

Gude Landfill Remediation Design Project Manual Montgomery County, Maryland

100% Submission

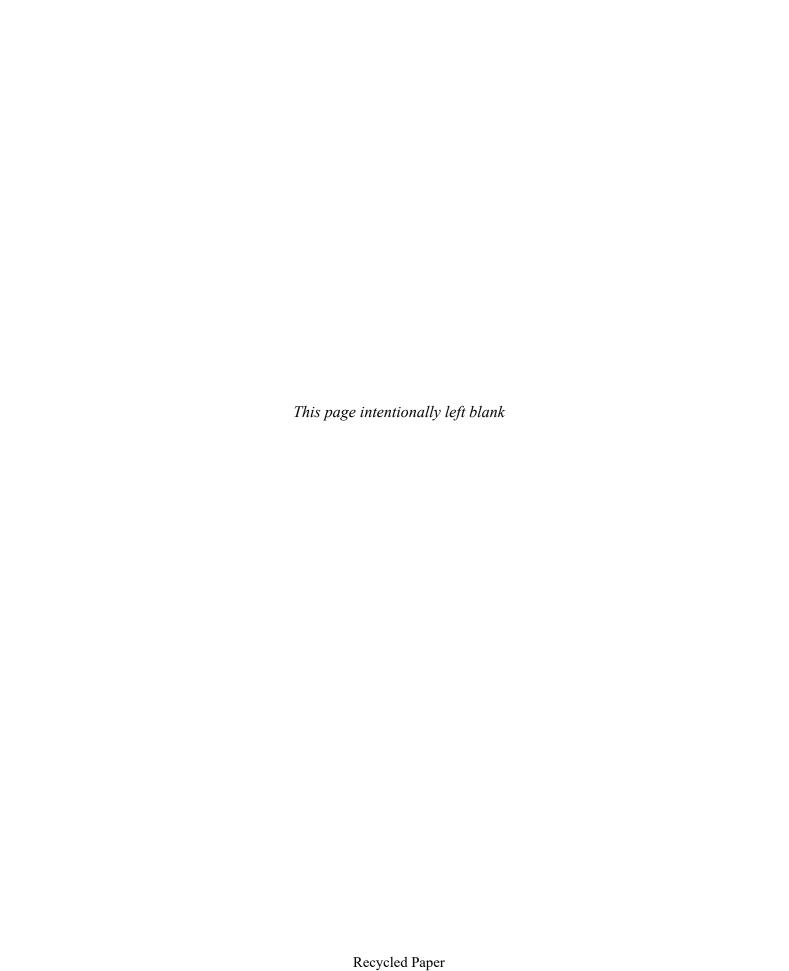
Prepared for

Northeast Maryland Waste Disposal Authority and Montgomery County Department of Environmental Protection Recycling and Resource Management Division Montgomery County, Maryland

Prepared by

EA Engineering, Science, and Technology, Inc., PBC 225 Schilling Circle, Suite 400 Hunt Valley, Maryland 21031 (410) 584-7000

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GUDE LANDFILL REMEDIATION CONSTRUCTION SPECIFICATIONS

CONTENTS

<u>DIVISION 1 – GENERAL REQUIREMENTS</u>

SECTION 01 11 00	SUMMARY OF WORK
SECTION 01 20 00	MEASUREMENT AND PAYMENT
SECTION 01 26 00	CONTRACT MODIFICATION PROCEDURES
SECTION 01 31 19.13	PRECONSTRUCTION MEETING
SECTION 01 31 19.23	PROGRESS MEETINGS
SECTION 01 32 33	PHOTOGRAPHIC DOCUMENTATION
SECTION 01 33 00	SUBMITTALS
SECTION 01 40 00	QUALITY CONTROL
SECTION 01 45 00	HEALTH AND SAFETY
SECTION 01 50 00	MOBILIZATION, DEMOBILIZATION, AND TRAFFIC
	CONTROL
SECTION 01 57 19	TEMPORARY ENVIRONMENTAL CONTROLS
SECTION 01 58 13	PROJECT IDENTIFICATION AND SIGNS
SECTION 01 59 00	TEMPORARY FACILITIES AND CONTROLS
SECTION 01 70 00	EXECUTION AND CLOSEOUT REQUIREMENTS

DIVISION 2 – EXISTING CONDITIONS

SECTION 02 41 00	DEMOLITION
5LC 11011 02 71 00	DLIVIOLITION

SECTION 02 61 13.13 WASTE EXCAVATION AND MATERIAL HANDLING

<u>DIVISION 3 – CONCRETE</u>

SECTION 03 05 16	DDECAST	CONCRETE	STRUCTURES
SECTION 05 05 10	PRECASI	CONCRETE	SIKUUTUKES

SECTION 03 30 53 MISCELLANEOUS CAST-IN-PLACE CONCRETE

DIVISION 6 – WOOD, PLASTIC, AND COMPOSITES

SECTION 06 10 63 EXTERIOR ROUGH CARPENTRY

<u>DIVISION 28 – ELECTRONIC SAFETY AND SECURITY</u>

SECTION 28 23 00 SITE SECURITY AND SURVEILLANCE

<u>DIVISION 31 – EARTHWORK</u>

SECTION 31 05 15	EARTHWORK
SECTION 31 05 16	AGGREGATES
SECTION 31 05 19 13	GEOTEXTILES

SECTION 31 05 19.16	GEOMEMBRANE
SECTION 31 05 19.26	GEOCOMPOSITE
SECTION 31 09 13	SETTLEMENT PLATES
SECTION 31 11 00	CLEARING AND GRUBBING
SECTION 31 25 00	EROSION AND SEDIMENT CONTROL

<u>DIVISION 32 – EXTERIOR IMPROVEMENTS</u>

SECTION 32 15 00	AGGREGATE SURFACING
SECTION 32 31 13.16	DOG PLAY AREA CHAIN-LINK FENCE ENCLOSURE
SECTION 32 33 00	SITE FURNISHINGS
SECTION 32 92 19	UPLAND MEADOW ESTABLISHMENT
SECTION 32 93 00	PLANTS

<u>DIVISION 33 – UTILITIES</u>

STORMWATER PIPING AND APPURTENANCES LANDFILL GAS COLLECTION AND CONVEYANCE SYSTEM
LANDFILL GAS EXTRACTION WELL AND CONDENSATE DRAIN SYSTEM
GEOTECHNICAL INVESTIGATIONS GENERAL PERMIT FOR DISCHARGES OF STORMWATER
ASSOCIATED WITH CONSTRUCTION ACTIVITY
TEMPORARY TRAFFIC CONTROL PLAN REQUIREMENTS
PROPERTY MARKERS
WASTE CUT AND FILL VISUALIZATION
FOREST CONSERVATION PLAN

SECTION 01 11 00 SUMMARY OF WORK

1. **GENERAL**

1.1 <u>Description</u>

1.1.1 Scope of Work

A. The Work to be performed under these Contract Documents consists of the construction of a closure cap for the Gude Landfill located in Montgomery County, Maryland. This Specification Section provides a general description of the scope of work which is not intended to be an all-encompassing listing of the project work to be performed by the CONTRACTOR. The CONTRACTOR shall refer to the appropriate detailed Specification Section for additional information. The Work includes, but is not limited to, the following:

1. Gude Landfill Closure:

- a. Placement and maintenance of erosion and sediment controls as depicted in the Contract Drawings and in accordance with applicable local and state regulations including silt fence, super silt fence, bench construction, swale construction, pumping and filtering practices, and temporary stabilization.
- b. Clearing, grubbing, and stripping vegetation from all areas within the limit of work.
- c. Demolition of existing stormdrains and drainage structures, buildings, and foundations as noted in the Contract Drawings.
- d. Preparation of the landfill closure cap subgrade which consists of:
 - 1) Existing cover soil removal and stockpiling.
 - 2) Grading and onsite waste excavation and relocation of waste materials within the landfill with leachate management.
 - 3) Placement of minimum one (1) foot of subgrade soil over regraded waste.
- e. Construction of landfill closure cap from bottom to top grade consisting of:
 - 1) Hydraulic barrier layer consisting of forty (40)-mil textured linear low density polyethylene geomembrane, underlain by geotextile.
 - 2) Geosynthetic drainage layer consisting of double-sided geocomposite.

- 3) Minimum twenty (20)-inch-thick layer of Vegetative Support Soil and minimum four (4)-inch-thick layer of Topsoil.
- 4) An alternate closure cap may be selected by the OWNER and would consist of a material that combines the geomembrane and geocomposite drainage layer into a single product.
- f. Construction of surface water drainage benches, swales, and gabion slope drainage channels.
- g. Construction of daylighted drainage systems.
- h. Improvements to active landfill gas collection system including abandoning and modifying existing extraction wells, and installing new extraction wells, new below-grade lateral and header collection piping, and new condensate drains.
- i. Modification to the existing temporary piezometers, monitoring wells, and dewatering sumps.
- j. Construction of access roads.
- k. Construction/implementation of stormwater management controls and improvements.
- 1. Site security, including the installation of video surveillance and replacement of the existing chain-link fence and gates.
- m. Site stabilization and development of passive land use features.
- n. Other project or Contract work as shown on the Contract Drawings and as specified herein.
- B. The project site is located in Montgomery County, Maryland, at 600 East Gude Drive, Rockville, Maryland 20850. The primary entrance for heavy construction vehicles will be Incinerator Lane, located off of Southlawn Lane, Rockville, Maryland. The detailed scope of work is annotated in the following sections. The CONTRACTOR is to be advised that Work operations will be adjacent to private homeowners, commercial businesses, and recreational pedestrians; therefore, working hours as well as noise, odor, and dust control will be monitored and strictly enforced.
- C. Hours of Work are defined in the General Conditions.
- D. The CONTRACTOR must comply with permits and approvals obtained for this project, including:

- 1. Sediment Control Permit 285970 (requirements incorporated into the Contract Documents)
- 2. Forest Conservation Plan 120130180 (refer to Attachment F)
- 3. General Permit for Discharges of Stormwater Associated with Construction Activity Maryland General Permit No. 20-CP (refer to Attachment B). See detailed requirements in Section 31 25 00, Paragraph 3.1.
- E. The CONTRACTOR must obtain any permits required to perform the Work that have not already been obtained by the OWNER.

