcement Depth Greater Than 12 inches (305 mm).
 - a. Depth Tolerance: Plus or Minus ½ inch (13 mm).
 - b. Concrete Cover Tolerance: Minus ½ inch (13 mm).
 2. Reinforcement Depth Less Than or Equal to 12 inches (305 mm):

- a. Depth Tolerance: Plus or Minus 3/8 inch (10 mm).
- b. Concrete Cover Tolerance: Minus 3/8 inch (10 mm).

B. Foundation Walls: Comply with ACI 530/530.1.

3.3 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed by Owner's testing laboratory according to ACI 318.
- B. Provide unrestricted access to Work and cooperate with appointed inspection and testing firm.
- C. Reinforcement Inspection:
 1. Placement Acceptance: Inspect specified and ACI 318 material requirements and specified placement tolerances.
 2. Welding: Inspect welds according to AWS D1.1.
 3. Periodic Placement Inspection: Inspect for correct materials, fabrication, sizes, locations, spacing, concrete cover, and splicing.
 4. Weldability Inspection: Inspect for reinforcement weldability if formed from steel other than ASTM A706.
 5. Continuous Weld Inspection: Inspect reinforcement according to ACI 318.
 6. Periodic Weld Inspection: Inspect other welded connections.

END OF SECTION 032000

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide all materials and labor necessary to complete all concrete, plain and reinforced, as indicated or as specified in these specifications and as required to complete the Project. Work, without limiting the generality thereof, includes:
1. Installation of concrete to provide , grade beams, footings, foundations, walls, slabs on grade, and other incidental concrete Work.
 2. Concrete pads for mechanical equipment.
 3. Furnishing and installation of admixtures.
 4. Work of other trades required to be built into concrete, such as inserts for connections to steel members, waterstops, flashing reglets, anchors, embedded plates, and reinforcing dowels.
 5. Finishing of concrete as specified herein or as indicated.

1.2 SUBMITTALS

- A. Product Data: Submit data on the following:
1. Portland cement.
 2. Fly ash.
 3. Slag cement.
 4. Blended hydraulic cement.
 5. Silica fume.
 6. Performance-based hydraulic cement.
 7. Aggregates.
 8. Admixtures:
 - a. Include limitations of use, such as restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.
 9. Vapor retarders or waterproof membranes.
 10. Curing materials.
 11. Joint fillers.
 12. Repair materials.
- B. Design Mixtures: For each concrete mixture, include the following:
1. Mixture identification.

2. Minimum 28-day compressive strength.
3. Durability exposure class.
4. Maximum water-cementitious materials ratio.
5. Slump limit.
6. Air content.
7. Nominal maximum aggregate size.
8. Indicate amounts of mixing water to be withheld for later addition at Project Site, if permitted.
9. Include manufacturer's certification that permeability-reducing admixture is compatible with mix design.
10. Include certification that dosage rate for permeability-reducing admixture matches dosage rate used in performance compliance test.
11. Submit intended placement method.
12. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
13. Submit separate mix designs if admixtures are required for the following:
 - a. Hot and cold weather concrete Work.
 - b. Air entrained concrete Work.

C. Qualification Data: Submit data for the following:

1. Installer: Include copies of applicable ACI certificates.
2. Ready-mixed concrete manufacturer.
3. Testing agency: Include copies of applicable ACI certificates.

D. Shop Drawings:

1. Construction Joint Layout:
 - a. Indicate proposed construction joints required to construct structure.
 - b. Location of construction joints is subject to approval of Architect/Engineer.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

F. Manufacturer Instructions: Submit installation procedures and interfacing required for adjacent Work.

G. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

1.3 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of embedded utilities and components concealed from view in finished construction.

1.4 QUALITY ASSURANCE

- A. **Installer Qualifications:** A qualified installer employing Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor certified as ACI Flatwork Concrete Finisher/Technician, or an ACI Concrete Flatwork Technician with experience installing and finishing concrete, and incorporating permeability-reducing admixtures.
 - 1. **Post-Installed Concrete Anchors Installers:** ACI-certified Adhesive Anchor Installer.
- B. **Ready-Mixed Concrete Manufacturer Qualifications:** A firm experienced manufacturing ready-mixed concrete products that complies with ASTM C94/C94M requirements for production facilities and equipment.
 - 1. **Manufacturer certified in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."**
- C. **Concrete Testing Service:** Employ and pay an independent testing laboratory, acceptable to the Owner, perform material evaluation tests and to review concrete mix designs proposed by Contractor to conform to this Specification.
- D. **Laboratory Testing Agency Qualifications:** A testing agency qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated and employing an ACI-certified Concrete Quality Control Technical Manager.
 - 1. **Personnel performing laboratory tests are required to be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisors are required to be ACI-certified Concrete Laboratory Testing Technician, Grade II.**
- E. **Field Quality-Control Testing Agency Qualifications:** An independent agency qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.
 - 1. **Personnel conducting field tests are required to be qualified as ACI Concrete Field Testing Technician, Grade I, in accordance with ACI CPP 610.1 or an equivalent certification program.**
- F. **Additional Testing and Inspection Services:**
 - 1. **If required, Owner's testing agency will perform additional testing and inspection services to verify conformance to Contract Documents as listed below:**
 - a. **Inspect concrete batching, mixing, and delivery operations.**
 - b. **Inspect forms, foundation preparation, reinforcement, embedded items, reinforcement placement, and concrete placing, finishing, and curing operations.**
 - c. **Sample concrete at point of placement and other locations as directed by Engineer and perform required tests.**
 - d. **Review manufacturer's report for shipment of cement, reinforcement, and prestressing tendons, and conduct laboratory tests or spot checks of materials received for compliance with specifications.**

- e. Other testing or inspection services as required by Engineer.
- 2. Provide Owner's testing agency with requested documentation and access to perform testing and inspection activities.
- G. Industry Standards: Maintain 1 copy of each standard affecting Work of this Section on Site.

1.5 AMBIENT CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 301, ACI 306.1, and as follows:
 - 1. Protect concrete Work from physical damage or reduced strength caused by frost, freezing actions, or low temperatures.
 - 2. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with ACI 301 unless modified by requirements in the Contract Documents.

2.2 CONCRETE MATERIALS

- A. Concrete Source Limitations:
 - 1. Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.
 - 2. Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant.
 - 3. Obtain aggregate from single source.
 - 4. Obtain each type of admixture from single source from single manufacturer.
- B. Concrete Components:
 - 1. Cement:
 - a. Comply with ASTM C150/C150M, Portland cement Type I or II or IL.
 - 2. Normal Weight Aggregates:
 - a. Comply with ASTM C33/C33M coarse aggregate or better, graded. Provide aggregates from a single source.

- 1) Alkali-Silica Reaction: Comply with one of the following:
 - a) Expansion Result of Aggregate: Not more than 0.04 percent at one year when tested in accordance with ASTM C1293.
 - b) Expansion Results of Aggregate and Cementitious Materials in Combination: Not more than 0.10 percent at an age of 16 days when tested in accordance with ASTM C1567.
 - c) Alkali Content in Concrete: Not more than 4 lb./cu. yd. for moderately reactive aggregate or 3 lb./cu. yd. for highly reactive aggregate, when tested in accordance with ASTM C1293 and categorized in accordance with ASTM C1778, based on alkali content being calculated in accordance with ACI 301.
- b. Coarse Aggregate Maximum Size: 1 inch
- c. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
3. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride in steel-reinforced concrete.
 - a. Air-Entraining Admixture: ASTM C260
 - b. Water-Reducing Admixture: ASTM C494, Type A.
 - c. Retarding Admixture: ASTM C494, Type B.
 - d. Water-Reducing and -Retarding Admixture: ASTM C494, Type D.
 - e. High-Range, Water-Reducing Admixture: ASTM C494, Type F.
 - f. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494, Type G.
 - g. Plasticizing and Retarding Admixture:
 - 1) Comply with ASTM C1017.
 - h. Set-Accelerating Corrosion Inhibitor: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C494/C494M, Type C.
 - 1) Manufacturers:
 - a) Dayton Superior Chemicals.
 - b) Euclid Chemical Company (The); an RPM company.
 - c) Kaufman Products, Inc.
 - d) Nox Crete products group.
 - e) Vexcon Chemicals Inc.
 - f) Approved Equal.
 - i. Non-Set-Accelerating Corrosion Inhibitor: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.

- 1) Manufacturers:
 - a) Euclid Chemical Company (The); an RPM company.
 - b) GCP Applied Technologies Inc.
 - c) Sika Corporation.
 - d) Specialty Products Group.
 - e) Approved Equal.

- j. Shrinkage-Reducing/Compensating Admixture:
 - 1) Designed to provide both of the following characteristics:
 - a) Expands at a rate that closely compensates for the shrinkage of the concrete mix.
 - b) Reduces the capillary surface tension of the concrete pore water.
 - 2) Provides at least 80% shrinkage reduction as measured and documented by field performance.
 - 3) Formulated for use in freezing and thawing weather.
 - 4) Dosage rate and mixing sequence per manufacturer's recommendations.
 - 5) Certified by NSF/ANSI Standard 61: Drinking Water System Components - Health Effects.
 - 6) Manufacturers:
 - a) Premier CPG.
 - b) Sika Corporation.
 - c) Approved equal.

4. Water and Water Used to Make Ice: ASTM C94/ potable or complying with ASTM C1602/C1602M, including all limits listed in Table 2 and the requirements of Paragraph 5.4.

2.3 CURING MATERIALS

- A. Film-Forming Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
 1. Manufacturers:
 - a. Euclid Chemical
 - b. Sika Corporation
 - c. W. R. Meadows, Inc
 - d. Substitutions: Permitted.

- B. Concrete Curing Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

- C. Concrete Curing Reusable Moisture-Retaining Covers, ASTM C171:

1. Burlap-polyethylene sheet.
 - a. 10 oz. burlap laminated onto 5 mil white coated polyethylene.
 - b. Reusable, natural burlap provides moisture absorption.
 - c. Coated white poly reflects sunlight and intense heat rays.
 - d. Quality lamination between the two fabrics.
 - e. Size: 10-by-100-foot roll.

2. Wet Cure Blankets:
 - a. Provide wet cure blankets comprised of a non-woven polypropylene fabric coated with a white-pigmented polyethylene, complying with ASTM C171; total thickness varies per manufacturer.
 - b. Manufacturers:
 - 1) PNA Construction Technologies.
 - 2) Reef Industries, Inc.
 - 3) Raven Industries.

- D. Clear, Water-Based, Membrane-Forming, Non-dissipating Curing Compound: ASTM C309, Type 1, Class B, certified by curing compound manufacturer to not interfere with bonding of floor covering.
 1. Manufacturers:
 - a. Kaufman Products, Inc.
 - b. SpecChem, LLC.
 - c. W. R. Meadows, Inc.
 - d. Euclid Chemical Company (the), an RPM company.
 - e. Substitutions: Permitted.

- E. Clear, Solvent-Based, Membrane-Forming, Curing and Sealing Compound: ASTM C1315, Type 1, Class A.
 1. Manufacturers:
 - a. ChemMasters, Inc.
 - b. Concrete Sealers USA.
 - c. Dayton Superior Specialty Chemicals.
 - d. Euclid Chemical Company (The); an RPM company.
 - e. Master Builders Solutions US LLC.
 - f. W.R. Meadows, Inc.
 - g. Substitutions: Permitted.

- F. Joint Devices and Filler:
 1. Joint Filler, Type A.

- a. Description: Asphalt-impregnated fiberboard or felt.
- b. Comply with ASTM D1751.
- c. Thickness and Profile: As designated on Drawings.

G. Nonshrink Grout:

1. Manufacturers:
 - a. Euclid Chemical Company (The); an RPM company.
 - b. QUIKRETE.
 - c. Sika Corporation.
 - d. Substitutions: Permitted.
2. Description: Premixed compound consisting of non-metallic aggregate, cement, and water-reducing and plasticizing agents.
3. Comply with ASTM C1107/C1107M.
4. Minimum Compressive Strength: 2,400 psi in 48 hours and 7,000 psi in 28 days.

H. Bonding Agent:

1. Manufacturers:
 - a. Euclid Chemical Company (The); an RPM company.
 - b. QUIKRETE.
 - c. Sika Corporation.
 - d. W.R. Meadows, Inc.
 - e. Substitutions: **Permitted**.

2.4 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301.
 1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than Portland cement in concrete as follows:
 1. Fly Ash or Other Pozzolans: 25 percent by mass.
 2. Slag Cement: 50 percent by mass.
 3. Silica Fume: 10 percent by mass.
 4. Total of Fly Ash or Other Pozzolans, Slag Cement, and Silica Fume: 50 percent by mass, with fly ash or pozzolans not exceeding 25 percent by mass, and silica fume not exceeding 10 percent by mass.
 5. Total of Fly Ash or Other Pozzolans and Silica Fume: 35 percent by mass, with fly ash or pozzolans not exceeding 25 percent by mass, and silica fume not exceeding 10 percent by mass.
- C. Admixtures: Use in accordance with manufacturer's written instructions.

1. Use water-reducing, high-range water-reducing, or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use corrosion-inhibiting admixture in concrete mixtures where indicated.
4. Use permeability-reducing admixture in concrete mixtures where indicated.

2.5 CONCRETE MIXTURES

A. Performance and Design Criteria:

1. Compressive Strength: 4000 psi at 28 days.
2. Cement Type: I, II or IL per ASTM C150.
3. Minimum Cement Content: 564 lb./cu. yd
4. Aggregate Type: Normal weight
5. Coarse Aggregate: 60-65 percent by volume.
6. Fine Aggregate: 35-40 percent by volume.
7. Maximum Water-Cementitious Materials Ratio: 0.45:1 by weight.
8. Aggregate Size:
 - a. Maximum: 1 inch (25 mm).
9. Air Content: 6 percent, plus or minus 1.5 percent.
10. Admixture Type(s): Water-reducer, Air-entrainer, Plasticizer, Retarder.
11. Slump: 4 inches (100 mm), plus or minus 1 inch (25 mm).

B. Ready-Mixed Concrete: Mix and deliver concrete according to ASTM C94.

C. Site-Mixed Concrete: Mix concrete according to ACI 318.

D. High Early Concrete Mix Proportions: Provide high early concrete as a preblended, prepackaged material requiring only the addition of water and stone aggregate.

2.6 CONCRETE MIXING

A. Ready-Mix Concrete: Comply with requirements of ASTM C94 and ASTM C1116 and as herein specified. Delete references for allowing additional water to be added to batch for material with insufficient slump. Addition of water to the batch will not be permitted.

1. Retempering of concrete by adding water or any other material is not permitted.

PART 3 - EXECUTION

3.1 EXAMINATION

- #### A. Verify requirements for concrete cover over reinforcement.

- B. Verify that anchors, seats, plates, reinforcement, and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with placing concrete.

3.2 PREPARATION

- A. Previously Placed Concrete:
 - 1. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent.
 - 2. Remove laitance, coatings, and unsound materials.
- B. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels, and pack solid with non-shrink grout.
- C. Remove debris and ice from formwork, reinforcement, and concrete substrates.
- D. Remove water from areas receiving concrete before concrete is placed.

3.3 INSTALLATION

- A. Placing Concrete:
 - 1. Place concrete according to ACI 301 and ACI 318.
 - 2. Notify testing laboratory minimum 24 hours prior to commencement of operations.
 - 3. Ensure that reinforcement, inserts, embedded parts, formed expansion and contraction joints, and are not disturbed during concrete placement.
 - 4. Joint Filler:
 - a. Separate slabs on grade from vertical surfaces with ½-inch-thick joint filler.
 - b. Place joint filler in checkerboard pattern placement sequence; set top to required elevations; secure to resist movement by wet concrete.
 - c. Extend joint filler from bottom of slab to within ¼ inch (6 mm) of finished slab surface.
 - d. Finish Joint Sealer Requirements: As specified by manufacturer's instructions.
 - 5. Deposit concrete at final position, preventing segregation of mix.
 - 6. Place concrete in continuous operation for each panel or section as determined by predetermined joints.
 - 7. Consolidate concrete.
 - 8. Maintain records of concrete placement, including date, location, quantity, air temperature, and test samples taken.
 - 9. Place concrete continuously between predetermined expansion, control, and construction joints.
 - 10. Do not interrupt successive placement and do not permit cold joints to occur.
 - 11. Place floor slabs in indicated saw-cut pattern.
 - 12. Saw-Cut Joints:

- a. Saw-cut joints within 12 hours after placing.
- b. Cut into 1/4 times the depth of slab thickness.

B. Separate Floor Toppings:

1. Prior to placing floor topping, remove deleterious material, roughen substrate concrete surface, and broom and vacuum clean.
2. Place required dividers, edge strips, reinforcement and other items to be cast in concrete.
3. Apply bonding agent to substrate.

C. Concrete Finishing:

1. Provide formed concrete surfaces to be left exposed with smooth-rubbed finish
2. Finish concrete floor surfaces as specified in Section 033500 - Concrete Finishing.

D. Curing and Protection:

1. Cure concrete floor surfaces as specified in Section 033900 - Concrete Curing.

3.4 FIELD QUALITY CONTROL

A. Perform field inspection and testing according to ACI 318.

B. Provide unrestricted access to Work and cooperate with appointed testing and inspection firm.

C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of Work.

D. Concrete Inspections:

1. Continuous Placement Inspection: Inspect for proper installation procedures.
2. Periodic Curing Inspection: Inspect for specified curing temperature and procedures.

E. Strength Test Samples:

1. Sampling Procedures: Comply with ASTM C172/C172M.
2. Cylinder Molding and Curing Procedures:
 - a. Comply with ASTM C31.
 - b. Cylinder Specimens: Standard lab and Field cured.
3. Sample concrete and make one set of ten cylinders for every 50 cu. yd. or less of each class of concrete placed each day 5 cylinders are to be field cured, and 5 cylinders are to be lab cured. Breaks for each are to be made at a minimum of 7 days, 14 days and 28 days.
4. If volume of concrete for a class of concrete would provide less than five sets of cylinders, take samples from five randomly selected batches, or from every batch if less than five batches are used.
5. Make one additional cylinder during cold weather concreting and field cure.

- F. Concrete Maturity Testing Using Sensors:
1. Non-destructive Test: Gather information from wireless embedded sensors recording temperature and strength.
 2. Data is logged and/or retrieved by external device in real-time.
 3. Comply with sensor manufacturer's written instructions and ASTM C1074, CSA A23.1/A23.2, ACI 318, ACI 228.1R, and ACI 306R.
- G. Field Testing:
1. Slump Test Method: Comply with ASTM C143.
 2. Air Content Test Method: Comply with ASTM C173 and ASTM C231.
 3. Temperature Test Method: Comply with ASTM C1064.
 4. Compressive Strength Concrete:
 - a. Measure slump and temperature for each sample.
 5. Measure air content in air-entrained concrete for each sample.
- H. Cylinder Compressive Strength Testing:
1. Test Method: Comply with ASTM C39/C39M.
 2. Test Acceptance: According to ACI 318.
 3. Test one cylinder from each set at 7 days, 14 days and 28 days..
 4. Retain one cylinder from each set for testing when requested by Architect/Engineer].
 5. Dispose of remaining cylinders if testing is not required.
- I. Core Compressive Strength Testing:
1. Sampling and Testing Procedures: Comply with ASTM C42.
 2. Test Acceptance: According to ACI 318.
 3. Drill three cores for each failed strength test from failed concrete.
- J. Measure floor and slab flatness and levelness in accordance with ASTM E1155 within 72 hours of completion of floor finishing and promptly report test results to Engineer.
- K. Patching:
1. Allow Engineer to inspect concrete surfaces immediately upon removal of forms.
 2. Honeycombing or Embedded Debris in Concrete:
 - a. Not acceptable.
 - b. Notify Architect/Engineer upon discovery.
 3. Patch imperfections as directed by Engineer according to ACI 301.
- L. Defective Concrete:

1. Description: Concrete not conforming to required lines, details, dimensions, tolerances, or specified requirements.
2. Repair or replacement of defective concrete will be determined by Architect/Engineer.
3. Do not patch, fill, touch up, repair, or replace exposed concrete except upon express direction of Architect/Engineer for each individual area.

END OF SECTION 033000

SECTION 43 41 11 - BOLTED STEEL TANKS

PART 1. GENERAL

1.1 SUMMARY

- A. Section Includes: Factory-coated bolted steel tanks.

1.2 DEFINITIONS

- A. Purchaser: Owner, as used in AWWA D103.
- B. Tank Low Level: Level when emptied through specified discharge fittings unless otherwise indicated on Drawings.

1.3 SCOPE

- A. Provide labor, equipment, and materials necessary for construction of two (2) equalization storage tanks for landfill leachate, associated piping, appurtenances, and ringwall foundation, as indicated in the Drawings.
- B. The following tanks will be used for the purpose of landfill leachate flow equalization and aeration. Tanks shall operate at atmospheric to -5" WC with pressure/vacuum relief protection devices. Off-gas collection via blower system. Tank construction per standard AWWA D103 with vacuum protection device to prevent tank from exceeding -6" WC under all operating conditions.
- C. This document is intended to provide supporting information to accompany the drawings and Tank Data Sheet (Attachment A). In case of conflict between this specification and the Tank Data Sheet, the Tank Data Sheet shall govern pressure/vacuum requirements and nozzle configurations.

1.4 SUBMITTALS

Product Datasheets:

- A. Expansion joint fittings and other specialty fittings.
- B. Ladder and ladder safety devices.
- C. Materials of construction, fabrication, and coatings.
- D. Shop Drawings:
- E. Complete plan, elevation, and sectional Drawings showing critical dimensions.
- F. Structural plate and support member sizes and thickness.
- G. Weld types and sizes.
- H. Supply and overflow piping details, including fittings, expansion joints, pipe support methods
- I. Handrail details.
- J. Access hatch details.
- K. Manufacturer's Certificate: Certify that tanks and appurtenances meet or exceed specified requirements.
- L. Pressure/Vacuum Relief Device: Submit product data, sizing calculations, capacity verification, factory test reports, and ANSI certifications for VAREC 2010B or approved equal.

- M. Design Submittals: Submit signed and P.E. sealed (in the State of Virginia) Shop Drawings with design calculations and assumptions for tank structural calculations.
- N. Test and Evaluation Reports:
 - a. Submit mill test reports.
- O. Written Report Certifying Work: Prepare and submit as indicated in AWWA D103.
- P. Submit Installation Certificate from equipment manufacturer's representative as described in PART 3.
- Q. Manufacturer Instructions: Installation requirements, including tank component handling procedures, anchoring, and layout.
- R. Source Quality-Control Submittals: Indicate results of shop tests and inspections.
- S. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- T. Manufacturer Reports: Certify that tanks have been installed according to manufacturer instructions.
- U. Qualifications Statements:
- V. Qualifications for manufacturer, erector, and licensed professional in the State of Virginia.
- W. The erector and manufacturer are responsible for providing relevant documented experience showing qualification for this project
- X. Manufacturer's approval of erector.

1.5 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual location and orientation of tank and appurtenances.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Extra Stock Materials:
 - 1. Two safety harnesses for ladder safety rail system.
 - 2. Additional materials as recommended by the Manufacturer.

1.7 QUALITY ASSURANCE

- A. Perform Work according to AWWA D103.
- B. Perform Work according to
 - 1. Virginia Department of Environmental Quality regulations and permits
 - 2. AWWA D103
 - 3. Applicable federal, state, and local regulatory codes
- C. Manufacturer: Company specializing in manufacturing products specified in this Section with a minimum of three years' experience.
- D. Erector: Company specializing in performing Work of this Section with a minimum of three years' experience and approved by manufacturer.
- E. Licensed Professional: Professional engineer experienced in design of specified Work and licensed in State of Virginia.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Storage:
 - 1. Store materials in areas protected from weather and moisture and according to manufacturer instructions.
 - 2. Do not store products directly on ground.
- B. Handling: Handle materials in a manner to prevent damage to interior or exterior surfaces.
- C. Protection:
 - 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 - 2. Provide additional protection according to manufacturer instructions.

1.9 EXISTING CONDITIONS

- A. Field Measurements:
 - 1. Verify field measurements prior to fabrication.
 - 2. Indicate field measurements on Shop Drawings.

1.10 WARRANTY

- A. Furnish a five-year (minimum) manufacturer's warranty for bolted steel tanks.

PART 2. PRODUCTS

2.1 TANKS

- A. Manufacturers:
 - 1. MidAtlantic Tank (Aquastore)
- B. Substitutions: Not permitted unless specified by Engineer.
- C. Description:
 - 1. Design, fabricate and erect two (2) ground level, glass-fused-to-steel, bolted-steel, dome-top tank with a 53.15' nominal inside diameter, 34' nominal sidewall height, and 500,000 gallons usable capacity with 24" freeboard. The total capacity of the tank shall be 559,093 gallons.
 - 2. Design and construction of required foundations for two (2) bolted steel tanks described above.

2.2 PERFORMANCE AND DESIGN CRITERIA

- A. Requirements as listed in AWWA D103, unless supplemented or modified in this Section:
- B. Bottom capacity level (BCL) and top capacity level (TCL) above top of foundation.
- C. Head Range: 32 feet
- D. Tank foundation
 - 1. Tank foundation consists of a concrete ringwall integral to containment pad, to be designed and stamped by manufacturer's State of Virginia registered structural engineer.
 - 2. A complete set of structural calculations shall be provided for the tank structure and foundation. All such submissions shall be stamped by a Registered Professional Engineer licensed in the state of project location, as well as, by a Registered Professional Engineer employed on the tank manufacturer's engineering staff.
 - 3. The tank foundation shall be designed by the manufacturer to safely sustain the structure and its live loads.
 - 4. Tank footing design shall be based on the geotechnical investigation report performed by the Engineer. The cost of this investigation and analysis is not to be included in the bid price. Copies of the report are to be provided to the bidder prior to bid date by the Owner or Engineer.
- E. Tank floor
 - 1. Glass-Coated, Bolted-Steel Floor for Leachate Storage Tank
 - 2. All bolts, nuts and washers exposed on the inside of the floor shall be capped with epoxy coating system compatible with glass-fused-to-steel coating and suitable for leachate service. Written approval from the Engineer must be received for material substitutions.
- F. Coatings:
 - 1. The tank coating system shall be glass-fused-to-steel (vitreous enamel) conforming to AWWA D103. Coatings shall be suitable for continuous exposure to landfill leachate with pH range of 5-11. NOTE: Baked-on powder epoxy painted, galvanized, or stainless-steel bolt-together tanks are not considered equal
 - 2. Bolt head encapsulation material and joint sealant shall be compatible with glass-fused-to-steel coating system and materials shall be suitable for continuous exposure to leachate.
- G. Bolts and Fasteners
 - 1. Bolt Finish - Zinc, mechanically deposited.
 - 2. Bolts used in tank lap joints shall meet the minimum requirements of AWWA D103, Section 4.2.
 - 3. Threaded fasteners shall be 300 series stainless steel per ASTM F593, Alloy Group 1.
 - 4. Lockbolts shall be 7075-T73 aluminum, 304 or 305 stainless steel.
 - 5. Screws shall be aluminum or 300 series stainless steel.
 - 6. Triangulated space truss: 6061-T6 aluminum struts and gussets.
- H. Tank Materials:
 - 1. Design requirements for mild strength steel shall be ASTM A1011 Grade 30 with a maximum allowable tensile stress of 18,000 psi.
 - 2. Design requirements for high strength steel shall be ASTM A1011 Grade 50 with a maximum allowable tensile stress of 30,000 psi.
- I. Location of Site: As indicated on Drawings
- J. Nearest Town: Bristol Virginia
- K. Railroad Siding: located approx. 1 mile West from Site.
- L. Access Route: As indicated.

M. Snow Loading:

1. Comply with AWWA D103, Section 5.2.3.1.
2. Minimum 25 psf

N. Wind Loading:

1. Comply with AWWA D103, Section 5.2.4.
2. Minimum 120 mph

O. Earthquake Loading:

1. Comply with AWWA D103, Section 5.2.5 and geotechnical investigation report (Attachment B)

P. Pressure And Vacuum Protection: Requirements per Tank Data Sheet (Attachment A), Section 3.

Q. Odor Control System Interface:

1. Off-gas collection (by others).
2. Off-gas blower capacity: 1,350 SCFM.
3. Tank operating pressure: Atmospheric to -5" WC nominal.
4. Vendor to provide sizing calculations for relief devices showing tank will not exceed -6" WC under worst-case conditions

2.3 TANK CONSTRUCTION

- A. Tank construction consists of glass-fused, bolted-steel, dome-top tank with a 53.15' nominal inside diameter, 34' nominal sidewall height, and 500,000 gallons usable capacity with 24" freeboard. The total capacity of the tank shall be 559,093 gallons. No substitutions are allowed.
- B. Comply with requirements listed in AWWA D103, unless supplemented or modified below:
- C. Construct equalization storage tank using the manufacturer's approved contractor in accordance with the manufacturer's requirements.
- D. Construct ringwall foundation as an integral part of containment slab to the grades shown on the Drawings.
- E. Sidewall Structure
 1. Field erection of the glass-coated, bolted-steel tank shall be in strict accordance with the procedures outlined in the manufacturer's erection manual, and performed by an authorized dealer of the tank manufacturer, regularly engaged in erection of these tanks.
 2. Specialized erection jacks and building equipment developed and manufactured by the tank manufacturer shall be used to erect the tanks.
 3. Particular care shall be taken in handling and bolting of the tank panels and members to avoid damage of the coating system. Prior to liquid test, all surface areas shall be visually inspected by the Engineer.
 4. An electrical leak test shall be performed during erection using a nine-volt leak detection device. All electrical leak points found on the inside surface shall be repaired in accordance with the manufacturer's published touch up procedure.

5. The placement of sealant on each panel may be inspected prior to placement of adjacent panels. However, the Engineer's inspection shall not relieve the bidder from his responsibility for liquid tightness.
 6. No backfill shall be placed against the tank sidewall without prior written approval and design review of the tank manufacturer. Any backfill shall be placed according to the strict instructions of the tank manufacturer.
- F. Roof System
1. All metal components of the aluminum dome structure shall be aluminum or 300 series stainless steel. No galvanized, aluminized, painted, or plated steel shall be used anywhere in the dome above the mounting bracket base plates. Dissimilar materials in the supporting structure shall be isolated from the aluminum dome by means of a compatible elastomeric gasket.
 2. The entire structure shall be designed as a watertight system under all design load and temperature conditions. The design shall include sealant to be completely encapsulated by applying it to the gusset covers' inner circumferences, beneath the gusset covers' top closure plates.
 3. The aluminum closure panels shall be attached continuously along their edges to the structural members by means of batten bars, which engage the panels in an interlocking joint. Designs that incorporate raised battens, overlapping panels and/or designs that incorporate fasteners which penetrate panels and attach to structural members are expressly prohibited. The roof panels shall be fabricated from continuous 3003-H16 aluminum sheeting.
 4. Connection forces shall be transferred through gusset plates connected to the top and bottom flanges of the beam struts. The connections shall be designed as moment connections; a minimum of four bolts shall be used to connect the gusset plate to each strut flange. The structural analysis shall be performed using non-linear, second order, stiffness analysis models in accordance with ADM 2010 Chapter C. Stability shall be provided for the structure as a whole and for each of its components. The available strengths of members and connections determined in accordance with Section C.3 shall equal or exceed the required strengths determined in accordance with Section C.2
 5. Fasteners shall be designed with a factor of safety of 2.34 on ultimate strength and 1.65 on yield strength.
- G. Tank bears on sand placed over the drainage sand, as shown on the Drawings.
- H. Corrosion Allowance:
1. According to AWWA D103.
 2. Passive sacrificial zinc anode cathodic protection system
- I. Bolting and Fasteners
1. Bolt seam design shall generally be in accordance with the requirements of AWWA D103 section 5.5.2; bolt spacing may be adjusted in the vertical bolt lines to increase the net section and improve joint efficiency to a maximum of 85%.
 2. All tank shell bolts shall be installed per manufacturer's recommendation, suitable for storage of landfill leachate.
- J. Balcony: As indicated

- K. Gaskets
1. Tank panel gaskets (shell-to-shell, roof-to-shell, floor-to-shell joints): Suitable for leachate service per AWWA D103, minimum 1/8" thickness.
 2. Pipe connection gaskets (nozzle flanges): EPDM per AWWA D103 and Tank Data Sheet.
- L. Sealant
1. All tank sealants shall be silicone and resistant to ozone and ultraviolet light and conform to Federal Specification TT-S-00230C.
- M. Miscellaneous Penetration Seals
1. All other penetration seals shall be weatherproof rubber seals.
- N. Identification Plate:
1. A manufacturer's nameplate shall list the tank serial number, tank diameter and height, maximum design capacity, intended storage use and date of installation.
 2. The nameplate shall be affixed to the tank exterior sidewall at a location approximately five (5) feet from grade elevation in a position of unobstructed view.
- O. Support Bearings:
1. Acceptable bearing surfaces for sliding bearing are Teflon to stainless steel only.
 2. In order to avoid damage to the Teflon and to reduce the coefficient of bearing friction, Teflon shall not bear on aluminum surfaces.
 3. Dome supports shall utilize only bolted connections. The use of aluminum structural welding at the dome supports is expressly prohibited.
- P. Pipe and Pipe Connections:
1. Pipe connections, flanges, and accessories shall be as indicated on Tank Data Sheet nozzle schedule
- Q. Overflow:
1. External
 2. Provide welded joint steel overflow pipe as indicated, suitably supported and extending to grade level.
 3. Overflow Diameter: As indicated.
 4. Terminate overflow pipe at 3 feet above finished grade to provide air break.
 5. Provide aluminum or bronze mesh insect screen and screen holder over air break opening.
- R. Roof Ladder
1. An outside tank ladder shall be furnished and installed as shown on the contract drawings.
 2. Ladders shall be fabricated of aluminum and utilize grooved, skid-resistant rungs and galvanized safety cage with OSHA approved step-off platform.
 3. The exterior ladder will be equipped with an OSHA approved safety rail/cable.
- S. Safety Devices:
1. Furnish safety rail along entire ladder length and extend 36 inches above tank roof.
 2. Comply with OSHA standards.

- T. Pressure/Vacuum Relief:
 - 1. Provide pressure/vacuum relief device at off-gas outlet per Tank Data Sheet MARK 10. VAREC 2010B or approved equal.
 - 2. Sized per vendor calculations submitted under Section 1.4.L and per Tank Data Sheet.
 - 3. Provide emergency vacuum and pressure relief per MARKS 19 and 20 on the Tank Data Sheet.
- U. Pile-Supported Foundation: When required according to fabricator's design.
- V. Vertical Distance from Finished Ground Level to Crown of Inlet and Outlet Pipes (Earth Cover) at Tank Foundation: As indicated.
- W. Specification Sheet for Seismic Data: According to AWWA D103 and the geotechnical investigation report provided by the Engineer.
- X. Additional Accessories:
- Y. Insulation:
 - 1. N/A

2.4 INLET AND OUTLET PIPE

- A. External Piping:
 - 1. Leachate influent/effluent piping: HDPE per project specifications (connects to SS tank nozzles via flanged connections).
 - 2. Overflow piping: ASTM A53/A53M, Grade B, Schedule 40, steel pipe, welded joints.
 - 3. All connections to tank nozzles: Flanged per nozzle schedule (Class 150)
- B. Where pipe connections are shown to pass through tank panels, they shall be field located, saw cut, (acetylene torch cutting or welding is not permitted), and utilize an interior and exterior flange assembly. Manufacturer-approved sealant compatible with glass-fused-to-steel coating.
- C. Refer to the Tank Data Sheet for information on Nozzle size, class, location and service.

2.5 OVERFLOW PIPE

- A. Overflow Pipe: ASTM A53/A53M, Grade B, Schedule 40, steel pipe, welded joint, with internal and external flange connections on both sides of the tank wall.

2.6 MATERIALS

- A. Furnish materials complying with this Section, as indicated equalization tanks are AQUASTORE bolted storage tank manufactured by CST Storage, Mid Atlantic Storage or approved equal designed per AWWA D103 Standards.
- B. All approved materials shall be protected from damage prior to packing for shipment

2.7 FABRICATION

- A. Materials, Design, and Fabrication: According to AWWA D103.

2.8 SOURCE QUALITY CONTROL

- A. Provide shop inspection and testing of component parts.
- B. Certificate of Compliance:
 - 1. If fabricator is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at fabricator's facility conforms to Contract Documents.
 - 2. Specified shop tests are not required for Work performed by approved fabricator.

PART 3. EXECUTION

3.1 EXAMINATION

- A. Verify layout and orientation of tank accessories and piping connections.
- B. The manufacturer's quality system shall be ISO 9001 certified
- C. The adherence of the glass coating to the steel shall be tested in accordance with ASTM B916-01. Any sheet that has poor adherence shall be rejected.

3.2 PREPARATION

- A. Support Pad:
 - 1. Clean tank pad, remove loose concrete, dust, and other debris.
 - 2. Place building paper on pad according to tank manufacturer's recommendations prior to placing tank.

3.3 INSTALLATION

- A. According to AWWA D103, as indicated, and according to manufacturer instructions.
- B. Connect piping to tank.
- C. To complete installation, install tank accessories not factory mounted.

3.4 FIELD QUALITY CONTROL

- A. Inspection and Testing:
 - 1. Hydrostatic Testing:

- a. Test completed and cleaned tank for liquid tightness by filling tank to its overflow elevation with clean water provided by Owner at no charge to the tank erector.
 - b. Correct leaks disclosed by this test.
 - c. Drain and legally dispose of test water off Site.
 - d. Any leaks disclosed by this test shall be corrected by the erector in accordance with the manufacturer's recommendations.
 - e. Pressure/Vacuum Relief Device Testing (per Tank Data Sheet):
 - i. Factory test vacuum relief disk: -5" WC \pm 0.5" WC.
 - ii. Factory test pressure relief disk: +2" WC \pm 0.5" WC.
 - iii. Verify relief capacity meets vendor calculations.
 - iv. Vendor to provide certified test report.
 - v. Field operational verification after installation.
- B. Equipment Acceptance: Adjust, repair, modify, or replace components failing to perform as specified and rerun tests.
- C. Furnish installation certificate from equipment manufacturer's representative attesting that equipment has been properly installed and is ready for startup and testing.

3.5 ATTACHMENTS

1. Attachment A – Tank Data Sheet
2. Attachment B – Geotechnical Investigation Report
3. Issue for Bid Drawings
4. Design Basis Report

END OF SECTION 43 41 11

TANK DATA SHEET

GENERAL

1. CODES AND STANDARDS:
 - a. AWWA D103: (Factory coated and bolted steel tanks)
 - b. AWWA D106: coating for storage tanks.
 - c. ASCE 7 (Structural loads-wind-snow and seismic).
 - d. OSHA (Access and safety).
2. NOMINAL CAPACITY: 500,000 GAL
3. SERVICE: Landfill leachate water equalization, blending and buffering of flows, aeration, recirculation

DESIGN DATA

1. FLUID TEMPERATURE: Max: 95 °F, Min 32 °F (Ambient)
2. AMBIENT TEMPERATURE: Max: 100 °F, Min: 10 °F
3. INTERNAL PRESSURE:

OPERATING CONDITIONS:

- Tank operates at atmospheric to -5" WC nominal during odor control operation
- Off-gas blower capacity: 1,350 SCFM
- Tank to be protected from excessive vacuum by pressure/vacuum relief device

VACUUM PROTECTION REQUIREMENTS:

- Vendor to provide pressure/vacuum relief device at off-gas outlet (MARK 10)
- Vacuum relief shall prevent tank from exceeding -6" WC under all operating conditions including blower transients
- Vacuum relief setpoint: -5" WC nominal
- Relief capacity to be calculated by vendor based on tank volume and blower capacity

PRESSURE PROTECTION REQUIREMENTS:

- Pressure relief setpoint: +2" WC (normal relief)
- Emergency pressure relief: +5 psig

DESIGN BASIS:

- Standard AWWA D103 atmospheric tank construction
 - Vacuum protection device prevents tank from excessive vacuum
4. SPECIFIC GRAVITY OF PROCESS FLUID: 1.05 AT 60 °F
 5. CORROSION ALLOWANCE: Corrosion protection provided by glass-fused-to-steel coating per AWWA D103
 6. FOUNDATION TYPE: Refer to Geotech Report (Attachment A)
 7. WIND: IMPORTANCE FACTOR Wind loads provided in ASCE Hazard Report (Attachment B)
 8. SNOW LOAD: Refer to ASCE Hazard Report. ROOF LIVE LOAD: N/A
 9. SEISMIC: Refer to Geotech Report (Attachment A)

10. FLUID pH RANGE: 5-11

FABRICATION

1. ROOF TYPE: Aluminum Geodesic Dome ROOF JOINT TYPE: Bolted
2. BOTTOM TYPE: Flat bottom glass-fused-to-steel bolted with gasketed joints BOTTOM TYPE JOINT: Bolted
3. COATING EXTERIOR: Glass-fused-to-steel per AWWA D103
4. COATING INTERIOR: Acid-resistant glass-fused-to-steel (Glass 97 or equivalent)
5. INSULATION: None required
6. MATERIAL PLATE: Carbon steel with glass-fused-to-steel coating
7. PIPE AND TUBE: 316 L SS (for nozzles/connections) PIPE GASKETS: EPDM
8. BOLTING: Coated carbon steel or stainless Steel
9. ODOR CONTROL OPERATION:
 - Tank to operate at atmospheric to -5" WC with vacuum protection device
 - Standard AWWA D103 construction with standard EPDM gaskets
 - Pressure/vacuum relief device at MARK 10 to protect tank from excessive vacuum
 - All penetrations to have gasketed connections per AWWA D103
 - Vendor to confirm tank suitability for operation with vacuum protection device

INSPECTION AND TEST

- Coating check
- Foundation concrete testing
- Bolt torque check
- Field testing
- Pressure/Vacuum Relief Device Testing (MARK 10):
 - Vendor to factory test relief device:
 - Vacuum relief disk opening pressure: -5" WC \pm 0.5" WC
 - Pressure relief disk opening pressure: +2" WC \pm 0.5" WC
 - Verify relief capacity meets vendor's sizing calculations
 - Vendor to provide certified test report
 - Field operational verification after installation

NOTES:

1. Drain nozzle to be placed in lowest point
2. Coating system shall handle pH range 5-11
3. Localized access platform (Manway and nozzle access)
4. Ladder for roof access
5. Spillway

6. Concrete footing design to be coordinated with General contractor to complete secondary concrete containment.
7. Vendor to provide appropriately sized pressure/vacuum relief device at MARK 10. Relief devices shall prevent tank vacuum from exceeding -6" WC under all operating and transient conditions. Vendor to provide relief device sizing calculations showing relief capacity (SCFM).