1.1.2 Related Work Specified Elsewhere

A. Not used.

1.2 References

A. Not used.

1.3 <u>Definitions</u>

A. Not used.

1.4 Qualifications

A. Not used.

1.5 **Submittals**

A. Not used.

1.6 Safety

A. Not used.

1.7 Quality Assurance

A. Not used.

1.8 **Product Delivery, Handling, and Storage**

A. Not used.

1.9 Schedule

A. Not used.

1.10 Contracts

A. The Work shall be coordinated by the CONTRACTOR.

1.11 Work By Others

A. Work by OWNER:

1. The OWNER may let other contractors within the Gude Landfill site during the term of this Contract. The CONTRACTOR will cooperate with other contractors and activities associated with this Work.

1.12 Sequence of Work

A. CONTRACTOR is responsible for establishing a schedule, to be approved by the CONSTRUCTION MANAGEMENT ENGINEER, for the sequence and progress of the Work. CONTRACTOR shall be solely responsible for coordination of all the Work to ensure completion of the Work within the time limits specified in the Contract.

1.13 Contractor's Use of Premises

A. CONTRACTOR'S use of the premises shall be confined to the areas within the Limits of Disturbance and the Administrative Area or as approved in writing by the OWNER.

B. CONTRACTOR shall:

- 1. Assume full responsibility for protection and safekeeping of products and equipment stored on or off premises.
- 2. Obtain, design, permit, manage, maintain, and pay for any offsite storage areas the CONTRACTOR chooses to utilize.

C. Limits on CONTRACTOR'S use of Site:

- 1. Shall be by agreement between the OWNER and the CONTRACTOR.
- 2. CONTRACTOR shall provide and maintain temporary facilities and access to these facilities for the duration of the Contract.

2. <u>MATERIALS</u>

A. Not used.

3. <u>EXECUTION</u>

A. Not used.

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SECTION 01 20 00 MEASUREMENT AND PAYMENT

1. **GENERAL**

1.1 <u>Description</u>

1.1.1 Scope of Work

A. The items listed in this Section refer to and are the same pay items listed on the Price Proposal. They constitute all of the pay items for the completion of the Work. Compensation for all such services and materials shall be included in the prices stipulated for the lump sum and unit price pay items listed herein. Items of Work not specifically included in this Section for measurement and payment as described herein will not be measured for payment but will be considered incidental to the Contract with the associated costs borne solely by the CONTRACTOR.

B. Schedule of Values

- 1. The Schedule of Values is a list of line items, corresponding to each aspect of the Work, establishing in detail the value or cost of each major part of the Work, and is submitted to CONSTRUCTION MANAGEMENT ENGINEER for acceptance.
- 2. Upon request of CONSTRUCTION MANAGEMENT ENGINEER, support values with data that substantiate their correctness.
- 3. The preliminary Schedule of Values is submitted to the CONSTRUCTION MANAGEMENT ENGINEER for initial review. The CONTRACTOR shall incorporate the CONSTRUCTION MANAGEMENT ENGINEER'S comments into the Schedule of Values and provide a re-submittal to the CONSTRUCTION MANAGEMENT ENGINEER. The CONSTRUCTION MANAGEMENT ENGINEER may require corrections and re-submittal of the Schedule of Values until it is acceptable.
- 4. The Schedule of Values and the Progress Schedule updates specified in Section 01 33 00, Submittals, shall be used as the basis for preparing each Application for Payment. The Schedule of Values may be used as a basis for negotiating the price of changes in the Work.
- 5. Unit price payment items with their associated quantity shall be included in the Schedule of Values. Provide in the Schedule of Values a detailed breakdown of the unit prices when required by the CONSTRUCTION MANAGEMENT ENGINEER.

1.1.2 Related Work Specified Elsewhere

A. Not used.

1.2 References

A. Not used.

1.3 <u>Definitions</u>

A. Not used.

1.4 Qualifications

A. Not used.

1.5 Submittals

A. Schedule of Values

- 1. The CONTRACTOR shall submit to the CONSTRUCTION MANAGEMENT ENGINEER for acceptance a Schedule of Values that allocates cost to each item of the Work.
- 2. The Schedule of Values shall include an itemized list of Work for each major part of the Contract, for each payment item as listed in the Price Proposal.
- 3. This schedule, when approved by the CONSTRUCTION MANAGEMENT ENGINEER, shall be used as the basis for the CONTRACTOR's Applications for Progress Payments.
- 4. Submit the required number of copies of the Schedule of Values to the CONSTRUCTION MANAGEMENT ENGINEER at or before the Preconstruction Meeting. The first Application for Payment will not be processed without a Schedule of Values approved by the CONSTRUCTION MANAGEMENT ENGINEER.
- 5. When required by the CONSTRUCTION MANAGEMENT ENGINEER, promptly submit an updated Schedule of Values to include cost breakdowns for changes in the Work, including Change Orders.

1.6 Safety

A. Not used.

1.7 **Quality Assurance**

A. Not used.

1.8 Product Delivery, Handling, and Storage

A. Not used.

1.9 Schedule

A. Not used.

1.10 Measurement

A. Measurement shall be made in accordance with the Price Proposal items and as described in the following sections.

1.10.1 Estimate of Quantities

- A. The estimated quantities for unit price pay items, as listed in the Price Proposal, are approximate only and are included solely for the purpose of comparison of Bids. The OWNER does not expressly or by implication agree that the nature of the materials encountered below the surface of the ground or the actual quantities of material encountered or required will correspond therewith, and reserves the right to increase or decrease any quantity or to eliminate any quantity as the CONSTRUCTION MANAGEMENT ENGINEER may deem necessary in accordance with the Contract Documents. CONTRACTOR shall not be entitled to any adjustment in a unit bid price as a result of any change in an estimated quantity and agrees to accept the aforesaid unit bid prices as complete and total compensation for any additions or deductions caused by changes or alterations in the Work directed by the OWNER. Increased or decreased Work involving change orders will be paid for as stipulated in the Contract Documents.
- B. Payment for unit price earthwork quantities shall be computed by field survey and analysis using AutoCAD Civil 3D or similar software. Points shall include all slope breaks and features. A maximum 25-foot by 25-foot (25' × 25') grid shall be used in the field and the vertical tolerance shall be 0.01 foot (0.01'). Alternative methods may be used as approved by the CONSTRUCTION MANAGEMENT ENGINEER. Surveys shall be field run by CONTRACTOR'S independent licensed surveyor.

1.11 Payment

- A. Payments to the CONTRACTOR shall be in accordance with the Contract.
- B. Lump sum price items shall be paid for the actual percentage of Work completed as identified in the approved Schedule of Values as required in Paragraph 1.5.

- C. Unit price items shall be paid in accordance with the Contract.
- D. Payment for the Work shall be made in accordance with the Price Proposal items as described in the following sections.

1.11.1 Payment Items

- A. The items listed in the Contract Documents refer to the pay items listed on the Proposal. They constitute all of the pay items for the completion of the Work. Compensation for all such services and materials shall be included in the prices stipulated for the unit price and lump sum pay items listed on the Price Proposal.
 - 1. Each lump sum and unit bid price will be deemed to include an amount considered by the CONTRACTOR to be adequate to cover the CONTRACTOR'S overhead and profit for each separately identified item.
 - 2. No progress payments will be made by the OWNER until the Construction Schedule and the Schedule of Values have been submitted and approved by the CONSTRUCTION MANAGEMENT ENGINEER.
 - 3. The CONTRACTOR shall accept in compensation, as herein provided, full payment for furnishing all materials, labor, tools, equipment, and incidentals necessary to the completed Work and for performing all Work contemplated and embraced by the Contract, also for all loss or damage arising from weather or other unforeseen conditions which may be encountered during the execution of the Work and until its final acceptance by the CONSTRUCTION MANAGEMENT ENGINEER, and for all risks of every description connected with the prosecution of the Work, except as provided herein, also for all expenses incurred as a result of the suspension of the Work as herein authorized.
 - 4. The payment of any partial estimate or of any retained percentage, except by and under the approved final invoice, in no way shall affect the obligation of the CONTRACTOR to repair or renew any defective parts of the construction or to be responsible for all damage due to such defects.

1.11.2 Eliminated Items

A. Should any items contained in the Schedule of Values be found unnecessary for the proper completion of the Work contracted, the CONSTRUCTION MANAGEMENT ENGINEER may eliminate such items from the Contract, and such action shall in no way invalidate the Contract. No allowance will be made for payment of items so eliminated.

1.11.3 Progress Payments

- A. Percentage of Work Complete—At the end of each pay period, the CONTRACTOR'S Superintendent or other authorized representative of the CONTRACTOR shall meet with the CONSTRUCTION MANAGEMENT ENGINEER and determine and agree upon the percentage of the project completed during the pay period.
- B. Application for Payment—The CONTRACTOR will then prepare and submit an Application for Payment to the CONSTRUCTION MANAGEMENT ENGINEER. The CONSTRUCTION MANAGEMENT ENGINEER will evaluate the Application for Payment, determine the amounts owed, and issue a Recommendation of Payment in such amounts as provided in the Contract Documents. Progress payments shall be made monthly as the Work progresses. All progress invoices and payments shall be subject to correction in the final invoice and payment. The progress payment will be based on invoices prepared by the CONTRACTOR and approved by the CONSTRUCTION MANAGEMENT ENGINEER for the value of the Work performed, and materials complete in place in accordance with the Contract. Retainage shall be as specified in the Contract Documents. The payment schedule shall be in accordance with the Contract Documents.

1.11.4 Final Payment

A. The CONTRACTOR shall submit and the CONSTRUCTION MANAGEMENT ENGINEER shall review, as soon as practicable after the completion of the project, a final invoice for the amount of Work performed under the Contract and establish the value of such Work. Final payment shall be made in accordance with the Contract Documents.

1.11.5 Incidental Work

- A. Incidental Work shall be paid for under the respective bid items identified in the Price Proposal at the lump sum and unit price bid and all other requirements of the Contract Documents. A partial list of incidental Work items for which separate payment is not measured may include, but is not limited to, the following items:
 - 1. Development of Construction Schedule, Schedule of Values, and Submittal Schedule.
 - 2. Repair of materials or natural surfaces damaged by CONTRACTOR or by weather-related occurrences.
 - 3. Testing.
 - 4. Safety devices.

- 5. Maintenance of traffic.
- 6. Removal of CONTRACTOR'S waste.
- 7. Watchmen.
- 8. Bonds and insurance.
- 9. Health and safety requirements, including a Health and Safety Plan.
- 10. Preparation of Construction Reports.
- 11. Providing miscellaneous temporary or accessory works.
- 12. Cleanup and restoration of property.
- 13. Coordination with the CONSTRUCTION MANAGEMENT ENGINEER, other contractors, and others.
- 14. Utility crossings and temporary utilities.
- 15. Dewatering and drying of soils.
- 16. Steel and/or wood sheeting utilized by the CONTRACTOR.
- 17. Dewatering of non-contaminated excavations.
- 18. Sound attenuation.
- 19. Submittals including reports, product data, certificates, material samples, testing and shop drawings.
- 20. Removal, salvaging, and onsite or offsite stockpiling of existing materials, debris, and wood, to include the following: riprap, metallic fencing, posts, buried piping, culverts, asphalt surfaces, etc.
- 21. Attendance and participation in preconstruction conference, progress, substantial completion, and final completion meetings.
- 22. Quality control.
- 23. Job signs.
- 24. Stormwater control not specifically identified in another bid item. For example, work required by permit conditions.

25. Preparation and approval of Record Drawings and As-built Surveys.

1.12 Measurement and Payment of Base Bid Items

1.12.1 Mobilization and Demobilization — Payment Item No. 1

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for mobilization and demobilization. The Work shall include, but not be limited to, obtaining all permits; moving all equipment onto and off of the site; furnishing, maintaining, and then removing field offices, staging areas, and storage areas; bonding, insurance, surety and administrative costs; temporary utilities; plan, shop drawing, and submittal preparation; health and safety plan; and other miscellaneous requirements.
- B. Measurement and Payment Payment Item No. 1 Mobilization and Demobilization will not be measured and will be paid by lump sum at the Contract price as shown for Payment Item No. 1 Mobilization and Demobilization in accordance with the Contract Documents. Bid Item No. 1 will be paid based on the following schedule:

Payment Milestone	Payment Amount
First monthly invoice after the	25%
CONTRACTOR has established temporary	
offices at the site	
Each monthly invoice after the first payment	2%
milestone until a cumulative total of 85% of	
Bid Item No. 1 has been paid	
After Final Completion of the Work	15% plus any additional percentage
	not paid under previous milestones

Related Specification Sections include:

- 1. SECTION 01 50 00 MOBILIZATION, DEMOBILIZATION, AND TRAFFIC CONTROL
- 2. SECTION 01 58 13 PROJECT IDENTIFICATION AND SIGNS
- 3. SECTION 01 59 00 TEMPORARY FACILITIES AND CONTROLS
- 4. SECTION 01 70 00 EXECUTION AND CLOSEOUT REQUIREMENTS

1.12.2 Security Features — Payment Item No. 2

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities to furnish, install, maintain, and monitor video surveillance devices. This includes cameras and associated power supply and communication connections to provide remote surveillance capabilities.
- B. Measurement and Payment Payment Item No. 2 Security Features will not be measured and will be paid by lump sum at the Contract price as shown for Payment

Item No. 2 Security Features in accordance with the Contract Documents. Related Specification Sections include:

1. SECTION 28 23 00 SITE SECURITY AND SURVEILLANCE

1.12.3 Surveying — Payment Item No. 3

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for surveying as required to control the work; demonstrate that required elevations, slopes, and dimensions have been met; measure applicable pay items; prepare as-built surveys; and other needs to construct the project.
- B. Measurement and Payment Payment Item No. 3 Surveying will not be measured and will be paid by lump sum at the Contract price as shown for Payment Item No. 3 Surveying in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 01 70 00 EXECUTION AND CLOSEOUT REQUIREMENTS

1.12.4 Forest Conservation Markers — Payment Item No. 4

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities to furnish and install forest conservation easement markers.
- B. Measurement and Payment Payment Item No. 4 Forest Conservation Markers will be measured on the basis of each marker and will be paid at the Contract price as shown for Payment Item No. 4 Forest Conservation Markers in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 01 58 13 PROJECT IDENTIFICATION AND SIGNS

1.12.5 Temporary Stabilization — Payment Item No. 5

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for temporary stabilization of disturbed areas in accordance with the Contract Documents. Areas of the temporary stabilization already installed by the CONTRACTOR and requiring maintenance or repair will not be measured nor paid.
- B. Measurement and Payment Payment Item No. 5 Temporary Stabilization will be measured on the basis of acres stabilized as determined by survey limits and will be paid at the Contract price as shown for Payment Item No. 5 Temporary Stabilization in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 31 25 00 EROSION AND SEDIMENT CONTROL

1.12.6 Soil Stabilization Matting — Payment Item No. 6

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing, installing, and repairing temporary and permanent soil stabilization matting in areas required by the Contract Documents. This item also includes removal and disposal of temporary matting when the matted area will be disturbed for additional construction. Areas of the soil stabilization matting already installed by the CONTRACTOR and requiring repair will not be measured nor paid.
- B. Measurement and Payment Payment Item No. 6 Soil Stabilization Matting will be measured on the basis of square yards as determined by survey limits and will be paid at the Contract price as shown for Payment Item No. 6 Soil Stabilization Matting in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 31 25 00 EROSION AND SEDIMENT CONTROL

1.12.7 Stabilized Construction Entrance — Payment Item No. 7

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing, installing, maintaining, and finally removing stabilized construction entrances. These shall be maintained for the duration of the project and may require complete reconstruction due to heavy use. Reconstruction will not be measured nor paid.
- B. Measurement and Payment Payment Item No. 7 Stabilized Construction Entrance will be measured on the basis of each stabilized construction entrance and will be paid at the Contract price as shown for Payment Item No. 7 Stabilized Construction Entrance in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 31 25 00 EROSION AND SEDIMENT CONTROL

1.12.8 Temporary Orange Construction Fence — Payment Item No. 8

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing, installing, maintaining, and finally removing temporary orange construction fence. Temporary orange construction fence that may be removed from a portion of the site where it is no longer required may be salvaged and re-used in an area where it is required and the second installation will also be measured and paid.
- B. Measurement and Payment Payment Item No. 8 Temporary Orange Construction Fence will be measured on the basis of linear feet installed as determined by survey and will be paid at the Contract price as shown for Payment Item No. 8 Temporary Orange Construction Fence in accordance with the Contract Documents. Related Specification Sections include:

1. SECTION 31 25 00 EROSION AND SEDIMENT CONTROL

1.12.9 Super Silt Fence — Payment Item No. 9

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing, installing, maintaining, and finally removing super silt fence. Super silt fence that may be removed from a portion of the site where it is no longer required may be salvaged and re-used in an area where it is required and the second installation will also be measured and paid.
- B. Measurement and Payment Payment Item No. 9 Super Silt Fence will be measured on the basis of linear feet installed as determined by survey and will be paid at the Contract price as shown for Payment Item No. 9 Super Silt Fence in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 31 25 00 EROSION AND SEDIMENT CONTROL

1.12.10 Filter Logs — Payment Item No. 10

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing, installing, maintaining, and finally removing filter logs. Filter logs that may be removed from a portion of the site where they are no longer required may be salvaged and re-used in an area where they are required and the second installation will also be measured and paid.
- B. Measurement and Payment Payment Item No. 10 Filter Logs will be measured on the basis of linear feet installed as determined by survey and will be paid at the Contract price as shown for Payment Item No. 10 Filter Logs in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 31 25 00 EROSION AND SEDIMENT CONTROL

1.12.11 Temporary Gabion Outlet Structure — Payment Item No. 11

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing, installing, maintaining, and finally removing temporary gabion outlet structures. Temporary gabion outlet structures that may be removed from a portion of the site where they are no longer required may be salvaged and re-used in an area where they are required and the second installation will also be measured and paid.
- B. Measurement and Payment Payment Item No. 11 Temporary Gabion Outlet Structure will be measured on the basis of each as determined by count in the field and will be paid at the Contract price as shown for Payment Item No. 11 Temporary

Gabion Outlet Structure in accordance with the Contract Documents. Related Specification Sections include:

1. SECTION 31 25 00 EROSION AND SEDIMENT CONTROL

1.12.12 Temporary Stone Outlet Structure — Payment Item No. 12

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing, installing, maintaining, and finally removing temporary stone outlet structures. Temporary stone outlet structures that may be removed from a portion of the site where they are no longer required may be salvaged and re-used in an area where they are required and the second installation will also be measured and paid.
- B. Measurement and Payment Payment Item No. 12 Temporary Stone Outlet Structure will be measured on the basis of each as determined by count in the field and will be paid at the Contract price as shown for Payment Item No. 12 Temporary Stone Outlet Structure in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 31 25 00 EROSION AND SEDIMENT CONTROL

1.12.13 Pipe Slope Drains — Payment Item No. 13

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing, installing, maintaining, and finally removing pipe slope drain. Pipe slope drain that may be removed from a portion of the site where it is no longer required may be salvaged and re-used in an area where it is required and the second installation will also be measured and paid.
- B. Measurement and Payment Payment Item No. 13 Pipe Slope Drains will be measured on the basis of linear feet installed as determined by survey and will be paid at the Contract price as shown for Payment Item No. 13 Pipe Slope Drains in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 31 25 00 EROSION AND SEDIMENT CONTROL

1.12.14 Clear Water Diversion Pipes — Payment Item No. 14

A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing, installing, maintaining, and finally removing clear water diversion pipe. Clear water diversion pipe that may be removed from a portion of the site where it is no longer required may be salvaged and re-used in an area where it is required and the second installation will also be measured and paid.