EQUALIZATION TANK NOZZLE AND ACCESS WAY SCHEDULE

MARK	SIZE	CLASS	TYPE	SERVICE	REMARKS
1	6"	150	HDPE	Leachate influent line	Top of side wall
2	16"	150	SS	Recirculation Pump inlet	Bottom of side wall
3	16"	150	SS	Recirculation Pump outlet	Bottom of side wall
4	6"	150	HDPE	Leachate effluent line	Bottom of side wall
5	6"	150	SS	Tank Drain	Bottom of side wall
6	10"	150	SS	Tank overflow nozzle	Above tank working level on side wall
7	4"	150	SS	Level Transmitter Port	On tank dome
8	4"	150	SS	Level Alarm HH Port	On tank dome
9	4"	150	SS	Level Alarm LL Port	On tank dome
10	8"	150	SS	Off-gas outlet with integral pressure/vacuum relief (VAREC 2010B (316 SS) or approved equal). Vendor to provide and install relief device per specification	On tank dome
11	36"	150	SS	Manway	3 ft from bottom of side wall
12	24"	150	SS	Secondary Manway	3 ft from bottom of side wall
13	30"	150	SS	Dome access hatch	Top of Dome, next to ladder platform
14	6"	150	SS	Interconnection between EQ Tanks	Bottom of side wall between tanks
15	2"	150	SS	Spare	Bottom of side wall
16	3"	150	SS	Spare	Bottom of side wall
17	4"	150	SS	Spare	Top of side wall
18	4"	150	SS	Spare	On tank dome
19	4"	150	SS	Emergency vacuum breaker	On tank dome
20	4"	150	SS	Pressure Relief Vent	On tank dome
21	2"	150	SS	Pressure transmitter	On tank dome
22	8"	150	SS	Blower line	Bottom of side wall

[END OF SECTION]



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DRAFT GEOTECHNICAL REPORT

Equalization Tank System

Bristol Virginia Sanitary Landfill and Quarry Balefill Facility Bristol, Virginia

Prepared for

City of Bristol

300 Lee Street
Bristol, VA 24201

Prepared by

Geosyntec Consultants, Inc.
1420 Kensington Rd, Suite 103
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Project CHR8600

This report was prepared under the supervision
and direction of the undersigned

August 4, 2025

A handwritten signature in black ink, appearing to read "James Hansen".

James R. Hansen, PE_(IL)
Senior Engineer

A handwritten signature in black ink, appearing to read "Chulwoo Kim".

Chulwoo Kim, PhD., PE_(VA)
Senior Engineer

EXECUTIVE SUMMARY

The City of Bristol contracted Geosyntec Consultants, Inc. (Geosyntec) to conduct a geotechnical site investigation and provide earthwork and foundation design recommendations for the installation of a proposed equalization (EQ) tank system at the Bristol Virginia Sanitary Landfill (Site) located at 2655 Valley Drive in Bristol, Virginia. Based on publicly available regional geologic information and interpretations, the Site is expected to have a moderate potential for the formation of karst features, but low potential for other geohazards, such as faults, liquefaction, or subsidence. The Site has a relatively flat topography not conducive to landslides, no surface faults mapped or reported in this area, and low seismicity.

Geosyntec performed three hollow-stem auger borings at the Site which encountered medium stiff to hard lean clay with sand and clayey sand with rock fragments in the upper 3.5 to 6 feet below ground surface (bgs) before hitting drilling refusal on rock. In one boring, rock coring was advanced to 32 feet bgs, consisting of limestone bedrock and boulders. Groundwater was not observed in any of the three borings.

Based on review of geologic maps, the Site has potential for the formation of karst features. To investigate this, Geosyntec's subcontractor, Collier Geophysics (Collier), completed a geophysical survey consisting of four, two-dimensional (2D) and four, one-dimensional (1D) multichannel analysis of surface waves (MASW) surveys. The MASW surveys were performed at the primary tank location and at an alternate tank location located to the southwest of the primary location. The results of the geophysical survey did not show evidence of voids or karst-related features in the tank foundation footprints.

Our analyses indicate that the Site soil and rock can support tank structures on shallow foundations. Recommendations are provided for proposed foundation systems for the EQ tanks, including cast-in-place, concrete shallow foundations.

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ACRONYMS AND ABBREVIATIONS

AASHTO	American Association of State Highway and Transportation Officials
ASCE	American Society of Civil Engineers
BVUA	Bristol Virginia Utility Authority
bgs	below ground surface
EQ	equalization
FEMA	Federal Emergency Management Agency
HSA	hollow-stem auger
IBC	International Building Code
LRFD	Load and Resistance Factor Design
mg/kg	milligrams per kilogram
NAVD 88	North American Vertical Datum of 1988
NFS	non-frost-susceptible
psf	pounds per square foot
RQD	Rock Quality Designation
SPT	standard penetration test
USBC	Uniform Statewide Building Code
USDA	United States Department of Agriculture
USGS	United States Geological Survey

1. INTRODUCTION

Geosyntec Consultants, Inc. (Geosyntec) prepared this geotechnical report (Report) for a proposed equalization (EQ) tank system at the Bristol Virginia Sanitary Landfill, located at 2655 Valley Drive in Bristol, Virginia (Site; **Figure 1**). The Bristol Virginia Sanitary Landfill plans to construct an EQ tank system that will store and equalize the collected leachate and landfill gas condensate before discharge to Bristol Virginia Utility Authority (BVUA) compliance manhole under BVUA’s Industrial Wastewater Discharge Permit (013I).

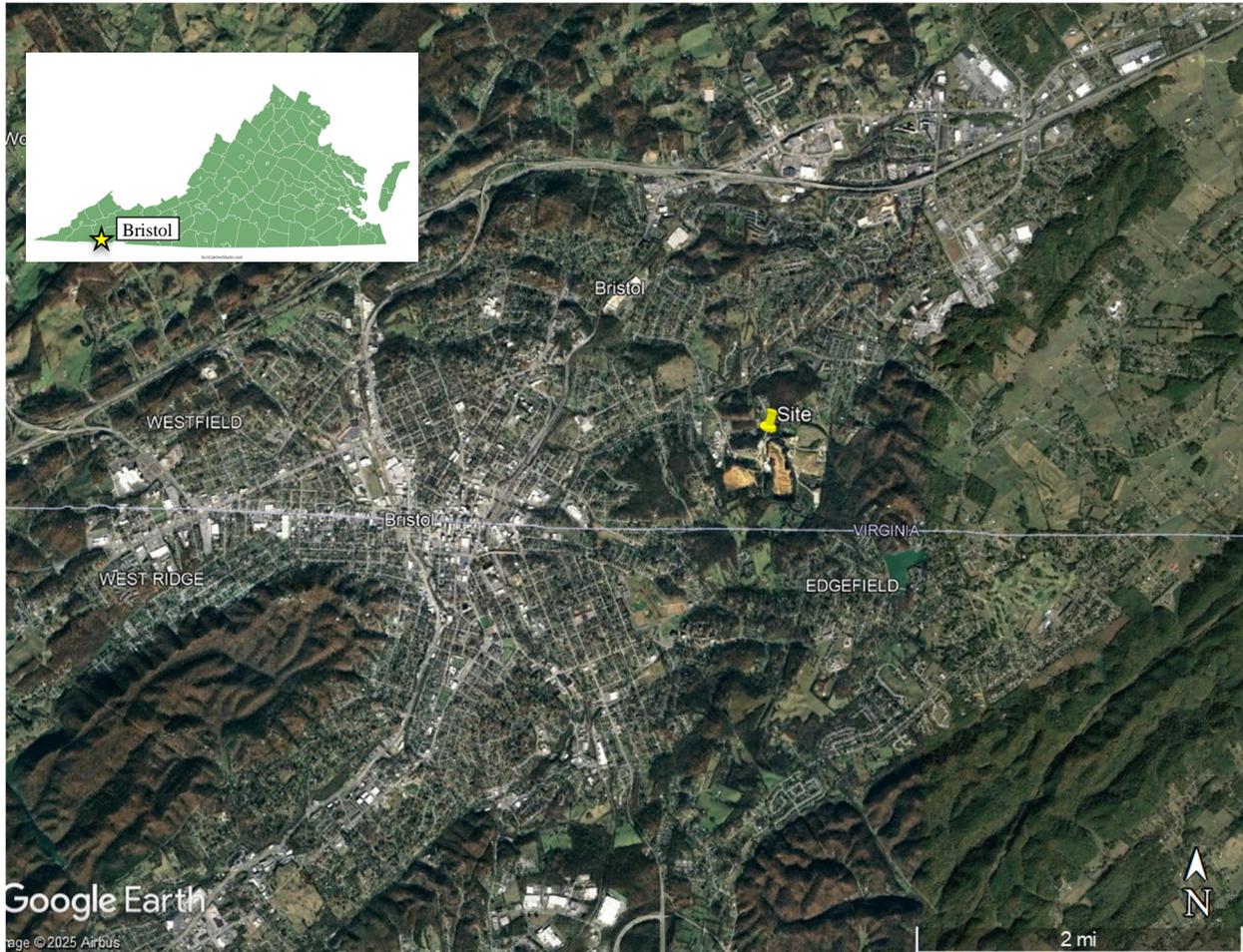


Figure 1. Vicinity Map

This Report documents the limited geotechnical explorations and testing performed for the construction of the proposed EQ tank system and provides geotechnical design and construction recommendations for the planned construction at the Site.

1.1 Project Understanding

The City of Bristol plans to build a new EQ tank system at an existing grassy area in the northern part of the Site (**Figure 2**). The proposed EQ tank system consists of two 500,000-gallon usable capacity tanks, each with a diameter of 53 feet and a sidewall height 34 feet. The two tanks will be enclosed in a single larger secondary containment, with outer dimensions of approximately 69

feet by 130 feet. The anticipated foundation system includes concrete ringwall foundations and a 6-inch thick monolithic concrete floor slab. The pad foundation, to which the primary tanks and the secondary containment will be anchor-bolted, is anticipated to have dimensions of approximately 69 feet by 130 feet.

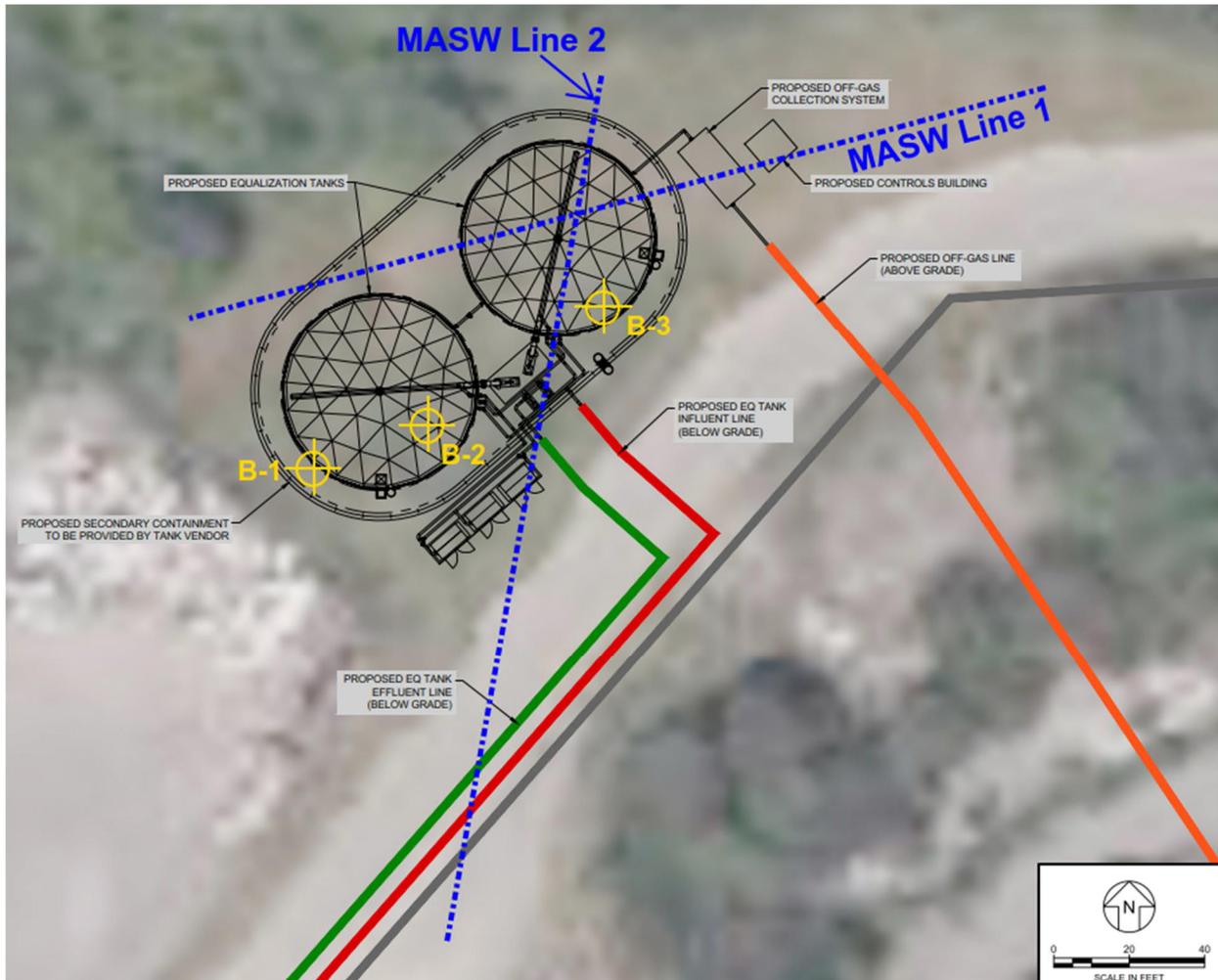


Figure 2. Site Plan showing Geotechnical Explorations

1.2 Scope of Services

The services provided to City of Bristol are in general accordance with our geotechnical evaluation work plan dated February 21, 2025. Our scope of services included performing a geotechnical field exploration, reviewing Virginia Uniform Statewide Building Code (USBC) and identifying applicable requirements, developing recommendations for the proposed foundation systems including ringwall foundations and slab-on-grade foundations, and preparing this geotechnical report.

This Report has been prepared for the City of Bristol and the project design team to be used solely in the design and construction of the proposed EQ tank system described herein. This Report may not contain sufficient information for other uses or the purposes of other parties.

2. GEOTECHNICAL SITE INVESTIGATION AND LABORATORY TESTING

The geotechnical site investigation program was developed to characterize the shallow subsurface soil and rock and develop recommendations for the appropriate foundation type.

2.1 Geotechnical Site Investigation

The geotechnical site investigation included two hollow-stem auger (HSA) borings (B-2 and B-3) advanced to 5 or 6 feet below ground surface (bgs) and one HSA boring with rock coring (B-1) advanced to 32 feet bgs. Geotechnical laboratory tests were performed on collected soil and rock samples.

The geotechnical exploration boring locations and features are summarized in **Table 1** and shown in **Figure 2**.

Table 1. Boring Coordinates and Termination Depths

Boring Designation	Exploration Type	Surface Elevation (feet NAVD 88) ¹	Latitude (degrees) ²	Longitude (degrees) ²	Auger Refusal Depth (feet bgs)	Termination Depth (feet bgs)
B-1	HSA with Rock Coring	1876	36.602574	-82.149820	3.5	32
B-2	HSA	1877	36.602606	-82.149713	4/4.5 ³	6
B-3	HSA	1878	36.602697	-82.149547	4.5	5

Notes:

1. Surface elevations, which reference the North American Vertical Datum of 1988 (NAVD 88), are approximate and obtained from American Society of Civil Engineers (ASCE) Hazard Tool (ASCE 2024).
2. Boring coordinates were surveyed by Geosyntec’s private utility locate subcontractor, Ground Penetrating Radar Systems, Inc.
3. In boring B-2, auger refusal was encountered at 4 feet bgs. A second borehole was advanced, without sampling, at an offset of 2 feet and auger refusal was encountered at 4.5 feet bgs.

Prior to field activities, Geosyntec discussed site access with landfill operations and prepared a site-specific health and safety task hazard analysis that identified site conditions, potential hazards, hazard control, monitoring procedures, personal protective equipment, and emergency procedures. Geosyntec’s drilling subcontractor, Athena Drilling, LLC (Athena) of Hendersonville, Tennessee, placed a call to VA811 prior to drilling to mark public utilities at the Site in the vicinity of the proposed exploration locations.

Athena, under the direct supervision of a Geosyntec field representative, advanced the three borings on February 25 through 26, 2025. Athena performed split-spoon sampling every two feet at each boring, until auger refusal was encountered. Split-spoon samples were obtained with a standard penetration test (SPT) sampler with measured blow counts (or N-values) in accordance with ASTM D1586. Borings B-2 and B-3 were terminated at auger refusal. Boring B-1 was advanced below the auger refusal depth by performing rock coring until 32 feet bgs.

A Geosyntec field representative recorded SPT N-values, logged samples, and described each sample visually and manually in general accordance with ASTM D2488. The split-spoon samples

were placed in jars and the rock core samples were placed in a core box. The samples were labeled and transported to the Athena geotechnical laboratory in Bowling Green, Kentucky.

After drilling and sampling was completed, the boreholes were backfilled with soil cuttings. The boring logs are presented in **Appendix A**.

2.2 Geotechnical Laboratory Testing

Soil and rock samples collected from the borings were used for classification and geotechnical laboratory testing. The results of the geotechnical laboratory testing program were used to refine visual classifications from the borings, estimate shear strength parameters, and develop geotechnical recommendations.

Geotechnical laboratory tests performed included the following:

- Moisture content (per ASTM D2216)
- Atterberg limits (per ASTM D4318)
- Grain size distribution (per ASTM D6913)
- Corrosivity testing, including resistivity, pH, soluble sulfate, and chloride (per American Association of State Highway and Transportation Officials [AASHTO] T288 to T291)
- Rock uniaxial compressive strength testing

The results of the laboratory tests are provided in **Appendix B**.

2.3 Geophysical Survey

Based on review of geologic maps, the Site has potential for the formation of karst features, such as sinkholes. Therefore, a geophysical survey was completed at the tank locations to collect remote sensing data of the subsurface that can help to identify potential sinkholes or subsurface voids. Geosyntec's subcontractor, Collier Geophysics (Collier), completed a geophysical survey consisting of four, two-dimensional (2D) and four, one-dimensional (1D) multichannel analysis of surface waves (MASW) surveys on June 17, 2025. The MASW surveys were performed at the primary tank location and at an alternate tank location located to the southwest of the primary location. The results of the MASW tests are included in **Appendix C**.

3. SITE CONDITIONS

The Site is located within the existing Bristol Virginia Sanitary Landfill. The area of the Site where the proposed EQ tanks will be located is immediately bounded by a wooded area to the north and west, Landfill Road to the east and south, and a paved area to the southwest. The existing ground surface within the footprint of the proposed EQ tanks slopes upward gently from the southwest to the northeast from approximately 1876 to 1878 feet (North American Vertical Datum of 1988 [NAVD 88]).

The following sections describe our findings of the Site conditions based on the geotechnical site investigation and review of publicly available geologic data (USDA 2024; Bartlett and Webb 1971; USGS 2018; USGS 2024; USGS 2004; Virginia Department of Mines, Minerals, and Energy 2023; FEMA 2024).

3.1 Subsurface Conditions

Geosyntec reviewed publicly available data on the geologic and topographic conditions of the area. The United States Department of Agriculture (USDA) soils map indicates that the area is underlain by fill material (USDA 2024). Surficial soils at the Site are anticipated to be underlain by gray to dark gray, thick bedded limestone with minor chert and white calcite inclusions of the Lenoir and Mosheim formations (Bartlett and Webb 1971).

The subsurface conditions encountered during the geotechnical site investigation are the following:

- **Topsoil** – approximately 4 to 6 inches of topsoil were encountered at the ground surface in all borings. Topsoil consisted of dark brown sandy lean clay, with grass roots and trace gravel.
- **Fill** – Three to four feet of residual soils fill, consisting of brownish yellow and gray lean clay with sand and clayey sand, with varying amounts of gravel, were encountered beneath the topsoil in all borings. Trace roots and varying amounts of angular rock fragments were also observed in this layer. SPT N-values in this layer typically ranged from 6 to 21, with an average of 12. Unconfined compressive strength readings measured with a pocket penetrometer ranged from 1.0 to 1.75 tons per square foot. Based on N-values and pocket penetrometer readings, the consistency of the fine-grained materials in this layer typically ranged from medium stiff to very stiff. Based on N-values, the coarse-grained materials were predominantly medium dense. The fill layer extended to depths ranging from 3.5 to 4.5 feet bgs.
- **Limestone** – Limestone was encountered underneath the fill layer until the termination depth of B-1 of 32 feet bgs. Rock quality designation (RQD) of the rock cores ranged from 0 to 22, indicating very poor quality bedrock. Recovery percentages of the rock cores ranged from 10 to 63. Lean clay was observed in some of the fractures and voids between the rock cores collected. Due to the low recovery and RQD values and observations of lean clay within voids, it is possible that the encountered limestone is comprised of buried floating boulders, and intact bedrock could be present at greater depths.

3.2 Groundwater Conditions

Groundwater was not observed in any of the three boreholes during drilling. Groundwater conditions, particularly perched groundwater in the clay fill and on top of rock, may vary seasonally with variations in precipitation.

3.3 Geohazards

Our review of publicly available regional geologic information and interpretations indicate that the Site has low geohazard potential. This assessment is based on the following:

- **Faults:** No surface faults have been mapped or reported in this area, according to the USGS Quaternary Fault and Fold Database (USGS 2018).
- **Liquefaction:** Liquefaction is a phenomenon in which soils experience loss of shear strength and settlement due to ground shaking during seismic events. Liquefaction is particularly of concern for loose, saturated sands, which are not present at the Site. Therefore, the risk of liquefaction at the Site is negligible.
- **Landslides:** According to the US Landslide Inventory (USGS 2024), there are no documented landslides at the Site, although the Site is located in an area with low to medium landslide susceptibility.
- **Subsidence:** Virginia is one of the country's largest producers of coal, and coal mine subsidence has been known to occur in the state. According to the public records, there are no historic coal mines in Bristol.

3.3.1 Karst-Related Geohazards

The Site is underlain by carbonate limestone bedrock, and karst-related sinkholes have been discovered in Bristol in the past (Virginia Department of Mines, Minerals, and Energy, 2023). Therefore, the risk of sinkhole development is generally present at the Site. Based on review of geologic maps, the carbonate rocks underlying the Site are susceptible to the formation of karst features such as sinkholes, disappearing streams, caves, and springs (USGS, 2004). Additionally, geologic mapping shows two existing sinkholes within 0.5 miles of the Site, and multiple sinkholes in the Bristol, Virginia area (Virginia Department of Mines, Minerals, and Energy, 2023).

To further evaluate the potential for karst-related features at the proposed tank locations, a Geosyntec geologist performed a site visit on June 17, 2025 to identify features at or near the primary and alternate tank locations that could be indicative of karst formation. This evaluation identified karst-related features approximately 200 feet away from the proposed tanks, but none in the immediate vicinity of the tanks. **Appendix D** includes a daily field report documenting this site visit.

The MASW survey was then performed to evaluate whether karst-related features are present at the proposed tank locations. The results of the MASW survey did not show evidence of voids or other karst-related features. These features would appear as decreases in shear wave velocity due to the presence of less dense material within competent bedrock, while at the Site, the shear wave velocity generally shows normal increases with depth.

3.4 Seismicity

The Site is classified as a low-seismicity area of the conterminous United States, and seismicity is not anticipated to greatly impact project design. Average shear wave velocities measured at the primary tank location were about 2,100 to 2,300 feet per second, based on 1D MASW tests, indicating that Site Class C (i.e., very dense soil and soft rock) is appropriate for the subsurface materials encountered at the Site. The seismic design parameters, determined from the web-based ASCE 7 hazard tool (ASCE 2024) for a Site Class C and a Risk Category II in accordance with ASCE 7-16 (ASCE, 2016), are summarized in **Table 2**.

Table 2. Seismic Design Parameters

Parameter	Value	Description
S_s	0.31	MCE_R ground motion (for 0.2-second period)
S_1	0.09	MCE_R ground motion (for 1-second period)
S_{MS}	0.32	Site-modified spectral acceleration (SA) value (for 0.2-second period)
S_{M1}	0.12	Site-modified spectral acceleration value (for 1-second period)
S_{DS}	0.21	Numeric seismic design value at 0.2-second SA
S_{D1}	0.077	Numeric seismic design value at 1-second SA
SDC	B	Seismic design category
PGA	0.18	MCE_G peak ground acceleration
T_L	12	Long-period transition period in seconds

3.5 Frost Depths

Because Bristol, Virginia does not provide a criterion for frost depth, Geosyntec reviewed frost depth criteria from nearby cities. The design criteria adopted by Johnson City, Tennessee, located 40 miles southwest of Bristol, recommends using a design frost depth of 12 inches. Blacksburg, Virginia, located about 120 miles northeast of Bristol, recommends using a design frost depth of 24 inches. Therefore, we recommend using a design frost depth of 24 inches for foundations.

The Virginia Uniform Statewide Building Code (USBC) adopted the 2021 version of the International Building Code (IBC) in which section 1809.5 discusses requirements for frost protection. Where foundations and other permanent supports and structures do not extend below the frost depth, ASCE 32 provides recommendations for alternative frost protection.

3.6 Flood Potential

The Federal Emergency Management Agency (FEMA) National Flood Hazard Layer Viewer map (FEMA 2024) delineates flood areas. The FEMA map indicates that the Site is not located within a flood zone.

4. GEOTECHNICAL PROPERTIES

4.1 Index Properties

Index testing of the samples collected from the upper fill layer at the Site included moisture content, Atterberg limits, and grain size distribution analyses. The laboratory index test results are summarized in **Table 3**.

Table 3. Summary of Index Test Results

Soil Unit	Soil Type	Moisture Content (%)	Atterberg Limits			Grain Size Distribution		
			Plastic Limit	Liquid Limit	Plasticity Index	% Gravel	% Sand	% Fines
Fill	Lean clay (CL) and Clayey sand (SC) with varying amounts of gravel	16 (9–26)	35 (30–45)	19 (19–20)	16 (11–25)	13 (3–18)	33 (25–39)	54 (43–72)

Notes:

1. Upper values are average values. Values in parentheses indicate the range of values in the results.

The laboratory index test results are provided in **Appendix B**.

4.2 Corrosivity

A composite sample from borings B-02 and B-03 was submitted for corrosion-related laboratory tests to measure the pH, electrical resistivity, and concentrations of chlorides and sulfates of the soils. These laboratory test results are summarized in **Table 4** and included in **Appendix B**.

Table 4. Summary of Test Results for pH, Chlorides, Sulfates, and Resistivity

Boring ID	Depth (feet bgs)	pH	Chlorides (mg/kg)	Sulfates (ppm)	Resistivity (ohm-cm)
B-02 and B-03	0–6	7.96	6.93	14.58	3,000

Notes:

- bgs: below ground surface
- mg/kg: milligrams per kilogram
- ohm-cm: ohm centimeter
- ppm: parts per million

According to AASHTO Load and Resistance Factor Design (LRFD) bridge design specifications (2020) Section 10.7.5, soil conditions should be considered as potentially corrosive to ferrous metals or concrete if one or more of the following conditions exists:

- pH less than 5.5
- Chlorides concentrations greater than 500 milligrams per kilogram (mg/kg)
- Sulfates concentrations greater than 1,000 mg/kg
- Resistivity less than 2,000 ohm-centimeter

The measured pH, chloride and sulfate concentrations, and resistivity are outside of the thresholds specified in AASHTO (2020). This indicates the native soils have low corrosivity.

5. RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION

The results from the site investigation suggest that the proposed EQ tanks can be supported by shallow foundations, provided the recommendations presented in this Report are incorporated into the design and construction. If changes in the planned type of structures or foundations are made or variations or differing Site conditions are encountered during construction, Geosyntec should be contacted to evaluate the effects of the changes on our recommendations.

5.1 Site Preparation and Earthwork

Earthwork for the project will generally consist of minor grading that includes clearing and grubbing, removal of topsoil, placement of backfill material, and subgrade preparation for foundations. Earthwork should be performed in accordance with the geotechnical recommendations of this Report, the project specifications, the current version of the State of Virginia Uniform Statewide Building Code (USBC), and applicable sections of the IBC.

5.1.1 Subgrade Preparation

Geosyntec recommends the existing grass and topsoil be completely removed from within the limits of the proposed construction area. The depth of topsoil, surface vegetation, roots, and other deleterious materials such as grass is expected to be approximately 6 inches in the areas covered with grass and should be confirmed in the field during construction.

Due to the potential presence of boulders and shallow bedrock, Geosyntec recommends over excavating a minimum of 12 inches below bottom of foundations or slabs to remove potential hard points that would create differential foundation stresses and settlement. The horizontal limits of the removal excavation should extend at least 2 feet beyond the outer edge of any concrete slab foundations. The subgrade soils should be compacted to a minimum of 95% of the standard Proctor maximum dry density and moisture-conditioned to between 0% and 3% above the optimum moisture content. Once the subgrade is compacted, additional fill should be placed and compacted to meet the design finished grades. The thickness of the additional fill could be 6 inches or more depending on the thickness of the topsoil / root zone removed. Details of the additional fill material and compaction criteria are provided in the next section.

Before placing fill, the subgrade areas should be proof-rolled using a large piece of construction equipment such as a fully loaded tandem-axle dump truck or a smooth-drum roller. Soft areas identified by a qualified geotechnical engineer during proof rolling should be excavated and replaced with approved compacted engineered fill. Provided the recommendations in this Report are followed, we expect settlement of the subgrade will be negligible and will occur rapidly, during or shortly after construction and initial tank filling. All foundation subgrades should be carefully inspected by a qualified geotechnical professional before concrete is placed. The foundation subgrade should be protected from freezing and accumulation of ponded water. Concrete should be placed as soon as the excavation is complete and the subgrade is inspected. All excavation surfaces should be protected until the concrete and backfill are placed. Bearing surfaces should be cleaned of all material loosened by the excavation before concrete is placed.

5.1.2 Fill Material and Compaction Criteria

Engineered fill should be placed in maximum 12-inch-thick (loose thickness) uniform horizontal lifts and compacted. The on-site predominantly sandy soils may be reused as fill, provided it meets the following criteria:

- free of organics and any other deleterious material (less than 2%)
- maximum fines content of 35%
- maximum liquid limit of 40 and plasticity index of 20
- maximum particle size of 3 inches.

Engineered fill should be compacted to at least 98% of the material's standard Proctor maximum dry density, within 2% of the optimum moisture content. Placement of fill should be observed and tested by the inspecting geotechnical engineer. We recommend that a minimum 6-inch-thick layer of AASHTO #57 stone (0.75-inch clean, crushed stone) base should be placed underneath the tank floor slab and any shallow foundations to protect the prepared subgrade, serve as a capillary break, and mitigate differential settlement. Aggregate base should be compacted to provide a firm, unyielding surface, as determined and approved by the inspecting geotechnical engineer.

If excavations do not produce sufficient fill soils on-site, imported fill may be required. Imported fill should classify as sand or gravel matching the Unified Soil Classification System designations SC, SM, SP, SW, GC, GM, GP, or GW and meet the criteria listed above. For landscaping areas or areas that do not require structural fill, Geosyntec recommends using on-site material as general fill to meet design finish grades. General fill should be compacted to a relative compaction of at least 92% of the standard Proctor maximum dry density.

5.1.3 Site Drainage

Subgrade preparation should not occur during a rain event. Water should not be allowed to pond inside the excavation. If water enters the excavation, it should be removed. The soil should be allowed to air-dry, and the surface should be scarified and proof-rolled or proof-compacted. Shallow groundwater levels are not expected at the Site. However, perched water may be encountered during excavation. Precautions should be taken to handle any perched water seeps and direct surface water away from excavations.

Surface drainage should be provided to prevent ponding and promote the drainage of surface water away from structure foundations and slabs and toward suitable collection and discharge facilities. Surfaces within 10 feet of foundations should be sloped at a minimum of 5%, or 2% if impervious, in accordance with section 1804.3 of the IBC. The contractor should implement drainage provisions during construction to divert rain and construction water away from open excavations.

5.2 Shallow Foundations

Concrete ringwall foundations are planned to support the tank loads. The ringwall foundations and spread footing foundations, should they be required, can be designed to bear on the existing fill soils using an allowable bearing capacity limited to 4,000 pounds per square foot (psf). Footings bearing directly on rock can be designed with an allowable bearing capacity of 8,000 psf. Footings

designed and constructed following the recommendations in this Report are anticipated to experience less than 1 inch of total settlement and ½ inch of differential settlement between footings. Footings should have a minimum width of 2 feet for continuous ringwall footings and 3 feet for individual spread footings.

Shallow foundations should be protected from frost action. As discussed in Section 3.5, Geosyntec recommends using a design frost depth of 24 inches to avoid frost-related impacts to foundations. We recommend that a minimum 6-inch-thick layer of AASHTO #57 stone (0.75-inch clean, crushed stone) base should be placed underneath any shallow foundations to mitigate differential settlement. Sliding resistance of footings and mat foundations can be evaluated using an allowable friction coefficient of 0.4 between aggregate base and concrete to provide resistance to lateral loads.

5.3 Slabs-on-Grade

Floor slabs can be constructed as slab-on-grade bearing on prepared subgrade, as described above. A minimum 6-inch-thick layer of ¾-inch clean, crushed stone should be placed beneath the slabs to protect the subgrade and serve as a capillary break. The design of slab-on-grade foundations requires frost protection to be designed in accordance with ASCE 32 (ASCE 2001). In lieu of frost protection measures described in ASCE 32, non-frost-susceptible (NFS) fill can be used around the tank perimeter and below slabs-on-grade. Fill can be considered as NFS if it has a fines content less than 6%, therefore site soils are not considered to be NFS.

5.3.1 Modulus of Subgrade Reaction

The modulus of subgrade reaction (k) can be used to assess the deformation of mat foundations and slabs on grade. The appropriate k-value for a particular loading situation depends on several soil and structural parameters, including soil type, soil uniformity, soil consistency and strength, and the duration and width of structural loads. At this Site, a modulus of subgrade reaction of 50 pounds per square inch per inch may be used for long-term tank loading on slabs-on-grade placed on aggregate base, in accordance with Section 5.1.2.

5.4 Construction Observations and Considerations

A geotechnical engineer should review the subsurface conditions as they are exposed during construction, including soil exposed in excavations; observe site preparation and earthwork construction; perform geotechnical testing of subgrade materials and placed geomaterials; and verify whether subsurface conditions encountered throughout the Site are essentially the same as those encountered in the borings and used as a basis for the development of the recommendations contained herein. The geotechnical engineer should alert all parties of any identified deviations or unsuitable conditions related to the aspects discussed in this Report. Based on the field observations, additional recommendations could be provided regarding the suitability of soil and other materials for foundation support, compaction, and import soil, among others.

The geotechnical engineer should also be retained during the preparation of the construction documents to review those portions of the project plans and specifications affected by the recommendations made in this Report and confirm that the intent of the recommendations contained herein is correctly incorporated into the construction documents.

6. LIMITATIONS

The work documented in this Report focuses on the evaluation of geotechnical characteristics of subsurface soils at the Site and development of geotechnical design recommendations for the proposed project. The recommendations presented herein are based on the understanding of the proposed project, as outlined in Section 1 of this Report. Geosyntec should be notified of any significant changes so that we may either confirm or modify our recommendations.

The Report and other materials resulting from Geosyntec's efforts were prepared exclusively for use by the City of Bristol to support the design and construction of the project. The Report is not intended to be used for final design. The Report is not intended to be used for other future improvements in the area and may not contain sufficient or appropriate information for such use. If this Report or portions of this Report are provided to contractors or included in specifications, it should be understood that it is provided for information only.

Soil deposits may vary in type, strength, and many other important properties between points of exploration due to nonuniformity of the geologic formations or due to man-made cut and fill operations. While Geosyntec cannot evaluate the consistency of the properties of materials in areas not explored, the conclusions drawn in this Report assume that the data obtained in the field and laboratory are reasonably representative of field conditions and are conducive to interpolation and extrapolation.

Geosyntec's investigation and evaluations were performed using generally accepted engineering approaches and principles available at this time and the degree of care and skill ordinarily exercised under similar circumstances by reputable geotechnical engineers practicing in this area. No other representation, either expressed or implied, is included or intended in this Report.

7. REFERENCES

- AASHTO. 2020. *LRFD Bridge Design Specifications*. 8th Edition. Washington DC: American Association of State Highway and Transportation Officials.
- ASCE. 2001. *Design and Construction of Frost-Protected Shallow Foundations*. ASCE 32-01. American Society of Civil Engineers.
- ASCE. 2016. *Minimum Design Loads and Associated Criteria for Buildings and Other Structures*. ASCE 7-16. American Society of Civil Engineers.
- ASCE. 2024. "ASCE 7 Hazard Tool." Available at: <https://asce7hazardtool.online>. American Society of Civil Engineers. Accessed April 4, 2024.
- Bartlett and Webb. 1971. *Geology of the Bristol and Wallace quadrangles, Virginia*. Virginia Division of Mineral Resources.
- FEMA. 2024. National Flood Hazard Layer (NFHL) Viewer. Federal Emergency Management Agency. Available at <https://hazards-fema.maps.arcgis.com/apps/webappviewer/index.html?id=8b0adb51996444d4879338b5529aa9cd>.
- IBC. 2021. International Building Code 2021. International Code Council.
- USDA. 2024. USDA Web Soil Survey. United States Department of Agriculture. Available at <https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>.
- USGS. 2024. U.S. Landslide Inventory. United States Geological Survey. Available at <https://usgs.maps.arcgis.com/apps/webappviewer/index.html?id=ae120962f459434b8c904b456c82669d>.
- USGS. 2018. Quaternary Fault and Fold Database of the United States. United States Geological Survey. Available at <https://www.usgs.gov/programs/earthquake-hazards/faults>.
- USGS. 2004. U.S. Geological Survey Open-File Report 2004-1352, Caves and Karst in the U.S. National Park Service, AGI Karst Map of the US.
- Virginia Department of Mines, Minerals, and Energy. 2023. Reconnaissance Mapping of Karst-related Sinkholes in Virginia. Updated July 2023. Accessed 16 April 2025 at <https://www.arcgis.com/apps/mapviewer/index.html?layers=81c6902f672c4426afaf61a574015254>

APPENDIX A

Boring Logs

KEY SHEET - CLASSIFICATIONS AND SYMBOLS

GS FORM:
SOIL-5920

EMPIRICAL CORRELATIONS WITH STANDARD PENETRATION RESISTANCE N VALUES *

	N VALUE * (BLOWS/FT)	CONSISTENCY	UNCONFINED COMPRESSIVE STRENGTH (TONS/SQ FT)		N VALUE * (BLOWS/FT)	RELATIVE DENSITY
FINE GRAINED SOILS	0 - 2	VERY SOFT	<0.25	COARSE GRAINED SOILS	0 - 4	VERY LOOSE
	3 - 4	SOFT	0.25 - 0.50		5 - 10	LOOSE
	5 - 8	MEDIUM STIFF	0.50 - 1.00		11 - 30	MEDIUM DENSE
	9 - 15	STIFF	1.00 - 2.00		31 - 50	DENSE
	16 - 30	VERY STIFF	2.00 - 4.00		>50	VERY DENSE
	>30	HARD	>4.00			

* ASTM D 1586; NUMBER OF BLOWS OF 140 POUND HAMMER FALLING 30 INCHES TO DRIVE A 2 IN. O.D., 1.4 IN. I.D. SAMPLER ONE FOOT.

UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART

MAJOR DIVISIONS		SYMBOLS	DESCRIPTIONS	
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS		GW WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	
			GP POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	
			GM SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES	
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO.4 SIEVE		GC CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES	
		SAND AND SANDY SOILS		SW WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
MORE THAN 50% OF MATERIAL COARSER THAN NO. 200 SIEVE SIZE	MORE THAN 50% OF COARSE FRACTION PASSING NO.4 SIEVE		SM SILTY SANDS, SAND-SILT MIXTURES	
			SC CLAYEY SANDS, SAND-CLAY MIXTURES	
			ML INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY	
FINE GRAINED SOILS	SILTS AND CLAYS		CL INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS	
			OL ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	
			MH INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILT	
	SILTS AND CLAYS		CH INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS	
			OH ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS	
			PT PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENT	
HIGHLY ORGANIC SOILS				

NOTE: DUAL SYMBOLS USED FOR BORDERLINE CLASSIFICATIONS

OTHER MATERIAL SYMBOLS

	BASALT		LIMESTONE		TOPSOIL
	BRECCIA		SANDSTONE		
	CHALK		SHALE		
	CHERT		BEDROCK		
	COAL		FILL		
	DOLOMITE		NO CORE / VOID		
	GYPSUM		TILL		

PARTICLE SIZE IDENTIFICATION

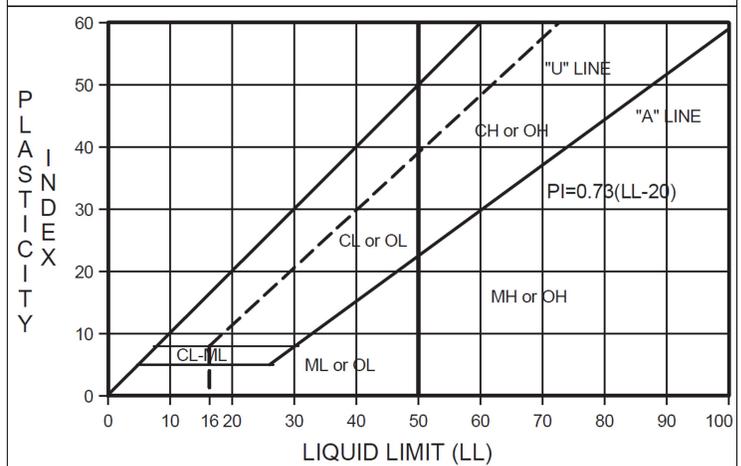
USCS (SOILS ONLY) *		SEDIMENTARY (ROCK ONLY)	
BOULDER	>300 mm	BOULDER	>256 mm
COBBLE	75 - 300 mm	COBBLE	64 - 256 mm
GRAVEL: COARSE	20 - 75 mm	PEBBLE	4 - 64 mm
GRAVEL: FINE	4.75 - 20 mm	GRANULE	2 - 4 mm
SAND: COARSE	2 - 4.75 mm	SAND: V. COARSE	1 - 2 mm
SAND: MEDIUM	0.42 - 2 mm	SAND: COARSE	0.5 - 1 mm
SAND: FINE	0.074 - 0.42 mm	SAND: MEDIUM	0.25 - 0.5 mm
		SAND: FINE	0.125 - 0.25 mm
		SAND: V. FINE	0.063 - 0.125 mm
SILT/CLAY	<0.074 mm	SILT	0.004 - 0.063 mm
		CLAY	<0.004 mm

* WELL GRADED - HAVING WIDE RANGE OF GRAIN SIZES AND APPRECIABLE AMOUNTS OF ALL INTERMEDIATE PARTICLE SIZES

* POORLY GRADED - PREDOMINANTLY ONE GRAIN SIZE, OR HAVING A RANGE OF SIZES WITH SOME INTERMEDIATE SIZES MISSING

PERCENTAGE OF PARTICLE TYPE IN DECREASING ORDER OF PARTICLE SIZE (GRAVEL, SAND, FINES)

PLASTICITY CHART



SAMPLER TYPE AND OTHER SYMBOLS

	SPLIT SPOON		WATER LEVEL AT TIME OF DRILLING, OR AS SHOWN
	MODIFIED CALIFORNIA		WATER LEVEL AT END OF DRILLING, OR AS SHOWN
	ENVIRONMENTAL SAMPLE		WATER LEVEL AFTER DRILLING, OR AS SHOWN
	PISTON SAMPLE	SAA	SAME AS ABOVE
	SONIC CORE	MSL	MEAN SEA LEVEL
	SHELBY TUBE SAMPLE	GWT	GROUND WATER TABLE
	VIBROCORE SAMPLE	BML	BELOW MUDLINE
		BGS	BELOW GROUND SURFACE
		BTCC	BELOW TOP OF CASING
		HSA	HOLLOW STEM AUGER

GS FORM:
SOIL-5950

BOREHOLE LOG

PROJECT NAME Bristol EQ Tank Geotechnical Investigation
NUMBER CHR8600 **GROUND SURF. (FT)** 1876
LOCATION Bristol, VA **DATUM** NAVD88
DATE STARTED 02-26-2025 **TOP OF CASING** N/A
DATE COMPLETED 02-26-2025 **GWT DEPTH (ft)** Not Encountered

DEPTH (ft)	ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	SAMPLE TYPE NUMBER	BLOW COUNTS	N-VALUE	SHELBY TUBE PRESSURE (psi)	RECOVERY % [RQD]	POCKET PEN. (tsf)	TORVANE (tsf)	REMARKS	BULK UNIT WT (pcf)	FINES CONTENT (%)	WATER CONTENT (%)	ATTERBERG LIMITS		
															LIQUID LIMIT	PLASTICITY INDEX	
		[CL] (10YR6/6) BROWNISH YELLOW LEAN CLAY WITH SAND, WITH ROCK FRAGMENTS, MEDIUM STIFF, MOIST, LOW PLASTICITY. 4 INCHES OF DARK BROWN TOPSOIL WITH GRASS ROOTS AT THE SURFACE. AT 2 FT, BROWNISH YELLOW MOTTLED WITH GRAY.		S-01	2 2 4	6											
				S-02	50/6" 50/5"			64	1.00		Auger refusal at 3.5 ft bgs. Drillers switched from HSA to rock core barrel rotary drilling.		72	26	45	25	
5	1871	[LIMESTONE], FINE, MODERATELY BEDDED, SLIGHTLY WEATHERED, HARD, INTENSELY FRACTURED MEDIUM LIGHT GRAY TO MEDIUM GRAY; SOME WHITE CALCITE INCLUSIONS; REDDISH BROWN MEDIUM PLASTICITY LEAN CLAY IN SOME OF THE FRACTURES AND VOIDS.		Run 1				63 [13]			UCS = 3899 psi						
10	1866			Run 2				50 [22]			From 3.5-33 ft bgs, possibly mostly boulders, due to discontinuities and gaps between rock pieces recovered. Reddish brown clay observed in some of the fractures and discontinuities.						
15	1861			Run 3				24 [12]			UCS = 7313 psi						
20	1856			Run 4				26 [9]									
25	1851			Run 5				20 [10]									
				Run 6				12									

CONTRACTOR Athena Drilling **LATITUDE** 36.602574
EQUIPMENT Geoprobe 7822DT **LONGITUDE** -82.149820
DRILL MTHD. HSA **COORDINATE SYSTEM**
DIAMETER (in.) 6.63 World Geodetic System Longitude/
Latitude (WGS 84)
LOGGER SFS **CHECKED BY** JH

NOTES: UCS = unconfined compressive strength

GS FORM:
SOIL-5950

BOREHOLE LOG

PROJECT NAME	Bristol EQ Tank Geotechnical Investigation		
NUMBER	CHR8600	GROUND SURF. (FT)	1876
LOCATION	Bristol, VA	DATUM	NAVD88
DATE STARTED	02-26-2025	TOP OF CASING	N/A
DATE COMPLETED	02-26-2025	GWT DEPTH (ft)	Not Encountered

DEPTH (ft)	ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	SAMPLE TYPE NUMBER	BLOW COUNTS	N-VALUE	SHELBY TUBE PRESSURE (psi)	RECOVERY % [RQD]	POCKET PEN. (tsf)	TORVANE (tsf)	REMARKS	BULK UNIT WT (pcf)	FINES CONTENT (%)	WATER CONTENT (%)	ATTERBERG LIMITS	
															LIQUID LIMIT	PLASTICITY INDEX
		MOSTLY REDDISH BROWN LEAN CLAY FROM 32 TO 33 FT, WITH ROCK FRAGMENTS .		Run 7				[0]			Boring terminated at 33 ft bgs. Excessive pressure on drill rods from sidewall materials.					
35	1841							10								
40	1836							[0]								
45	1831															
50	1826															
55	1821															

DRAFT

CONTRACTOR	Athena Drilling	LATITUDE	36.602574
EQUIPMENT	Geoprobe 7822DT	LONGITUDE	-82.149820
DRILL MTHD.	HSA	COORDINATE SYSTEM	World Geodetic System Longitude/ Latitude (WGS 84)
DIAMETER (in.)	6.63	CHECKED BY	JH
LOGGER	SFS		

NOTES: UCS = unconfined compressive strength

GS FORM:
SOIL-5950

BOREHOLE LOG

PROJECT NAME Bristol EQ Tank Geotechnical Investigation
NUMBER CHR8600 **GROUND SURF. (FT)** 1877
LOCATION Bristol, VA **DATUM** NAVD88
DATE STARTED 02-25-2025 **TOP OF CASING** N/A
DATE COMPLETED 02-25-2025 **GWT DEPTH (ft)** Not Encountered

DEPTH (ft)	ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	SAMPLE TYPE NUMBER	BLOW COUNTS	N-VALUE	SHELBY TUBE PRESSURE (psi)	RECOVERY %	POCKET PEN. (tsf)	TORVANE (tsf)	REMARKS	BULK UNIT WT (pcf)	FINES CONTENT (%)	WATER CONTENT (%)	ATTERBERG LIMITS	
															LIQUID LIMIT	PLASTICITY INDEX
5	1872	[CL] (10YR6/6) BROWNISH YELLOW LEAN CLAY WITH TRACE SAND, WITH LIGHT GRAY LIMESTONE FRAGMENTS, STIFF, MOIST, LOW PLASTICITY. TRACE ROOTS. [SC] (10YR6/6) BROWNISH YELLOW CLAYEY SAND, ROCK FRAGMENTS INCREASE, PLATY LIMESTONE FRAGMENTS IN BOTTOM 3 INCHES, MEDIUM DENSE, MOIST. [CL] (10YR6/6) BROWNISH YELLOW LEAN CLAY WITH TRACE SAND, WITH ROCK FRAGMENTS, PLATY ROCK FRAGMENTS IN UPPER 2 INCHES, STIFF, MOIST, LOW PLASTICITY.		S-01 S-02 S-03	2 3 6 13 6 8 13 25 5 6 8 7	9 21 14		75 88 67		1.75			9 47 25	30	14	
10	1867										Drill chatter when drilling from 2-4 ft. Auger refusal at 4 ft.					
15	1862										Second borehole offset by 2 ft advanced to 4.5 ft bgs. Chatter from 2-4.5 ft bgs, auger refusal at 4.5 ft bgs.					
20	1857															
25	1852															

DRAFT

CONTRACTOR Athena Drilling **LATITUDE** 36.602606
EQUIPMENT Geoprobe 7822DT **LONGITUDE** -82.149713
DRILL MTHD. HSA **COORDINATE SYSTEM**
DIAMETER (in.) 6.63 World Geodetic System Longitude/
Latitude (WGS 84)
LOGGER SFS **CHECKED BY** JH

NOTES:

GS FORM:
SOIL-5950

BOREHOLE LOG

PROJECT NAME Bristol EQ Tank Geotechnical Investigation
NUMBER CHR8600 **GROUND SURF. (FT)** 1878
LOCATION Bristol, VA **DATUM** NAVD88
DATE STARTED 02-25-2025 **TOP OF CASING** N/A
DATE COMPLETED 02-25-2025 **GWT DEPTH (ft)** Not Encountered

DEPTH (ft)	ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	SAMPLE TYPE NUMBER	BLOW COUNTS	N-VALUE	SHELBY TUBE PRESSURE (psi)	RECOVERY %	POCKET PEN. (tsf)	TORVANE (tsf)	REMARKS	BULK UNIT WT (pcf)	FINES CONTENT (%)	WATER CONTENT (%)	ATTERBERG LIMITS	
															LIQUID LIMIT	PLASTICITY INDEX
5	1873	[CL] (10YR6/6) BROWNISH YELLOW LEAN CLAY WITH TRACE SAND AND GRAVEL, MEDIUM STIFF, MOIST, LOW PLASTICITY. TRACE ROOTS AND LIMESTONE FRAGMENTS. [SC] (10YR6/6) BROWNISH YELLOW CLAYEY SAND, ROCK FRAGMENTS INCREASE, MEDIUM DENSE, MOIST. [CL] (10YR6/6) BROWNISH YELLOW LEAN CLAY WITH SAND AND GRAVEL, DARK GRAY LIMESTONE FRAGMENTS, HARD, MOIST, LOW PLASTICITY.		S-01 S-02 S-03	1 2 3 6 6 8 20 10 50/6"	5 18	71 88 61				Drill chatter drilling from 2-4 ft. Auger refusal at 4.5 ft.		43	11 10 19	30	11
10	1868															
15	1863															
20	1858															
25	1853															

DRAFT

CONTRACTOR Athena Drilling **LATITUDE** 36.602697
EQUIPMENT Geoprobe 7822DT **LONGITUDE** -82.149547
DRILL MTHD. HSA **COORDINATE SYSTEM**
World Geodetic System Longitude/
Latitude (WGS 84)
DIAMETER (in.) 6.63 **CHECKED BY** JH
LOGGER SFS

NOTES:

APPENDIX B

Laboratory Test Results



350 Cal Batsel Road
Bowling Green, KY 42101
Phone: (615) 255-9702

NATURAL MOISTURE CONTENT (ASTM D2216)

CLIENT: City of Bristol

PROJECT NAME: Bristol Landfill - EQ Tanks

PROJECT NUMBER 82001.25

PROJECT LOCATION: Bristol, TN

SOIL DESCRIPTION: _____

EQUIPMENT USED: 3kg Ohaus Scale, Metal Tares, Oven

Location	Sample Type	Sample Interval (feet)	Moisture (%)
B-01		0	26.0
		2	13.5
B-02		0	8.9
		2	13.5
		4	25.0
B-03		0	10.7
		2	9.7
		4	18.8

Abbreviations:

SS = Split Spoon
ST = Shelby Tube
G = Grab Sample
B = Bulk Sample

TESTED BY: DJ

REVIEWED BY:

DATE: 3/20/2025



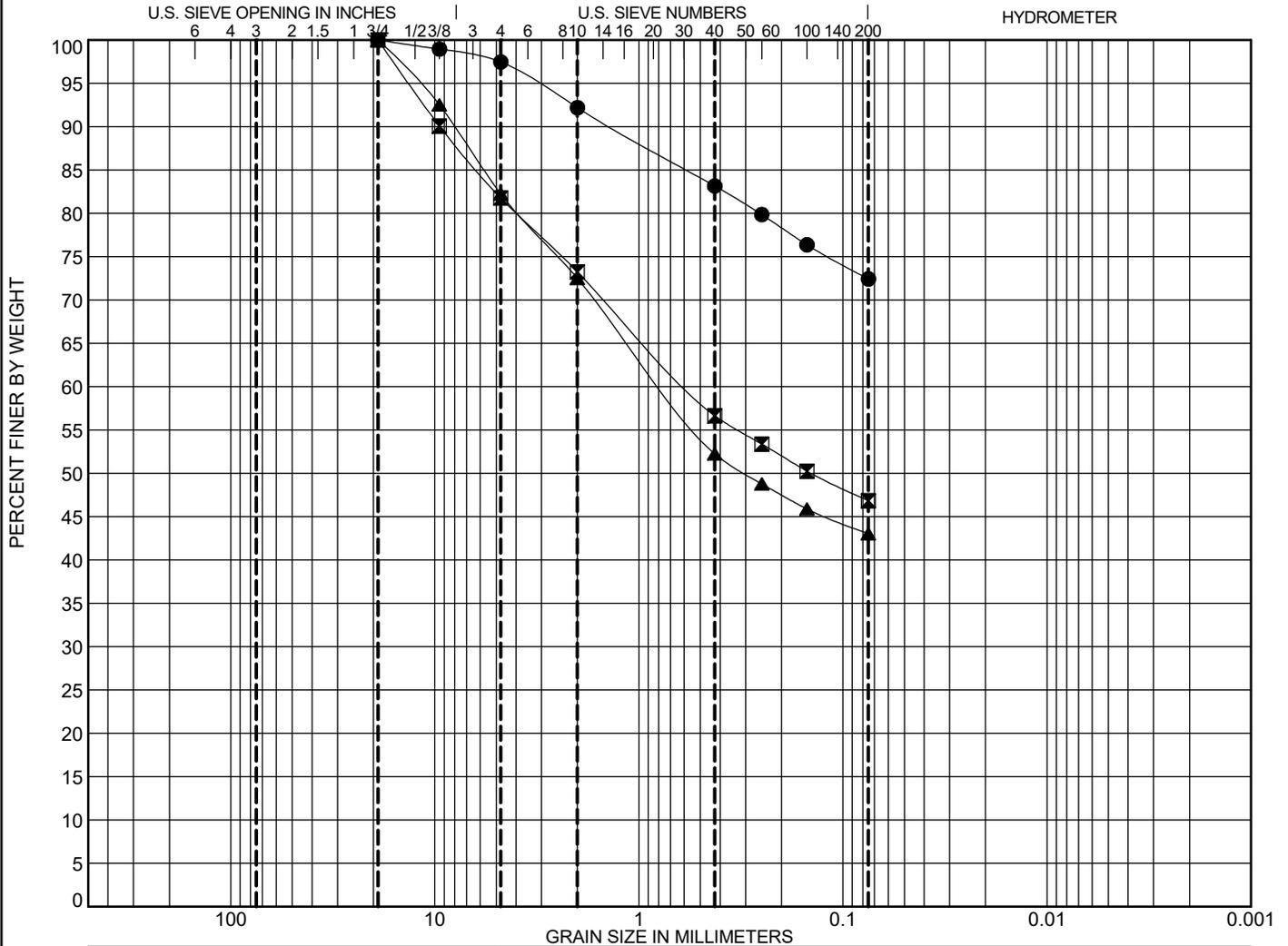
350 Cal Batsel Road
Bowling Green, KY 42101
Phone: (615) 255-9702

GRAIN SIZE DISTRIBUTION

ASTM D6913 - COARSE GRAIN SIZE

ASTM D7928 - FINE GRAIN SIZE

CLIENT: City of Bristol PROJECT NAME: Bristol Landfill - EQ Tanks
 PROJECT NUMBER 82001.25 PROJECT LOCATION: Bristol, TN
 SOIL DESCRIPTION: _____



Specimen Identification	GRAVEL		SAND			SILT OR CLAY					
	coarse	fine	coarse	medium	fine	Spec. Grav.	LL	PL	PI	Cc	Cu
● B-01, 0'							45	20	25		
☒ B-02, 2'							30	16	14		
▲ B-03, 2'							30	19	11		
Specimen Identification	D ₉₀	D ₆₀	D ₅₀	D ₁₀	%Gravel	%Sand	%Silts	%Clays			
● B-01, 0'	1.374				2.5	25.0		72.4			
☒ B-02, 2'	9.447	0.581	0.143		18.2	34.9		46.8			
▲ B-03, 2'	8.017	0.769	0.301		17.8	39.2		43.0			

TESTED BY: DJ TEST DATE: 3/19/2025 REVIEWED BY: DATE:



ASTM D 7012																																													
Rock Core Unconfined Compression Test																																													
Job Name: <u>Bristol Landfill - EQ Tanks</u>	Job number: <u>82001.25</u>																																												
Location: <u>Boring # B-01</u>	Depth: <u>Run 1</u>																																												
Date Received: _____																																													
Specimen Type: <u>Rock Core</u>																																													
Lithologic description <u>Limestone</u>																																													
Formation name _____																																													
Testing apparatus: <u>Forney F250FDR2000</u>																																													
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Unconfined compressive strength =	3899 lbs/ sq. in.																																												
Specimen's moisture condition before test	<u>Air Dry</u>																																												



ASTM D 7012
Rock Core Unconfined Compression Test

Job Name: Bristol Landfill - EQ Tanks **Job number:** 82001.25
Location: Boring # B-01 **Depth:** Run 3
Date Received: _____
Specimen Type: Rock Core
Lithologic description Limestone
Formation name _____
Testing apparatus: Forney F250FDR2000

specimen height (.01)	
1=	4.17
2=	4.17
3=	4.17
4=	4.17
5=	4.17
6=	4.17
7=	4.17
8=	4.17
9=	4.17

Specimen diameter (.01)	
1=	1.85
2=	1.85
3=	1.85
4=	1.85

Average = 4.174 in. **Average =** 1.850 in.

height to diameter ratio = 2.256

Load= 19658 lbs

Unconfined compressive strength = 7313 lbs/ sq. in.

Specimen's moisture condition before test Air Dry



April 4, 2025

Project No. 2025-184-001

Jason Childress
Athena Engineering & Environmental
52 Lindsley Ave., Suite 101
Nashville, TN 37210

Transmittal
Laboratory Test Results
82001.25

Please find attached the laboratory test results for the above referenced project. The tests were outlined on the Project Verification Form that was transmitted to your firm prior to the testing. The testing was performed in general accordance with the methods listed on the enclosed data sheets. The test results are believed to be representative of the samples that were submitted for testing and are indicative only of the specimens that were evaluated. We have no direct knowledge of the origin of the samples and imply no position with regard to the nature of the test results, i.e. pass/fail and no claims as to the suitability of the material for its intended use.

The test data and all associated project information provided shall be held in strict confidence and disclosed to other parties only with authorization by our Client. The test data submitted herein is considered integral with this report and is not to be reproduced except in whole and only with the authorization of the Client and Geotechnics. The remaining sample materials for this project will be retained for a minimum of 90 days as directed by the Geotechnics' Quality Program.

We are pleased to provide these testing services. Should you have any questions or if we may be of further assistance, please contact our office.

Respectfully submitted,
Geotechnics, Inc.

Nathan Melaro
Director of Operations

***We understand that you have a choice in your laboratory services
and we thank you for choosing Geotechnics.***

CHLORIDE ION CONTENT IN SOILS
AASHTO T 291 - 94 (2018) (Method B)

Client: Athena Engineering & Environmental
 Client Reference: 82001.25
 Project No.: 2025-184-001
 Lab ID: 2025-184-001-001

Boring No.: B-02/B-03
 Depth (ft): 0.0-6.0'
 Sample No.: Bag
 Description: Brown
 (- # 10 Sieve material)

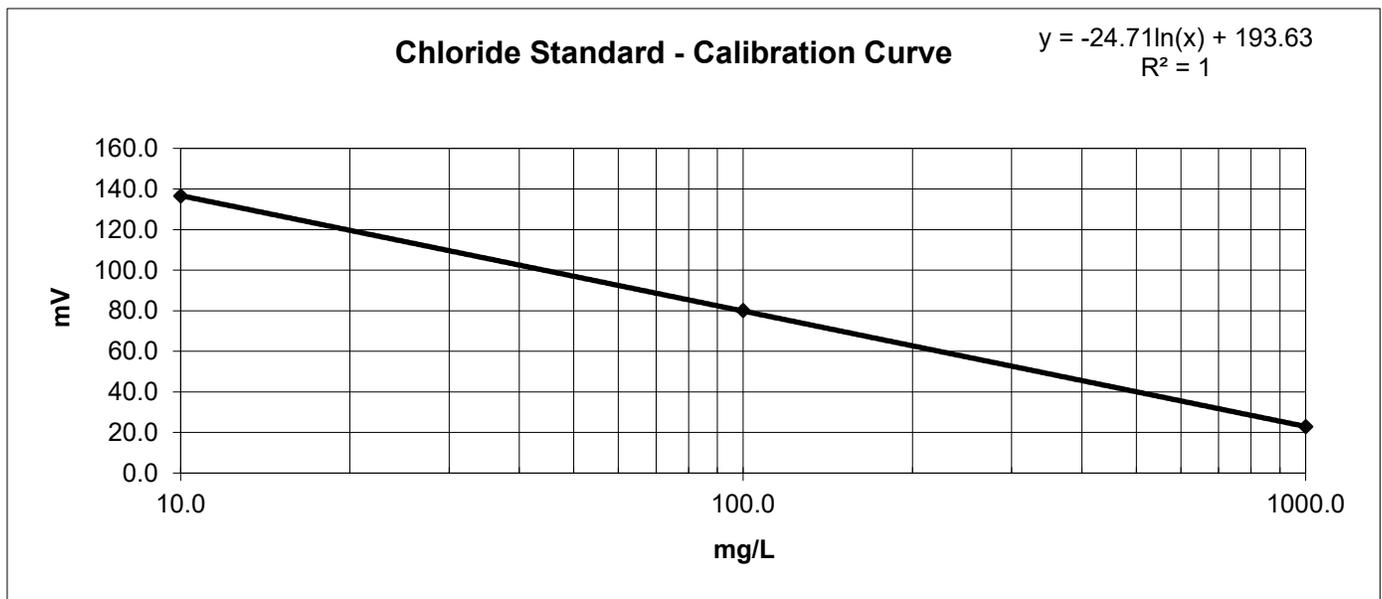
CHLORIDE STANDARD: CALIBRATION CURVE

STANDARD	MILLIVOLTS (mV)
10.0 mg/L	136.6
100.0 mg/L	80.1
1000.0 mg/L	22.8

MEASUREMENT OF CHLORIDES

Sample Weight (g):	<u>100.0</u>	CONCENTRATION	CONCENTRATION
Water added to Sample (ml):	<u>100.0</u>	(mg/L)	(mg/kg)
Size of Sample Aliquot (ml):	<u>25.0</u>		
Sample Reading (mV):	<u>145.8</u>	6.93	6.93

Notes: 1) Samples and standards were buffered by the addition of an equal volume of the 0.2 M KNO₃ solution (1:1 volume).
 2) Samples were dried for a minimum of 12 hours at 110 ± 5°C.



Notes:

Tested By JAM Date 4/3/25 Checked By EG Date 4/4/25

Minimum Resistivity

AASHTO T288-12

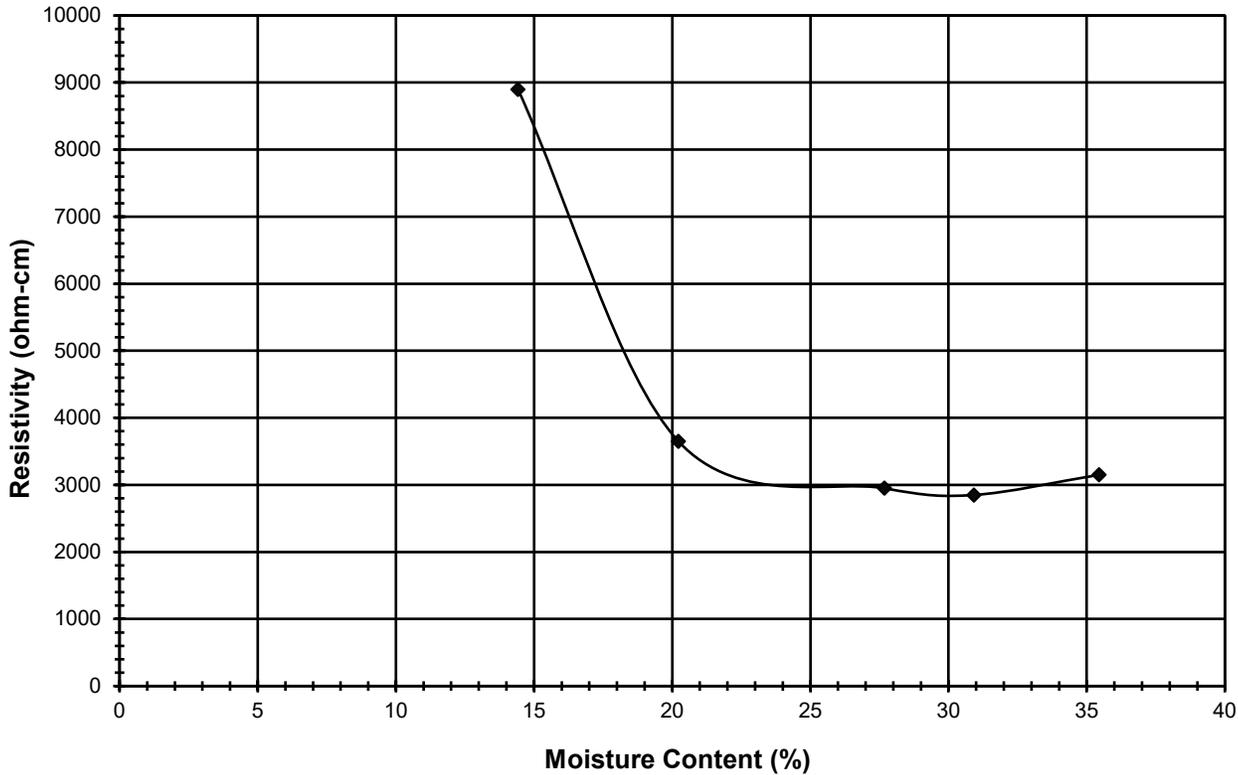


Client: Athena Engineering Environmental
 Client Reference: 82001.25
 Project No.: 2025-184-001
 Lab ID: 2025-184-001-001

Boring No.: B-02/B-03
 Depth (ft): 0.0-6.0'
 Sample No.: Bag
 Visual Description: Brown
 (- #10 Sieve material)

Tare No.:	158	262	511	719	730
Tare & Wet Specimen (g):	26.06	23.58	29.46	52.19	55.83
Tare & Dry Specimen (g):	24.98	21.42	27.26	45.20	46.22
Tare Weight (g):	17.49	10.74	19.31	22.59	19.11
Moisture Content (%):	14.4	20.2	27.7	30.9	35.4
Resistance (ohm):	8900	3650	2950	2850	3150
Resistivity (ohm-cm):	8900	3650	2950	2850	3150

Note: The ratio of Miller Box area versus distance between electrodes is equal to 1.



Soil Class	Corrosion Resistance	Specific Resistivity (ohm-cm)
1	Excellent	10,000 - 6,000
2	Good	6,000 - 4,500
3	Fair	4,500 - 2,000
4	Bad	2,000 - 0

Tested By JAM Date 3/31/2025 Checked By EG Date 4/2/2025

pH OF SOILS
AASHTO T 289-91 (2013)

Client: Athena Engineering & Environmental
 Client Reference: 82001.25
 Project No.: 2025-184-001

Lab ID: 001
 Boring No.: B-02/B-03
 Depth (ft): 0.0-6.0'
 Sample No.: Bag

Drying Tare No.: 599
 Testing Tare No.: M

Temperature (°C): 24.2

pH of Sample: 7.96

Meter Calibration (as used each day)		
Buffer pH	Meter Reading	Meter Model
4.00	4.00	ORION 720A
7.00	7.01	
10.00	10.03	

Tested By JAM Date 4/2/25 Checked By EG Date 4/3/25

Water-Soluble Sulfate Ion Content in Soil AASHTO T 290-95 (2020)

Client:	Athena Engineering & Environmental	Boring No.:	B-02/B-03
Client Reference:	82001.25	Depth (ft):	0.0-6.0'
Project No.:	2025-184-001	Sample No.:	Bag
Lab ID:	2025-184-001-001	Soil Description:	Brown

Sulfate Standard - Calibration Curve Spectrophotometer Readings

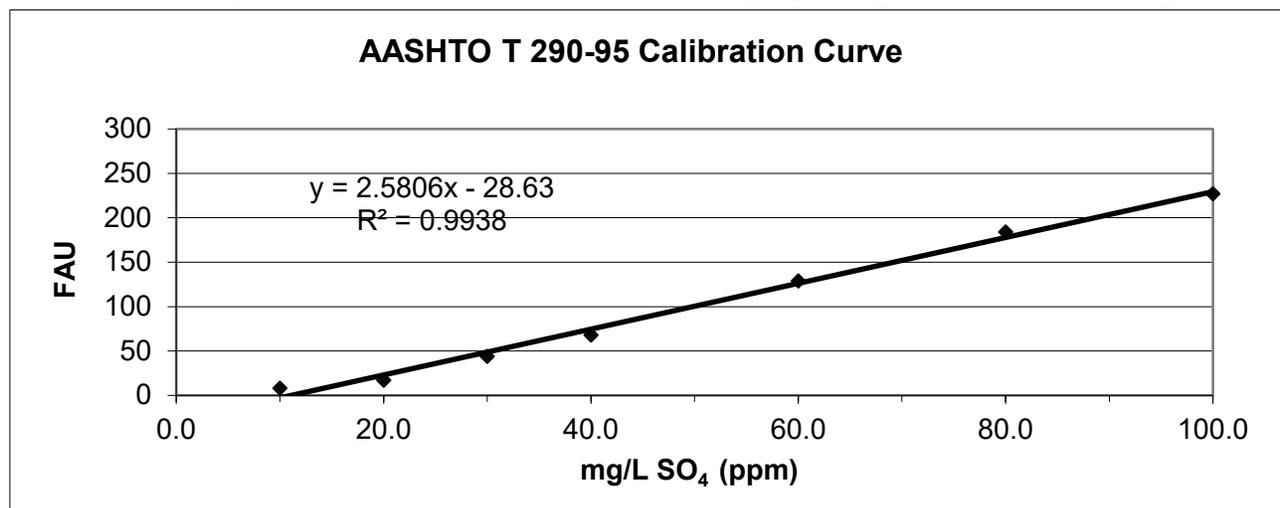
<u>Sulfate Ion Concentrations (mg/L)</u>									
0.0	4.0	10.0	20.0	30.0	40.0	60.0	80.0	100.0	
<u>Spectrophotometer Readings (FAU)</u>									
Underrange	Underrange	8	17	44	68	129	184	227	

Measurement of Barium Chloride Turbidity

(Sample contains 5.0 mL NaCl solution and 0.3 g BaCl₂·2H₂O)

<p>Sample Weight (g): 100.0</p> <p>Water added to Sample (mL): 300.0</p> <p>Size of Sample Aliquot (mL): 50.0</p> <p>Sample Reading (FAU): 9</p> <p>Sample Diluted: No</p> <p>Sulfate Solution Added (ml): 0</p>	<p style="text-align: center;"><u>Sample Moisture Content</u></p> <p>Tare Number: 599</p> <p>Weight of Tare & Wet Sample (g): 170.64</p> <p>Weight of Tare & Dry Sample (g): 169.43</p> <p>Weight of Tare (g): 84.96</p> <p>Weight of Water (g): 1.21</p> <p>Weight of Dry Sample (g): 84.47</p> <p>Moisture Content (%): 1.43</p>
--	--

Sample Sulfate Ion Concentration:	14.58	mg/L SO₄ (ppm)
Sample Sulfate Ion Content:	43.7	mg/Kg SO₄ (not corrected for moisture)
Sample Sulfate Ion Content:	44.4	mg/Kg SO₄ (corrected for moisture)



Tested by: JAM	Date: 4/2/25	Checked by: EG	Date: 4/4/2025
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APPENDIX C

MASW Results

June 29, 2025

Geosyntec Consultants, Inc.

1255 Roberts Boulevard
NW Suite 200
Kennesaw, GA
United States

Attn: Sofia Fernandez Santoyo
SFernandezSantoyo@geosyntec.com
630-203-3358

RE: Geophysical Letter Report | Project # 250171
Geosyntec 2MASW 1Vs(100) Bristol, VA

Collier Geophysics (Collier) conducted a geophysical investigation on behalf of Geosyntec (Client) at two proposed Above Ground Storage Tank (AST) sites near Bristol, Virginia. The geophysical survey consisted of two, 2D multichannel analysis of surface waves (MASW) surveys and two, 1D Vs100 surveys at two distinct locations for a total of four, 2D MASW surveys and four, Vs100 surveys. The purpose of this investigation was to identify any possible voids, weathered zones, or other geohazards beneath the proposed footprints of the two tanks. Additionally, 1D Vs100 models were generated to determine the International Building Code (IBC) Seismic Site Classification at both locations.

The onsite data collection was performed on June 17th, led by Collier geophysicists Nick Rebman and Ian Matthews.

Overview

The project site is located at a closed landfill in Bristol, Virginia (Figure 1). Two Aboveground Storage Tanks (AST) are proposed for the site in one of two potential areas: a primary location and an alternate location. Prior to development, the depth to bedrock and its shear strength must be determined. This investigation is particularly important as the site is underlain by limestone bedrock, which is known to be subject to karst development.

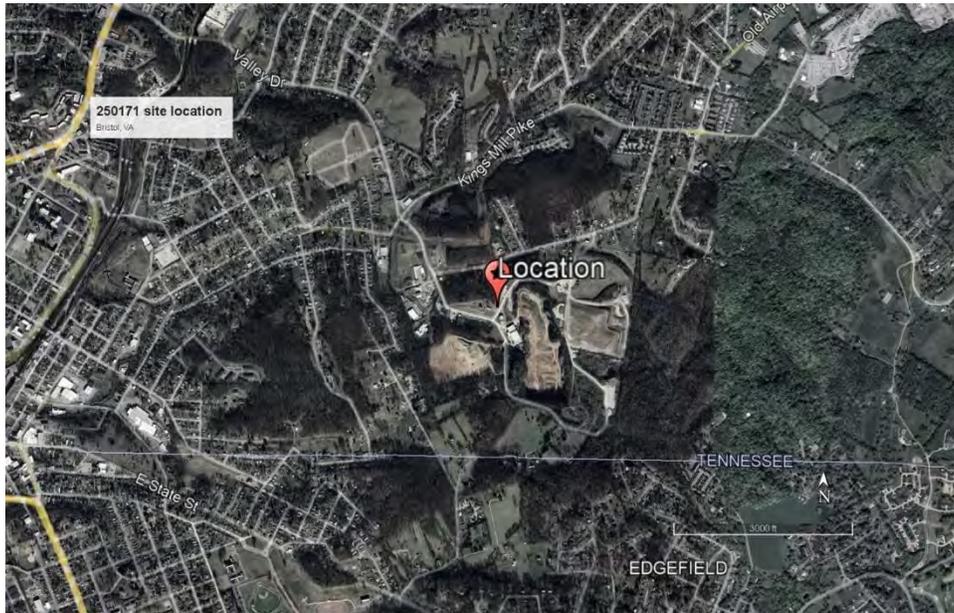


Figure 1: Site location shown by red marker. Imagery source: Google Earth, 2025.



Figure2: Line 2 Primary location (Left); Line 4 Alternative location (Right)

Methods

Multichannel Analysis of Surface Waves (MASW) Method

MASW is a nondestructive seismic method to evaluate the shear-wave velocity distribution and structure for overburden soil deposits and bedrock. It analyses dispersion properties of certain types of seismic surface waves (fundamental-mode Rayleigh waves) propagating horizontally along the surface of measurement directly from impact points to receivers (hammer shot points to geophones, respectively). The method provides the shear wave (V_s) information in either 1D (depth) or 2D (depth and surface distance) formats.

The main benefit of the MASW method is to take full advantage of the complicated nature of seismic waves that always contain body and surface wave energy. Surface wave energy comprises greater than 70% of the energy generated by an impact to the surface. Utilizing pattern-recognition techniques similar to those used in seismic exploration surveys, the MASW method properly accounts for the body waves, the ambient noise, and the surface wave energy contained in a shot record. In urban settings this method is often the most applicable seismic method to map the subsurface. The objective of the MASW geophysical survey method is to present vertical and/or lateral changes in shear wave velocities caused by geologic structure. Shear wave velocity variations can be the result of stiffness changes in the overburden soils, relief on the bedrock surface, or a combination of both.

MASW Data Acquisition

A total of four seismic lines were collected for this investigation, with line positions shown in Figure A-1, appended to this report. The lines were distributed across two survey areas. Lines 1 and 2 were performed in the primary location, crossing each other over the proposed Above ground Storage Tank (AST) footprint. Lines 3 and 4 were performed in the alternate location, also crossing over its proposed AST footprint.

Several site constraints affected data acquisition. A fence required Line 2 to be shifted south west by 115 ft. Additionally, data quality for Lines 2, 3, and 4 was negatively impacted by dense vegetation and road crossings, Line 2 crossed a paved road and Lines 3 and 4 crossing a gravel road.

The data for all four lines were collected using a 24-channel Geode seismograph with a total line length of 230 feet, corresponding to a 10-foot geophone spacing. The line locations and orientations were measured with an Emlid Reach RS3 GNSS Receiver pair, capable of sub-meter horizontal accuracy. Analog data from the geophones were digitized by the seismograph and transmitted to a laptop for recording.

Both active and passive surveys were conducted along each line. For the active-source surveys, the seismic source was a 16-lb sledgehammer. Shots were performed at 25 points along the lines, including locations at each geophone and two offset points, with a 10-foot spacing between shot locations. At each point, two unfiltered 2-second records were recorded using a 0.125 millisecond (ms) sample rate, for a total of 50 records per line.

For the passive-source surveys, which utilize ambient vibrational energy, no predefined source points were used. The ambient noise at this site consisted primarily of vegetation movement and light vehicle traffic. For each line, twenty unfiltered 30-second records of this ambient energy were recorded using a 2 millisecond (ms) sample rate.

Data Processing

The acquired seismic data were processed to generate one-dimensional (1D) and two-dimensional (2D) shear wave velocity (V_s) profiles of the subsurface. The processing workflow, performed using GeoGiga Surface Plus software, is detailed below. An example of a processed dispersion image and curve is provided in Figure 3.

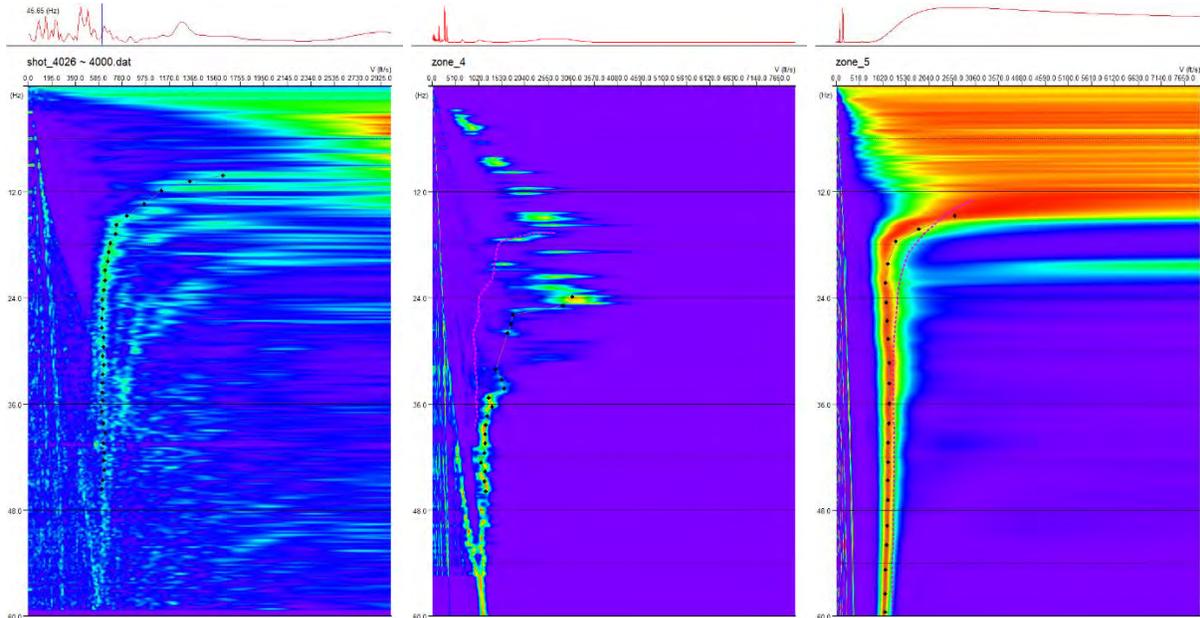


Figure 3: Dispersion curve examples, Line 4 Passive (Left), Line 2 Active (Center), Line 1 Active (Right)

Active MASW Processing

- 1. Dispersion Analysis:** Each active-source shot record was transformed from the time-distance domain to the frequency-velocity domain. This step generates a dispersion image that shows the distribution of surface wave energy across a range of phase velocities and frequencies.
- 2. Curve Generation:** To improve the signal-to-noise ratio, dispersion images along each survey line were grouped and averaged, resulting in six distinct dispersion curves per line. Each curve represents the fundamental mode of Rayleigh wave propagation.
- 3. Inversion:** The dispersion curves were then subjected to an iterative inversion process. This algorithm systematically adjusts a layered-earth model until the theoretical dispersion curve of the model provides a best fit to the measured field data.
- 4. Profile Creation:** The inversion of each dispersion curve produces a 1D V_s sounding (a plot of velocity versus depth). By analyzing overlapping subsets of geophones, multiple 1D soundings were created along the survey line. These soundings were then interpolated to construct a continuous 2D V_s cross-section.

Passive MASW Processing

The passive (ambient noise) seismic data were processed using a similar workflow. The primary difference was that all data from a single survey line were combined to generate one averaged dispersion image. The resulting dispersion curve was then inverted to produce a single 1D Vs model that represents the bulk average seismic properties beneath the entire array. To assess spatial variability in subsurface conditions, multiple survey lines were deployed across the site.

For engineering purposes, the data were processed in accordance with the International Building Code (IBC) 2015. For each 1D Vs sounding, the layer-weighted average shear wave velocity over the top 100 feet (30 meters) was calculated.

Results and Discussion

2D MASW

Analysis of boring data from lines 1 and 2 indicates that heavily fractured limestone begins at a depth of 3 to 5 feet in the primary location. In Boring 1, auger refusal occurred at 3.5 feet, with limestone logged from 3.5 to 33 feet. Similarly, Boring 3 encountered auger refusal at 4.5 feet. These depths correspond with a shear wave velocity (Vs) of 1150-1250 ft/s along seismic lines 1 and 2. While these velocities are relatively low, the boring logs classify the limestone as 'intensely fractured,' making these seismic velocities consistent with the observed conditions.

Solid limestone is interpreted to begin at a Vs velocity of approximately 1500 ft/s. Along line 1, this velocity is first observed at a depth of around 40 feet on the east side and remains at a relatively consistent elevation to the west. On line 2, the depth to solid limestone varies, starting at approximately 45 feet on the north side and shallowing to 22 feet on the south side.

In the alternate location, the weathered limestone, characterized by Vs velocities of 1150-1250 ft/s, is encountered at a greater depth. Along line 3, this layer begins at 35-40 feet on the north side and becomes shallower to the south, approaching the surface. Line 4 exhibits a similar, though less pronounced, trend, with the fractured limestone interface rising from a depth of 45 feet on the north side to 35 feet on the south side.