- B. Measurement and Payment Payment Item No. 14 Clear Water Diversion Pipes will be measured on the basis of linear feet installed as determined by survey and will be paid at the Contract price as shown for Payment Item No. 14 Clear Water Diversion Pipes in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 31 25 00 EROSION AND SEDIMENT CONTROL

1.12.15 Sump Pit — Payment Item No. 15

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing, installing, pumping, maintaining, and finally removing sump pits. Sump pits that may be removed from a portion of the site where they are no longer required may be salvaged and re-used in an area where they are required and the second installation will also be measured and paid.
- B. Measurement and Payment Payment Item No. 15 Sump Pit will be measured on the basis of each as determined by count in the field and will be paid at the Contract price as shown for Payment Item No. 15 Sump Pit in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 31 25 00 EROSION AND SEDIMENT CONTROL

1.12.16 Filter Bag — Payment Item No. 16

- A. This item consists of all materials, labor, equipment, and appurtenances required may be salvaged and re-used in an area where they are required and the second installation will also be measured and paid.
- B. Measurement and Payment Payment Item No. 16 Filter Bag will be measured on the basis of each as determined by count in the field and will be paid at the Contract price as shown for Payment Item No. 16 Filter Bag in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 31 25 00 EROSION AND SEDIMENT CONTROL

1.12.17 Inlet Protection — Payment Item No. 17

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing, installing, maintaining, and finally removing inlet protection. Inlet protection that may be removed from a portion of the site where it is no longer required may be salvaged and re-used in an area where it is required and the second installation will also be measured and paid.
- B. Measurement and Payment Payment Item No. 17 Inlet Protection will be measured on the basis of each as determined by count in the field and will be paid at the

Contract price as shown for Payment Item No. 17 Inlet Protection in accordance with the Contract Documents. Related Specification Sections include:

1. SECTION 31 25 00 EROSION AND SEDIMENT CONTROL

1.12.18 Earth Dike A-1 — Payment Item No. 18

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing, installing, maintaining, and finally removing earth dikes (A-1). Earth dikes (A-1) that may be removed from a portion of the site where they are no longer required may be salvaged and re-used in an area where they are required and the second installation will also be measured and paid.
- B. Measurement and Payment Payment Item No. 18 Earth Dike A-1 will be measured on the basis of linear feet installed as determined by survey and will be paid at the Contract price as shown for Payment Item No. 18 Earth Dike A-1 in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 31 25 00 EROSION AND SEDIMENT CONTROL

1.12.19 Earth Dike A-2 — Payment Item No. 19

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing, installing, maintaining, and finally removing earth dikes (A-2). Earth dikes (A-2) that may be removed from a portion of the site where they are no longer required may be salvaged and re-used in an area where they are required and the second installation will also be measured and paid.
- B. Measurement and Payment Payment Item No. 19 Earth Dike A-2 will be measured on the basis of linear feet installed as determined by survey and will be paid at the Contract price as shown for Payment Item No. 19 Earth Dike A-2 in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 31 25 00 EROSION AND SEDIMENT CONTROL

1.12.20 Earth Dike A-3 — Payment Item No. 20

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing, installing, maintaining, and finally removing earth dikes (A-3). Earth dikes (A-3) that may be removed from a portion of the site where they are no longer required may be salvaged and re-used in an area where they are required and the second installation will also be measured and paid.
- B. Measurement and Payment Payment Item No. 20 Earth Dike A-3 will be measured on the basis of linear feet installed as determined by survey and will be paid at the

Contract price as shown for Payment Item No. 20 Earth Dike A-3 in accordance with the Contract Documents. Related Specification Sections include:

1. SECTION 31 25 00 EROSION AND SEDIMENT CONTROL

1.12.21 Earth Dike B-2 — Payment Item No. 21

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing, installing, maintaining, and finally removing earth dikes (B-2). Earth dikes (B-2) that may be removed from a portion of the site where they are no longer required may be salvaged and re-used in an area where they are required and the second installation will also be measured and paid.
- B. Measurement and Payment Payment Item No. 21 Earth Dike B-2 will be measured on the basis of linear feet installed as determined by survey and will be paid at the Contract price as shown for Payment Item No. 21 Earth Dike B-2 in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 31 25 00 EROSION AND SEDIMENT CONTROL

1.12.22 Mountable Berms — Payment Item No. 22

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing, installing, maintaining, and finally removing mountable berms, including earth, geotextile, and stone.
- B. Measurement and Payment Payment Item No. 22 Mountable Berms will be measured on the basis of each as determined by count in the field and will be paid at the Contract price as shown for Payment Item No. 22 Mountable Berms in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 31 25 00 EROSION AND SEDIMENT CONTROL

1.12.23 Temporary Access Culvert — Payment Item No. 23

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing, installing, maintaining, and finally removing temporary access culverts, including geotextile, aggregate, and pipe.
- B. Measurement and Payment Payment Item No. 23 Temporary Access Culvert will be measured on the basis of linear feet installed as determined by survey and will be paid at the Contract price as shown for Payment Item No. 23 Temporary Access Culvert in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 31 25 00 EROSION AND SEDIMENT CONTROL

1.12.24 Temporary Stone Downchute — Payment Item No. 24

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing, installing, maintaining, and finally removing temporary stone downchutes, including geotextile and riprap.
- B. Measurement and Payment Payment Item No. 24 Temporary Stone Downchute will be measured on the basis of tons of riprap installed. The CONTRACTOR shall provide copies of tickets from the riprap supplier. It will be paid at the Contract price as shown for Payment Item No. 24 Temporary Stone Downchute in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 31 25 00 EROSION AND SEDIMENT CONTROL

1.12.25 Sediment Basin No. 1 — Payment Item No. 25

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing, installing, maintaining, and finally removing Sediment Basin No. 1, including riser structure, trash rack, barrel, anti-seep collars, dewatering device, baffle boards, clay, basin embankment, temporary chain link construction fence, low permeable soil, and related elements required. Waste excavation and placement and common borrow fill will be paid under other payment items.
- B. Measurement and Payment Payment Item No. 25 Sediment Basin No. 1 will not be measured and will be paid by lump sum at the Contract price as shown for Payment Item No. 25 Sediment Basin No. 1 in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 31 05 15 EARTHWORK
 - 2. SECTION 31 25 00 EROSION AND SEDIMENT CONTROL

1.12.26 Clearing and Surface Demolition — Payment Item No. 26

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for site clearing, mowing, structure demolition, pavement removal, hauling, and disposal of items as required in the Contract Documents.
- B. Measurement and Payment Payment Item No. 26 Clearing and Surface Demolition will be measured on the basis of acres cleared as determined by survey limits and will be paid at the Contract price as shown for Payment Item No. 26 Clearing and Surface Demolition in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 02 41 00 DEMOLITION
 - 2. SECTION 31 11 00 CLEARING AND GRUBBING

1.12.27 Excavation and Stockpiling of Existing Cover — Payment Item No. 27

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for excavation, hauling, stockpiling, and maintenance of stockpiles of existing cover soil to be re-used in the Work.
- B. Measurement and Payment Payment Item No. 27 Excavation and Stockpiling of Existing Cover will be measured on the basis of cubic yards excavated as determined by pre- and post-excavation surveys (existing conditions after clearing and existing cover soil removal) and will be paid at the Contract price as shown for Payment Item No. 27 Excavation and Stockpiling of Existing Cover in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 01 70 00 EXECUTION AND CLOSEOUT REQUIREMENTS
 - 2. SECTION 31 05 15 EARTHWORK

1.12.28 Waste Excavation and Placement — Payment Item No. 28

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for excavation, controlling leachate, hauling, placing, grading, compacting, and covering waste material as identified in the Contract Documents.
- B. Measurement and Payment Payment Item No. 28 Waste Excavation and Placement will be measured on the basis of in-place cubic yards of waste excavated as determined by pre- and post-excavation surveys (existing cover soil removal and waste excavation). Volume of waste placed will not be measured. It will be paid at the Contract price as shown for Payment Item No. 28 Waste Excavation and Placement in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS
 - 2. SECTION 01 70 00 EXECUTION AND CLOSEOUT REQUIREMENTS
 - 3. SECTION 02 61 13.13 WASTE EXCAVATION AND MATERIAL HANDLING

1.12.29 Common Borrow — Payment Item No. 29

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for material testing, loading, hauling, placing, grading, and compacting existing onsite soils as common borrow.
- B. Measurement and Payment Payment Item No. 29 Common Borrow will not be measured and will be paid by lump sum at the Contract price as shown for Payment Item No. 29 Common Borrow in accordance with the Contract Documents. Related Specification Sections include:

1.12.30 No. 2 Stone (Leachate Seep Repair) — Payment Item No. 30

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities to furnish and install No. 2 Stone for leachate seep repairs as identified in the Contract Documents.
- B. Measurement and Payment Payment Item No. 30 No. 2 Stone (Leachate Seep Repair) will be measured on the basis of tons of No. 2 Stone delivered to the site as approved by the CONSTRUCTION MANAGEMENT ENGINEER. The CONTRACTOR shall provide copies of tickets from the supplier. It will be paid at the Contract price as shown for Payment Item No. 30 No. 2 Stone (Leachate Seep Repair) in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 02 61 13.13 WASTE EXCAVATION AND MATERIAL HANDLING
 - 2. SECTION 31 05 16 AGGREGATES

1.12.31 Tire Management and Disposal — Payment Item No. 31

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for managing, storing, transporting, processing, and/or disposing of tires uncovered during waste excavation.
- B. Measurement and Payment Payment Item No. 31 Tire Management and Disposal will be measured on the basis of tons of tires delivered to a disposal or processing facility. The CONTRACTOR shall provide copies of tickets from the disposal or processing facility. It will be paid at the Contract price as shown for Payment Item No. 31 Tire Management and Disposal in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 02 61 13.13 WASTE EXCAVATION AND MATERIAL HANDLING

1.12.32 Potentially Hazardous Waste Management — Payment Item No. 32

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for characterizing, managing, storing, transporting, and disposing of hazardous waste.
- B. Measurement and Payment Payment Item No. 32 Potentially Hazardous Waste Management will not be measured and will be paid in accordance with specific proposals prepared by the CONTRACTOR and approved by the CONSTRUCTION MANAGEMENT ENGINEER. Each proposal will be customized for potential

hazardous waste that is encountered during the Work. Related Specification Sections include:

1. SECTION 02 61 13.13 WASTE EXCAVATION AND MATERIAL HANDLING

1.12.33 Leachate Removal (Oaks Landfill) — Payment Item No. 33

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for leachate management, including planning, tracking, pumping, piping, temporary storage, and hauling for disposal to the County's facility at Oaks Landfill in Gaithersburg, Maryland.
- B. Measurement and Payment Payment Item No. 33 Leachate Removal (Oaks Landfill) will be measured on the basis of gallons of leachate transported to Oaks Landfill based on truck capacity and number of truckloads and will be paid at the Contract price as shown for Payment Item No. 33 Leachate Removal (Oaks Landfill) in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 02 61 13.13 WASTE EXCAVATION AND MATERIAL HANDLING

1.12.34 Leachate Removal (Third-Party Facility) — Payment Item No. 34

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for leachate management, including planning, tracking, pumping, piping, temporary storage, and hauling for disposal to a third-party facility identified by the CONTRACTOR.
- B. Measurement and Payment Payment Item No. 34 Leachate Removal (Third-Party Facility) will be measured on the basis of gallons of leachate transported to a third-party facility as reported on disposal tickets and will be paid at the Contract price as shown for Payment Item No. 34 Leachate Removal (Third-Party Facility) in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 02 61 13.13 WASTE EXCAVATION AND MATERIAL HANDLING

1.12.35 Odor Control Foam — Payment Item No. 35

A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities to furnish, store, mix, and apply foam over exposed waste as needed for odor control or as directed by the CONSTRUCTION MANAGEMENT ENGINEER.