Analysis of all 2D Vs models does not show any evidence of voids, karst, differential weathering, or other geohazards in the area of the AST footprints. These features would appear as decreases in velocity due to the presence of less dense material within competent bedrock. Bedrock at the site, while heavily weathered near the surface, shows normal increases in shear-wave velocity with depth.

The 2D MASW models are shown in Figures A-2 to A-5 appended to this report.

1D MASW

Line 1		Line 2	
Depth (ft)	Vs (ft/s)	Depth (ft)	Vs (ft/s)
13.4	1303	12.73	1263
19.77	1277	15.38	1225
27.42	1417	18.57	1197
36.59	1881	22.39	1362
47.6	2536	26.97	1598
60.82	3528	32.48	1823
76.68	4462	39.08	2389
95.7	4905	47.01	3022
125	5089	105	3267
Line 3		Line 4	
Depth (ft)	Vs (ft/s)	Depth (ft)	Vs (ft/s)
7.49	637	6.53	672
14.59	745	13.37	707
23.1	1110	21.57	898
33.32	1708	31.42	1210
45.58	2454	43.23	1477
60.3	3784	57.4	1878
77.95	5265	74.41	2911
99.14	6234	94.83	4338
130	6757	125	5185

Table 1: Lines 1-4 Vs(100) data

The surface-wave data obtained at this site produced Vs100 values of (using equation 16-40, IBC2009, section 1613.5.5):

Line 1: Vs(100) = **2338.7ft/s**

Line 2: Vs(100) = **2156.4ft/s**

Line 3: Vs(100) = **1958.5ft/s**

Line 4: Vs(100) = **1411.7ft/s**

All lines generally exhibited a continuous increase in velocity with depth; however, Line 1 and Line 2 showed a small, discrete decrease in velocity (5%) between the depths of 15 and 20 feet. While it is possible that these decreases are caused by subsurface voids, 1D MASW is not capable of differentiating between possible causes of velocity decreases with depth as it measures the bulk velocity along the entire profile. Other possible causes can include, variable soil compaction along certain parts of the profile, surface or bedrock topography, or poor signal response at certain frequencies.

The Line 1 model reached a final velocity of 5,089 ft/s at a depth of 125 feet. The model for Line 2 reached a maximum velocity of 3,267 ft/s at 105 feet, while the Line 3 model terminated at 6,757 ft/s at a depth of 130 feet. The Line 4 model reached a terminal velocity of 5,185 ft/s at a depth of 125 feet.

These velocities provide insight into the subsurface conditions. Based on the seismic site classifications from the National Earthquake Hazard Reduction Program (NEHRP), which are adopted by the International Building Code (IBC) and shown in Table 2, the materials beneath Lines 3 can be characterized as very dense soil to soft rock. While Line 4 is characterized as dense sand or hard clay. The significantly higher velocities observed in Lines 1 and 2 are indicative of competent soft rock.

The associated 1D MASW models can be found in Figures B-1 through B-4 appended to this report.

Site Class	S-Velocity (Vs) (ft/sec)
A (Hard Rock)	>5,000
B (Medium hard Rock)	3,000 – 5,000
BC (Soft Rock)	2,100, - 3,000
C (Very dense Soil/Soft Rock)	1,450 – 2,100
CD (Dense sand or hard clay)	1,000 – 1,450
D (Medium Dense sand or stiff clay)	700 – 1,000
DE (Loose sand or medium stiff clay)	500 – 700
E (Very loose sand or soft clay)	<500
F (Soils requiring additional response)	<600 + additional conditions

Table 2: ASCE/SEI 7-22 seismic site classifications based on shear-wave velocity (Vs) ranges.

Closure

The 1D and 2D MASW investigation conducted at the site shows no evidence of subsurface voids beneath the proposed AST locations.

The geophysical methods and field procedures defined in this report were applicable to the project objectives and have been successfully applied by Collier geophysicists to investigations of similar size and nature. However, sometimes field or subsurface conditions are different from those anticipated and the resultant data may not achieve the investigation objectives. Collier warrants that our services were performed within the limits prescribed for this project, with the usual thoroughness and competence of the geophysical profession. Collier conducted this project using the current standards of the geophysical industry and use in-house quality control standards to produce a precise geophysical survey. However, it is possible that not all subsurface features or hazards can or will be identified by geophysical investigation alone. Therefore, additional intrusive investigations should be considered to validate the results of this investigation.

If you have any questions regarding the field procedures, data analysis, or the results presented herein, please do not hesitate to contact us. For further information regarding the details of the techniques used in this investigation, Collier can submit a more detailed method addendum upon request. We appreciate working with you and look forward to providing you with geophysical services in the future.

Respectfully Submitted,

Collier Geophysics, LLC

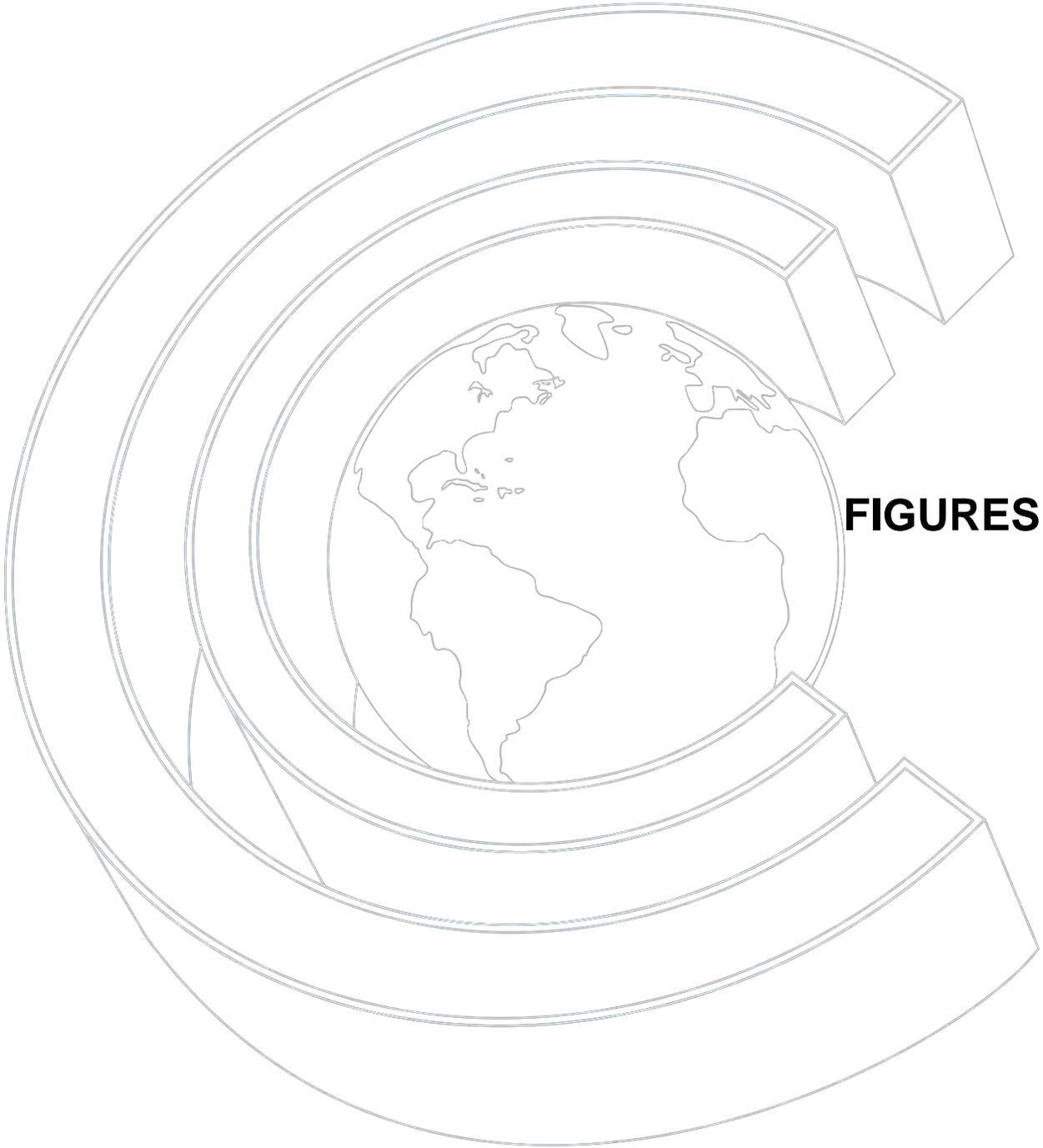
Ian Matthews

Ian Matthews
Geophysicist

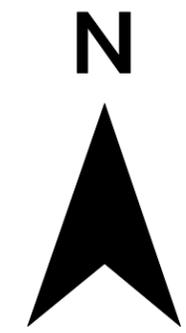
Nicholas Rebman

Nicholas Rebman
Geophysicist

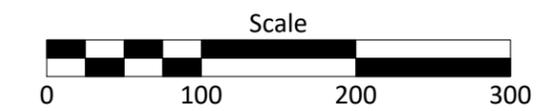
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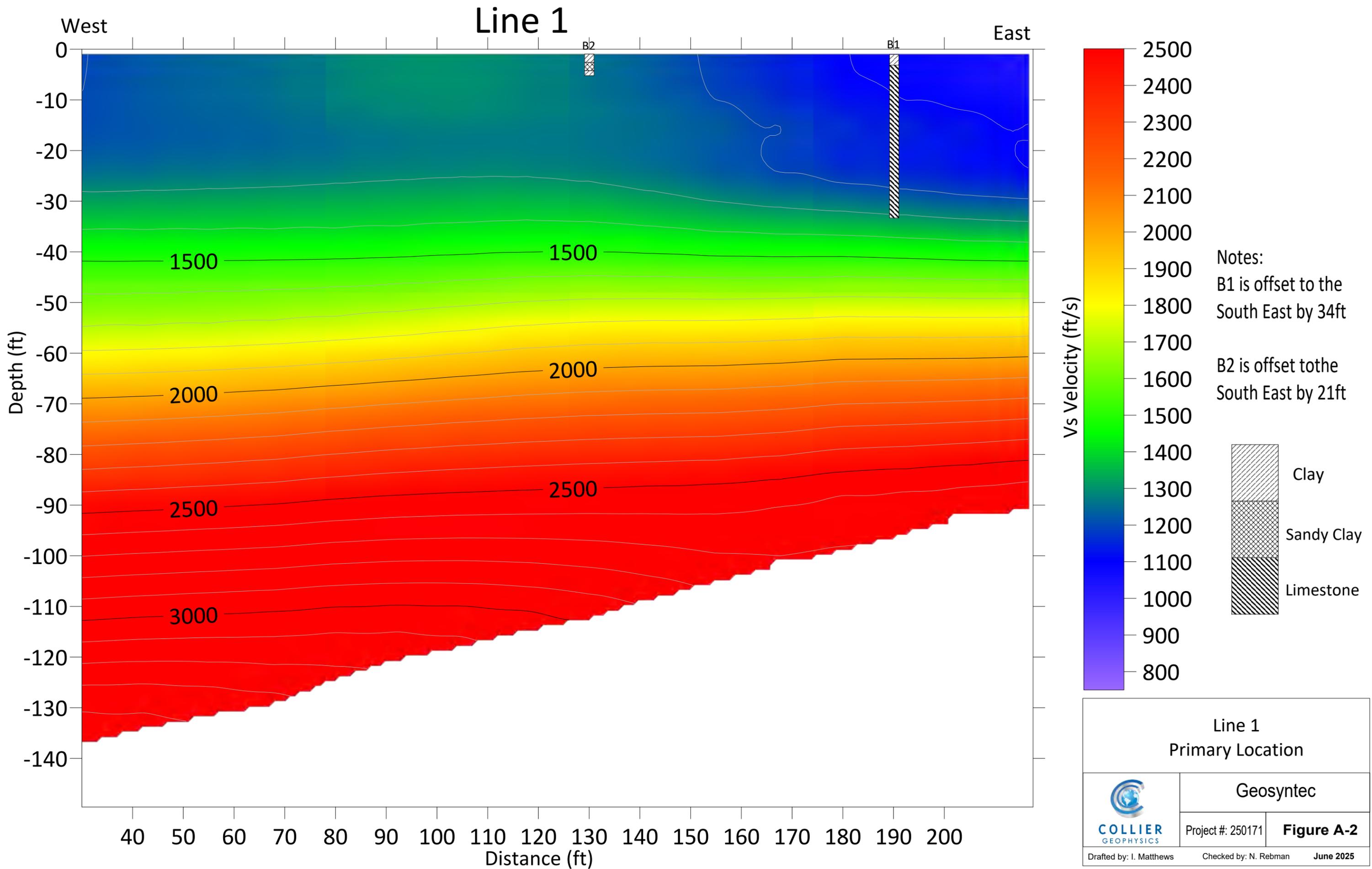
FIGURES



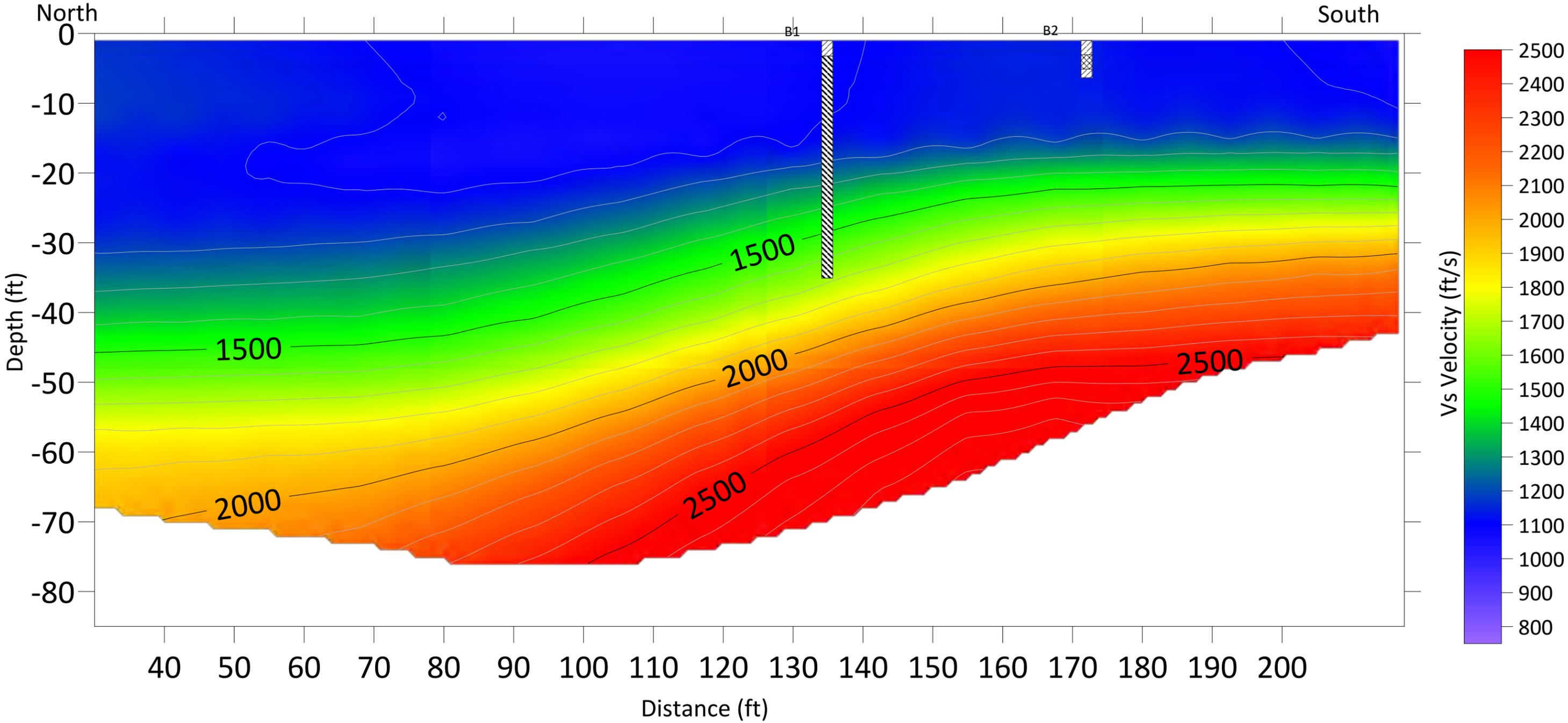
-  Line 1
-  Line 2
-  Line 3
-  Line 4



Site Sketch MASW Profile Locations		
 COLLIER GEOPHYSICS	Geosyntec	
	Project #: 250171	Figure A-1
Drafted by: I. Matthews	Checked by: N.Rebman	June 2025

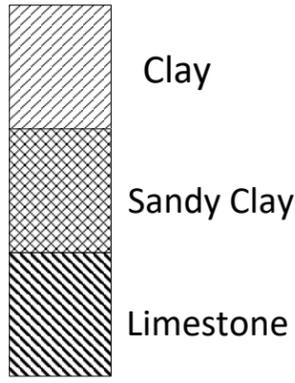


Line 2

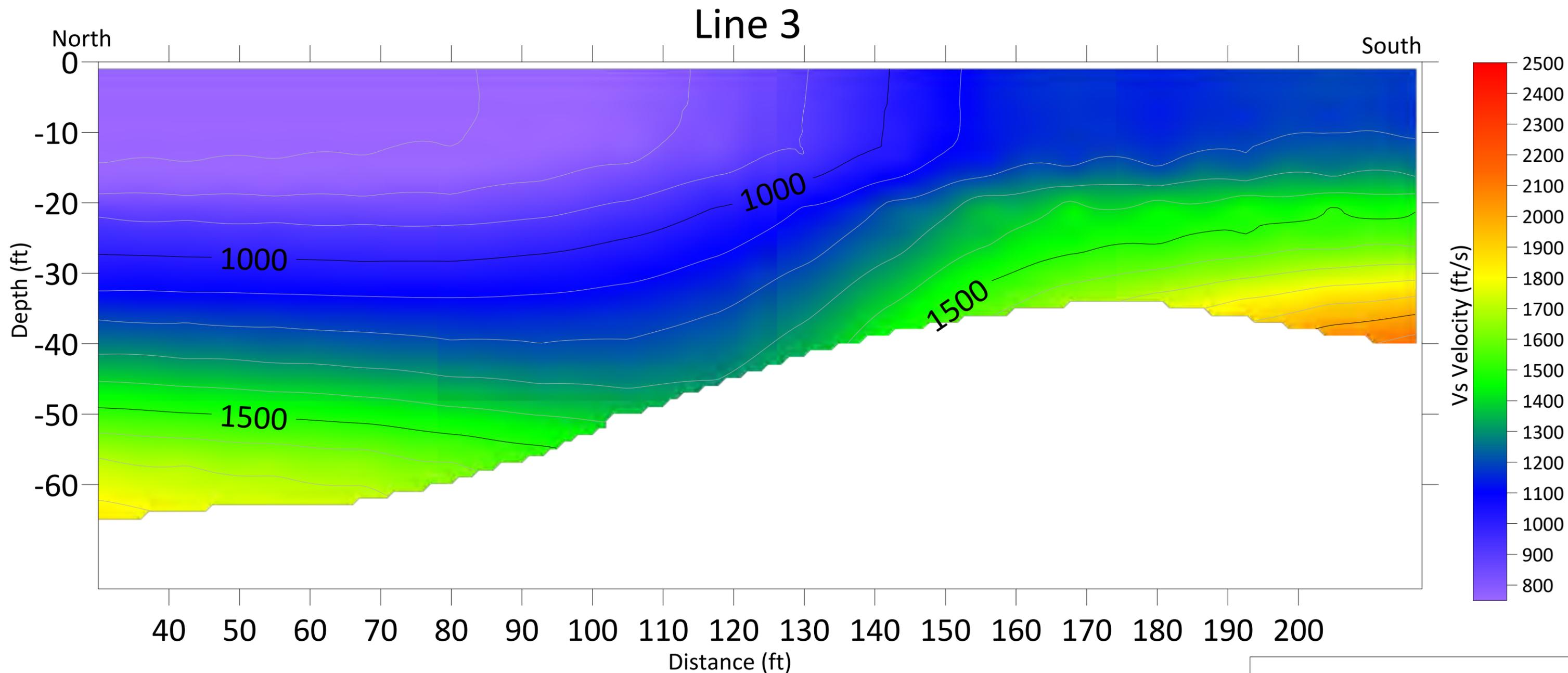


Notes:

B2 is offset to the East by 5ft
 B1 is offset to the West by 41ft

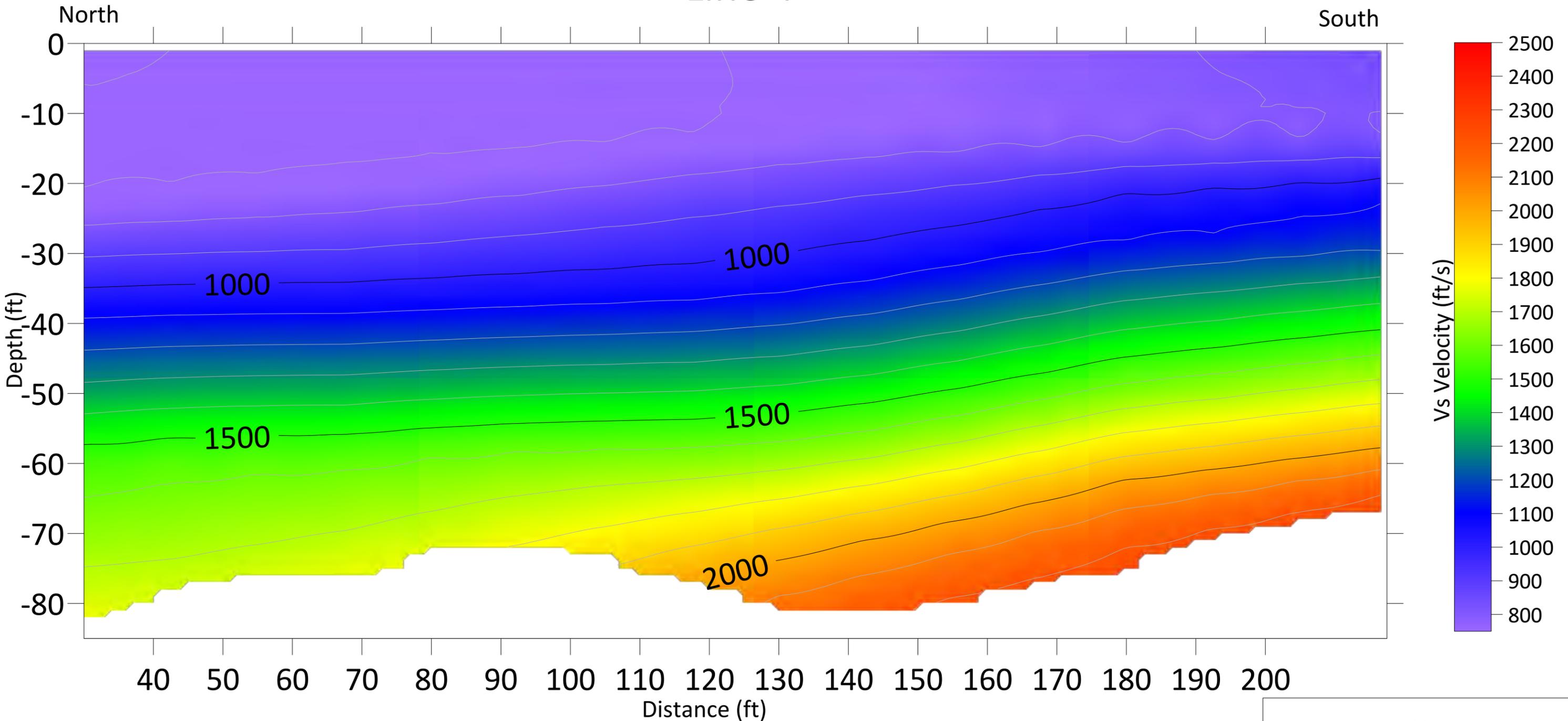


Line 2 Primary Location		
	Geosyntec	
	Project #: 250171	Figure A-3
Drafted by: I. Matthews Checked by: N. Rebman June 2025		



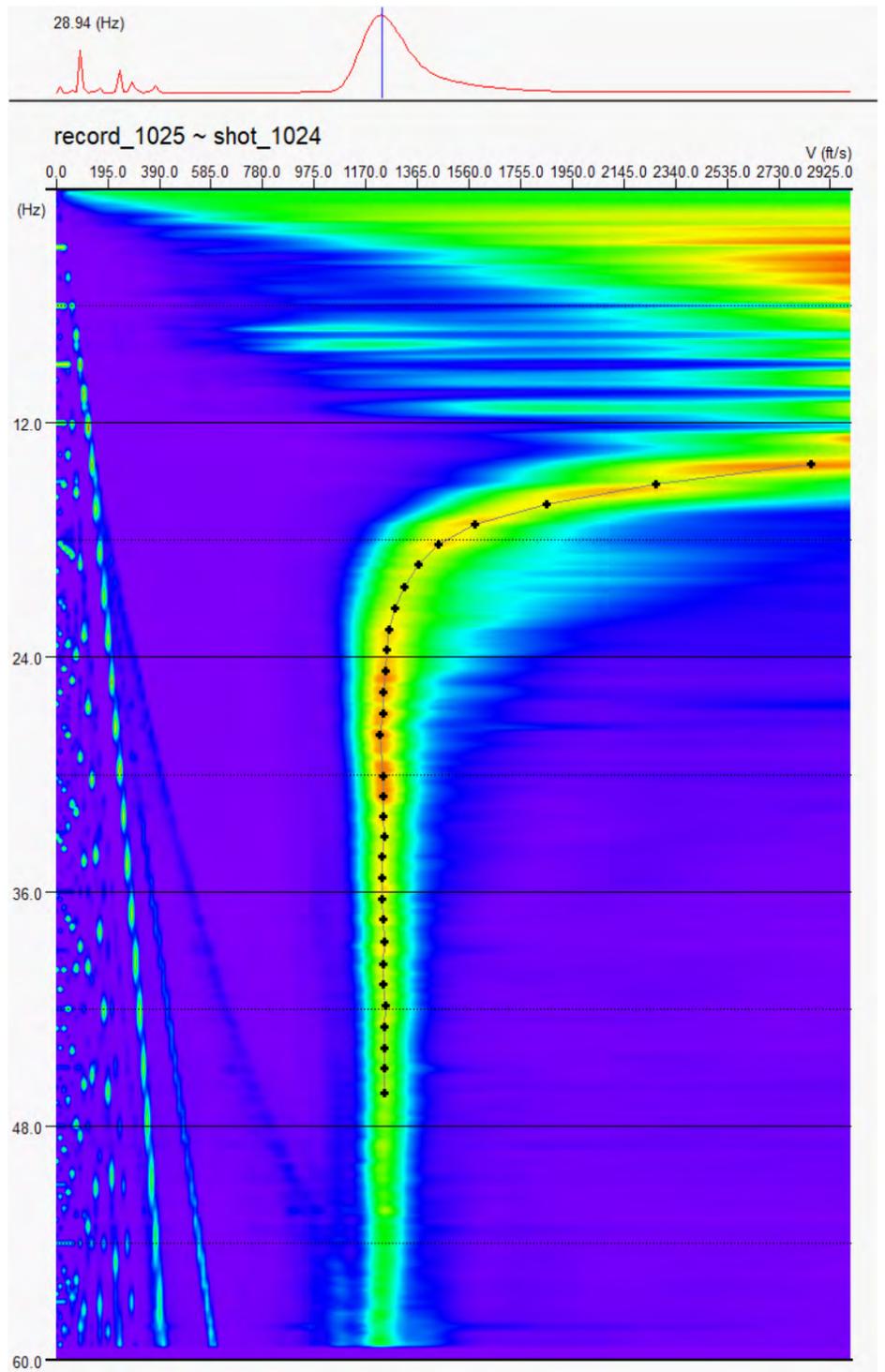
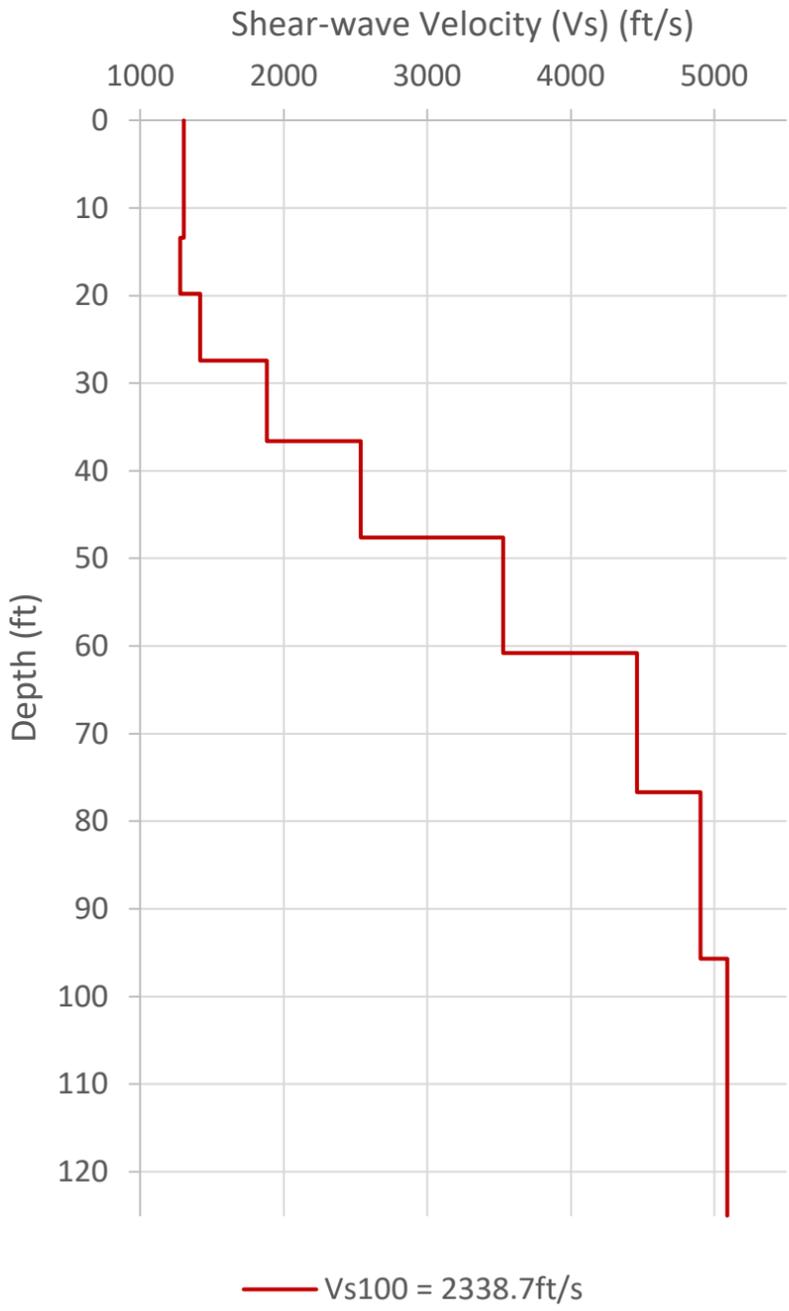
Line 3 Alternate Location		
 COLLIER GEOPHYSICS	Geosyntec	
	Project #: 250171	Figure A-4
Drafted by: I. Matthews	Checked by: N. Rebman	June 2025

Line 4



Line 4 Alternate Location		
 COLLIER GEOPHYSICS	Geosyntec	
	Project #: 250171	Figure A-5
Drafted by: I. Matthews	Checked by: N. Rebman	June 2025

Line 1



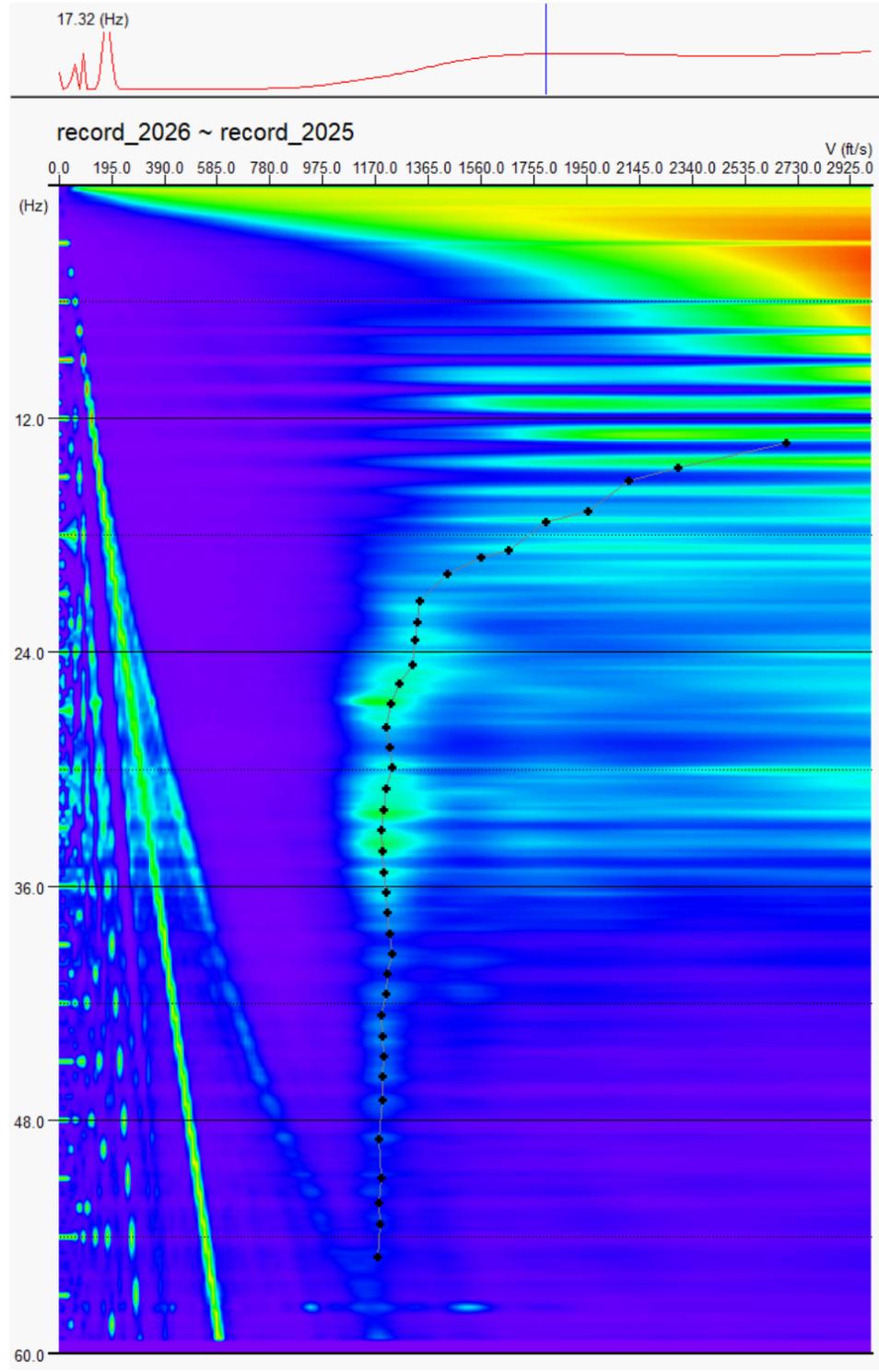
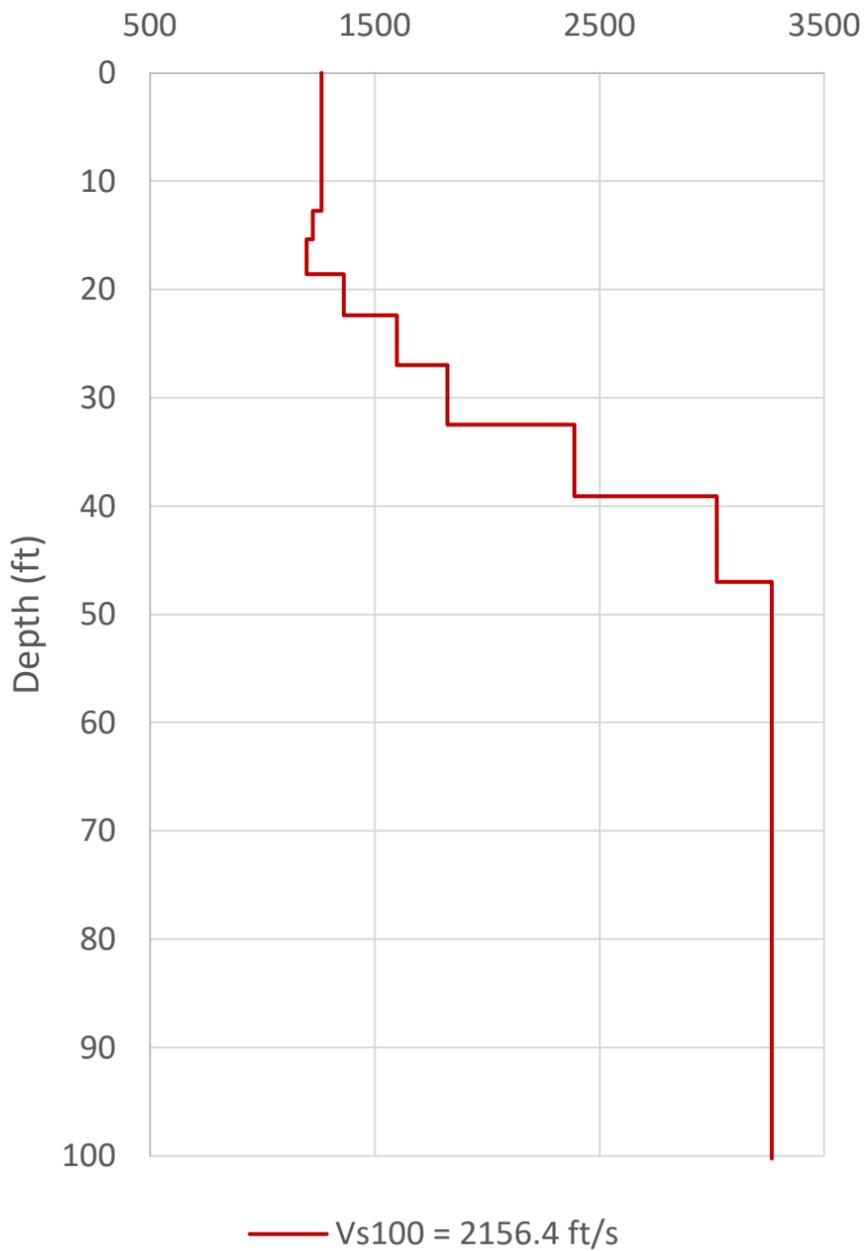
Line 1	
Depth (ft)	V_s (ft/s)
13.4	1303
19.77	1277
27.42	1417
36.59	1881
47.6	2536
60.82	3528
76.68	4462
95.7	4905
125	5089

V_{s100} : 2338.7

Line 1 1D MASW Results Bristol, VA		
 COLLIER GEOPHYSICS	Geosyntec	
	Project #: 250171	Figure B-1
Drafted by: I. Matthews Checked by: N. Rebman June 2025		

Line 2

Shear-wave Velocity (Vs) (ft/s)



Line 2	
Depth (ft)	Vs (ft/s)
12.73	1263
15.38	1225
18.57	1197
22.39	1362
26.97	1598
32.48	1823
39.08	2389
47.01	3022
105	3267

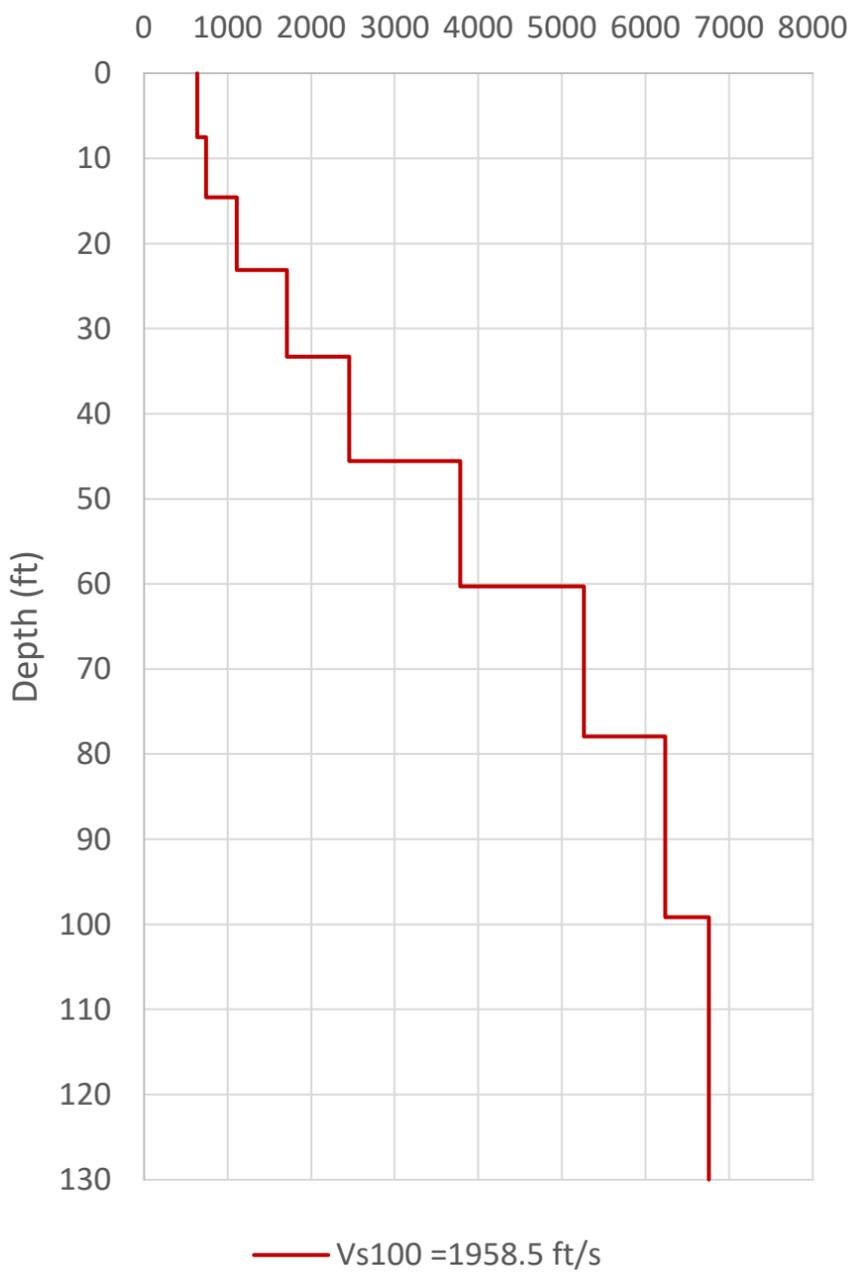
Vs100: 2156.4

Line 2
1D MASW Results
Bristol, VA

<p>COLLIER GEOPHYSICS</p>	Geosyntec	
	Project #: 250171	Figure B-2
Drafted by: I. Matthews Checked by: N.Rebman June 2025		