- B. Measurement and Payment Payment Item No. 35 Odor Control Foam will be measured on the basis of square yards of foam applied based on field measurements and will be paid at the Contract price as shown for Payment Item No. 35 Odor Control Foam in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS
 - 2. SECTION 02 61 13.13 WASTE EXCAVATION AND MATERIAL HANDLING

1.12.36 Odor Control Blanket — Payment Item No. 36

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities to furnish, store, mix, and apply a spray-on blanket over exposed waste as needed for odor control or as directed by the CONSTRUCTION MANAGEMENT ENGINEER.
- B. Measurement and Payment Payment Item No. 36 Odor Control Blanket will be measured on the basis of square yards of foam applied based on field measurements and will be paid at the Contract price as shown for Payment Item No. 36 Odor Control Blanket in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS
 - 2. SECTION 02 61 13.13 WASTE EXCAVATION AND MATERIAL HANDLING

1.12.37 Odor Control Granule Sleeves — Payment Item No. 37

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities to furnish, store, install, and maintain granule sleeves.
- B. Measurement and Payment Payment Item No. 37 Odor Control Granule Sleeves will be measured on the basis of months installed (3 month minimum) and will be paid at the Contract price as shown for Payment Item No. 37 Odor Control Granule Sleeves in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS
 - 2. SECTION 02 61 13.13 WASTE EXCAVATION AND MATERIAL HANDLING

1.12.38 Odor Control Misting System — Payment Item No. 38

A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities to furnish, store, install, refill, provide water, provide power, and

- maintain 8 misting units and misting liquid along the Northwest Slope during waste excavation activities as needed for odor control or as directed by the CONSTRUCTION MANAGEMENT ENGINEER.
- B. Measurement and Payment Payment Item No. 38 Odor Control Misting System will be measured on the basis of months installed and operating and will be paid at the Contract price as shown for Payment Item No. 38 Odor Control Misting System in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS
 - 2. SECTION 02 61 13.13 WASTE EXCAVATION AND MATERIAL HANDLING

1.12.39 Demo Existing/Install Temporary LFG Collection System — Payment Item No. 39

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for removing existing landfill gas (LFG) piping, installing temporary LFG piping, removing existing condensate sumps, modifying existing dewatering sumps, removing existing condensate traps and drains, coordinating with the LANDFILL GAS OPERATIONS AND MAINTENANCE CONTRACTOR, and offsite disposal of removed materials.
- B. Measurement and Payment Payment Item No. 39 Demo Existing/Install Temporary LFG Collection System will not be measured and will be paid by lump sum at the Contract price as shown for Payment Item No. 39 Demo Existing/Install Temporary LFG Collection System in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 33 51 10 LANDFILL GAS COLLECTION AND CONVEYANCE SYSTEM
 - 2. SECTION 33 51 11 LANDFILL GAS EXTRACTION WELL AND CONDENSATE DRAIN SYSTEM

1.12.40 Install New LFG System — Payment Item No. 40

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for abandoning, extending, and shortening existing LFG extraction wells; and making connections to the existing LFG header.
- B. Measurement and Payment Payment Item No. 40 Install New LFG System will not be measured and will be paid by lump sum at the Contract price as shown for Payment Item No. 40 Install New LFG System in accordance with the Contract Documents. Related Specification Sections include:

- 1. SECTION 33 51 10 LANDFILL GAS COLLECTION AND CONVEYANCE SYSTEM
- 2. SECTION 33 51 11 LANDFILL GAS EXTRACTION WELL AND CONDENSATE DRAIN SYSTEM

1.12.41 Abandon LFG Extraction Well Borehole — Payment Item No. 41

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing and installing backfill material in abandoned LFG extraction well boreholes.
- B. Measurement and Payment Payment Item No. 41 Abandon LFG Extraction Well Borehole will be measured on the basis of linear feet of LFG extraction well borehole abandoned as determined by field measurement and will be paid at the Contract price as shown for Payment Item No. 41 Abandon LFG Extraction Well Borehole in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 33 51 11 LANDFILL GAS EXTRACTION WELL AND CONDENSATE DRAIN SYSTEM

1.12.42 New LFG Extraction Wells — Payment Item No. 42

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for drilling boreholes, monitoring gas concentrations during drilling, and furnishing and installing new LFG extraction wells.
- B. Measurement and Payment Payment Item No. 42 New LFG Extraction Wells will be measured on the basis of linear feet of LFG well pipe installed as determined by field measurement and will be paid at the Contract price as shown for Payment Item No. 42 New LFG Extraction Wells in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 33 51 11 LANDFILL GAS EXTRACTION WELL AND CONDENSATE DRAIN SYSTEM

1.12.43 New LFG Extraction Well Appurtenances — Payment Item No. 43

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing and installing gravel pads, fiberglass markers, LFG wellheads, and dedicated LFG well pumps.
- B. Measurement and Payment Payment Item No. 43 New LFG Extraction Well Appurtenances will not be measured and will be paid by lump sum at the Contract price as shown for Payment Item No. 43 New LFG Extraction Well Appurtenances in accordance with the Contract Documents. Related Specification Sections include:

1. SECTION 33 51 11 LANDFILL GAS EXTRACTION WELL AND CONDENSATE DRAIN SYSTEM

1.12.44 LFG Header Piping - 12 Inch — Payment Item No. 44

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing, storing, welding, trenching, installing, and testing the permanent 12-inch LFG piping.
- B. Measurement and Payment Payment Item No. 44 LFG Header Piping 12 Inch will be measured on the basis of linear feet of LFG pipe installed as determined by survey and will be paid at the Contract price as shown for Payment Item No. 44 LFG Header Piping 12 Inch in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 33 51 10 LANDFILL GAS COLLECTION AND CONVEYANCE SYSTEM

1.12.45 LFG Header Piping - 8 Inch — Payment Item No. 45

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing, storing, welding, trenching, installing, and testing the permanent 8-inch LFG piping.
- B. Measurement and Payment Payment Item No. 45 LFG Header Piping 8 Inch will be measured on the basis of linear feet of LFG pipe installed as determined by survey and will be paid at the Contract price as shown for Payment Item No. 45 LFG Header Piping 8 Inch in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 33 51 10 LANDFILL GAS COLLECTION AND CONVEYANCE SYSTEM

1.12.46 LFG Lateral Piping - 6 Inch — Payment Item No. 46

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing, storing, welding, trenching, installing, and testing the permanent 6-inch LFG piping.
- B. Measurement and Payment Payment Item No. 46 LFG Lateral Piping 6 Inch will be measured on the basis of linear feet of LFG pipe installed as determined by survey and will be paid at the Contract price as shown for Payment Item No. 46 LFG Lateral Piping 6 Inch in accordance with the Contract Documents. Related Specification Sections include:

1. SECTION 33 51 10 LANDFILL GAS COLLECTION AND CONVEYANCE SYSTEM

1.12.47 LFG Road Crossings — Payment Item No. 47

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing and installing the steel carrier pipes for the LFG piping at road crossings.
- B. Measurement and Payment Payment Item No. 47 LFG Road Crossings will be measured on the basis of linear feet of LFG pipe installed as determined by field measurement and will be paid at the Contract price as shown for Payment Item No. 47 LFG Road Crossings in accordance with the Contract Documents.

1.12.48 LFG Valves — Payment Item No. 48

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing, installing, and testing LFG valves.
- B. Measurement and Payment Payment Item No. 48 LFG Valves will not be measured and will be paid by lump sum at the Contract price as shown for Payment Item No. 48 LFG Valves in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 33 51 10 LANDFILL GAS COLLECTION AND CONVEYANCE SYSTEM

1.12.49 Condensate Drains — Payment Item No. 49

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing and installing pipe, caps, flanges, couplings, bushings, tees, stone, and bentonite; and drilling, performing gas monitoring, and filling the condensate drain with water.
- B. Measurement and Payment Payment Item No. 49 Condensate Drains will be measured on the basis of each as determined by count in the field and will be paid at the Contract price as shown for Payment Item No. 49 Condensate Drains in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 33 51 11 LANDFILL GAS EXTRACTION WELL AND CONDENSATE DRAIN SYSTEM

1.12.50 Subgrade (Existing Onsite Soil) — Payment Item No. 50

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for material testing, loading, hauling, placing, grading, and compacting existing onsite soils as subgrade.
- B. Measurement and Payment Payment Item No. 50 Subgrade (Existing Onsite Soil) will be measured on the basis of cubic yards of placed subgrade from existing onsite sources as determined by pre- and post-placement surveys (regraded waste and closure cap subgrade) and will be paid at the Contract price as shown for Payment Item No. 50 Subgrade (Existing Onsite Soil) in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 01 70 00 EXECUTION AND CLOSEOUT REQUIREMENTS
 - 2. SECTION 31 05 15 EARTHWORK