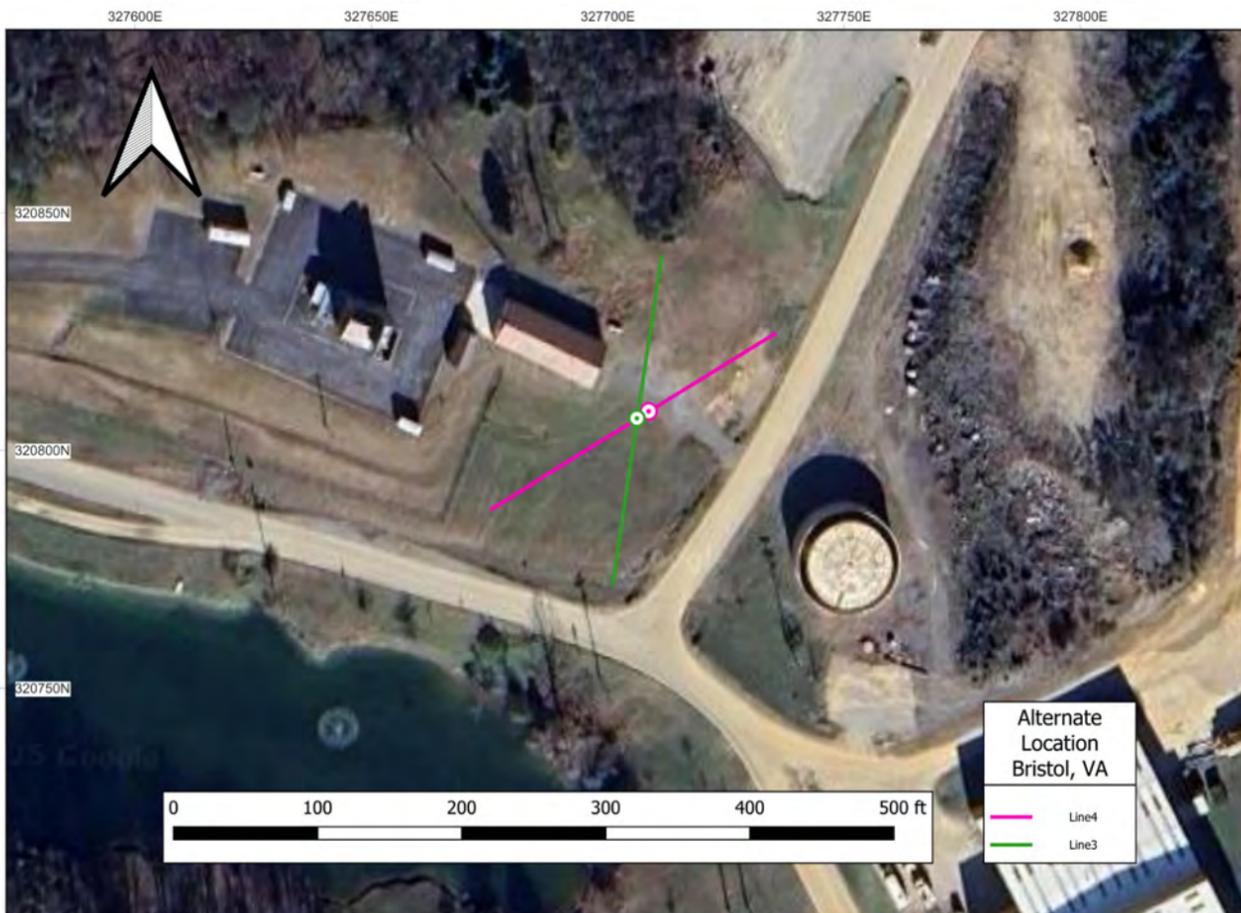
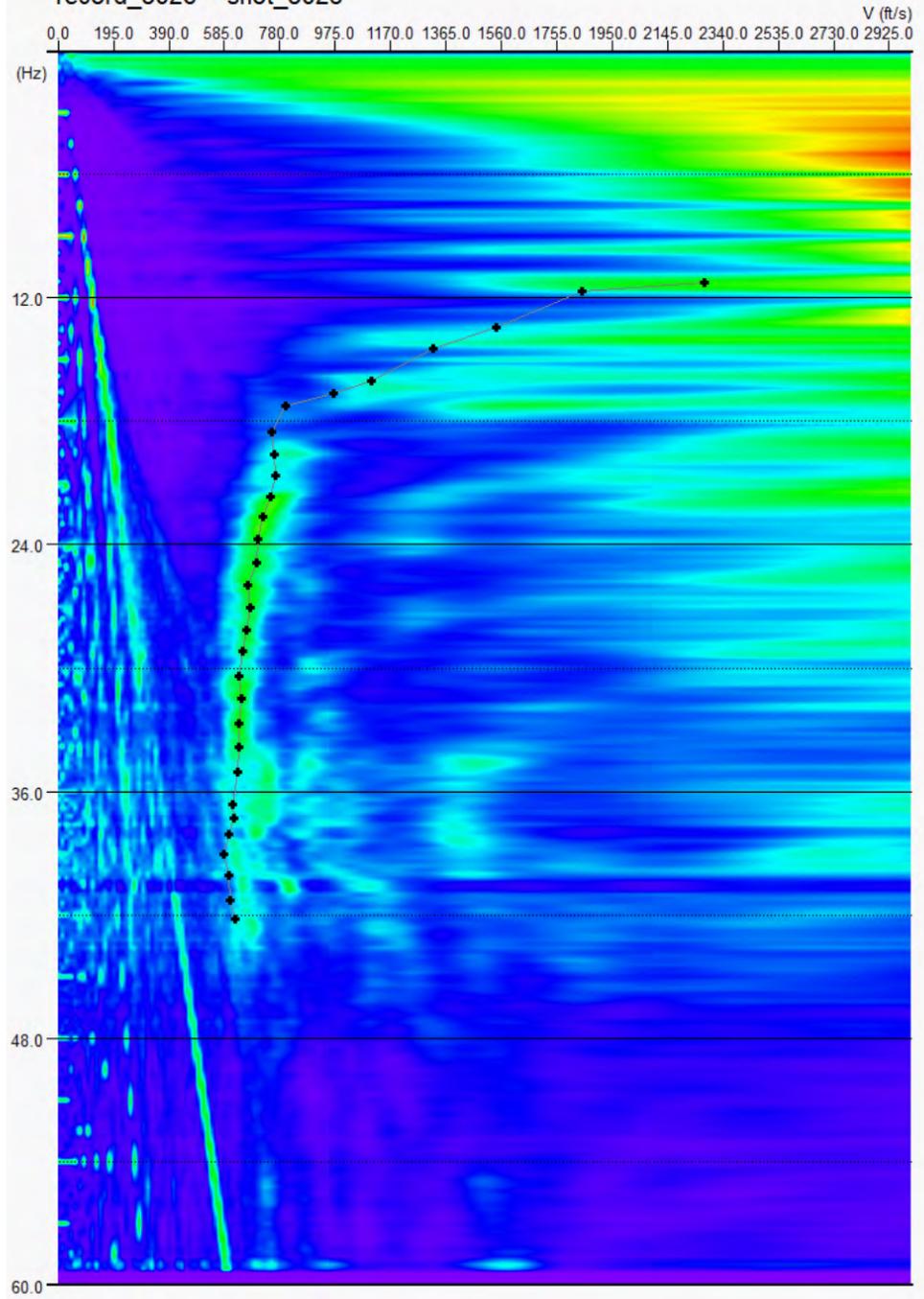
Line 3

Shear-wave Velocity (Vs) (ft/s)



13.44 (Hz)

record_3026 ~ shot_3025

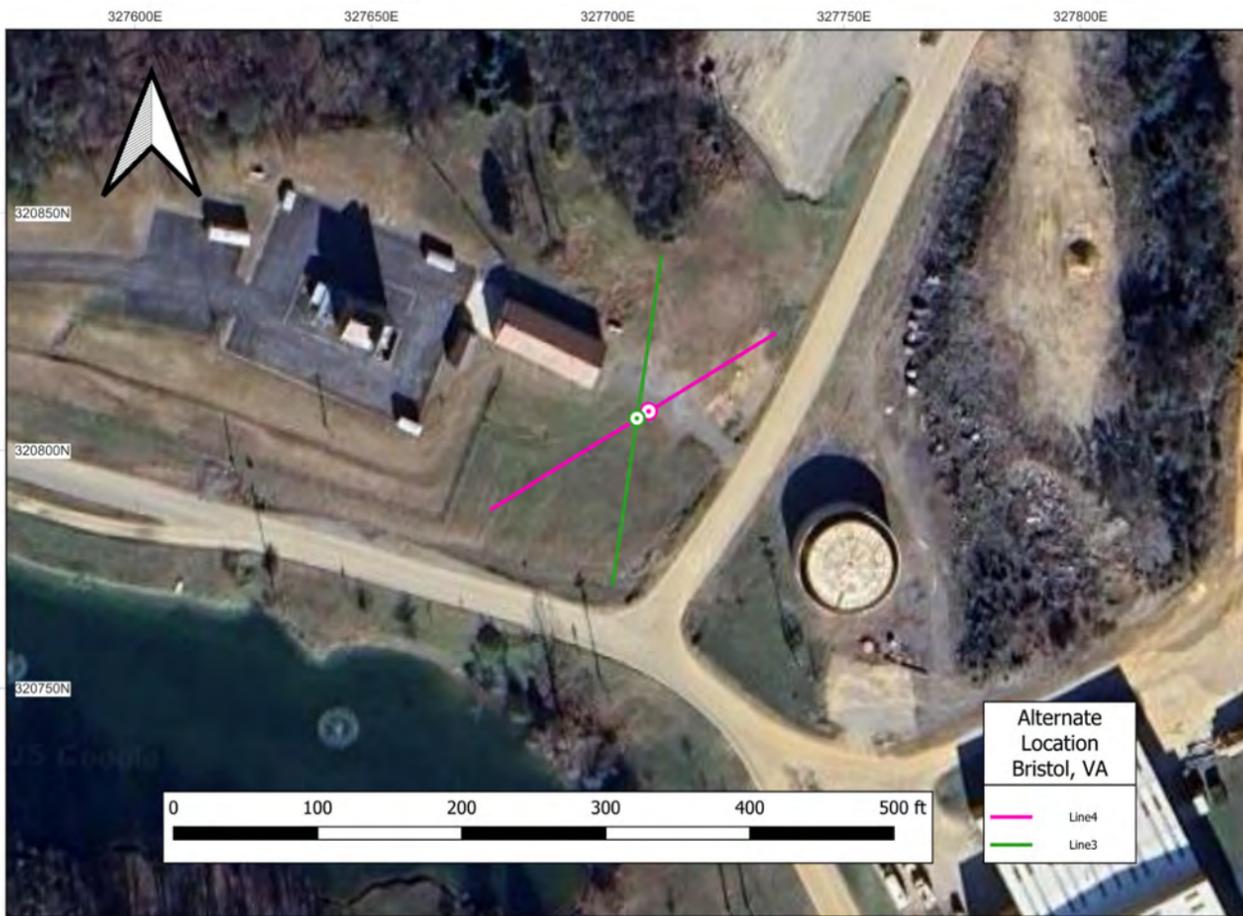
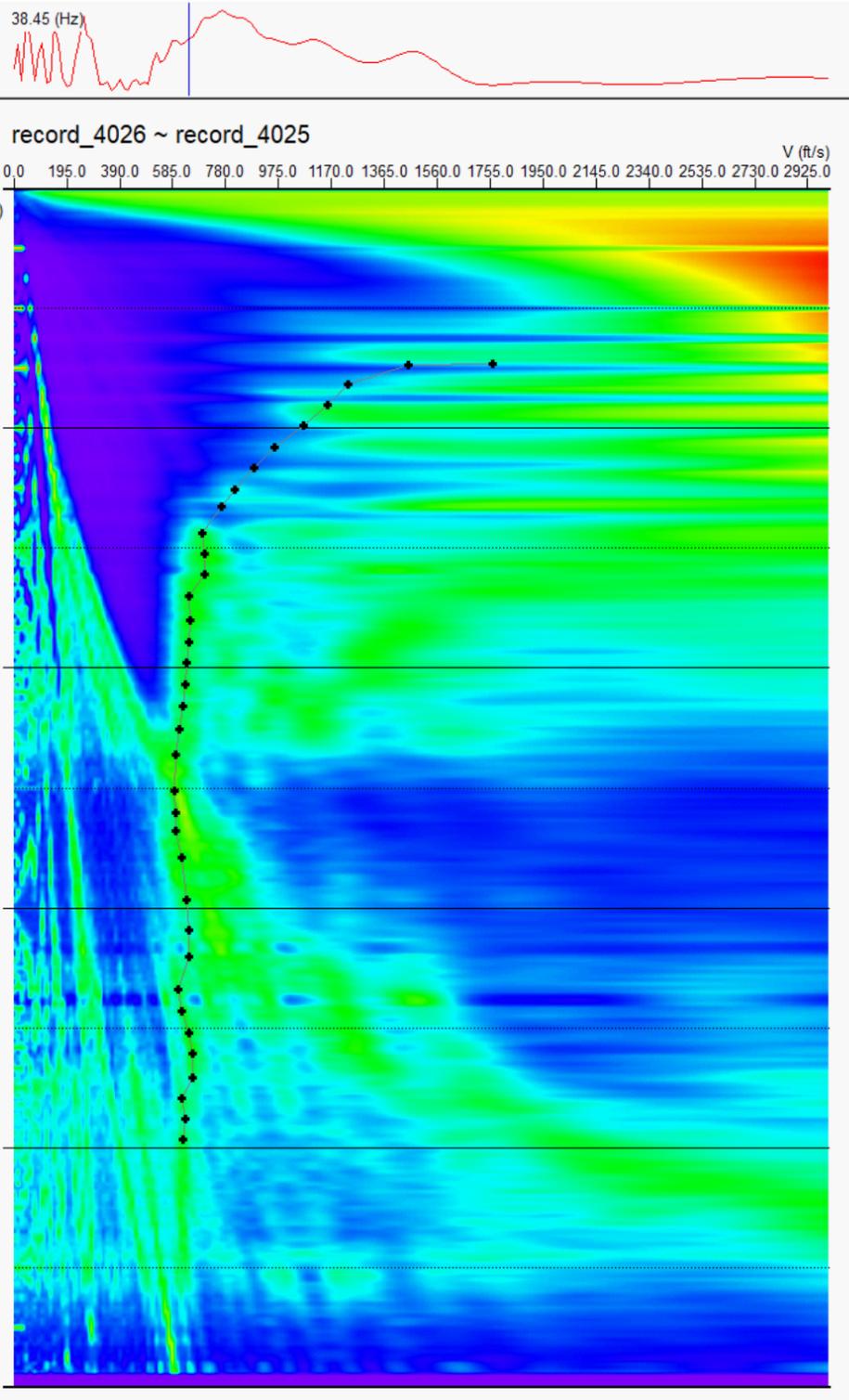
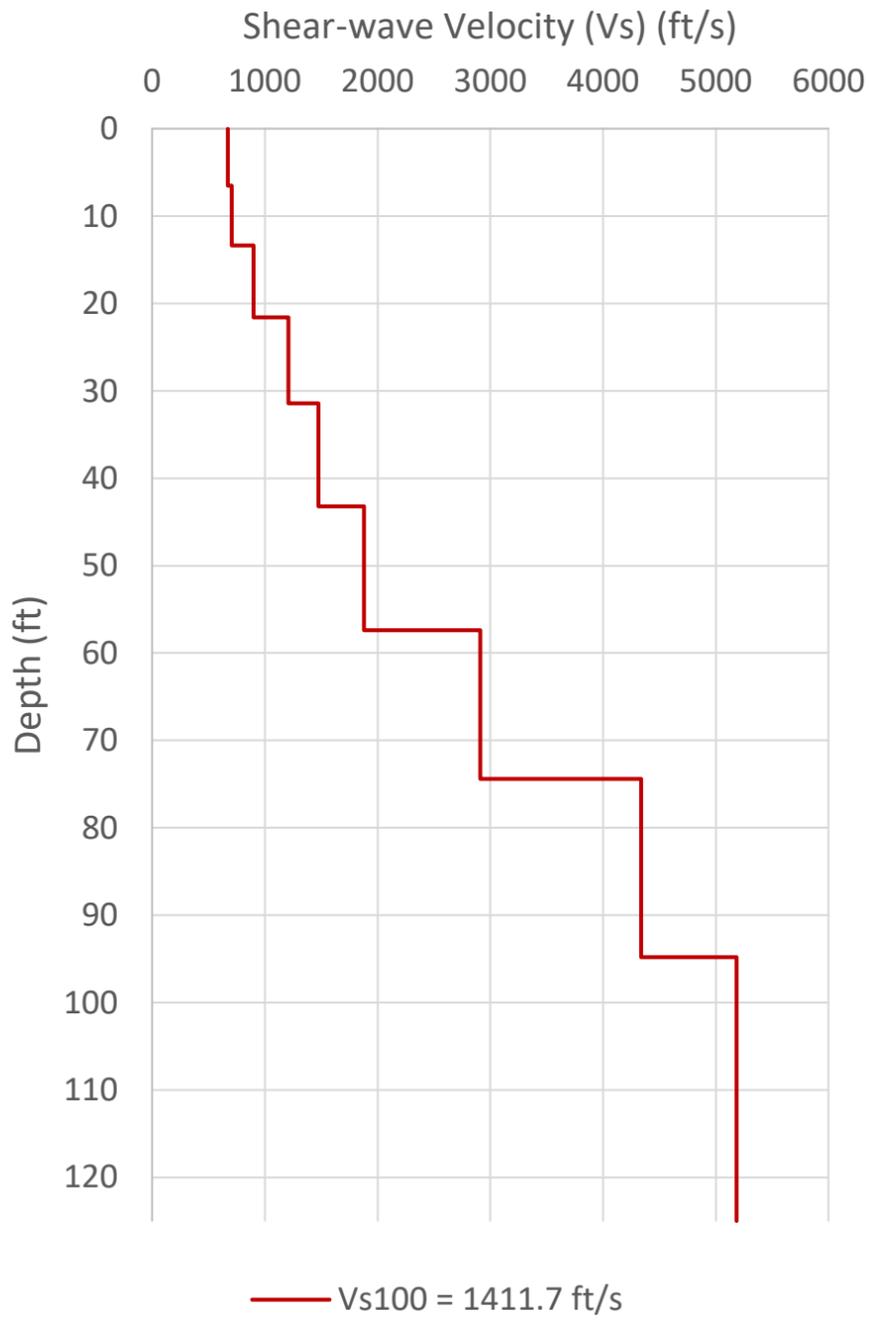


Line 3	
Depth (ft)	Vs (ft/s)
7.49	637
14.59	745
23.1	1110
33.32	1708
45.58	2454
60.3	3784
77.95	5265
99.14	6234
130	6757

Vs100: 1958.5

Line 3 1D MASW Results Bristol, VA		
 COLLIER GEOPHYSICS	Geosyntec	
	Project #: 250171	Figure B-3
Drafted by: I. Matthews Checked by: N. Rebman June 2025		

Line 4



Line 4	
Depth (ft)	V_s (ft/s)
6.53	672
13.37	707
21.57	898
31.42	1210
43.23	1477
57.4	1878
74.41	2911
94.83	4338
125	5185

V_{s100} : 1411.7

Line 4 1D MASW Results Bristol, VA

<p>COLLIER GEOPHYSICS</p>	Geosyntec	
	Project #: 250171	Figure B-4

APPENDIX D

Daily Field Report

DAILY FIELD REPORT		
PROJECT AND SITE INFORMATION		
PROJECT: City of Bristol Landfill EQ Tank Geotechnical Investigation		DATE: 6/17/2025
DESCRIPTION: MASW geophysics survey. Karst assessment.	PROJECT NO.: CHR8600	PHASE NO.: 01/03
CLIENT: City of Bristol	LOCATION: Bristol, VA	
CONTRACTOR(S): Collier Geophysics		
WEATHER: 71-88 F, partly cloudy		
ONSITE PERSONNEL		
NAME	COMPANY	POSITION
Trent Toelle	Geosyntec	Professional Geologist
Nick Rebman	GPRS	Senior Project Manager
Ian Mathews	City of Bristol	Operations Manager
VISITOR'S NAME	COMPANY	POSITION
SITE CONDITIONS		
Wet in morning from previous rains. Dried out during the day. MASW line locations in grasses as short as a few inches to as tall at 18in, as well as sections of paved road.		
DESCRIPTION OF WORK		
0730	Geosyntec and Collier arrived on site. Checked in with client and gave a brief run through of tasks to be performed.	
0800	Geosyntec at primary tank location. Took part in safety briefing with THA. Inspected primary site and concluded Line D-D' needed to be shifted south toward the road to avoid fence line at property boundary.	
0820	Geosyntec set up air monitoring equipment while Collier prepared set up on line C-C'.	
0900	Collier begin MASW survey on line C-C'.	
0915	Geosyntec begin karst assessment.	
1030	Collier begin MASW survey on line D-D'.	
1130	Collier begin MASW survey at secondary tank location on line B-B'. B' location needed to be shifted east to avoid fire fighting structure.	
1230	Collier begin MASW survey on line A-A'.	
1350	Geosyntec and Collier completed MASW survey and karst assessment.	
1415	Geosyntec and Collier demobilized from site.	

DAILY FIELD REPORT

PROJECT AND SITE INFORMATION

PROJECT: City of Bristol Landfill EQ Tank Geotechnical Investigation		DATE: 6/17/2025
DESCRIPTION: MASW geophysics survey. Karst assessment.	PROJECT NO.: CHR8600	PHASE NO.: 01/03



Figure 1: Collier beginning MASW survey at line C-C'



Figure 2: Collier setting up at line B-B'



Figure 3: Observed void on other side of chain-link net inside landfill



Figure 4: Observed cave in rock wall above landfill wall.

DAILY FIELD REPORT		
PROJECT AND SITE INFORMATION		
PROJECT: City of Bristol Landfill EQ Tank Geotechnical Investigation		DATE: 6/17/2025
DESCRIPTION: MASW geophysics survey. Karst assessment.	PROJECT NO.: CHR8600	PHASE NO.: 01/03
 <p>Figure 5: Deep fracture observed above landfill wall.</p>	 <p>Figure 6: Flowstone observed above landfill wall.</p>	
ISSUES, RESOLUTIONS, AND SITE DISCUSSIONS		
Collier observed a black bear on opposite side of fence near D'. It was decided that Geosyntec would not extend the karst assessment beyond the fence for safety concerns.		
PLAN FOR THE NEXT FEW DAYS		
None.		
HEALTH AND SAFETY GOOD CATCH – CONCERNS		
<ul style="list-style-type: none"> Geosyntec monitored ambient air during work, and no elevated levels were detected. 		

DAILY FIELD REPORT

PROJECT AND SITE INFORMATION

PROJECT: City of Bristol Landfill EQ Tank Geotechnical Investigation		DATE: 6/17/2025	
DESCRIPTION: MASW geophysics survey. Karst assessment.		PROJECT NO.: CHR8600	PHASE NO.: 01/03

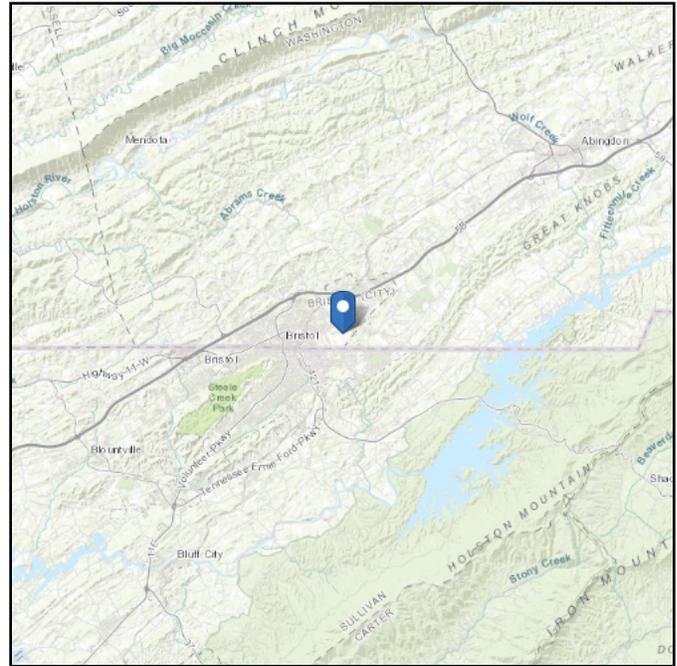
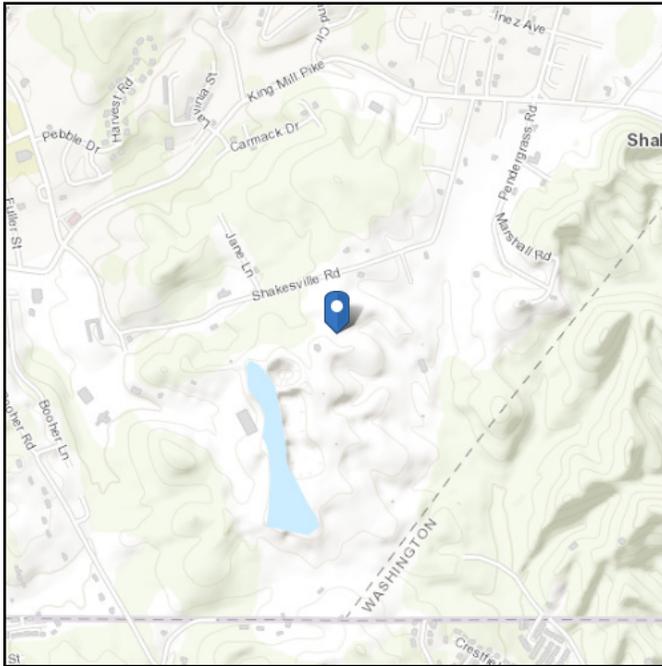


ASCE Hazards Report

Address:
Landfill
Bristol, Virginia
24201

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: C - Very Dense
Soil and Soft Rock

Latitude: 36.602933
Longitude: -82.146193
Elevation: 1909.8047181773975 ft
(NAVD 88)



Wind

Results:

Wind Speed	106 Vmph
10-year MRI	73 Vmph
25-year MRI	79 Vmph
50-year MRI	85 Vmph
100-year MRI	90 Vmph

Data Source: ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2

Date Accessed: Tue Oct 28 2025

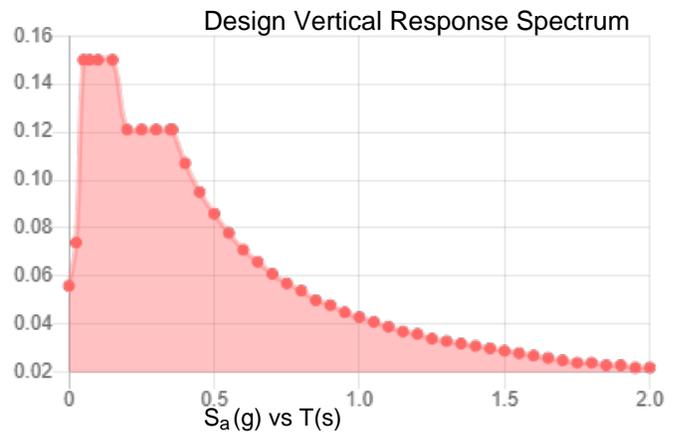
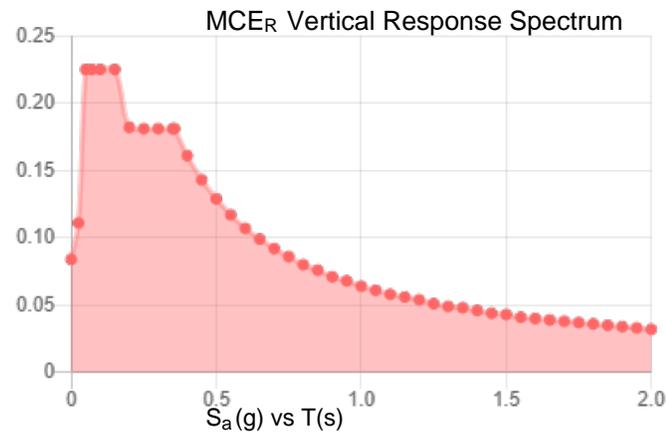
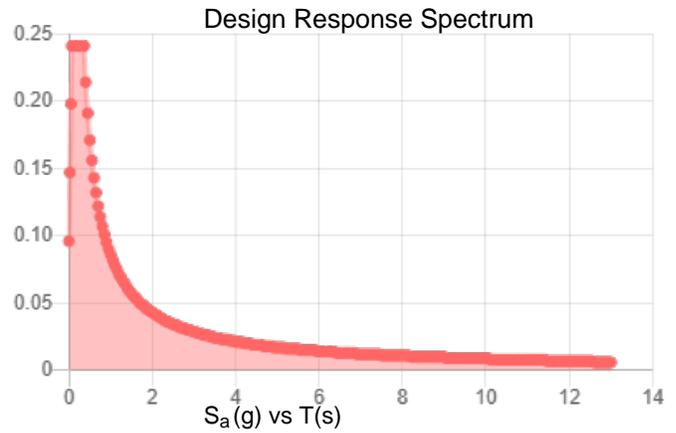
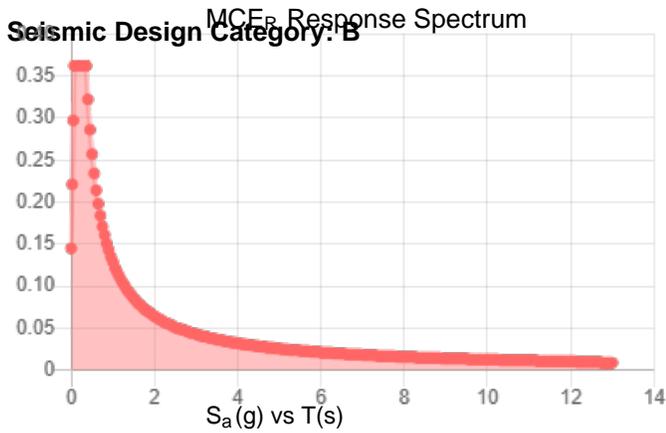
Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is not in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2.

Site Soil Class: C - Very Dense Soil and Soft Rock

Results:

S_s :	0.278	S_{D1} :	0.086
S_1 :	0.086	T_L :	12
F_a :	1.3	PGA :	0.162
F_v :	1.5	PGA _M :	0.201
S_{MS} :	0.362	F_{PGA} :	1.238
S_{M1} :	0.129	I_e :	1
S_{DS} :	0.241	C_v :	0.778



Data Accessed: Tue Oct 28 2025

Date Source:

USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-16 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.

Ice

Results:

Ice Thickness: 1.00 in.
Concurrent Temperature: 15 F
Gust Speed 30 mph

Data Source: Standard ASCE/SEI 7-16, Figs. 10-2 through 10-8

Date Accessed: Tue Oct 28 2025

Ice thicknesses on structures in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

In the Appalachian Mountains, ice thicknesses may vary significantly over short distances.

Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 500-year mean recurrence interval, and temperatures concurrent with ice thicknesses due to freezing rain. Thicknesses for ice accretions caused by other sources shall be obtained from local meteorological studies. Ice thicknesses in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Snow

Results:

Ground Snow Load, p_g : 15 lb/ft²
Mapped Elevation: 1909.8 ft

Data Source: ASCE/SEI 7-16, Table 7.2-8

Date Accessed: Tue Oct 28 2025

Values provided are ground snow loads. In areas designated "case study required," extreme local variations in ground snow loads preclude mapping at this scale. Site-specific case studies are required to establish ground snow loads at elevations not covered.

Snow load values are mapped to a 0.5 mile resolution. This resolution can create a mismatch between the mapped elevation and the site-specific elevation in topographically complex areas. Engineers should consult the local authority having jurisdiction in locations where the reported 'elevation' and 'mapped elevation' differ significantly from each other.

Rain

Results:

15-minute Precipitation Intensity: 4.9 in./h

60-minute Precipitation Intensity: 2.58 in./h

Data Source: NOAA National Weather Service, Precipitation Frequency Data Server, Atlas 14
(<https://www.nws.noaa.gov/oh/hdsc/>)

Date Accessed: Tue Oct 28 2025

The ASCE Hazard Tool is provided for your convenience, for informational purposes only, and is provided "as is" and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

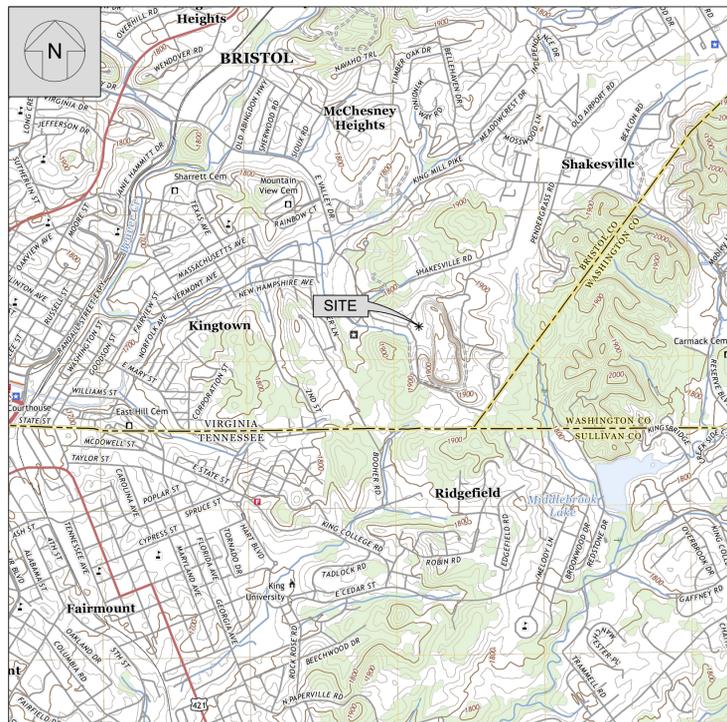
ASCE does not intend, nor should anyone interpret, the results provided by this Tool to replace the sound judgment of a competent professional, having knowledge and experience in the appropriate field(s) of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the contents of this Tool or the ASCE standard.

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EQUALIZATION TANK SYSTEM DESIGN

BRISTOL SANITARY LANDFILL AND QUARRY BALEFILL FACILITY - BRISTOL, VIRGINIA

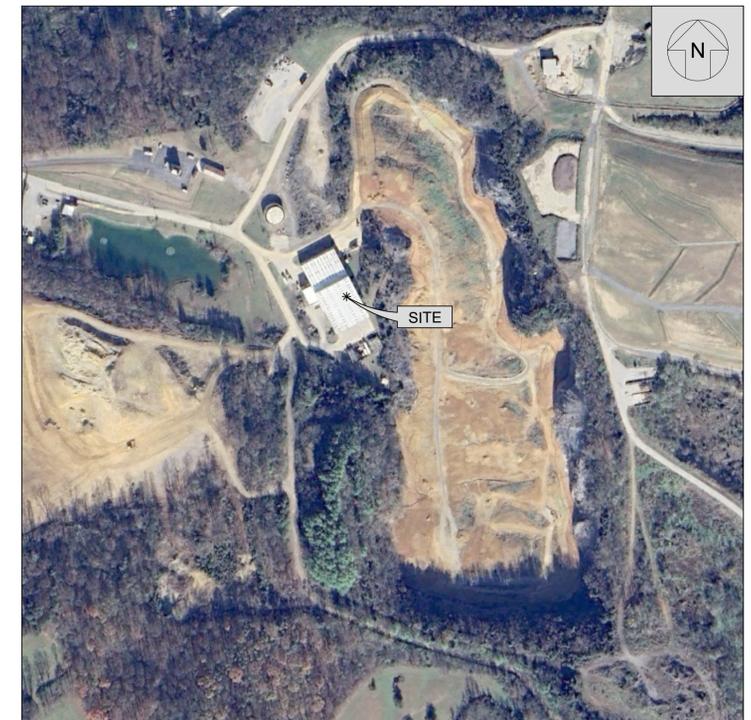
EQUALIZATION TANKS - ISSUED FOR BID (IFB) NOVEMBER 2025



LOCATION MAP
SCALE: 1" = 24000'

USGS BRISTOL QUADRANGLE
BRISTOL COUNTY, BRISTOL, VIRGINIA
7.5 MINUTE SERIES
2022

DRAWING INDEX		
SHEET NUMBER	DRAWING NUMBER	SHEET TITLE
GENERAL		
1	G-001	TITLE SHEET AND DRAWING INDEX
2	G-002	GENERAL NOTES
CIVIL		
3	C-101	EXISTING SITE CONDITIONS
4	C-102	PROPOSED SITE PLAN
5	C-401	ENLARGED SITE PLAN
STRUCTURAL		
6	S-100	TANK FOUNDATION REINFORCEMENT
7	S-101	SUMP DETAIL
PROCESS		
8	D-001	PROCESS SYMBOLOGY AND ABBREVIATIONS
9	D-601	PROCESS FLOW DIAGRAM
10	D-602	PROCESS AND INSTRUMENTATION DIAGRAM SHT 1
11	D-603	PROCESS AND INSTRUMENTATION DIAGRAM SHT 2
12	D-604	INTERLOCK LIST
EQUIPMENT		
13	Q-101	EQUALIZATION TANK
14	Q-501	EQUALIZATION TANK DETAILS
MECHANICAL		
15	M-300	EQUALIZATION TANK SYSTEM - ENLARGED VIEW
16	M-301	AERATION SYSTEM PIPING SECTION & DETAILS
17	M-302	LEACHATE DISCHARGE PUMP SECTION
18	M-303	IN BETWEEN TK-200 & 210 SECTION
19	M-304	IN BERM NORTH AND SOUTH
20	M-601	OVERALL ISOMETRIC
21	M-602	RENDERED VIEWS



VICINITY MAP
NOT TO SCALE:

SOURCE: GOOGLE EARTH IMAGERY DATE: 11-2024

PREPARED BY:



134 N. LA SALLE STREET, SUITE 300
CHICAGO, ILLINOIS 60602
TEL: 312-658-0500

PREPARED FOR:



CITY OF BRISTOL VIRGINIA
SOLID WASTE MANAGEMENT FACILITY
2655 VALLEY DRIVE
BRISTOL, VIRGINIA

NOTICE TO BIDDERS - SCOPE LIMITATION

THIS DRAWING PACKAGE IS FOR EQUALIZATION (EQ) TANKS ONLY.

THE SCOPE OF WORK FOR THIS BID INCLUDES ONLY THE EQ TANKS AS SHOWN IN THIS DRAWING SET. ANCILLARY EQUIPMENT, SYSTEMS, AND COMPONENTS SHOWN IN OTHER IFB DRAWINGS ARE NOT INCLUDED IN THIS BID SCOPE AND SHALL NOT BE INCLUDED IN PRICING.

BIDDERS SHALL BASE THEIR PROPOSALS SOLELY ON THE EQUIPMENT AND WORK DEPICTED IN THIS EQ TANK DRAWING PACKAGE. REFERENCE TO OTHER PROJECT DRAWINGS IS FOR INFORMATIONAL AND COORDINATION PURPOSES ONLY.

ISSUED FOR BID ONLY - NOT FOR CONSTRUCTION

THIS DRAWING MAY NOT BE ISSUED FOR PROJECT TENDER OR CONSTRUCTION, UNLESS SEALED.

DESIGN BY: BS
DRAWN BY: RN
CHECKED BY: KMH
DRAWING NO.: **G-001**

TITLE: TITLE SHEET AND DRAWING INDEX
PROJECT: EQUALIZATION TANK DESIGN
SITE: BRISTOL SANITARY LANDFILL AND QUARRY
BALEFILL FACILITY - BRISTOL, VIRGINIA



134 N. LA SALLE STREET, SUITE 300
CHICAGO, ILLINOIS
TELEPHONE: 312.658.0500

DATE: NOVEMBER 2025
PROJECT NO.: CHR8600
FILE: CHR8600_G-001 IFB TANKS
SHEET NO.: **1** OF **21**

C:\GEO-ACCAD\GCS\GEO\BRISTOL_SANITARY_LANDFILL\PROJECT\FILES\CADD\01_EQ_TANK_SYSTEM\DWGS\BHEETS\CHR8600_G-001_IFB_TANKS

PART 1 - INTRODUCTION

- 1.1 GENERAL
THE DRAWINGS AND SPECIFICATIONS CONTAIN INFORMATION FOR THE CONSTRUCTION AND INSTALLATION OF AN EQUALIZATION TANK TO BE INSTALLED AT THE BRISTOL SANITARY LANDFILL AND QUARRY IN BRISTOL, VIRGINIA. CONSTRUCTION OVERSIGHT AND INSTALLATION TESTING SERVICES WILL BE MANAGED AND PERFORMED BY THE OWNER'S GENERAL CONTRACTOR FOR THE PROJECT.
- 1.2 OWNER - CITY OF BRISTOL, VIRGINIA
- 1.3 ENGINEER - GEOSYNTEC CONSULTANTS, INC.

PART 2 - CONTRACTOR SAFETY REQUIREMENTS

- 2.1 THE CONTRACTOR IS RESPONSIBLE FOR THE SAFETY OF THEIR PERSONNEL AND SUBCONTRACTOR PERSONNEL. THE CONTRACTOR SHALL PERFORM WORK CONSISTENT WITH THE OWNER'S SAFETY PROGRAM REQUIREMENTS, WHICH WILL BE PROVIDED. AT A MINIMUM THE CONTRACTOR SHALL:
 - A. DEVELOP AND HAVE AVAILABLE A SITE SPECIFIC HEALTH AND SAFETY PLAN (HASP) WHICH CONFORMS TO THE ENGINEER'S AND OWNER STANDARDS.
 - B. DEVELOP AND HAVE AVAILABLE ON SITE JOB LOSS ANALYSIS (JLA) FORMS OUTLINING THE TASKS TO BE PERFORMED, THE JOB STEPS, THE HAZARDS, AND THE MITIGATING PROCEDURES TO MINIMIZE RISK AND MAXIMIZE SAFETY.
 - C. CONDUCT AND DOCUMENT A TAILGATE SAFETY MEETING EACH MORNING WHEN SITE WORK IS TO BE PERFORMED.
 - D. ENSURE COMPLIANCE WITH ALL FEDERAL AND STATE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) AND LOCAL SAFETY REGULATIONS.
- 2.2 WORK HOURS SHALL BE DURING DAYLIGHT HOURS ONLY, UNLESS APPROVED BY THE OWNER PRIOR TO THE WORK BEING PERFORMED. WEEKEND WORK WILL NOT BE ALLOWED, UNLESS APPROVED BY OWNER. WORK HOURS MAY BE DICTATED BY THE PROPERTY OWNER AND/OR, CITY ORDINANCE.
- 2.3 THE CONTRACTOR SHALL HAVE SUFFICIENT QUANTITIES AND QUALITY OF HARD HATS, GOGGLES, SAFETY GLASSES, REFLECTIVE VESTS, GLOVES AND/OR PERSONAL PROTECTIVE EQUIPMENT AS NECESSARY ON SITE TO OUTFIT ALL CONTRACTOR WORKERS, AND PROVIDE FOR A SECURE WORK AREA.
- 2.4 THE CONTRACTOR SHALL ESTABLISH AN EXCLUSION ZONE AROUND ALL WORK AREAS TO RESTRICT ACCESS AND PROVIDE APPROPRIATE PROTECTIONS DURING BOTH WORKING AND NON-WORKING HOURS. THE CONTRACTOR SHALL SECURE ALL WORK AREAS WITH BARRICADES OR TEMPORARY CHAIN LINK FENCE TO PROTECT THE WORK AREA FROM INTRUSION. IF CONDITIONS WARRANT, THE CONTRACTOR SHALL PROVIDE TRAFFIC FLAGGERS IN ADDITION TO BARRICADES TO CONTROL INGRESS AND EGRESS FROM THE WORK AREA.
- 2.5 A PRE-CONSTRUCTION SAFETY MEETING SHALL BE HELD AT THE SITE PRIOR TO THE ANTICIPATED START OF CONSTRUCTION. THE PRE-CONSTRUCTION SAFETY MEETING SHALL BE ATTENDED BY OWNER, THE ENGINEER, AND THE CONTRACTOR.
- 2.6 THE CONTRACTOR SHALL CONTAIN LOOSE DEBRIS AND STORE CONSTRUCTION MATERIALS ON A DAILY BASIS AND MAKE SURE THAT THE WORK AREA IS CLEAN AND ORDERLY PRIOR TO DEPARTURE FROM THE SITE.
- 2.7 THE CONTRACTOR IS RESPONSIBLE FOR INITIATING, MAINTAINING, AND SUPERVISING ALL SAFETY MEASURES AND PROGRAMS IN CONNECTION WITH THE PROJECT. THE CONTRACTOR WILL TAKE ALL NECESSARY PRECAUTIONS FOR THE SAFETY OF, AND WILL PROVIDE THE NECESSARY PRECAUTIONS TO PROTECT SITE WORKERS, CONSTRUCTION OBSERVATION PERSONNEL, AND SITE VISITORS.

- 2.8 THE CONTRACTOR SHALL FURNISH AND PLACE PROPER GUARDS FOR PREVENTION OF ACCIDENTS, INCLUDING ALL SITE SAFETY SIGNAGE, OR OTHER SAFETY FEATURES REQUIRED. AS NEEDED, THE CONTRACTOR WILL PROVIDE AND MAINTAIN SUFFICIENT LIGHT DURING NIGHT HOURS TO SECURE SUCH PROTECTION IF REQUESTED BY THE OWNER.

PART 3 - GENERAL CONSTRUCTION SPECIFICATIONS:

- 3.1 THE CONTRACTOR SHALL REVIEW THE DESIGN PLANS AND OTHER CONTRACT DOCUMENTS, AND FIELD VERIFY ALL DIMENSIONS AND SITE CONDITIONS BEFORE STARTING WORK. THE ENGINEER SHALL BE NOTIFIED OF ANY DISCREPANCY. DEVIATIONS FROM DESIGN CONSTITUTES A STOP WORK SITUATION. THE ENGINEER SHALL BE NOTIFIED, AND VERIFICATION OF DESIGNS AND SPECIFICATIONS MUST BE COMPLETED PRIOR TO MAKING FIELD CHANGES. ALL CHANGES ARE TO BE DOCUMENTED VIA THE ENGINEER'S FORMAL SUBMITTAL PROCESS.
- 3.2 THE CONTRACTOR SHALL PERFORM ALL WORK IN ACCORDANCE WITH RELEVANT BUILDING CODES FOR THE CITY OF BRISTOL, THE STATE OF VIRGINIA, THE NATIONAL ELECTRIC CODE, AND ALL OTHER APPLICABLE FEDERAL, STATE AND LOCAL CODES.
- 3.3 PRE-CONSTRUCTION MEETINGS BETWEEN OWNER, THE CONTRACTOR(S), AND ENGINEER WILL BE REQUIRED BEFORE ANY WORK BEGINS. THE MEETINGS WILL BE HELD AT THE SITE UNLESS OTHERWISE AGREED UPON BY ALL PARTIES IN ADVANCE.
- 3.4 WHERE MATERIALS OR PRODUCTS CALLED FOR UNDER THIS CONTRACT ARE INSTALLED BEFORE THE INSTALLATION OR ERECTION OF ADEQUATE PROTECTIVE STRUCTURES, THE CONTRACTOR, WITHOUT ADDITIONAL COMPENSATION, SHALL PROVIDE APPROVED, EFFECTIVE AND DURABLE MEASURES TO PROTECT SUCH MATERIALS OR PRODUCTS AGAINST DAMAGE FROM THE ELEMENTS OR FROM ANY OTHER CAUSES.

- 3.5 ALL MACHINERY, EQUIPMENT, PIPING, ACCESSORIES, AND APPURTENANCES IN VICINITY OF WORK AREAS SHALL BE ADEQUATELY SUPPORTED AND SAFEGUARDED AGAINST ALL DAMAGE OR INJURY DURING PERFORMANCE OF WORK UNDER THIS CONTRACT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DAMAGE OR INJURY RESULTING FROM OPERATIONS AND SHALL REPAIR SUCH DAMAGE IMMEDIATELY AND TO THE SATISFACTION OF THE ENGINEER.
- 3.6 ALL MATERIALS USED FOR CONSTRUCTION OF THE FACILITY SHALL BE NEW UNLESS OTHERWISE NOTED.
- 3.7 THE OWNER, WITH THE ENGINEER'S GUIDANCE SHALL APPLY FOR AND OBTAIN ALL STATE WATER DISCHARGE APPROVALS/PERMITS.
- 3.8 THE CONTRACTOR SHALL OBTAIN AND PAY FOR ALL APPLICABLE CONSTRUCTION PERMITS AND APPROVALS. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY INSPECTIONS, INCLUDING ELECTRICAL, MECHANICAL, CIVIL, OR OTHER APPLICABLE INSPECTIONS, AND OBTAIN A FINAL SIGNED OFF INSPECTION CARD FROM THE LOCAL AUTHORITY.
- 3.9 THE CONTRACTOR SHALL PROVIDE A ONE YEAR WARRANTY ON ALL CONTRACTOR-PROVIDED MATERIALS AND SUPPLIES. THE CONTRACTOR SHALL PROVIDE THE OWNER AND ENGINEER WITH COPIES OF ALL MATERIAL AND EQUIPMENT RECEIPTS. THE CONTRACTOR SHALL PROVIDE A WARRANTY ON WORKMANSHIP FOR A PERIOD OF NOT LESS THAN ONE YEAR. ALL DEFECTS IN CONTRACTOR SUPPLIED AND INSTALLED MATERIALS AND SUPPLIES SHALL BE REPAIRED AT CONTRACTOR EXPENSE.
- 3.10 THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT IN ACCORDANCE WITH THE MANUFACTURERS' SPECIFICATIONS AND INSTRUCTIONS.
- 3.11 ALL ITEMS AND EQUIPMENT NOT CLEARLY INDICATED SHALL BE PROVIDED BY AND INSTALLED BY THE CONTRACTOR. THE EQUIPMENT TABLE ON SHEET D-601.
- 3.12 THE CONTRACTOR SHALL BE RESPONSIBLE FOR KEEPING THE SITE FREE OF EXCESSIVE DEBRIS AND WASTE DURING CONSTRUCTION.
- 3.13 CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR REPAIRING ALL DAMAGE MADE TO ABOVE GROUND STRUCTURES AS THE RESULT OF ACCIDENT OR NEGLIGENCE.
- 3.14 THE CONTRACTOR SHALL RESTORE ALL DISTURBED AREAS TO MATCH THE PRE-CONSTRUCTION CONDITIONS AND THE SURROUNDING AREA. THIS INCLUDES DISTURBED LAWNS, TREES, SHRUBS, PLANTINGS, FENCES, SIDEWALKS, PAVED SURFACES AND OTHER STRUCTURES.
- 3.15 UPON COMPLETION OF THE PROJECT, THE CONTRACTOR SHALL PROVIDE THE ENGINEER WITH SURVEY INFORMATION AND CONSTRUCTION DETAILS IN ORDER TO PREPARE "AS-BUILT" DRAWINGS. THE "AS-BUILT" DRAWINGS SHALL SHOW THE ACTUAL CONSTRUCTION DETAILS, LOCATIONS, COMPOUND LAYOUT, AND PIPING DETAILS.
- 3.16 A FINAL INSPECTION WILL BE PERFORMED BY THE ENGINEER AND/OR AN OWNER REPRESENTATIVE. ALL ITEMS NOT MEETING THE SPECIFICATIONS, DESIGN PLANS, AND DOCUMENTED AND APPROVED CHANGES SHALL BE PROMPTLY REPAIRED AND/OR REPLACED BY THE CONTRACTOR AT NO EXPENSE TO THE OWNER.
- 3.17 THE CONTRACTOR SHALL PROVIDE AN ELECTRICIAN FOR A MINIMUM OF TWO DAYS FOR THE STARTUP OF THE EQUIPMENT. THE ELECTRICIAN SHALL BE PREPARED TO DEMONSTRATE PROPER MOTOR ROTATION, PROPER CONNECTIONS OF EQUIPMENT TO CIRCUIT BREAKERS, AND BE AVAILABLE TO TROUBLESHOOT ELECTRICAL PROBLEMS WITH THE SYSTEM.

PART 4 - EQUALIZATION TANK SYSTEM CONSTRUCTION AND STARTUP

- 4.1 THE SYSTEM CONTRACTOR SHALL BE RESPONSIBLE FOR THE CONSTRUCTION, PRE-MOBILIZATION TESTING, MOBILIZATION/DELIVERY, INSTALLATION, AND STARTUP/SHAKEDOWN OF THE SYSTEM.
- 4.2 CONTRACTOR IS RESPONSIBLE FOR PURCHASING ALL NEW EQUIPMENT AND MATERIALS REQUIRED TO CONSTRUCT THE SYSTEM PER THE RELEVANT DRAWINGS AND SPECIFICATIONS.
- 4.3 THE CONTRACTOR SHALL CONDUCT STARTUP/SHAKEDOWN ACTIVITIES AND ANY REQUESTED TESTING OR PERFORMANCE MONITORING IN COORDINATION WITH THE ENGINEER AND OTHER NECESSARY CONTRACTORS TO CONFIRM THE SYSTEM OPERATES AS ANTICIPATED TO THE SATISFACTION OF THE ENGINEER AND OWNER PRIOR TO FINAL SYSTEM ACCEPTANCE BY THE ENGINEER AND OWNER.
- 4.4 CONTRACTOR WILL SIZE WIRING PER MANUFACTURES SPECIFICATIONS AND CONFIRM WITH ENGINEER.

PART 5 - AS-BUILT DOCUMENTATION

- 5.1 THE CONTRACTOR SHALL BE RESPONSIBLE FOR RECORD DRAWINGS (RED LINES) SHOWING ACTUAL DETAILS, DIMENSIONS, AND OTHER PERTINENT FEATURES, AND IDENTIFY ANY DEVIATIONS FROM THE ORIGINAL DESIGN.
- 5.2 FOLLOWING THE SUCCESSFUL COMPLETION OF START-UP AND SHAKEDOWN TESTING, THE CONTRACTOR SHALL SUBMIT AS-BUILTS, MARKUPS, AND DETAILS TO THE ENGINEER FOR FINAL AS-BUILT DRAWINGS TO BE PREPARED.

PART 6 - SUBMITTALS

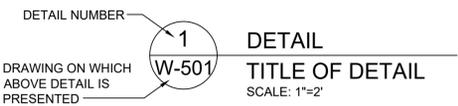
- 6.1 THE CONTRACTOR SHALL SUBMIT THE FOLLOWING INFORMATION TO THE ENGINEER AND OWNER FOR REVIEW AND APPROVAL A MINIMUM OF 5 BUSINESS DAYS PRIOR TO THE START OF CONSTRUCTION:
 - A. LIST OF PROPOSED MATERIALS AND SUBCONTRACTORS.
 - B. SHOP DRAWINGS AND/OR SPECIFICATIONS FOR ANY PROPOSED EQUIPMENT/MATERIALS THAT VARY FROM THOSE IDENTIFIED IN THE SPECIFICATIONS.
 - C. ANY SUBMITTALS OR SPECIFICATIONS FOR MATERIALS AND EQUIPMENT AS REQUIRED IN THESE DESIGN DOCUMENTS OR AS REQUESTED BY THE OWNER OR ENGINEER.
 - D. CONSTRUCTION SCHEDULE.
- 6.2 THE CONTRACTOR SHALL SUBMIT THE FOLLOWING INFORMATION TO THE ENGINEER WITHIN 30 DAYS FROM COMPLETION OF WORK:
 - A. AS BUILT RECORD DRAWINGS (RED LINES), INCLUDE ORIGINAL CADD FILES.
 - B. MANUFACTURER DESCRIPTIONS, MANUALS/GUIDANCE, TECHNICAL SPECIFICATIONS, SHOP DRAWINGS, AND PRODUCT DATA FOR ANY EQUIPMENT/MATERIALS INSTALLED.
 - C. ALL EQUIPMENT AND MATERIAL PURCHASE RECEIPTS AND MANUFACTURER WARRANTIES.
 - D. DATA FROM LEAKAGE TESTING OF CONVEYANCE PIPING.
 - E. SUPPORTING DATA OR CERTIFICATIONS AS APPROPRIATE.

PART 7 - CONSTRUCTION SCHEDULE

- 7.1 THE CONTRACTOR SHALL CONFIRM A CONSTRUCTION SCHEDULE WITH THE ENGINEER AND OWNER AT LEAST TWO WEEKS (10 BUSINESS DAYS) PRIOR TO ANY WORK AT THE SITE.
- 7.2 THE PROPOSED CONSTRUCTION SCHEDULE SHALL BE PRESENTED IN A TIME LINE FORMAT SHOWING ESTIMATED START DATE, DURATION AND COMPLETION TIMES FOR EACH ACTIVITY. ANY DEVIATION FROM THE ORIGINALLY PROPOSED SCHEDULE MUST BE COMMUNICATED TO THE ENGINEER WITHIN 24-HOURS.
- 7.3 THE CONTRACTOR SHALL MAKE PROPER AND TIMELY NOTIFICATION OF ALL WORK AND INSPECTIONS TO REGULATORY OR GOVERNING AGENCIES AS REQUIRED BY APPLICABLE PERMITS.

ABBREVIATIONS

APPROX	APPROXIMATE
DIA	DIAMETER
ELEV	ELEVATION
HOR	HORIZONTAL
MIN	MINIMUM
STA	STATION
STL	STEEL
T/S	TOP OF SLOPE
TYP	TYPICAL
W	WITH



EXAMPLE: DETAIL NUMBER 1 PRESENTED ON DRAWING NO. W-501.

ABOVE SYSTEM ALSO APPLIES TO SECTION IDENTIFICATIONS.

DETAIL IDENTIFICATION LEGEND

NOTICE TO BIDDERS - SCOPE LIMITATION

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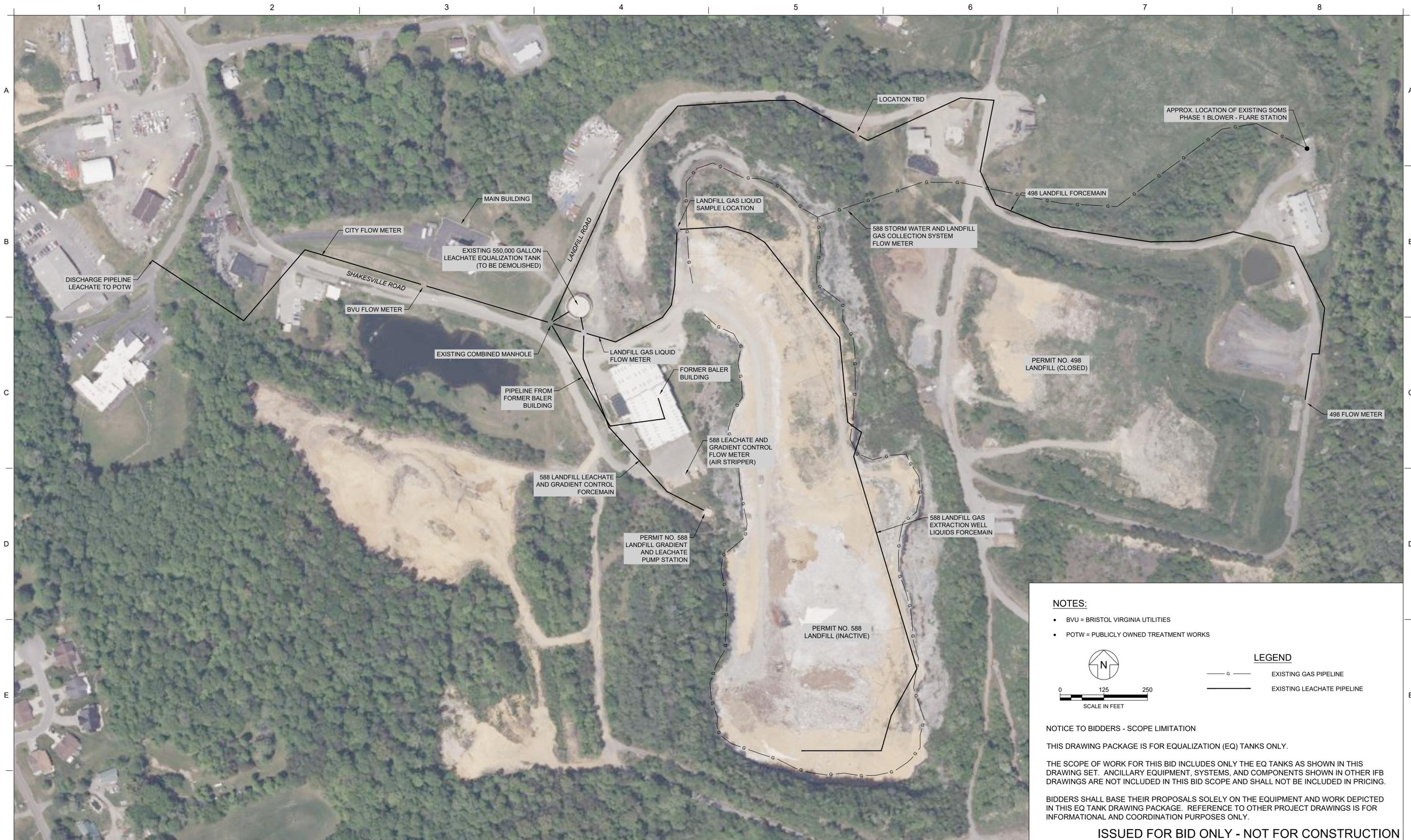
ISSUED FOR BID ONLY - NOT FOR CONSTRUCTION

C:\GED-ACC\GDG\GEOSYNTEC\CITY OF BRISTOL_SANITARY LANDFILL\PROJECT FILES\CADD\EQ TANK SYSTEM\DWGS\BRIEFS\CHR8600_G-002

C	10/26/25	ISSUE FOR BID (IFB) DESIGN SET	RN	BS	
B	7/28/25	60% DESIGN REVIEW	RN	BS	
A	5/12/25	30% DESIGN REVIEW	RN	BS	
REV	DATE	DESCRIPTION	DRN	APP	

DESIGN BY:	BS	TITLE:	GENERAL NOTES
DRAWN BY:	RN	PROJECT:	EQUALIZATION TANK DESIGN
CHECKED BY:	KMH	SITE:	BRISTOL SANITARY LANDFILL AND QUARRY BALEFILL FACILITY - BRISTOL, VIRGINIA
DRAWING NO.:	G-002		

DATE:	NOVEMBER 2025
PROJECT NO.:	CHR8600
FILE:	CHR8600_G-002
SHEET NO.:	2 OF 21



NOTES:

- BVU = BRISTOL VIRGINIA UTILITIES
- POTW = PUBLICLY OWNED TREATMENT WORKS

LEGEND

— G — EXISTING GAS PIPELINE
 ————— EXISTING LEACHATE PIPELINE

0 125 250
 SCALE IN FEET

NOTICE TO BIDDERS - SCOPE LIMITATION

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				DESIGN BY: BS	TITLE: EXISTING SITE CONDITIONS
				DRAWN BY: RN	PROJECT: EQUALIZATION TANK DESIGN
				CHECKED BY: KMH	SITE: BRISTOL SANITARY LANDFILL AND QUARRY BALEFILL FACILITY - BRISTOL, VIRGINIA
				DRAWING NO.: C-101	
REV	DATE	DESCRIPTION	DRN	APP	
C	10/26/25	ISSUE FOR BID (IFB) DESIGN SET	RN	BS	
B	7/28/25	60% DESIGN REVIEW	RN	BS	
A	5/12/25	30% DESIGN REVIEW	RN	BS	

CITY OF BRISTOL VIRGINIA

Geosyntec consultants

134 N. LA SALLE STREET, SUITE 300
 CHICAGO, ILLINOIS
 TELEPHONE: 312.658.0500

DATE: NOVEMBER 2025
 PROJECT NO.: CHR8600
 FILE: CHR8600_C-101
 SHEET NO.: 3 OF 21

C:\GEO-ACC\GEO\BRYNTEC\CITY OF BRISTOL_SANITARY LANDFILL\PROJECT FILES\CADD\1_EG TANK SYSTEM\DWG\BRIE\CHR8600_C-101

BRISTOL VIRGINIA SOLID WASTE FACILITY CONTROL MONUMENTS 9-10-2020				
BENCHMARK	NORTHING	EASTING	ELEVATION	DESCRIPTION
BM-1	3398930.8510	10412541.7390	1945.9200	BOLT IN CONCRETE MONUMENT
BM-2	3398427.2980	10411954.6380	1880.3510	BOLT IN CONCRETE MONUMENT
BM-3	3399535.2420	10412031.2950	1864.1110	TOP OF ANCHOR BOLT FOR ROCK PROTECTION FENCING
BM-4	3399345.9430	10413587.4720	1852.0750	1/2" REBAR IN CONCRETE AT FENCE CORNER

BENCHMARK INFORMATION PROVIDED BY THE CITY OF BRISTOL, VIRGINIA



NOTES:

- BVU = BRISTOL VIRGINIA UTILITIES
- POTW = PUBLICLY OWNED TREATMENT WORKS

LEGEND

- ★ BENCHMARK
- G — EXISTING GAS PIPELINE
- — — EXISTING LEACHATE PIPELINE

0 125 250
SCALE IN FEET

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DESIGN BY:	BS	TITLE:	PROPOSED SITE PLAN
DRAWN BY:	RN	PROJECT:	EQUALIZATION TANK DESIGN
CHECKED BY:	KMH	SITE:	BRISTOL SANITARY LANDFILL AND QUARRY BALEFILL FACILITY - BRISTOL, VIRGINIA
DRAWING NO.:	C-102		

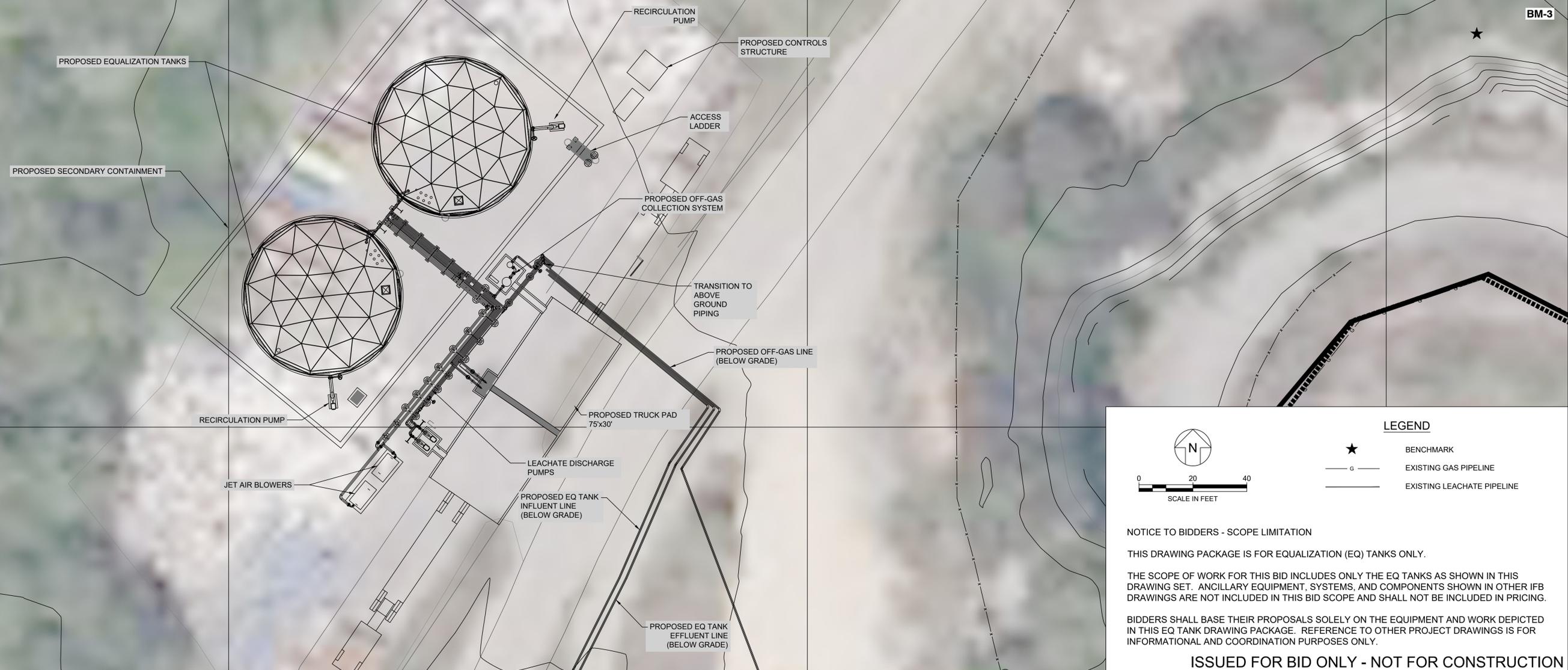
REV	DATE	DESCRIPTION	DRN	APP
C	10/26/25	ISSUE FOR BID (IFB) DESIGN SET	RN	BS
B	7/28/25	60% DESIGN REVIEW	RN	BS
A	5/12/25	30% DESIGN REVIEW	RN	BS

<p>CITY OF BRISTOL VIRGINIA</p> <p>134 N. LA SALLE STREET, SUITE 300 CHICAGO, ILLINOIS TELEPHONE: 312.658.0500</p>	<p>DATE: NOVEMBER 2025</p> <p>PROJECT NO.: CHR8600</p> <p>FILE: CHR8600_C-102</p> <p>SHEET NO.: 4 OF 21</p>
	<p>Geosyntec consultants</p>

C:\GEO-ACC\GEO\GEO\PROJECT FILES\CADD\1_EG TANK SYSTEM\DWG\BRIEFS\CHR8600_C-102

BRISTOL VIRGINIA SOLID WASTE FACILITY CONTROL MONUMENTS 9-10-2020				
BENCHMARK	NORTHING	EASTING	ELEVATION	DESCRIPTION
BM-1	3398930.8510	10412541.7390	1945.9200	BOLT IN CONCRETE MONUMENT
BM-2	3398427.2980	10411954.6380	1880.3510	BOLT IN CONCRETE MONUMENT
BM-3	3399535.2420	10412031.2950	1864.1110	TOP OF ANCHOR BOLT FOR ROCK PROTECTION FENCING
BM-4	3399345.9430	10413587.4720	1852.0750	1/2" REBAR IN CONCRETE AT FENCE CORNER

BENCHMARK INFORMATION PROVIDED BY THE CITY OF BRISTOL, VIRGINIA



LEGEND

- ★ BENCHMARK
- G — EXISTING GAS PIPELINE
- — EXISTING LEACHATE PIPELINE

0 20 40
SCALE IN FEET

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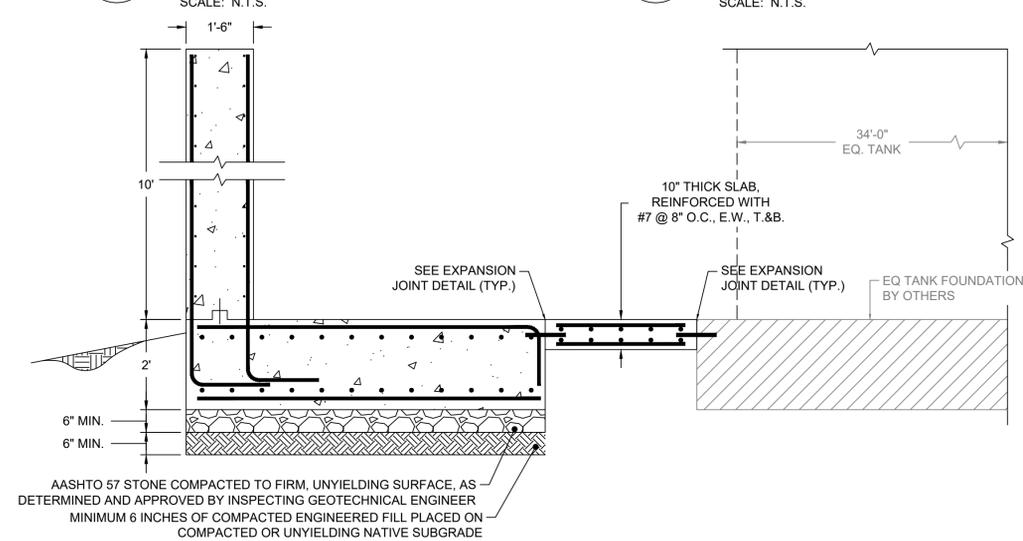
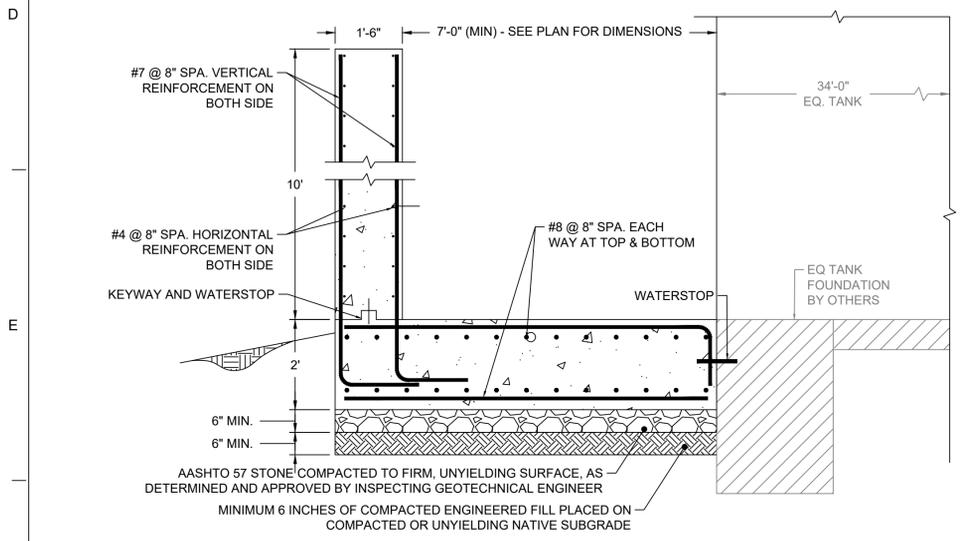
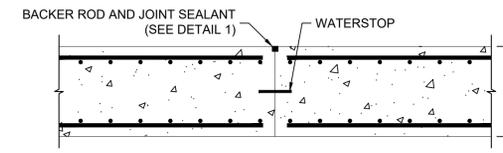
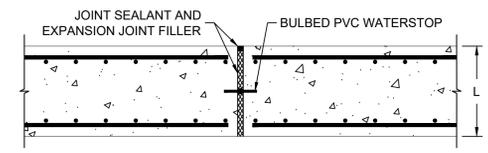
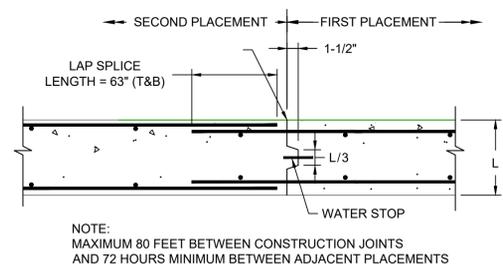
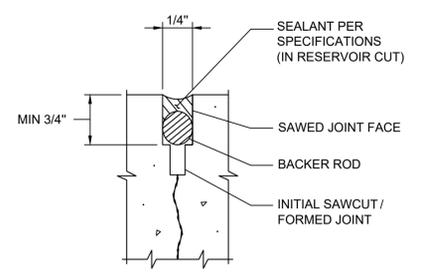
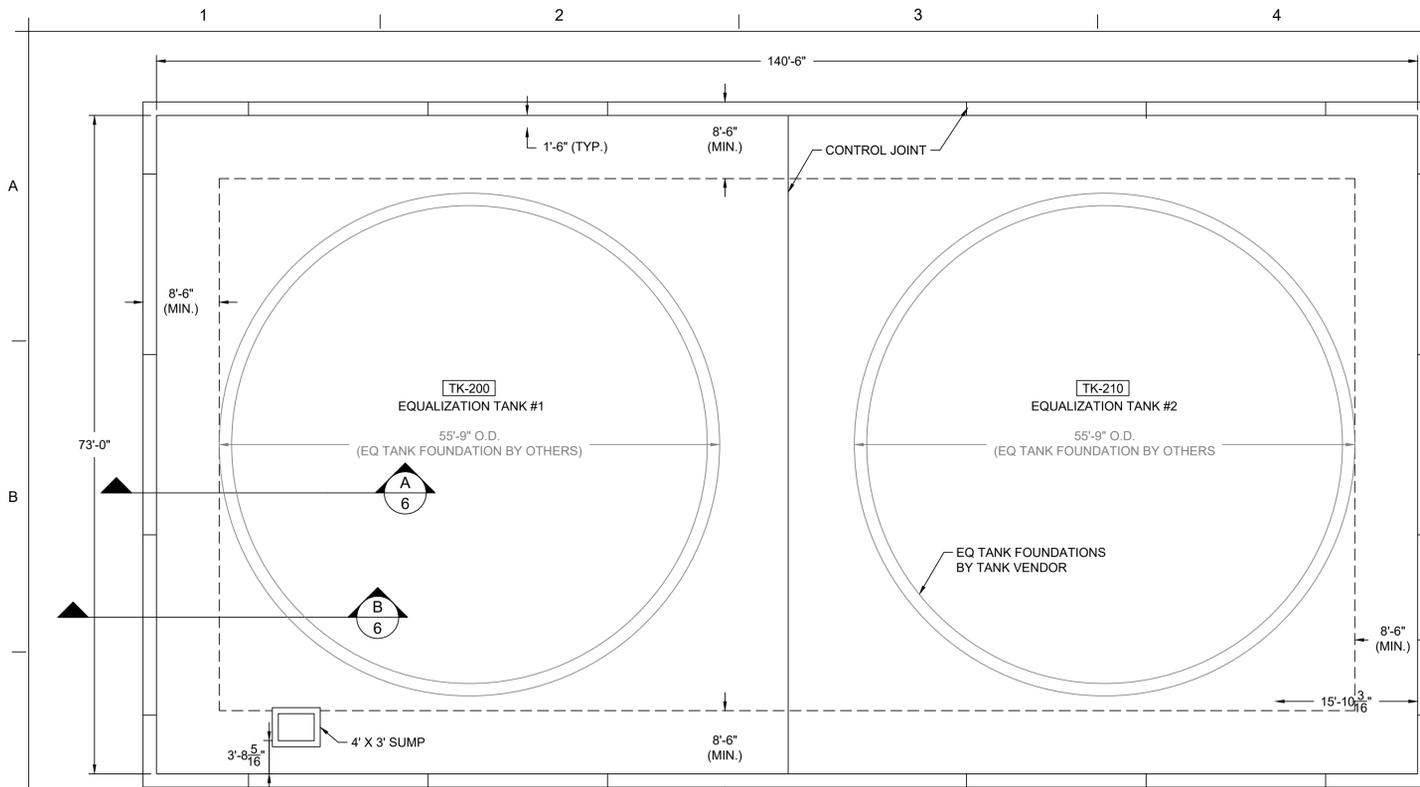
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DESIGN BY:	BS	TITLE:	ENLARGED SITE PLAN
DRAWN BY:	RN	PROJECT:	EQUALIZATION TANK DESIGN
CHECKED BY:	KMH	SITE:	BRISTOL SANITARY LANDFILL AND QUARRY BALEFILL FACILITY - BRISTOL, VIRGINIA
DRAWING NO.:	C-401		

 134 N. LA SALLE STREET, SUITE 300 CHICAGO, ILLINOIS TELEPHONE: 312.658.0500	DATE:	NOVEMBER 2025
	PROJECT NO.:	CHR8600
	FILE:	CHR8600_C-102
	SHEET NO.:	5 OF 21

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LEGEND

- GENERAL NOTES:
- THE CONTRACTOR SHALL VERIFY ALL FIELD CONDITIONS WITH REGARD TO TOPOGRAPHY, SITE DRAINAGE, LANDSCAPING, UTILITIES, EXISTING FOLIAGE, ETC. PRIOR TO BIDDING.
 - FOUNDATION LOCATION ONLY SHOWN FOR REFERENCE AND SHALL NOT BE USED FOR CONSTRUCTION. IT IS THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE THE FOUNDATION LOCATION WITH THE OWNER.
 - NO CONSTRUCTION PLANS SHALL BE USED FOR CONSTRUCTION UNLESS SPECIFICALLY MARKED FOR CONSTRUCTION.
 - FOR CLARITY, NOT ALL SITE FEATURES MAY BE SHOWN.
 - THE ENGINEER AND OWNER ARE NOT RESPONSIBLE FOR THE CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES OR PROCEDURES, TIME OF PERFORMANCE, PROGRAMS OR ANY SAFETY PRECAUTIONS USED BY THE CONTRACTOR. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR EXECUTION OF THEIR WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS AND SPECIFICATIONS.
 - THE CONTRACTOR SHALL COMPLY WITH AND OBSERVE THE RULES AND REGULATIONS OF O.S.H.A. AND APPROPRIATE AUTHORITIES REGARDING SAFETY PROVISIONS. SITE SAFETY SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
 - IF THE DIMENSIONS NOTED AND THE SCALED DIMENSIONS DO NOT AGREE, THE NOTED DIMENSIONS SHALL GOVERN.
 - THE CONTRACTOR SHALL COORDINATE ALL REQUIRED CONSTRUCTION ACCESS ARRANGEMENTS, STAGING AREAS, AND ON-SITE MATERIAL STORAGE AREAS WITH THE OWNER PRIOR TO CONSTRUCTION.
 - UNLESS OTHERWISE INDICATED BY THE SITE CIVIL PLANS, ALL AREAS WHICH ARE DAMAGED DURING CONSTRUCTION SHALL BE RESTORED TO PRE-CONSTRUCTION CONDITION BY THE CONTRACTOR AT ITS EXPENSE.
 - PRIOR TO PLACING CONCRETE, CONTRACTOR SHALL SUBMIT THE FOLLOWING FOR APPROVAL, AT A MINIMUM: CONCRETE MIX DESIGN, STEEL REINFORCEMENT SHOP DRAWINGS, JOINT LOCATION PLAN, WORK PLAN AND QC PLAN.
- CONCRETE NOTES:
- PRIOR TO CONCRETE AND REBAR PLACEMENT THE SUBGRADE SURFACE SHALL BE STABLE AND CLEAR OF STANDING WATER AND DEBRIS.
 - THE MINIMUM 28-DAY COMPRESSIVE STRENGTH OF CONCRETE SHALL BE 4,000 PSI PER ASTM C109.
 - ALL CONCRETE WORK INCLUDING FORMING, REINFORCING, MIXING, PLACING AND CURING SHALL BE DONE IN ACCORDANCE WITH THE ACI MANUAL OF CONCRETE PRACTICE INCLUDING "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE" (ACI 318) AND "SPECIFICATIONS FOR STRUCTURAL CONCRETE" (ACI 301). FOLLOW ACI 305 AND 306 FOR ALL HOT AND COLD WEATHER CONCRETING.
 - CEMENT SHALL CONFORM TO ASTM C150, TYPE I, TYPE II, OR TYPE 1L WITH AIR ENTRAINING ADMIXTURE PER ASTM C260 ADDED AT THE MIXER TO ACHIEVE FOUR (4) TO SIX (6) PERCENT BY VOLUME OF ENTRAINED AIR AT THE POINT OF CONCRETE PLACEMENT.
 - REINFORCED CONCRETE SLABS SHALL BE OF THE THICKNESS AND DIMENSIONS AS SHOWN ON THE PLANS.
 - WELDING OR HEATING OF REINFORCING STEEL IS PROHIBITED. FIELD COLD BENDING OF REINFORCING BARS SHALL CONFORM ACI 315. THE BEND RADIUS SHALL NOT BE LESS THAN SPECIFIED IN ACI 315.
 - THE USE OF CONCRETE MIXES USING ADMIXTURES, FLY ASH OR POZZOLANS MUST BE APPROVED BY THE ENGINEER PRIOR TO ORDERING THE CONCRETE. CALCIUM CHLORIDE SHALL NOT BE ALLOWED IN THE CONCRETE MIX.
 - FIELD-CURED TEST CYLINDERS ARE REQUIRED PER ACI 318. CONCRETE SHALL BE SAMPLED AND TESTED IN THE FIELD FOR SLUMP, YIELD, AIR CONTENT, AND TEMPERATURE.
 - FILL ALL SURFACE VOIDS AND IMPERFECTIONS IMMEDIATELY AFTER STRIPPING FORMS WITH A GROUT MIX OF 2 PARTS SAND AND 1 PART TYPE 1 PORTLAND CEMENT.
 - ALL EXPOSED CONCRETE EDGES SHALL BE FINISHED WITH A 3/4" CHAMFER.
 - ALL HORIZONTAL SURFACES SHALL RECEIVE A BROOM FINISH.
 - MINIMUM CONCRETE TESTING FREQUENCY SHALL BE 1 TEST PER CONCRETE POUR, AND FOR EACH ADDITIONAL 50 CUBIC YARDS. SEE CONCRETE SPECIFICATIONS FOR ADDITIONAL TESTING REQUIREMENTS.
- REINFORCING STEEL:
- STEEL REINFORCEMENT SHALL BE DEFORMED AND CONFORM TO THE REQUIREMENTS OF ASTM A615, GRADE 60. WELDED WIRE FABRIC SHALL CONFORM TO THE REQUIREMENTS OF ASTM 185.
 - MINIMUM REINFORCING STEEL CLEAR COVER 3" FOR CONCRETE CAST DIRECTLY AGAINST EARTH.
 - WHERE REINFORCING BARS ARE NOTED AS CONTINUOUS, THE TERMINATION OF ALL CONTINUOUS REINFORCING BAR RUNS SHALL BE A STANDARD HOOK UNLESS NOTED OTHERWISE.
 - WHERE SPLICE LENGTHS ARE NOT SPECIFIED, USE 30 BAR DIAMETERS IN CAST CONCRETE.
 - REINFORCING STEEL SHALL NOT BE TACK WELDED FOR ANY REASON. WELDED REINFORCING STEEL SPLICES ARE NOT PERMITTED.
 - LAP ALL WELDED WIRE FABRIC A MINIMUM DISTANCE OF ONE CROSS WIRE SPACING PLUS 2 INCHES.
 - ALL REINFORCING STEEL SHALL BE SUPPORTED ON STANDARD ACCESSORIES, HELD RIGIDLY AND ACCURATELY IN PLACE, AND PROTECTED AGAINST DISPLACEMENT BEFORE AND DURING PLACEMENT OF CONCRETE.
 - DOWELS AND OTHER MISCELLANEOUS STEEL EMBEDDED ITEMS SHALL BE LOCATED AND HELD IN SPECIFIED POSITION PRIOR TO PLACEMENT OF CONCRETE AND SHALL NOT BE PUSHED INTO CONCRETE FOLLOWING CONCRETE POUR.
- ENGINEERED FILL
- ENGINEERED FILL SHALL MEET THE FOLLOWING CRITERIA:
 - FREE OF ORGANICS AND ANY OTHER DELETERIOUS MATERIAL (LESS THAN 2% BY WEIGHT)
 - MAXIMUM FINES CONTENT OF 35%
 - MAXIMUM LIQUID LIMIT OF 40 AND PLASTICITY INDEX OF 20
 - MAXIMUM LIQUID PARTICLE SIZE OF 3 INCHES.
 - ENGINEERED FILL SHALL BE PLACED IN MAXIMUM 12-INCH-TICK LOOSE LIFT.
 - ENGINEERED FILL SHALL BE COMPACTED TO A MINIMUM OF 98% OF THE MAXIMUM DRY DENSITY BASED ON STANDARD PROCTOR METHODS (ASTM D698), MOISTURE CONTENT SHALL BE WITHIN 2% OF THE OPTIMUM MOISTURE CONTENT UNLESS APPROVED BY INSPECTING GEOTECHNICAL ENGINEER.