1.12.51 Subgrade (Furnished Soil) — Payment Item No. 51

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for material testing, furnishing, loading, hauling, placing, grading, and compacting soils furnished from offsite as subgrade.
- B. Measurement and Payment Payment Item No. 51 Subgrade (Furnished Soil) will be measured on the basis of cubic yards of placed subgrade from offsite sources as determined by pre- and post-placement surveys (regraded waste and closure cap subgrade) and will be paid at the Contract price as shown for Payment Item No. 51 Subgrade (Furnished Soil) in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 01 70 00 EXECUTION AND CLOSEOUT REQUIREMENTS
 - 2. SECTION 31 05 15 EARTHWORK

1.12.52 Geosynthetic Closure Cap — Payment Item No. 52

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for material testing, furnishing, storing, installing, installation testing, and repairing for all layers of geosynthetics in the geosynthetic closure cap as specified in the Contract Documents.
- B. Measurement and Payment Payment Item No. 52 Geosynthetic Closure Cap will be measured on the basis of square feet installed as determined by survey limits and will be paid at the Contract price as shown for Payment Item No. 52 Geosynthetic Closure Cap in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 31 05 19.13 GEOTEXTILES

- 2. SECTION 31 05 19.16 GEOMEMBRANE
- 3. SECTION 31 05 19.26 GEOCOMPOSITE

1.12.53 Alternate Geosynthetic Closure Cap — Payment Item No. 52A

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for material testing, furnishing, storing, installing, installation testing, and repairing for all layers of geosynthetics in the alternate geosynthetic closure cap as specified in the Contract Documents.
- B. Measurement and Payment Payment Item No. 52A Alternate Geosynthetic Closure Cap will be measured on the basis of square feet installed as determined by survey limits and will be paid at the Contract price as shown for Payment Item No. 52A Alternate Geosynthetic Closure Cap in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 31 05 19.13 GEOTEXTILES
 - 2. SECTION 31 05 19.16 GEOMEMBRANE
 - 3. SECTION 31 05 19.26 GEOCOMPOSITE

1.12.54 Vegetative Support Soil (Existing Onsite Soil) — Payment Item No. 53

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for material testing, loading, hauling, placing, grading, and compacting existing onsite soils as vegetative support soil.
- B. Measurement and Payment Payment Item No. 53 Vegetative Support Soil (Existing Onsite Soil) will be measured on the basis of cubic yards of placed vegetative support soil from existing onsite sources as determined by pre- and post-placement surveys (cap geosynthetics and vegetative support soil) and will be paid at the Contract price as shown for Payment Item No. 53 Vegetative Support Soil (Existing Onsite Soil) in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 01 70 00 EXECUTION AND CLOSEOUT REQUIREMENTS
 - 2. SECTION 31 05 15 EARTHWORK

1.12.55 Vegetative Support Soil (Furnished Soil) — Payment Item No. 54

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for material testing, furnishing, loading, hauling, placing, grading, and compacting soils furnished from offsite as vegetative support soil.
- B. Measurement and Payment Payment Item No. 54 Vegetative Support Soil (Furnished Soil) will be measured on the basis of cubic yards of placed vegetative support soil from offsite sources as determined by pre- and post-placement surveys (cap geosynthetics and vegetative support soil) and will be paid at the Contract price

as shown for Payment Item No. 54 Vegetative Support Soil (Furnished Soil) in accordance with the Contract Documents. Related Specification Sections include:

- 1. SECTION 01 70 00 EXECUTION AND CLOSEOUT REQUIREMENTS
- 2. SECTION 31 05 15 EARTHWORK

1.12.56 Topsoil — Payment Item No. 55

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for material testing, furnishing, loading, hauling, placing, and grading soils furnished from offsite as topsoil.
- B. Measurement and Payment Payment Item No. 55 Topsoil will be measured on the basis of cubic yards of placed topsoil as determined by pre- and post-placement surveys (vegetative support soil and topsoil) and will be paid at the Contract price as shown for Payment Item No. 55 Topsoil in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 01 70 00 EXECUTION AND CLOSEOUT REQUIREMENTS
 - 2. SECTION 32 92 19 UPLAND MEADOW ESTABLISHMENT

1.12.57 Cap Perimeter Riprap Drainage — Payment Item No. 56

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing, storing, and installing geotextile and riprap around the perimeter of the geosynthetic closure cap to provide positive drainage.
- B. Measurement and Payment Payment Item No. 56 Cap Perimeter Riprap Drainage will be measured on the basis of tons of riprap installed. The CONTRACTOR shall provide copies of tickets from the riprap supplier. It will be paid at the Contract price as shown for Payment Item No. 56 Cap Perimeter Riprap Drainage in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 31 05 16 AGGREGATES

1.12.58 Inlet Structure — Payment Item No. 57

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for preparing the location, furnishing, installing, backfilling, compacting, and attaching geomembrane liner to storm drain inlet structures.
- B. Measurement and Payment Payment Item No. 57 Inlet Structure will be measured on the basis of each as determined by count in the field and will be paid at the Contract price as shown for Payment Item No. 57 Inlet Structure in accordance with the Contract Documents. Related Specification Sections include:

1. SECTION 33 31 00 STORMWATER PIPING AND APPURTENANCES

1.12.59 Manhole — Payment Item No. 58

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for preparing the location, furnishing, installing, backfilling, compacting, and attaching geomembrane liner to storm drain manholes.
- B. Measurement and Payment Payment Item No. 58 Manhole will be measured on the basis of each as determined by count in the field and will be paid at the Contract price as shown for Payment Item No. 58 Manhole in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 33 31 00 STORMWATER PIPING AND APPURTENANCES

1.12.60 18" RCP — Payment Item No. 59

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for preparing the location, trenching, furnishing, installing, backfilling, compacting, and connecting 18" RCP to storm drain structures.
- B. Measurement and Payment Payment Item No. 59 18" RCP will be measured on the basis of linear feet of pipe installed as determined by field measurement and will be paid at the Contract price as shown for Payment Item No. 59 18" RCP in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 33 31 00 STORMWATER PIPING AND APPURTENANCES

1.12.61 24" RCP — Payment Item No. 60

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for preparing the location, trenching, furnishing, installing, backfilling, compacting, and connecting 24" RCP to storm drain structures.
- B. Measurement and Payment Payment Item No. 60 24" RCP will be measured on the basis of linear feet of pipe installed as determined by field measurement and will be paid at the Contract price as shown for Payment Item No. 60 24" RCP in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 33 31 00 STORMWATER PIPING AND APPURTENANCES

1.12.62 30" RCP — Payment Item No. 61

A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for preparing the location, trenching, furnishing, installing, backfilling, compacting, and connecting 30" RCP to storm drain structures.

- B. Measurement and Payment Payment Item No. 61 30" RCP will be measured on the basis of linear feet of pipe installed as determined by field measurement and will be paid at the Contract price as shown for Payment Item No. 61 30" RCP in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 33 31 00 STORMWATER PIPING AND APPURTENANCES

1.12.63 Gabion Downchutes — Payment Item No. 62

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for preparing the location, and furnishing and installing CR-6, geotextile, gabion baskets, and gabion stone for the gabion downchutes.
- B. Measurement and Payment Payment Item No. 62 Gabion Downchutes will be measured on the basis of linear feet of downchute installed as determined by survey and will be paid at the Contract price as shown for Payment Item No. 62 Gabion Downchutes in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 31 05 16 AGGREGATES
 - 2. SECTION 31 25 00 EROSION AND SEDIMENT CONTROL

1.12.64 Turf Reinforcement Matting — Payment Item No. 63

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing, installing, and repairing temporary and permanent swale turf reinforcement matting. This item also includes removal and disposal of temporary matting when the matted area will be disturbed for additional construction. Areas of the swale turf reinforcement matting already installed by the CONTRACTOR and requiring repair will not be measured nor paid.
- B. Measurement and Payment Payment Item No. 63 Turf Reinforcement Matting will be measured on the basis of square yards of matting installed as determined by survey and will be paid at the Contract price as shown for Payment Item No. 63 Turf Reinforcement Matting in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 31 25 00 EROSION AND SEDIMENT CONTROL

1.12.65 Box Culverts — Payment Item No. 64

A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for preparing the location, and furnishing and installing the pea gravel, geotextile, box culverts, and CR-6.

- B. Measurement and Payment Payment Item No. 64 Box Culverts will be measured on the basis of each as determined by count in the field and will be paid at the Contract price as shown for Payment Item No. 64 Box Culverts in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 33 31 00 STORMWATER PIPING AND APPURTENANCES

1.12.66 Northwest Slope Discharge Facility — Payment Item No. 65

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing and installing bar guards, pipes, and rock outlet protection for the Northwest Slope Discharge Facility.
- B. Measurement and Payment Payment Item No. 65 Northwest Slope Discharge Facility will not be measured and will be paid by lump sum at the Contract price as shown for Payment Item No. 65 Northwest Slope Discharge Facility in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 33 31 00 STORMWATER PIPING AND APPURTENANCES

1.12.67 Gravel Access Roads — Payment Item No. 66

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for excavation of road section, furnishing and installing geotextile and crusher run aggregate, including grading, compaction, and smoothing the transition to surrounding grade.
- B. Measurement and Payment Payment Item No. 66 Gravel Access Roads will be measured on the basis of square yards of gravel access roads installed as determined by survey and will be paid at the Contract price as shown for Payment Item No. 66 Gravel Access Roads in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 32 15 00 AGGREGATE SURFACING

1.12.68 Wooden Guardrail — Payment Item No. 67

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing and installing wooden guardrail.
- B. Measurement and Payment Payment Item No. 67 Wooden Guardrail will be measured on the basis of linear feet of wood guardrail installed as determined by survey and will be paid at the Contract price as shown for Payment Item No. 67 Wooden Guardrail in accordance with the Contract Documents. Related Specification Sections include:

1. SECTION 32 33 00 SITE FURNISHINGS

1.12.69 Dog Play Area Fence Enclosure — Payment Item No. 68

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing and installing the dog play fence.
- B. Measurement and Payment Payment Item No. 68 Dog Play Area Fence Enclosure will be measured on the basis of linear feet of enclosure installed as determined by survey and will be paid at the Contract price as shown for Payment Item No. 68 Dog Play Area Fence Enclosure in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 32 31 13.16 DOG PLAY AREA FENCE ENCLOSURE