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REV	DATE	DESCRIPTION	DRN	APP
C	10/26/25	ISSUE FOR BID (IFB) DESIGN SET	RN	BS
B	7/28/25	60% DESIGN REVIEW	RN	BS
A	5/12/25	30% DESIGN REVIEW	RN	BS
		DESCRIPTION	DRN	APP

DESIGN BY:	LMA	TITLE:	TANK FOUNDATION REINFORCEMENT
DRAWN BY:	AS	PROJECT:	EQUALIZATION TANK DESIGN
CHECKED BY:	NPH	SITE:	BRISTOL SANITARY LANDFILL AND QUARRY BALEFILL FACILITY - BRISTOL, VIRGINIA
DRAWING NO.:	S-100		

<p>CITY OF BRISTOL VIRGINIA</p>	<p>134 N. LA SALLE STREET, SUITE 300 CHICAGO, ILLINOIS TELEPHONE: 312.658.0500</p>	DATE:	NOVEMBER 2025
		PROJECT NO.:	CHR8600
		FILE:	CHR8600.01-S01
		SHEET NO.:	6 OF 21

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A

B

C

D

E

F

A

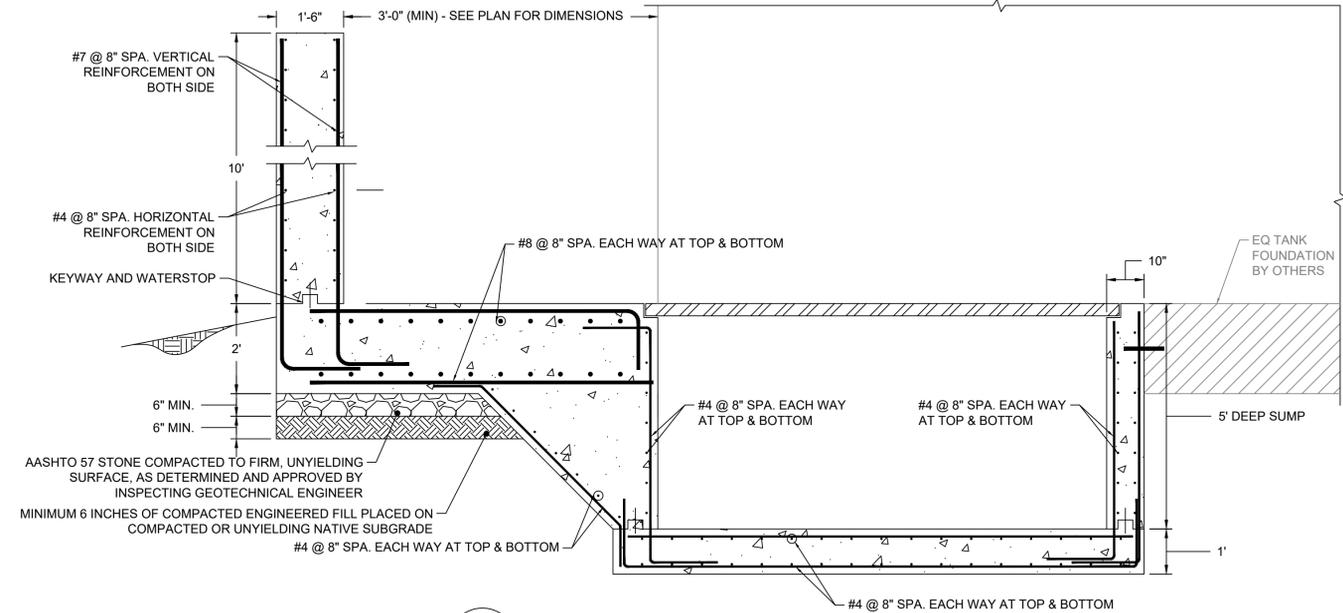
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C

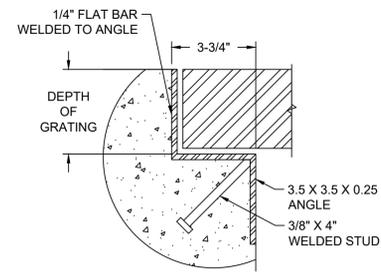
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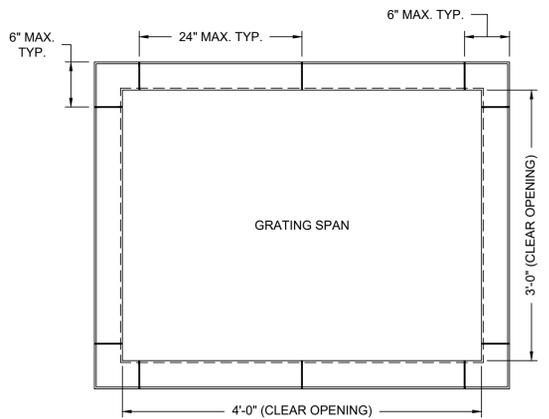
F



6
S-101
DETAIL
SUMP DETAIL
SCALE: N.T.S.



7
S-101
DETAIL
CURB ANGLE
SCALE: N.T.S.



GRATING TO BE: 19-W-4 (1-1/4" X 3/8") STEEL, SERRATED, WITH MINIMUM REQUIREMENTS OF ASTM A1018 GRADE 36. ALL STEEL ANGLES, GRATING AND ANCHORS SHALL BE STAINLESS STEEL.

8
S-101
DETAIL
WELDED STUD LAYOUT
SCALE: N.T.S.

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DESIGNED BY:	LMA
DRAWN BY:	AS
CHECKED BY:	NPH
DRAWING NO.:	S-101

TITLE:	SUMP DETAIL
PROJECT:	EQUALIZATION TANK DESIGN
SITE:	BRISTOL SANITARY LANDFILL AND QUARRY BALEFILL FACILITY - BRISTOL, VIRGINIA

CITY OF BRISTOL VIRGINIA

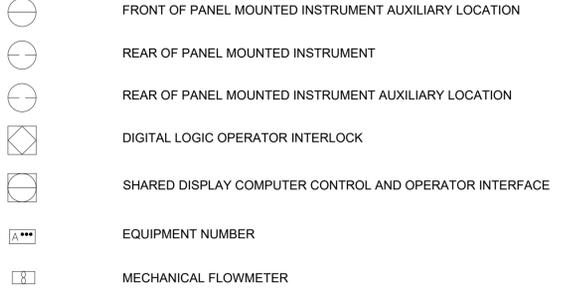
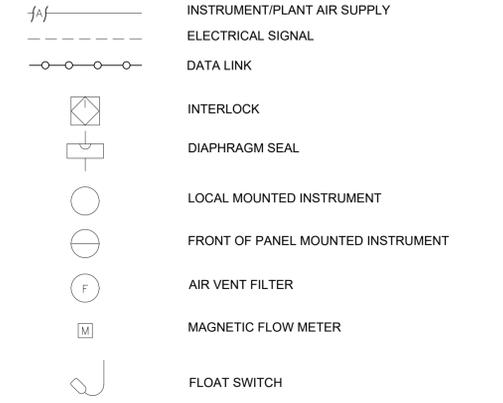
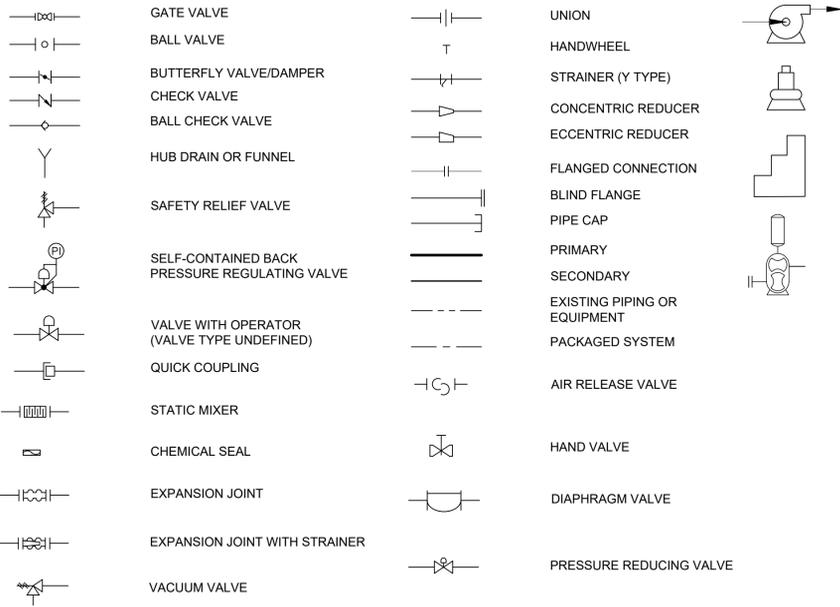
Geosyntec consultants

134 N. LA SALLE STREET, SUITE 300
CHICAGO, ILLINOIS
TELEPHONE: 312.658.0500

DATE:	NOVEMBER 2025
PROJECT NO.:	CHR8600
FILE:	CHR8600.01-S02
SHEET NO.:	7 OF 21

PROCESS & INSTRUMENTATION SYMBOLS

INSTRUMENT SYMBOLS



PIPING IDENTIFICATION	
HDPE	HIGH DENSITY POLYETHYLENE
STL	CARBON STEEL
SS	STAINLESS STEEL
FLX	FLEX TUBING
EXAMPLE:	NOMINAL PIPE SIZE, INCHES MATERIAL OF CONSTRUCTION SERVICE REFERENCE

ABBREVIATIONS

ARV	AIR RELEASE VALVE
BFP	BACKFLOW PREVENTER
BFV	BUTTERFLY VALVE
BV	BALL VALVE
CV	CHECK VALVE
FCV	FLOW CONTROL VALVE
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
H/O/A	HAND OFF AUTO SWITCH
HS	HAND SWITCH
HV	HAND VALVE
MX	STATIC MIXER
OA	OFF AUTO SWITCH
P	PROCESS
PDI	PRESSURE DIFFERENTIAL
PI	PRESSURE INDICATOR
PLC	PROGRAMMABLE LOGIC CONTROL
PRV	PRESSURE RELEASE VALVE
SP	SAMPLE PORT
V	VENT
VFD	VARIABLE FREQUENCY DRIVE

INSTRUMENT SOCIETY OF AMERICA (ISA) IDENTIFICATION TABLE

LETTER	FIRST LETTER(S)		SUCCEEDING LETTERS		
	PROCESS OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS (+)		ALARM		
B	BURNER FLAME		USER'S CHOICE (+)	USER'S CHOICE (+)	USER'S CHOICE (+)
C	CONDUCTIVITY			CONTROL	
D	DENSITY (S.G.)	DIFFERENTIAL			
E	VOLTAGE/EMF		PRIMARY ELEMENT		
F	FLOW RATE	RATIO/BIAS			
G	GAUGE		GLASS	GATE	
H	HAND (MANUAL)				HIGH
I	CURRENT		INDICATE		
J	POWER	SCAN			
K	TIME OR SCHEDULE			CONTROL STATION	
L	LEVEL		LIGHT (PILOT)		LOW
M	MOTION				MIDDLE/INTERMEDIATE
N	USER'S CHOICE (+)		USER'S CHOICE (+)	USER'S CHOICE (+)	USER'S CHOICE (+)
O	USER'S CHOICE (+)		ORIFICE/RESTRICTION		
P	PRESSURE/VACUUM		POINT (TEST CONNECTION)		
Q	QUANTITY/EVENT (+)	INTEGRATE	INTEGRATE		
R	RADIOACTIVITY		RECORD/PRINT		
S	SPEED/FREQUENCY	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTI-VARIABLE (+)		MULTIFUNCTION (+)	MULTIFUNCTION (+)	MULTIFUNCTION (+)
V	VISCOSITY			VALVE/DAMPER	
W	WEIGHT/FORCE		WELL		
X	UNCLASSIFIED (+)		UNCLASSIFIED (+)	UNCLASSIFIED (+)	UNCLASSIFIED (+)
Y	USER'S CHOICE (+)			RELAY/COMPUTE (+)	
Z	POSITION			DRIVE, ACTUATE, OR UNCLASSIFIED FINAL CONTROL ELEMENT	

(+) WHEN USED, EXPLANATION IS SHOWN ADJACENT TO INSTRUMENT SYMBOL. SEE ABBREVIATIONS LIST.

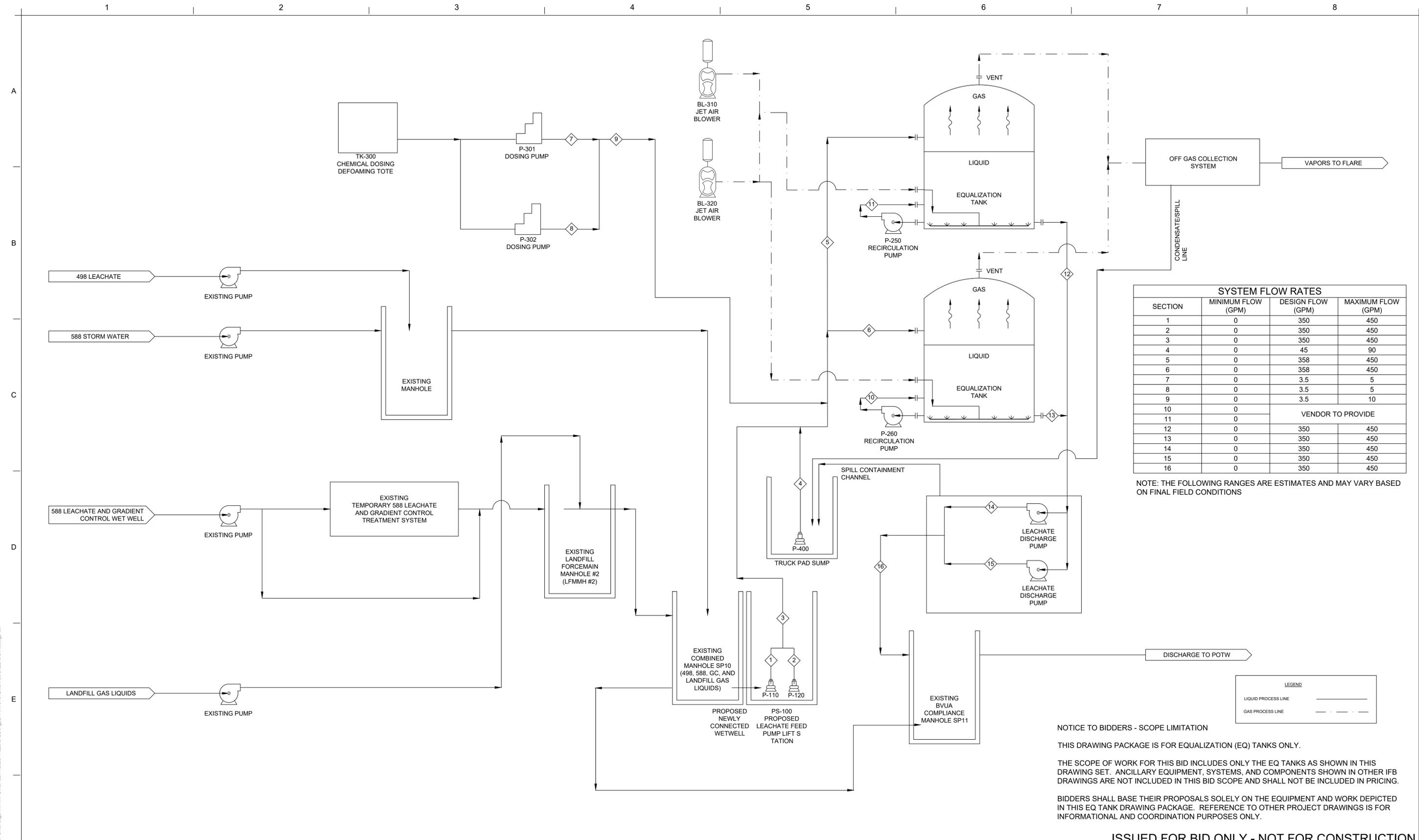
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 THE SCOPE OF WORK FOR THIS BID INCLUDES ONLY THE EQ TANKS AS SHOWN IN THIS DRAWING SET. ANCILLARY EQUIPMENT, SYSTEMS, AND COMPONENTS SHOWN IN OTHER IFB DRAWINGS ARE NOT INCLUDED IN THIS BID SCOPE AND SHALL NOT BE INCLUDED IN PRICING.

BIDDERS SHALL BASE THEIR PROPOSALS SOLELY ON THE EQUIPMENT AND WORK DEPICTED IN THIS EQ TANK DRAWING PACKAGE. REFERENCE TO OTHER PROJECT DRAWINGS IS FOR INFORMATIONAL AND COORDINATION PURPOSES ONLY.

ISSUED FOR BID ONLY - NOT FOR CONSTRUCTION

DESIGN BY: AR DRAWN BY: RN CHECKED BY: BD DRAWING NO.: D-001		TITLE: PROCESS SYMBOLOGY AND ABBREVIATIONS PROJECT: EQUALIZATION TANK DESIGN SITE: BRISTOL SANITARY LANDFILL AND QUARRY BALEFILL FACILITY - BRISTOL, VIRGINIA		DATE: NOVEMBER 2025 PROJECT NO.: CHR8600 FILE: CHR8600_D-001 SHEET NO.: 8 OF 21	
C 10/26/25 ISSUE FOR BID (IFB) DESIGN SET RN BS B 7/28/25 60% DESIGN REVIEW RN BS A 5/12/25 30% DESIGN REVIEW RN BS REV DATE DESCRIPTION DRN APP		CITY OF BRISTOL VIRGINIA Geosyntec consultants 134 N. LA SALLE STREET, SUITE 300 CHICAGO, ILLINOIS TELEPHONE: 312.658.0500			

C:\GED-ACC\DCS\GEOSYNTEC\CITY OF BRISTOL_SANITARY LANDFILL\PROJECT FILES\CADD\EQ TANK SYSTEM\DWGS\BRIEFS\CHR8600_D-001



SYSTEM FLOW RATES			
SECTION	MINIMUM FLOW (GPM)	DESIGN FLOW (GPM)	MAXIMUM FLOW (GPM)
1	0	350	450
2	0	350	450
3	0	350	450
4	0	45	90
5	0	358	450
6	0	358	450
7	0	3.5	5
8	0	3.5	5
9	0	3.5	10
10	0	VENDOR TO PROVIDE	
11	0	VENDOR TO PROVIDE	
12	0	350	450
13	0	350	450
14	0	350	450
15	0	350	450
16	0	350	450

NOTE: THE FOLLOWING RANGES ARE ESTIMATES AND MAY VARY BASED ON FINAL FIELD CONDITIONS

LEGEND	
LIQUID PROCESS LINE	—————
GAS PROCESS LINE	- - - - -

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REV	DATE	DESCRIPTION	DRN	APP
C	10/26/25	ISSUE FOR BID (IFB) DESIGN SET	RN	BS
B	7/28/25	60% DESIGN REVIEW	RN	BS
A	5/12/25	30% DESIGN REVIEW	RN	BS
		DESCRIPTION	DRN	APP

DESIGN BY:	AR
DRAWN BY:	RN
CHECKED BY:	BD
DRAWING NO.:	D-601

TITLE:	PROCESS FLOW DIAGRAM
PROJECT:	EQUALIZATION TANK DESIGN
SITE:	BRISTOL SANITARY LANDFILL AND QUARRY BALEFILL FACILITY - BRISTOL, VIRGINIA

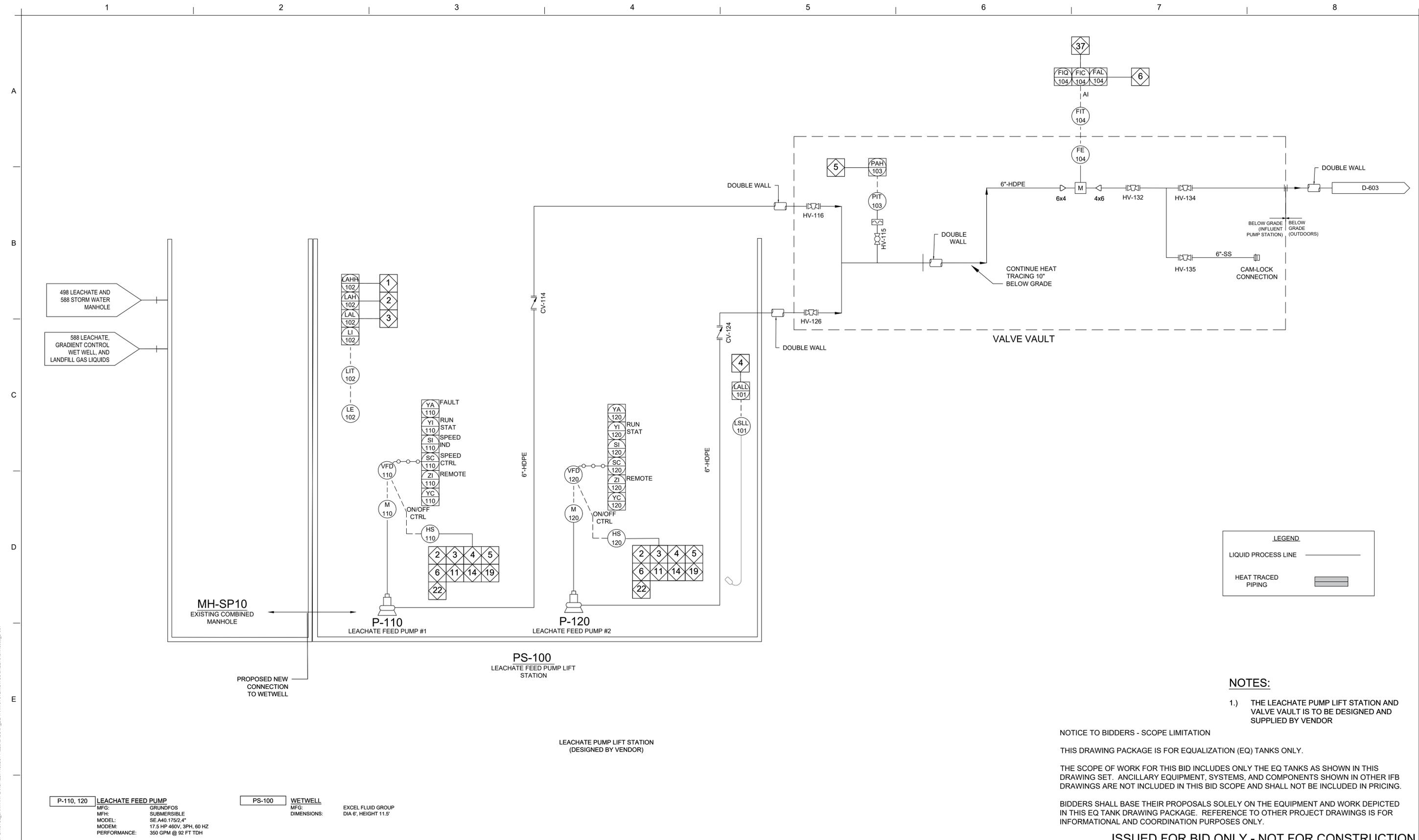
CITY OF BRISTOL VIRGINIA

Geosyntec consultants

134 N. LA SALLE STREET, SUITE 300
CHICAGO, ILLINOIS
TELEPHONE: 312.658.0500

DATE:	NOVEMBER 2025
PROJECT NO.:	CHR8600
FILE:	CHR8600_D-601
SHEET NO.:	9 OF 21

C:\GED-ACC\DCS\GEOSYNTEC\CITY OF BRISTOL_SANITARY LANDFILL\PROJECT FILES\CADD\1_EQ TANK SYSTEM\DWGS\BRIETS\CHR8600_D-601



P-110, 120	LEACHATE FEED PUMP	PS-100	WETWELL
MFG:	GRUNDFOS	MFG:	EXCEL FLUID GROUP
MFH:	SUBMERSIBLE	DIMENSIONS:	DIA 6", HEIGHT 11.5'
MODEL:	SE A40.175/2.4"		
MODEM:	17.5 HP 460V, 3PH, 60 HZ		
PERFORMANCE:	350 GPM @ 92 FT TDH		

- NOTES:**
- THE LEACHATE PUMP LIFT STATION AND VALVE VAULT IS TO BE DESIGNED AND SUPPLIED BY VENDOR

NOTICE TO BIDDERS - SCOPE LIMITATION

THIS DRAWING PACKAGE IS FOR EQUALIZATION (EQ) TANKS ONLY.

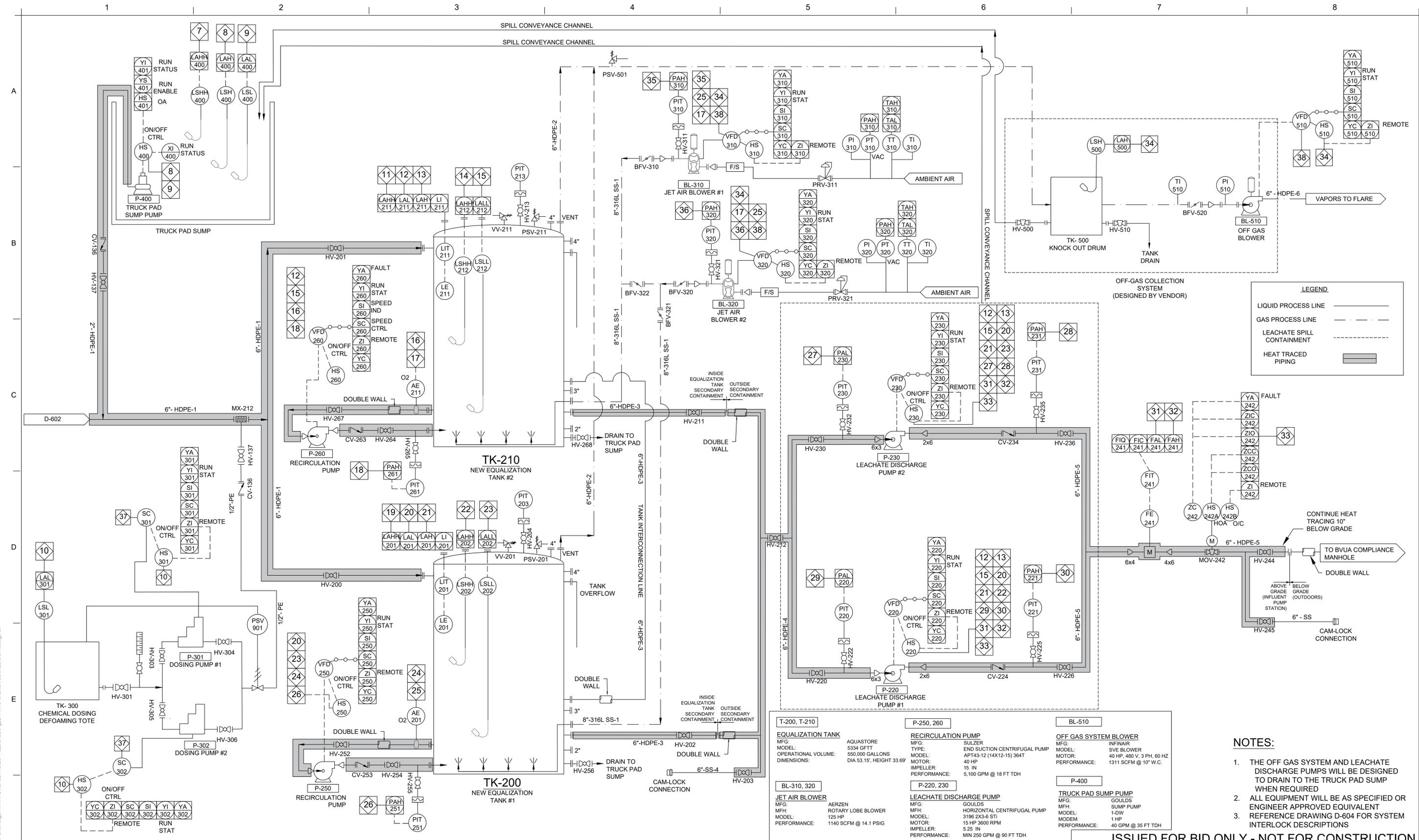
THE SCOPE OF WORK FOR THIS BID INCLUDES ONLY THE EQ TANKS AS SHOWN IN THIS DRAWING SET. ANCILLARY EQUIPMENT, SYSTEMS, AND COMPONENTS SHOWN IN OTHER IFB DRAWINGS ARE NOT INCLUDED IN THIS BID SCOPE AND SHALL NOT BE INCLUDED IN PRICING.

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ISSUED FOR BID ONLY - NOT FOR CONSTRUCTION

DESIGN BY: AR DRAWN BY: RN CHECKED BY: BD DRAWING NO.: D-602		TITLE: PROCESS AND INSTRUMENTATION DIAGRAM SHT 1 PROJECT: EQUALIZATION TANK DESIGN SITE: BRISTOL SANITARY LANDFILL AND QUARRY BALEFILL FACILITY - BRISTOL, VIRGINIA		DATE: NOVEMBER 2025 PROJECT NO.: CHR8600 FILE: CHR8600_D-601 SHEET NO.: 10 OF 21
C 10/26/25 ISSUE FOR BID (IFB) DESIGN SET RN BS B 7/28/25 60% DESIGN REVIEW RN BS A 5/12/25 30% DESIGN REVIEW RN BS REV DATE DESCRIPTION DRN APP				

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DESIGN BY: AR	TITLE: PROCESS AND INSTRUMENTATION DIAGRAM SHT 2	DATE: NOVEMBER 2025
DRAWN BY: RN	PROJECT: EQUALIZATION TANK DESIGN	PROJECT NO.: CHR8600
CHECKED BY: BD	SITE: BRISTOL SANITARY LANDFILL AND QUARRY BALEFILL FACILITY - BRISTOL, VIRGINIA	FILE: CHR8600_D-601
DRAWING NO.: D-603		SHEET NO.: 11 OF 21




134 N. LA SALLE STREET, SUITE 300
CHICAGO, ILLINOIS
TELEPHONE: 312.658.0500

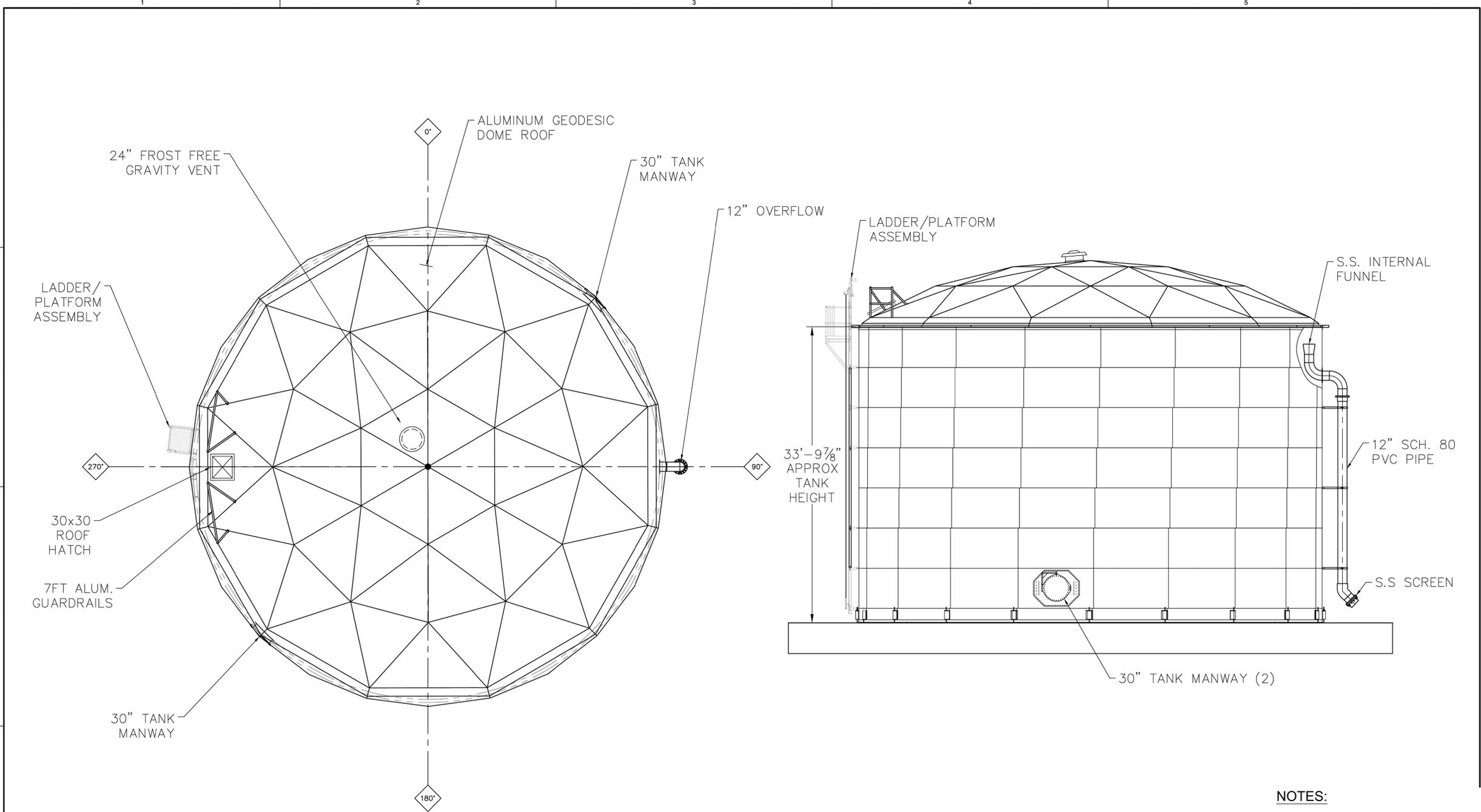
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1 2 3 4 5 6 7 8

A B C D E F

1 2 3 4 5 6 7 8

Drawing: C:\GEO-ACC\ACCDocs\Geosyntec\CITY OF BRISTOL_SANITARY LANDFILL\Project Files\CADD\01_EQ TANK SYSTEM\DWGS\REFS\BRISTOL_TANKS WITHOUT 2ND CONTAINMENT.dwg
 Plotted: 7/25/2025 11:01 PM



NOTES:
 1. DRAWINGS PROVIDED BY TANK VENDOR FOR REFERENCE.

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B	7/28/25	60% DESIGN REVIEW	RN	BS
A	5/12/25	30% DESIGN REVIEW	RN	BS

DESIGN BY:	BS	TITLE:	EQUALIZATION TANK
DRAWN BY:	RN	PROJECT:	EQUALIZATION TANK DESIGN
CHECKED BY:	KMH	SITE:	BRISTOL SANITARY LANDFILL AND QUARRY BALEFILL FACILITY - BRISTOL, VIRGINIA
DRAWING NO.:	Q-101		

134 N. LA SALLE STREET, SUITE 300
CHICAGO, ILLINOIS
TELEPHONE: 312.658.0500

DATE:	NOVEMBER 2025
PROJECT NO.:	CHR8600
FILE:	CHR8600_Q-101
SHEET NO.:	13 OF 21

C:\GEO-ACC\GEOBYTEC\CITY OF BRISTOL_SANITARY LANDFILL\PROJECT FILES\CADD\01_EQ TANK SYSTEM\DWGS\REFS\BRISTOL_TANKS WITHOUT 2ND CONTAINMENT.dwg

CONTENTS:
 FA-01 FOUNDATION DETAILS
 MA-01 TANK DETAILS
 MA-02 PRIMARY TANK DETAILS
 MA-03 SECONDARY TANK DETAILS
 MA-04 LADDER DETAILS

DRAWING REQUEST NOTES:
 THESE DRAWINGS ARE PRELIMINARY IN DESIGN. THESE DRAWINGS ARE TO BE USED AS A STARTING POINT FOR YOUR PROJECT. THESE DRAWINGS ARE NOT ENGINEERED AND SHOULD NOT BE USED AS AN "APPROVED FOR CONSTRUCTION" SET.

TANK ORIENTATION
 • TANK ORIENTATION IS SHOWN WITH THE 0° CARDINAL LINE POINTING NORTH
 • PIPING AND OTHER DETAILS MAY BE ROTATED FOR CLARITY

FOUNDATION DESIGN
 • FOUNDATION DESIGN SHOWN IS A TYPICAL FOUNDATION DESIGN. FINAL FOUNDATION FOR CONSTRUCTION TO BE DESIGNED BY CST STORAGE SYSTEMS OF DEKALB, IL. THE FINAL FOUNDATION WILL BE DESIGNED AFTER JOB IS AWARDED AND WHEN A SOILS REPORT IS RECEIVED.
 • FINAL FOUNDATION DESIGN TO INCLUDE:
 ○ REBAR QUANTITIES, BAR SHAPES AND BAR SIZES
 ○ MINIMUM CONCRETE COMPRESSIVE STRENGTH
 ○ FOOTING DEPTHS, WIDTHS AND SLAB THICKNESS
 ○ MIN. SOIL BEARING REQUIREMENTS

TANK DESIGN
 • THIS DRAWING SET SHOWS BASIC DIMENSIONS
 • TANK DESIGN WILL BE COMPLETED BY CST STORAGE SYSTEMS OF DEKALB, IL. THE FINAL TANK DESIGN WILL BE RECEIVED AFTER JOB IS AWARDED.
 • TANK DESIGN WILL INCLUDE ALL CALCULATIONS AND TANK PANEL REQUIREMENTS

PIPING
 • ALL PIPING IS SHOWN AS TYPICALLY INSTALLED.
 • PIPING INCLUDES BUT IS NOT LIMITED TO: UNDER TANK PIPING, OVERFLOW PIPING AND TANK NOZZLES.
 • PIPE LOCATIONS, SIZING AND MATERIAL WILL NEED TO BE CONFIRMED BY THE DESIGN ENGINEER.