1.12.70 Signage — Payment Item No. 69

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing and installing small and large informational signs, educational posts, directional sign posts, trail markers, and post bases.
- B. Measurement and Payment Payment Item No. 69 Signage will not be measured and will be paid by lump sum at the Contract price as shown for Payment Item No. 69 Signage in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 32 33 00 SITE FURNISHINGS

1.12.71 Site Furnishings — Payment Item No. 70

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing and installing owl nesting boxes, trash receptacles, stump climb, tunnel, boulders, teeter totter, balance star, magnifying lens post, butterfly box, tic tac toe, disc golf tee box, disc golf target basket, disc golf tee post, boulder terrace, sloped chaise lounge chairs, park benches, shade structures, post bases, and other miscellaneous site furnishings not specifically identified in other items.
- B. Measurement and Payment Payment Item No. 70 Site Furnishings will not be measured and will be paid by lump sum at the Contract price as shown for Payment Item No. 70 Site Furnishings in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 32 33 00 SITE FURNISHINGS

1.12.72 Art Installation — Payment Item No. 71

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing and installing the art installation.
- B. Measurement and Payment Payment Item No. 71 Art Installation will not be measured and will be paid by lump sum at the Contract price as shown for Payment Item No. 71 Art Installation in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 32 33 00 SITE FURNISHINGS

1.12.73 Mulch Bed — Payment Item No. 72

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing and installing mulch in the mulch beds.
- B. Measurement and Payment Payment Item No. 72 Mulch Bed will be measured on the basis of square yard of mulch bed installed as determined by survey and will be paid at the Contract price as shown for Payment Item No. 72 Mulch Bed in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 32 33 00 SITE FURNISHINGS

1.12.74 Timber Edging — Payment Item No. 73

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing and installing sand bedding, rebar, and timber edging for the mulch bed.
- B. Measurement and Payment Payment Item No. 73 Timber Edging will be measured on the basis of linear feet of timber edging installed as determined by survey and will be paid at the Contract price as shown for Payment Item No. 73 Timber Edging in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 32 33 00 SITE FURNISHINGS

1.12.75 Concrete Footers — Payment Item No. 74

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for excavation and furnishing and installing steel reinforcing and concrete.
- B. Measurement and Payment Payment Item No. 74 Concrete Footers will be measured on the basis of cubic yards of concrete footer installed based on field measurements and will be paid at the Contract price as shown for Payment Item No.

- 74 Concrete Footers in accordance with the Contract Documents. Related Specification Sections include:
- 1. SECTION 03 30 53 MISCELLANEOUS CAST-IN-PLACE CONCRETE

1.12.76 Aggregate for Site Furnishings — Payment Item No. 75

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing and installing graded aggregate and 3/8" rounded pea gravel for site furnishings.
- B. Measurement and Payment Payment Item No. 75 Aggregate for Site Furnishings will be measured on the basis of cubic yards of aggregate installed based on field measurements and will be paid at the Contract price as shown for Payment Item No. 75 Aggregate for Site Furnishings in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 31 05 16 AGGREGATES

1.12.77 Geotextile Fabric — Payment Item No. 76

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing and installing geotextile for site furnishings, including mulch beds, foundations, and other miscellaneous applications.
- B. Measurement and Payment Payment Item No. 76 Geotextile Fabric will be measured on the basis of square feet of geotextile fabric installed as determined by survey and will be paid at the Contract price as shown for Payment Item No. 76 Geotextile Fabric in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 31 05 19.13 GEOTEXTILES

1.12.78 Upland Meadow Establishment — Payment Item No. 77

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for fertilizing, seeding, watering, and other measures to initially plant Mix #1, Mix#2, and Mix #3 in the upland meadow.
- B. Measurement and Payment Payment Item No. 77 Upland Meadow Establishment will be measured on the basis of square yard of upland meadow installed and established as determined by survey and will be paid at the Contract price as shown for Payment Item No. 77 Upland Meadow Establishment in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 32 92 19 UPLAND MEADOW ESTABLISHMENT

1.12.79 Erosion Control Blanket — Payment Item No. 78

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing and installing erosion control blanket.
- B. Measurement and Payment Payment Item No. 78 Erosion Control Blanket will be measured on the basis of square yard of erosion control blanket installed as determined by survey and will be paid at the Contract price as shown for Payment Item No. 78 Erosion Control Blanket in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 31 25 00 EROSION AND SEDIMENT CONTROL

1.12.80 Straw Mulch — Payment Item No. 79

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing and installing straw mulch.
- B. Measurement and Payment Payment Item No. 79 Straw Mulch will be measured on the basis of square yard of straw mulch installed as determined by survey and will be paid at the Contract price as shown for Payment Item No. 79 Straw Mulch in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 31 25 00 EROSION AND SEDIMENT CONTROL

1.12.81 Meadow Maintenance — Payment Item No. 80

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for maintaining and ensuring establishment of the upland meadow areas.
- B. Measurement and Payment Payment Item No. 80 Meadow Maintenance will not be measured and will be paid by lump sum at the Contract price as shown for Payment Item No. 80 Meadow Maintenance in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 32 92 19 UPLAND MEADOW ESTABLISHMENT

1.12.82 Tree and Shrub Planting — Payment Item No. 81

A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing, installing, and establishing trees and shrubs, including excavation, deer protection fencing, tree bark protectors, staking, mulch, watering, and other measures required to establish trees and shrubs.

- B. Measurement and Payment Payment Item No. 81 Tree and Shrub Planting will not be measured and will be paid by lump sum at the Contract price as shown for Payment Item No. 81 Tree and Shrub Planting in accordance with the Contract Documents. Related Specification Sections include:
 - 1. SECTION 32 93 00 PLANTS

1.12.83 Chain-Link Fence — Payment Item No. 82

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing and installing permanent chain-link fence.
- B. Measurement and Payment Payment Item No. 82 Chain-Link Fence will be measured on the basis of linear feet of chain-link fence installed as determined by survey and will be paid at the Contract price as shown for Payment Item No. 82 Chain-Link Fence in accordance with the Contract Documents.

1.12.84 Chain-Link Personnel Gate — Payment Item No. 83

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing and installing permanent chain-link personnel gates.
- B. Measurement and Payment Payment Item No. 83 Chain-Link Personnel Gate will be measured on the basis of each as determined by count in the field and will be paid at the Contract price as shown for Payment Item No. 83 Chain-Link Personnel Gate in accordance with the Contract Documents.

1.12.85 Chain-Link Vehicle Gate — Payment Item No. 84

- A. This item consists of all materials, labor, equipment, and appurtenances to complete Work activities for furnishing and installing permanent chain-link vehicle gates.
- B. Measurement and Payment Payment Item No. 84 Chain-Link Vehicle Gate will be measured on the basis of each as determined by count in the field and will be paid at the Contract price as shown for Payment Item No. 84 Chain-Link Vehicle Gate in accordance with the Contract Documents.

2. <u>MATERIALS</u>

A. Not used.

3. <u>EXECUTION</u>

A. Not used.

-- End of Section --

SECTION 01 26 00 CONTRACT MODIFICATION PROCEDURES

1. **GENERAL**

1.1 <u>Description</u>

A. General

- 1. This Section expands upon provisions of the General Conditions and Supplementary Conditions, and includes:
 - a. Requests for interpretation.
 - b. Minor variations in the Work and Field Orders.
 - c. Work Change Directives.
 - d. Proposal requests.
 - e. Change Order proposals.
 - f. Change Orders.
- B. Submit Contract modification documents to CONSTRUCTION MANAGEMENT ENGINEER at addresses in Section 01 33 00, Submittals.
- C. Retain at CONTRACTOR'S office and at the Site complete copy of each Contract modification document and related documents, and OWNER'S and CONSTRUCTION MANAGEMENT ENGINEER'S responses.

1.1.1 Requests For Interpretation (RFI)

A. General

- 1. Submit written requests for interpretation to CONSTRUCTION MANAGEMENT ENGINEER.
- 2. Submit request for interpretation to obtain clarification or interpretation of the Contract Documents. Report conflicts, errors, ambiguities, and discrepancies in the Contract Documents using requests for interpretation.
- 3. Do not submit request for interpretation when other form of communication is appropriate, such as submittals, requests for substitutions or "or equals," notices, ordinary correspondence, or other form of communication. Improperly prepared or inappropriate requests for interpretation will be returned without response or action and noted as such.

B. Procedure

- 1. Submit one (1) original, one (1) hardcopy, and an electronic PDF document of each request for interpretation to the CONSTRUCTION MANAGEMENT ENGINEER for distribution. CONSTRUCTION MANAGEMENT ENGINEER will forward the request for distribution to the following:
 - a. CONSTRUCTION MANAGEMENT ENGINEER (original).
 - b. OWNER (electronic copy).
- 2. CONSTRUCTION MANAGEMENT ENGINEER will provide review of requests for interpretation and will provide response within five (5) days. Allow sufficient time for review and response.
- 3. CONSTRUCTION MANAGEMENT ENGINEER will maintain log of requests for interpretation. An electronic copy of log will be provided upon request.
- 4. CONSTRUCTION MANAGEMENT ENGINEER will provide written response to each request for interpretation. An electronic copy of CONSTRUCTION MANAGEMENT ENGINEER'S electronic response (via email) will be distributed to CONTRACTOR and OWNER.
- 5. If CONSTRUCTION MANAGEMENT ENGINEER requests additional information to make an interpretation, provide information requested within five (5) days, unless CONSTRUCTION MANAGEMENT ENGINEER allows additional time, via correspondence referring to request for interpretation number.
- 6. If CONTRACTOR believes that a change in Contract Price or Contract Times or other change to the Contract is required, notify CONSTRUCTION MANAGEMENT ENGINEER in writing before proceeding with Work associated with the request for interpretation.
- C. Each request for interpretation shall be submitted on the request for interpretation form included with this Section, or other form acceptable to CONSTRUCTION MANAGEMENT ENGINEER.
 - 1. Number each request for interpretation as follows: Numbering system shall be the Contract number followed by a hyphen, "RFI", another hyphen, and a three (3)-digit sequential number. Example: First request for interpretation on the general contract for project titled, "Contract No. XXXX" would be, "XXXX-RFI-001."
 - 2. In space provided on form, describe the interpretation requested. Provide additional sheets as required. Include text and sketches as required in sufficient detail for CONSTRUCTION MANAGEMENT ENGINEER's response.