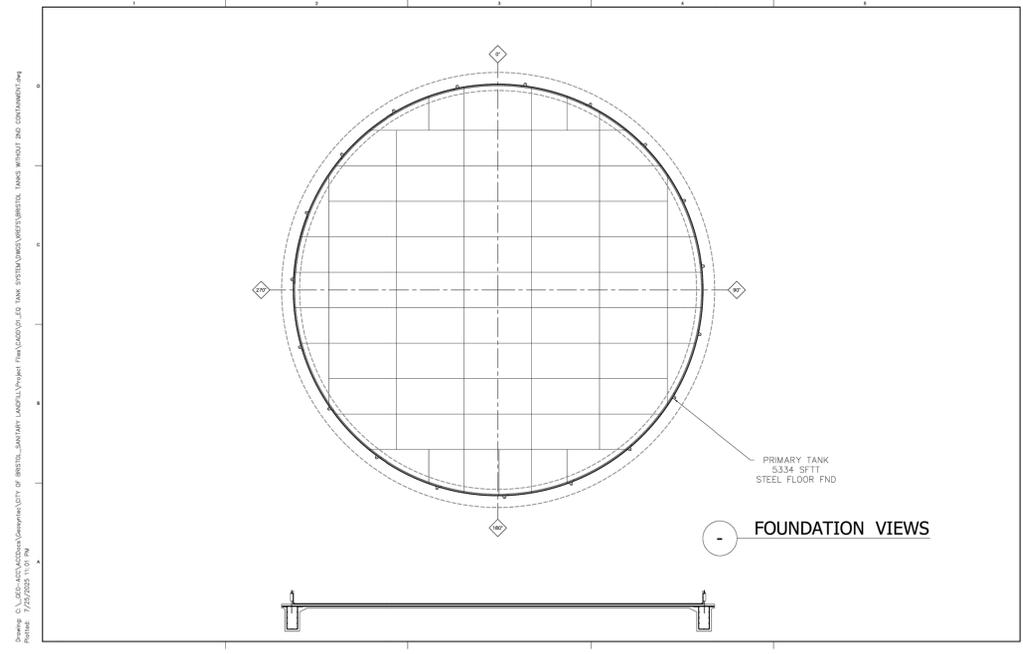
PROJECT NAME: BRISTOL SANITARY LANDFILL
 EQUALIZATION TANK DESIGN

ENGINEER: GEOSYNTEC CONSULTANTS

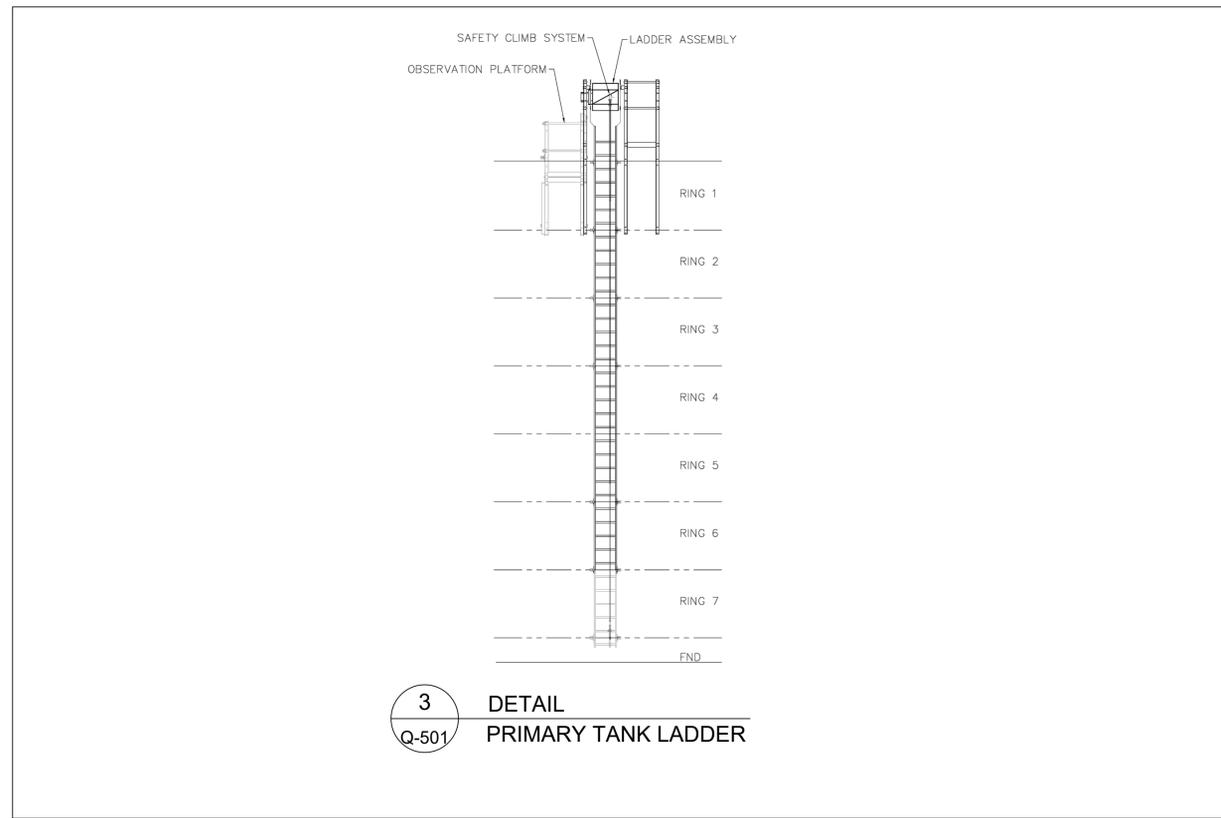
TANK SIZE: PRIMARY - 5334 GFTT
 SECONDARY - 6724 SST

DATE: 05/06/2025

1 DETAIL
Q-501 EQUALIZATION TANK NOTES



2 DETAIL
Q-501 PRIMARY TANK PLAN VIEW



3 DETAIL
Q-501 PRIMARY TANK LADDER

NOTES:

1. DRAWINGS PROVIDED BY TANK VENDOR FOR REFERENCE.

NOTICE TO BIDDERS - SCOPE LIMITATION

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A	5/12/25	30% DESIGN REVIEW	RN	BS

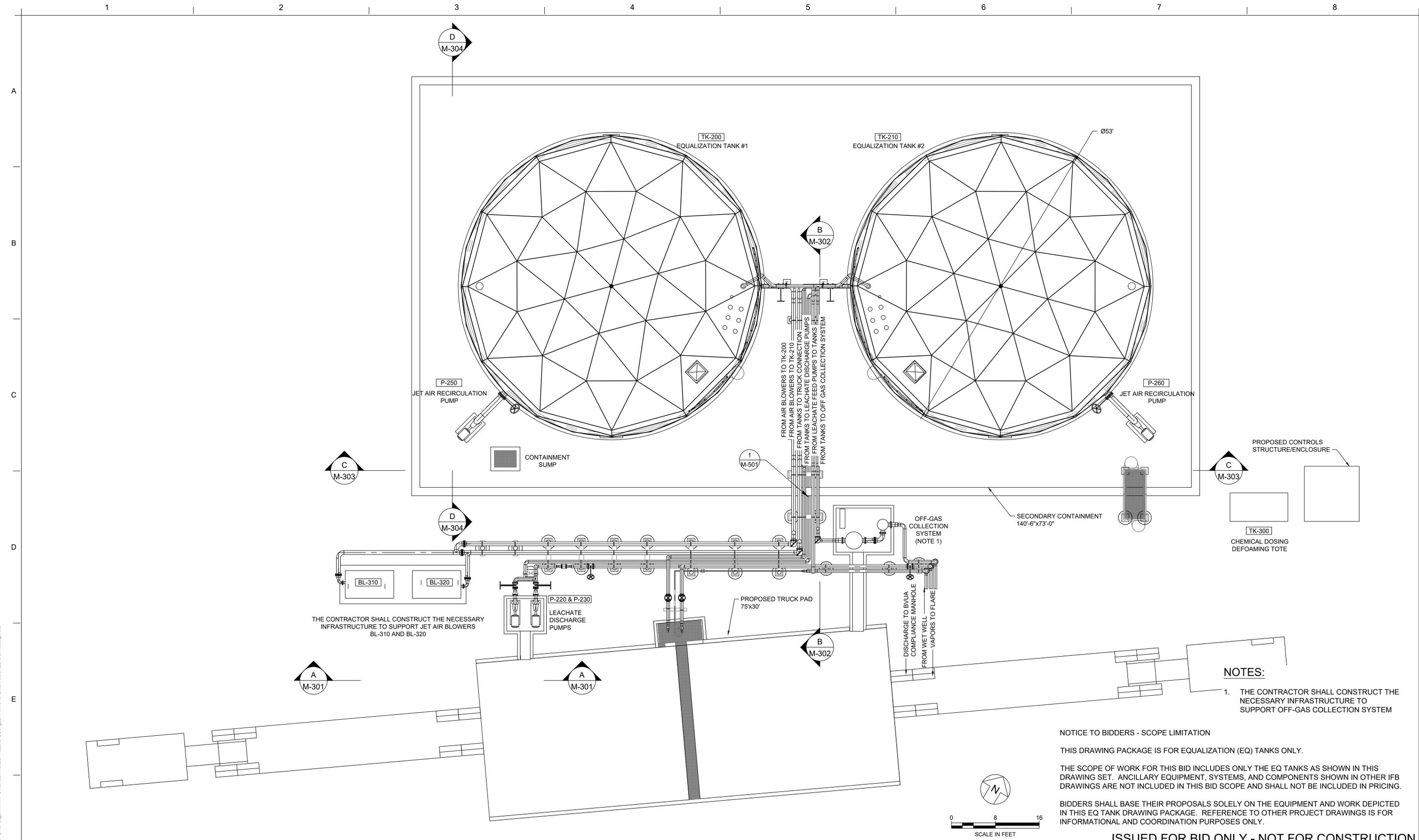
DESIGN BY:	BS	TITLE:	EQUALIZATION TANK DETAILS
DRAWN BY:	RN	PROJECT:	EQUALIZATION TANK DESIGN
CHECKED BY:	KMH	SITE:	BRISTOL SANITARY LANDFILL AND QUARRY BALEFILL FACILITY - BRISTOL, VIRGINIA
DRAWING NO.:	Q-501		

CITY OF BRISTOL VIRGINIA

Geosyntec consultants

134 N. LA SALLE STREET, SUITE 300
 CHICAGO, ILLINOIS
 TELEPHONE: 312.658.0500

DATE:	NOVEMBER 2025
PROJECT NO.:	CHR8600
FILE:	CHR8600_Q-102
SHEET NO.:	14 OF 21



THE CONTRACTOR SHALL CONSTRUCT THE NECESSARY INFRASTRUCTURE TO SUPPORT JET AIR BLOWERS BL-310 AND BL-320

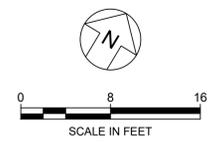
- NOTES:**
1. THE CONTRACTOR SHALL CONSTRUCT THE NECESSARY INFRASTRUCTURE TO SUPPORT OFF-GAS COLLECTION SYSTEM

NOTICE TO BIDDERS - SCOPE LIMITATION

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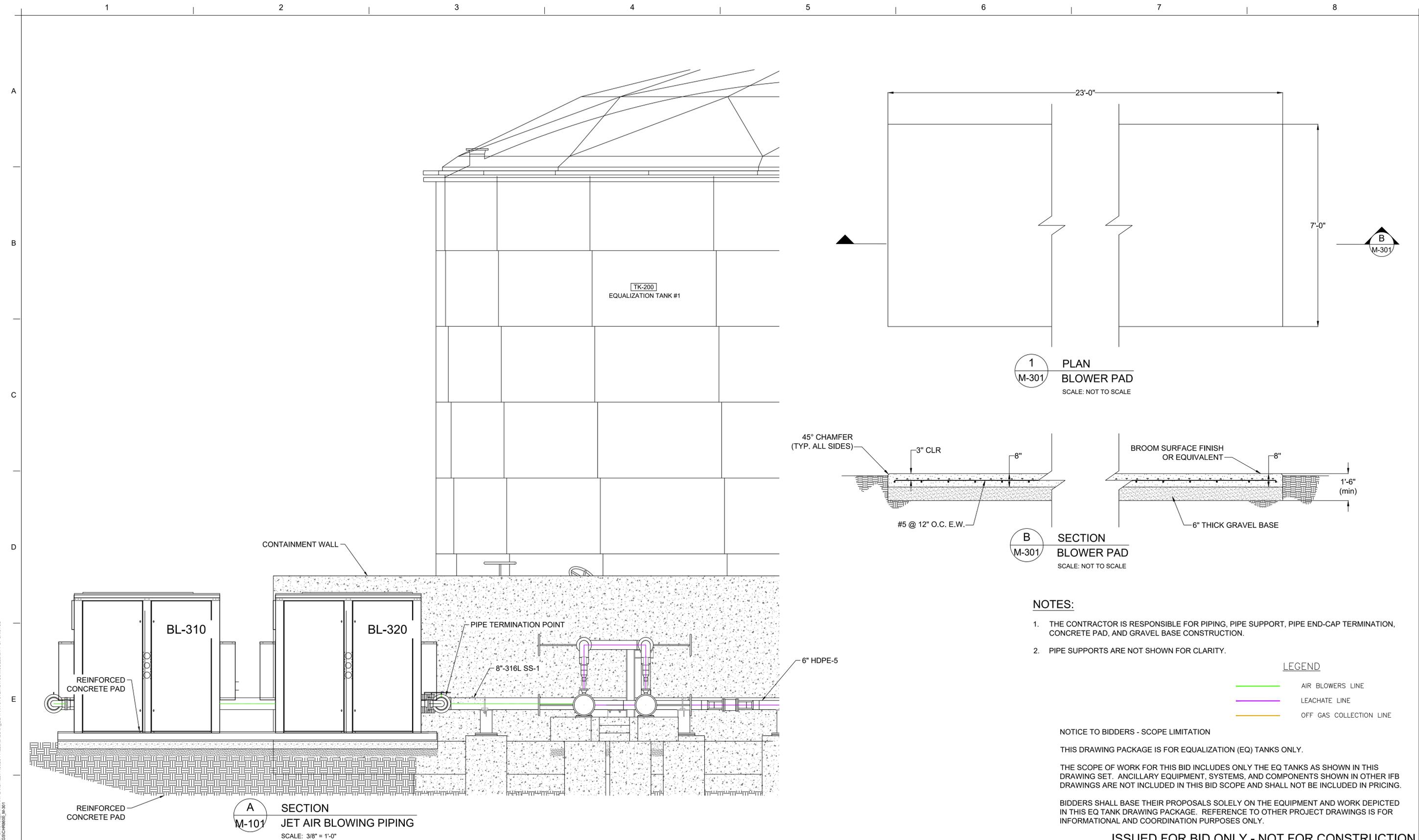
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REV	DATE	DESCRIPTION	DRN	APP
C	10/26/25	ISSUE FOR BID (IFB) DESIGN SET	RN	BS
B	7/28/25	60% DESIGN REVIEW	RN	BS
A	5/12/25	30% DESIGN REVIEW	RN	BS

DESIGN BY:	BS	TITLE:	EQUALIZATION TANK SYSTEM - ENLARGED VIEW
DRAWN BY:	RN	PROJECT:	EQUALIZATION TANK DESIGN
CHECKED BY:	KMH	SITE:	BRISTOL SANITARY LANDFILL AND QUARRY BALEFILL FACILITY - BRISTOL, VIRGINIA
DRAWING NO.:	M-300		

<p>CITY OF BRISTOL VIRGINIA</p>	<p>Geosyntec consultants</p> <p>134 N. LA SALLE STREET, SUITE 300 CHICAGO, ILLINOIS TELEPHONE: 312.658.0500</p>	DATE:	NOVEMBER 2025
		PROJECT NO.:	CHR8600
		FILE:	CHR8600_M-300
		SHEET NO.:	15 OF 21

C:\GEO-ACC\GEO\GEO\PROJECT FILES\CADD\01_EQ TANK SYSTEM\DWG\BRIEFS\CHR8600_M-300



- NOTES:**
1. THE CONTRACTOR IS RESPONSIBLE FOR PIPING, PIPE SUPPORT, PIPE END-CAP TERMINATION, CONCRETE PAD, AND GRAVEL BASE CONSTRUCTION.
 2. PIPE SUPPORTS ARE NOT SHOWN FOR CLARITY.

LEGEND

—	AIR BLOWERS LINE
—	LEACHATE LINE
—	OFF GAS COLLECTION LINE

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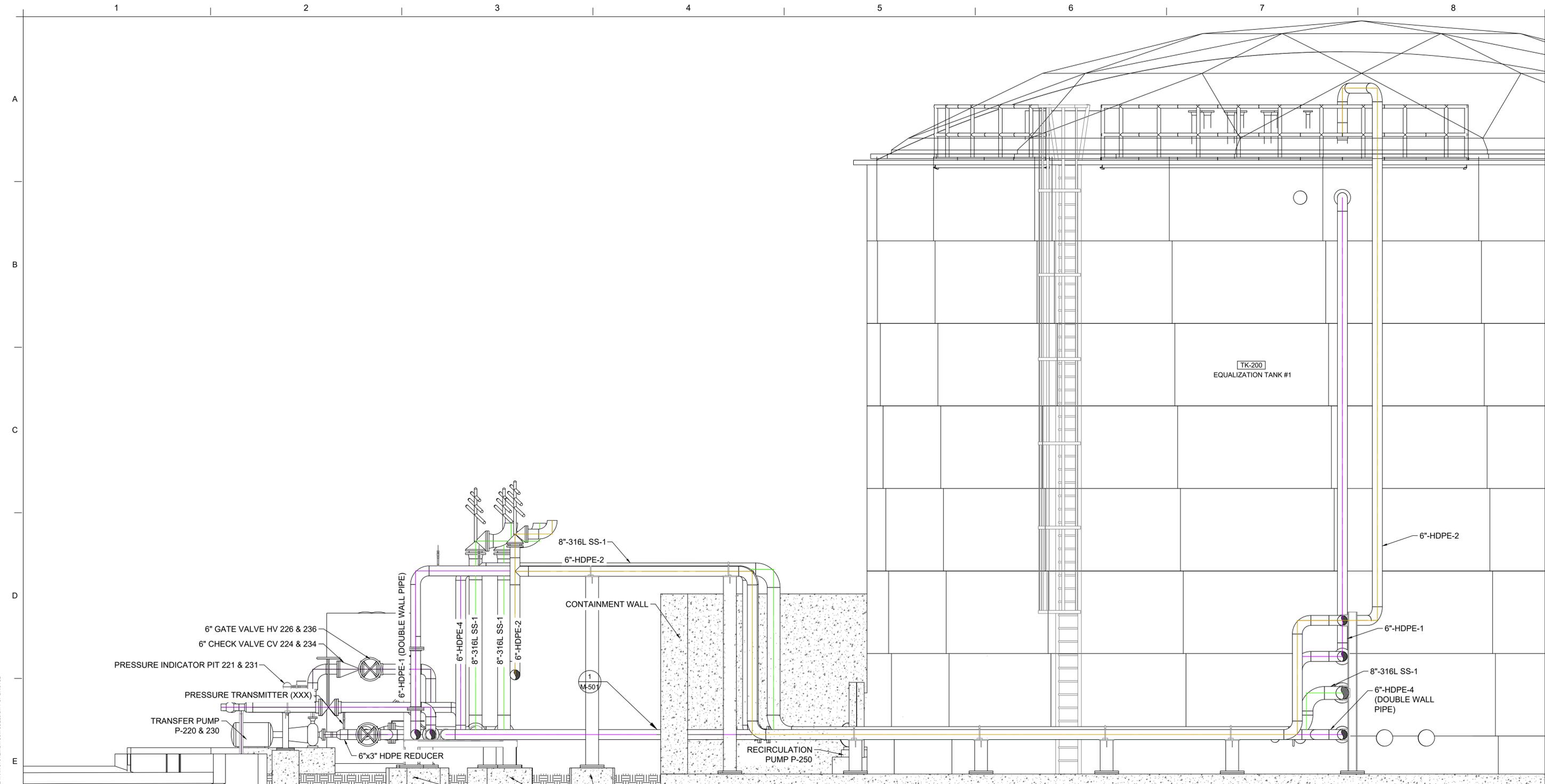
REV	DATE	DESCRIPTION	DRN	APP
C	10/26/25	ISSUE FOR BID (IFB) DESIGN SET	RN	BS
B	7/28/25	60% DESIGN REVIEW	RN	BS
A	5/12/25	30% DESIGN REVIEW	RN	BS

DESIGN BY:	BS	TITLE:	AERATION SYSTEM PIPING SECTION & DETAILS
DRAWN BY:	RN	PROJECT:	EQUALIZATION TANK DESIGN
CHECKED BY:	KMH	SITE:	BRISTOL SANITARY LANDFILL AND QUARRY BALEFILL FACILITY - BRISTOL, VIRGINIA
DRAWING NO.:	M-301		

134 N. LA SALLE STREET, SUITE 300
CHICAGO, ILLINOIS
TELEPHONE: 312.658.0500

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consultants

DATE:	NOVEMBER 2025
PROJECT NO.:	CHR8600
FILE:	CHR8600_M-301
SHEET NO.:	16 OF 21



B SECTION
M-101 LEACHATE DISCHARGE PUMP SECTION
 SCALE: 3/8" = 1'-0"

LEGEND

—	AIR BLOWERS LINE
—	LEACHATE LINE
—	OFF GAS COLLECTION LINE

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REV	DATE	DESCRIPTION	DRN	APP
C	10/26/25	ISSUE FOR BID (IFB) DESIGN SET	RN	BS
B	7/28/25	60% DESIGN REVIEW	RN	BS
A	5/12/25	30% DESIGN REVIEW	RN	BS

DESIGN BY:	BS	TITLE:	LEACHATE DISCHARGE PUMP SECTION
DRAWN BY:	RN	PROJECT:	EQUALIZATION TANK DESIGN
CHECKED BY:	KMH	SITE:	BRISTOL SANITARY LANDFILL AND QUARRY BALEFILL FACILITY - BRISTOL, VIRGINIA
DRAWING NO.:	M-302		



134 N. LA SALLE STREET, SUITE 300
 CHICAGO, ILLINOIS
 TELEPHONE: 312.658.0500

DATE:	NOVEMBER 2025
PROJECT NO.:	CHR8600
FILE:	CHR8600_M-302
SHEET NO.:	17 OF 21

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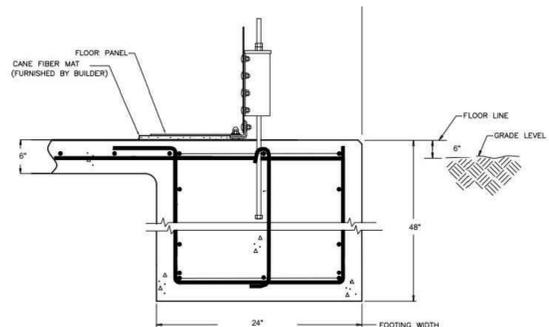
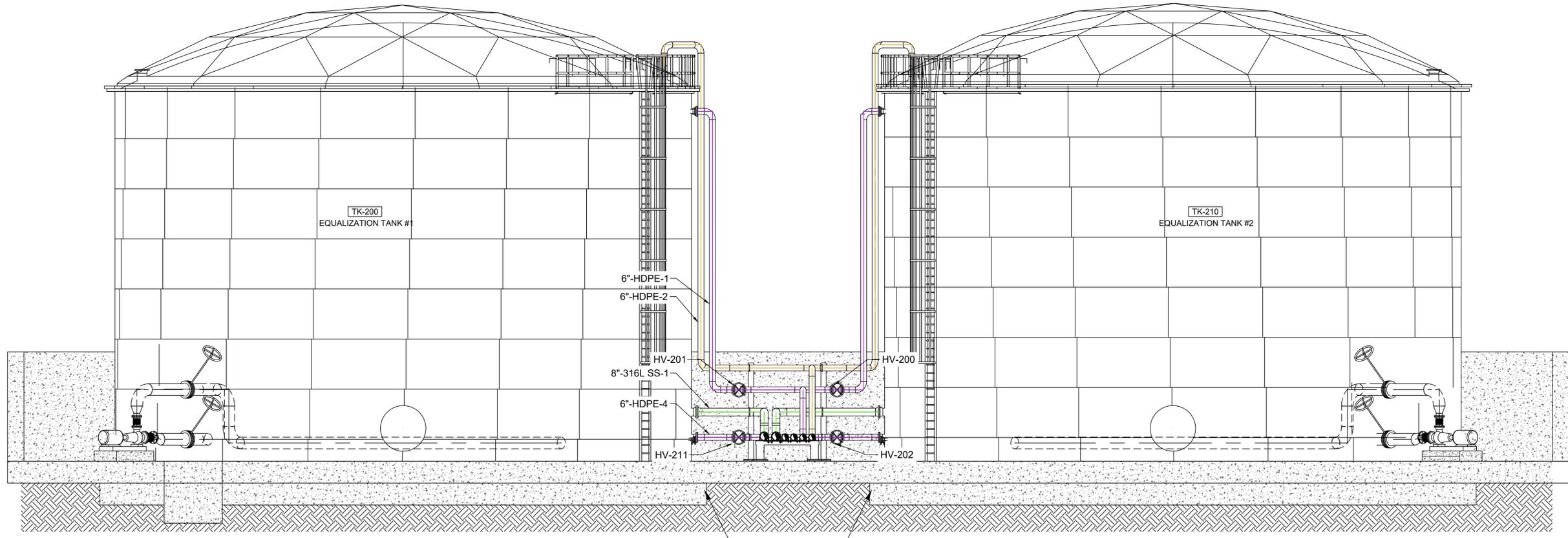
B

C

D

E

F



1 M-303
DETAIL
FOUNDATION RING WALL
 SCALE: NOT TO SCALE

C M-101
SECTION
IN BETWEEN TK-200 & TK-210
 SCALE: 3/16" = 1'-0"

LEGEND

—	AIR BLOWERS LINE
—	LEACHATE LINE
—	OFF GAS COLLECTION LINE

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DESIGN BY:	BS	TITLE:	IN BETWEEN TK-200 & 210 SECTION
DRAWN BY:	RN	PROJECT:	EQUALIZATION TANK DESIGN
CHECKED BY:	KMH	SITE:	BRISTOL SANITARY LANDFILL AND QUARRY BALEFILL FACILITY - BRISTOL, VIRGINIA
DRAWING NO.:	M-303		

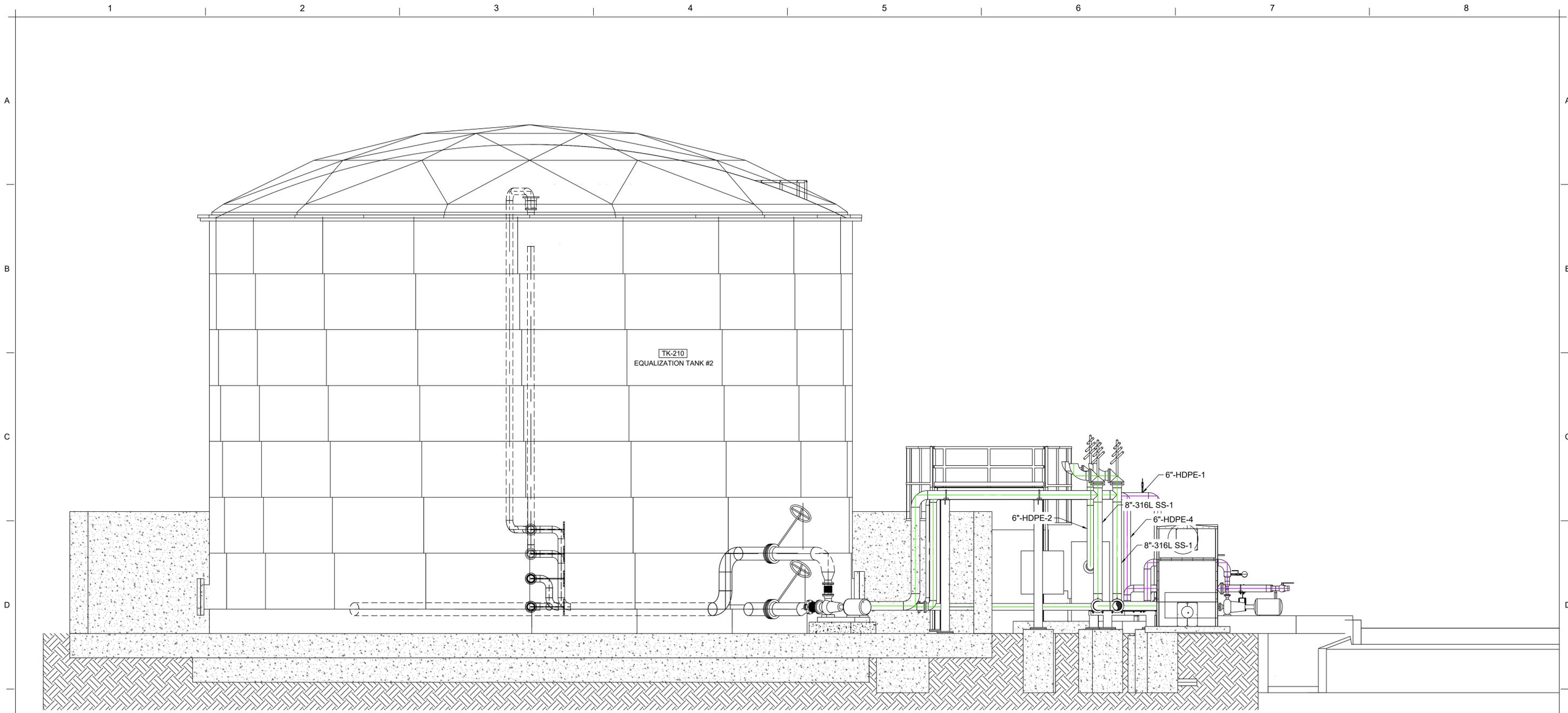
Geosyntec
consultants

134 N. LA SALLE STREET, SUITE 300
CHICAGO, ILLINOIS
TELEPHONE: 312.658.0500

DATE:	NOVEMBER 2025
PROJECT NO.:	CHR8600
FILE:	CHR8600_M-303
SHEET NO.:	18 OF 21

REV	DATE	DESCRIPTION	DRN	APP
C	10/26/25	ISSUE FOR BID (IFB) DESIGN SET	RN	BS
B	7/28/25	60% DESIGN REVIEW	RN	BS
A	5/12/25	30% DESIGN REVIEW	RN	BS
		DESCRIPTION	DRN	APP

1 2 3 4 5 6 7 8



LEGEND

—	AIR BLOWERS LINE
—	LEACHATE LINE
—	OFF GAS COLLECTION LINE

D
M-101 SECTION
 IN BERM NORTH AND SOUTH
 SCALE: 1/4" = 1'-0"

NOTICE TO BIDDERS - SCOPE LIMITATION

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REV	DATE	DESCRIPTION	DRN	APP
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B	7/28/25	60% DESIGN REVIEW	RN	BS
A	5/12/25	30% DESIGN REVIEW	RN	BS

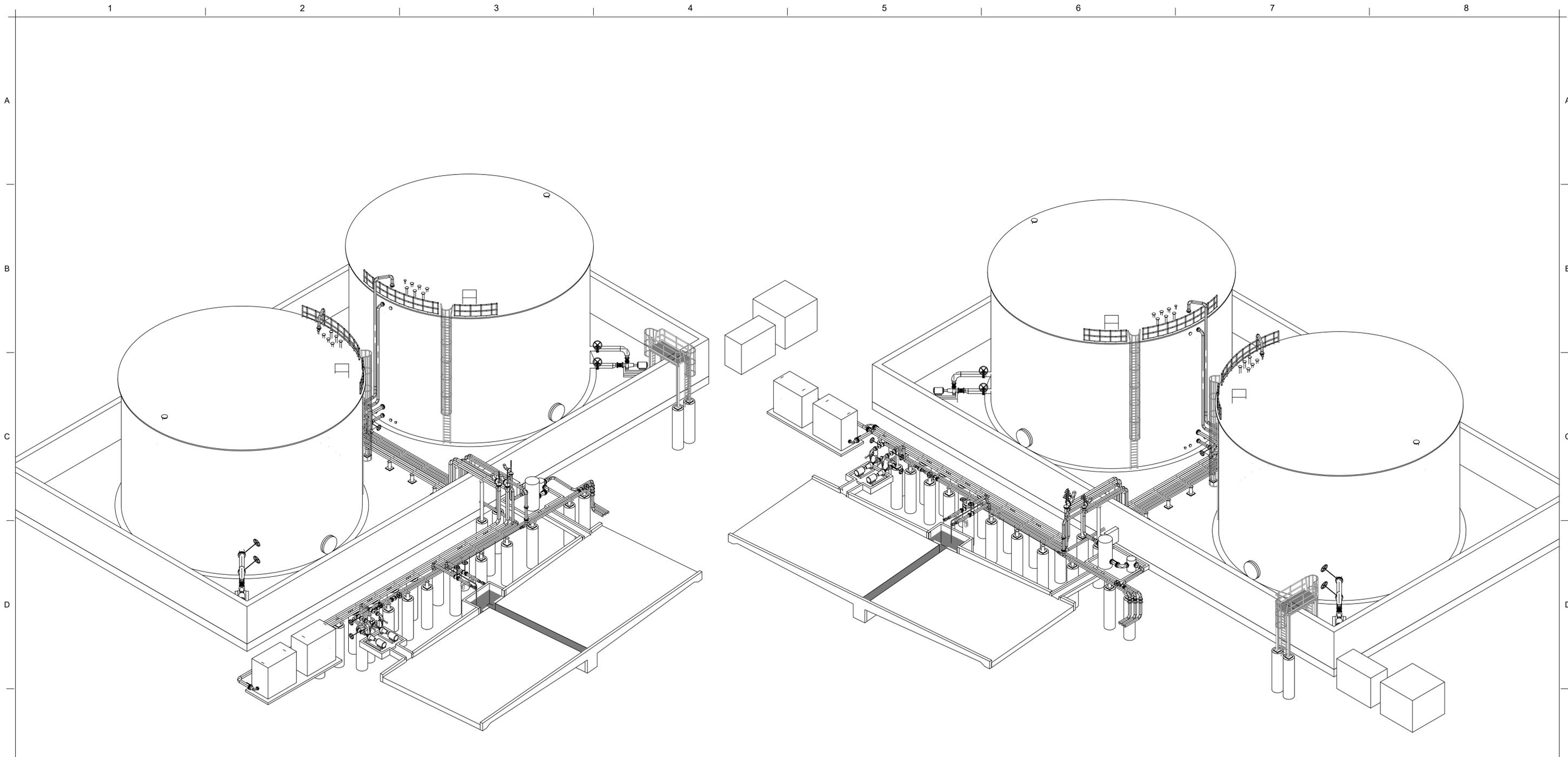
DESIGNED BY:	BS
DRAWN BY:	RN
CHECKED BY:	KMH
DRAWING NO.:	M-304

TITLE:	IN BERM NORTH AND SOUTH
PROJECT:	EQUALIZATION TANK DESIGN
SITE:	BRISTOL SANITARY LANDFILL AND QUARRY BALEFILL FACILITY - BRISTOL, VIRGINIA

Geosyntec
consultants

134 N. LA SALLE STREET, SUITE 300
CHICAGO, ILLINOIS
TELEPHONE: 312.658.0500

DATE:	NOVEMBER 2025
PROJECT NO.:	CHR8600
FILE:	CHR8600_M-304
SHEET NO.:	19 OF 21



A SECTION
M-601 SW ISOMETRIC VIEW
 SCALE: 3/32" = 1'-0"

B SECTION
M-601 SE ISOMETRIC VIEW
 SCALE: 3/32" = 1'-0"

NOTICE TO BIDDERS - SCOPE LIMITATION

THIS DRAWING PACKAGE IS FOR EQUALIZATION (EQ) TANKS ONLY.

THE SCOPE OF WORK FOR THIS BID INCLUDES ONLY THE EQ TANKS AS SHOWN IN THIS DRAWING SET. ANCILLARY EQUIPMENT, SYSTEMS, AND COMPONENTS SHOWN IN OTHER IFB DRAWINGS ARE NOT INCLUDED IN THIS BID SCOPE AND SHALL NOT BE INCLUDED IN PRICING.

BIDDERS SHALL BASE THEIR PROPOSALS SOLELY ON THE EQUIPMENT AND WORK DEPICTED IN THIS EQ TANK DRAWING PACKAGE. REFERENCE TO OTHER PROJECT DRAWINGS IS FOR INFORMATIONAL AND COORDINATION PURPOSES ONLY.

ISSUED FOR BID ONLY - NOT FOR CONSTRUCTION

C:\GEO-ACCAD\GEO\SYSTEMS\BRISTOL_SANITARY_LANDFILL\PROJECT_FILES\CADD\EQ_TANK_SYSTEM\DWG\MODELELECFY OF BRISTOL - SANITARY LANDFILL PLANT 2024\HR8600\M-601.DWG

REV	DATE	DESCRIPTION	DRN	APP
C	10/26/25	ISSUE FOR BID (IFB) DESIGN SET	RN	BS
B	7/28/25	60% DESIGN REVIEW	RN	BS
A	5/12/25	30% DESIGN REVIEW	RN	BS

DESIGN BY:	BS	TITLE:	OVERALL ISOMETRIC
DRAWN BY:	RN	PROJECT:	EQUALIZATION TANK DESIGN
CHECKED BY:	KMH	SITE:	BRISTOL SANITARY LANDFILL AND QUARRY BALEFILL FACILITY - BRISTOL, VIRGINIA
DRAWING NO.:	M-601		

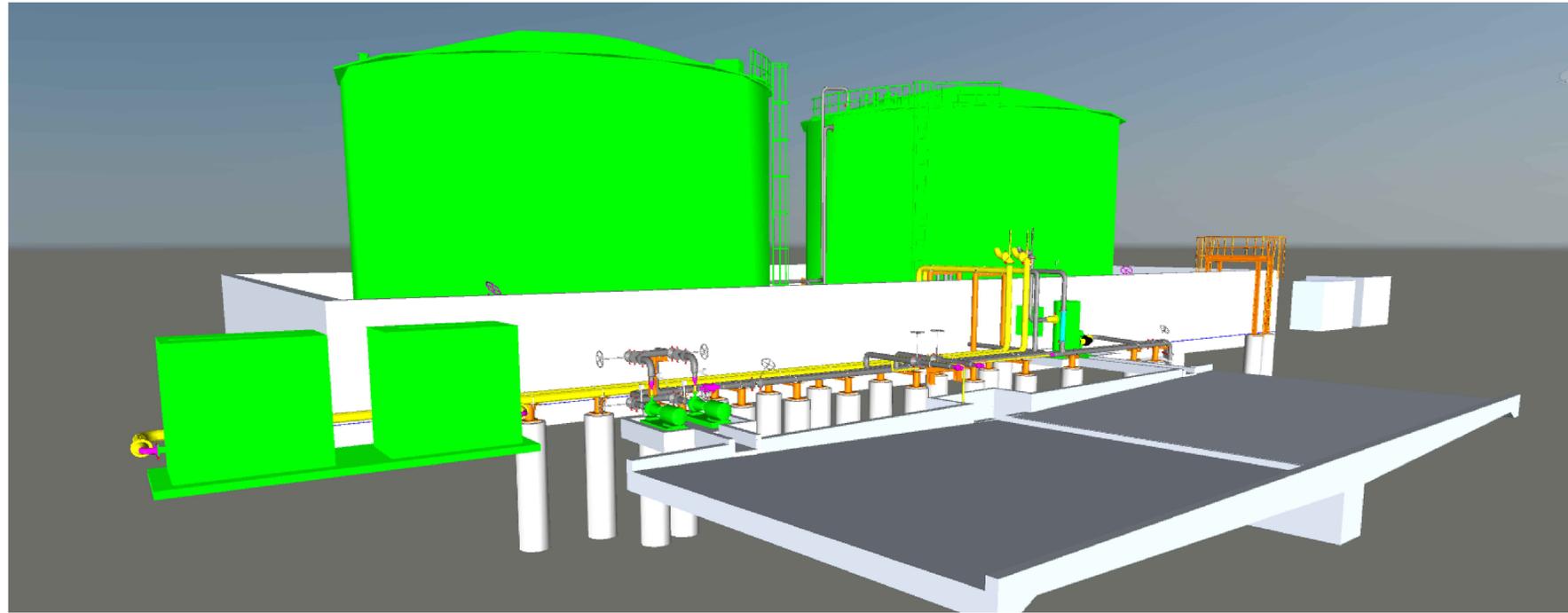




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PROJECT NO.:	CHR8600
FILE:	CHR8600_M-601
SHEET NO.:	20 OF 21

A



A

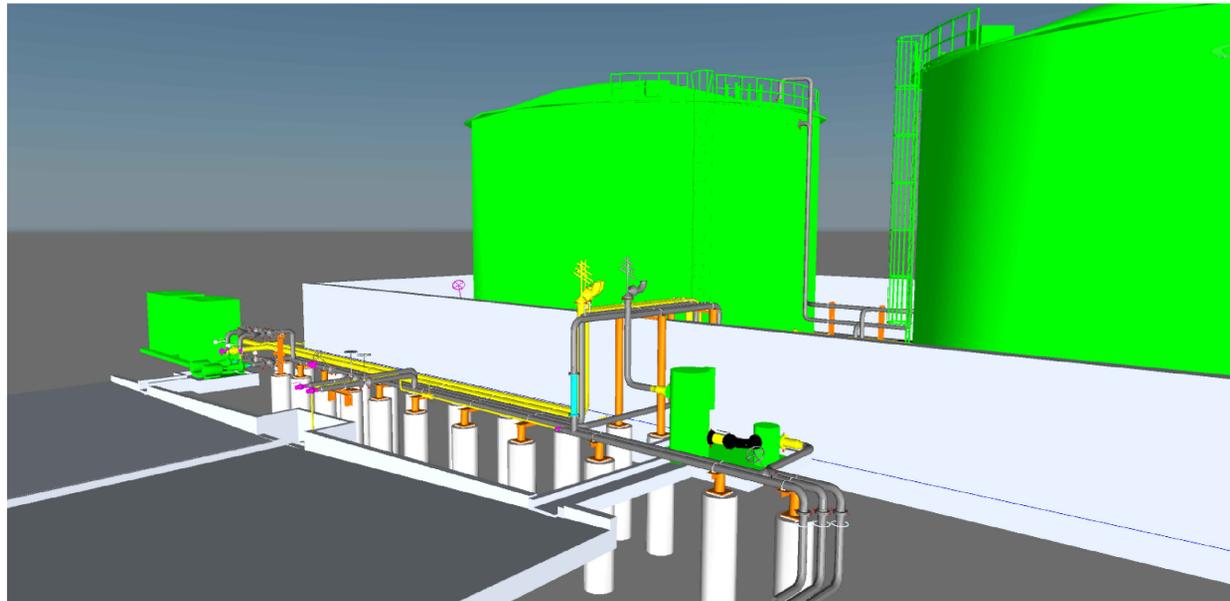
B

B

C

C

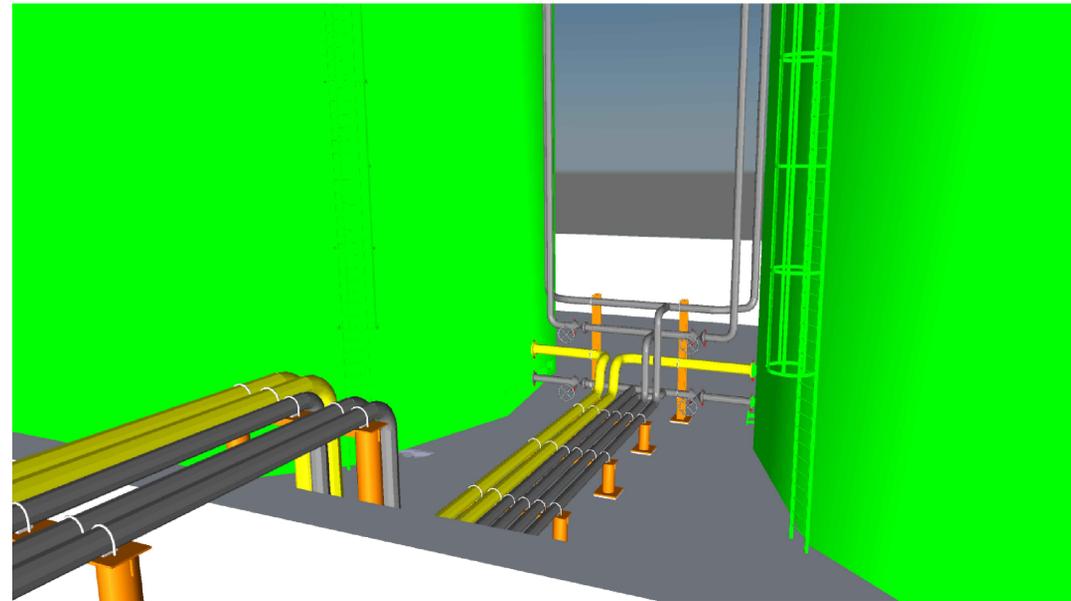
2
M-629
DETAIL
RENDERED VIEW
SCALE: NTS



D

D

2
M-629
DETAIL
RENDERED VIEW
SCALE: NTS



E

E

3
M-629
DETAIL
RENDERED VIEW
SCALE: NTS

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F

F

C:\GEO-ACCAD\GEO\BRISTOL\BRISTOL_SANITARY_LANDFILL_PROJECT_FILES\CADD\EQ_TANK_SYSTEM\DWG\MODEL\VIEW\BRISTOL_SANITARY_LANDFILL_PLANT_2024\CHR8600_M-629

REV	DATE	DESCRIPTION	DRN	APP
C	10/26/25	ISSUE FOR BID (IFB) DESIGN SET	RN	BS
B	7/28/25	60% DESIGN REVIEW	RN	BS
A	5/12/25	30% DESIGN REVIEW	RN	BS

DESIGN BY:	BS	TITLE:	RENDERED VIEWS
DRAWN BY:	RN	PROJECT:	EQUALIZATION TANK DESIGN
CHECKED BY:	KMH	SITE:	BRISTOL SANITARY LANDFILL AND QUARRY BALEFILL FACILITY - BRISTOL, VIRGINIA
DRAWING NO.:	M-602		

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DATE:	NOVEMBER 2025
PROJECT NO.:	CHR8600
FILE:	CHR8600_M-629
SHEET NO.:	21 OF 21