3. When applicable, request for interpretation shall include CONTRACTOR'S recommended resolution.

1.1.2 Minor Variations in Work and Field Orders

A. General

- 1. A Field Order, when required, will be initiated by CONSTRUCTION MANAGEMENT ENGINEER and issued by OWNER.
- 2. Field Orders authorize minor variations in the Work, but do not change the Contract Price or Contract Times.
- 3. Field Orders will be submitted on the field order form included with this Section.
- 4. CONSTRUCTION MANAGEMENT ENGINEER will maintain a log of Field Orders Issued.

B. Procedure

- 1. One (1) hardcopy and an electronic copy of each Field Order will be distributed to:
 - a. CONTRACTOR.
 - b. OWNER (electronic only).
 - c. CONSTRUCTION MANAGEMENT ENGINEER.
- 2. If Field Order is unclear, submit request for interpretation.
- 3. If CONTRACTOR believes that a change in Contract Price or Contract Times or other change to the Contract is required, immediately notify OWNER and CONSTRUCTION MANAGEMENT ENGINEER in writing. Approval is required before proceeding with Work associated with the Field Order.

1.1.3 Work Change Directives

A. General

- 1. Work Change Directives are for use in situations involving changes in the Work which, if not processed expeditiously, might delay the project. These changes are often initiated in the field and may affect the Contract Price or the Contract Times. They are not a Change Order, but only a directive to proceed with Work that may be included in a subsequent Change Order.
- 2. Work Change Directives, when required, order additions, deletions, or revisions to the Work.

- 3. Work Change Directives do not change the Contract Price or Contract Times, but are evidence that the parties to the Contract expect that the change ordered or documented by the Work Change Directive will be incorporated in subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times. Work Change Directives with no effect on Contract Price or Contract Times may be formalized as a "Zero-Dollar Change Order." Work Change Directives require approval from the Northeast Maryland Waste Disposal Authority prior to implementation.
- 4. Work Change Directives will be submitted on the work change directive form included with this Section.

B. Procedure

- 1. Three (3) originals and an electronic copy of the Work Change Directive signed by OWNER and CONSTRUCTION MANAGEMENT ENGINEER will be furnished to CONTRACTOR, who shall promptly sign each original Work Change Directive and, within five (5) days of receipt, return all originals to CONSTRUCTION MANAGEMENT ENGINEER.
- 2. Original, signed Work Change Directives will be distributed as follows:
 - a. CONTRACTOR: One (1) original.
 - b. OWNER: One (1) original.
 - c. CONSTRUCTION MANAGEMENT ENGINEER: One (1) original.
- 3. When required by CONSTRUCTION MANAGEMENT ENGINEER, documentation for the Work performed under each separate Work Change Directive, for each day, the number and type of workers employed and hours worked; equipment used including manufacturer, model, and year of equipment, and number of hours; materials used, receipts for and descriptions of materials and equipment incorporated into the Work, invoices and labor and equipment breakdowns for Subcontractors and Suppliers, and other information required by OWNER or CONSTRUCTION MANAGEMENT ENGINEER, in a format acceptable to CONSTRUCTION MANAGEMENT ENGINEER. Submit this documentation to CONSTRUCTION MANAGEMENT ENGINEER as a Change Order proposal.
- 4. Once the Work covered by this directive is completed or final costs and times are determined, CONTRACTOR shall submit documentation for inclusion in a Change Order.

1.1.4 Proposal Requests

A. General

1. Proposal requests are initiated by OWNER.

- 2. Proposal requests are for requesting the effect on Contract Price and Contract Times and other information relative to contemplated changes in the Work.
- 3. Proposal requests do not authorize changes or variations in the Work, and do not change the Contract Price or Contract Times or terms of the Contract.
- 4. Proposal requests will be furnished using the proposal request form included with this Section.

B. Procedure

- 1. One (1) hardcopy and an electronic copy of each signed proposal request will be furnished to the CONTRACTOR with one (1) hardcopy and an electronic copy each to:
 - a. OWNER.
 - b. CONSTRUCTION MANAGEMENT ENGINEER.
- 2. Submit request for interpretation to clarify conflicts, errors, ambiguities, and discrepancies in proposal request.
- 3. Upon receipt of proposal request, CONTRACTOR shall prepare and submit a Change Order proposal, in accordance with this Section, for the proposed Work described in the proposal request.

1.1.5 Change Order Proposals (COP)

A. General

1. Submit written Change Order proposal to OWNER and CONSTRUCTION MANAGEMENT ENGINEER in response to each proposal request, and when CONTRACTOR believes a change in the Contract Price or Contract Times or other change to the terms of the Contract is required.

B. Procedure

- 1. Submit to CONSTRUCTION MANAGEMENT ENGINEER one (1) original, four (4) hardcopies, and an electronic copy of each Change Order proposal with accompanying documentation. Pages are to be numbered. CONSTRUCTION MANAGEMENT ENGINEER will distribute for review.
- 2. CONSTRUCTION MANAGEMENT ENGINEER will review Change Order proposal and either request additional information from CONTRACTOR or provide to OWNER recommendation regarding approval of the Change Order proposal.

- 3. If CONSTRUCTION MANAGEMENT ENGINEER requests additional information to render a decision, submit required information within five (5) days of receipt of CONSTRUCTION MANAGEMENT ENGINEER's request, unless CONSTRUCTION MANAGEMENT ENGINEER allows greater amount of time. Submit the required information via correspondence that refers to Change Order proposal number.
- 4. Upon completing review, one (1) hardcopy, and an electronic copy of CONSTRUCTION MANAGEMENT ENGINEER's written response, if any, will be distributed to:
 - a. CONTRACTOR.
 - b. OWNER.
 - c. CONSTRUCTION MANAGEMENT ENGINEER.
- 5. If Change Order proposal is recommended for approval by CONSTRUCTION MANAGEMENT ENGINEER and approved by OWNER, a Change Order will be issued.
- 6. If parties do not agree on terms for the change, OWNER or CONTRACTOR may file a Claim against the other, in accordance with the General Conditions and the Supplementary Conditions.
- C. Each Change Order proposal shall be submitted on the Change Order proposal form included with this Section, or other form acceptable to OWNER.
 - 1. Number each Change Order proposal as follows: Numbering system shall be the Contract number followed by a hyphen, "COP", another hyphen, and a three (3)-digit sequential number. Example: First Change Order proposal for the general contract for project named "Contract XXXX" would be, "XXXX-COP-001."
 - 2. In space provided on form:
 - a. Describe scope of each proposed change. Include text and sketches on additional sheets as required to provide detail sufficient for CONSTRUCTION MANAGEMENT ENGINEER'S review and response. If a change item is submitted in response to proposal request, write in as scope, "In accordance with Proposal Request No." followed by the proposal request number. Provide written clarifications, if any, to scope of change.
 - b. Provide justification for each proposed change. If change is in response to proposal request, write in as justification, "In accordance with Proposal Request No." followed by the proposal request number.
 - c. List the total change in Contract Price and Contract Times for each proposed change.

- 3. Unless otherwise directed by CONSTRUCTION MANAGEMENT ENGINEER, attach to the Change Order proposal detailed breakdowns of pricing (Cost of the Work and CONTRACTOR'S fee) including:
 - a. List of Work tasks to accomplish the change and any reference to applicable specification(s) and/or drawing(s).
 - b. For each task, labor cost breakdown including labor classification, total hours per labor classification, and hourly cost rate for each labor classification, including data on MFD participation.
 - c. Construction equipment and machinery to be used, including manufacturer, model, and year of manufacture, and number of hours for each.
 - d. Detailed breakdown of materials and equipment to be incorporated into the Work, including quantities, unit costs, and total cost, with Supplier's written quotations.
 - e. Breakdowns of the Cost of the Work and fee for Subcontractors, including labor, construction equipment and machinery, and materials and equipment incorporated into the Work, other costs, and Subcontractor fees.
 - f. Breakdown of other costs eligible, in accordance with the General Conditions and the Supplementary Conditions.
 - g. Breakdown of pricing shall be in accordance with the unit pricing of any existing Bid and Contingency items when applicable.
 - h. Other information required by CONSTRUCTION MANAGEMENT ENGINEER.
 - i. CONTRACTOR'S fees applied to eligible CONTRACTOR costs and eligible Subcontractor costs.

1.1.6 Change Orders

A. General

- 1. Change Orders will be recommended by CONSTRUCTION MANAGEMENT ENGINEER, signed by CONTRACTOR and approved by OWNER, to authorize additions, deletions, or revisions to the Work, or changes to the Contract Price or Contract Times.
- 2. Change Orders will be issued utilizing the form included.

B. Procedure

- 1. Three (3) originals and one (1) electronic copy of each Change Order will be furnished to CONTRACTOR, who shall promptly sign each original Change Order and return all originals to OWNER within five (5) days of receipt. Electronic copies need to include all attachments with the pages numbered.
- 2. Each original Change Order will be signed by representatives of OWNER and forwarded to the Northeast Maryland Waste Disposal Authority for approval.
- 3. After approval by County, original Change Orders will be distributed to CONTRACTOR, OWNER, and CONSTRUCTION MANAGEMENT ENGINEER.

1.2 References

A. Not used.

1.3 Definitions

A. Not used.

1.4 Qualifications

A. Not used.

1.5 **Submittals**

A. Not used.

1.6 Safety

A. Not used.

1.7 Quality Assurance

A. Not used.

1.8 **Product Delivery, Handling, and Storage**

A. Not used.

1.9 Schedule

A. Not used.

1.10 Contracts

A. Not used.

1.11 Work By Others

B. Not used.

1.12 Sequence of Work

C. Not used.

1.13 CONTRACTOR'S Use of Premises

A. Not used.

2. <u>MATERIALS</u>

A. Not used.

3. <u>EXECUTION</u>

A. Not used.

-- End of Section --

REQUEST FOR INTERPRETATIONS (RFI)

CONTRACTOR:	RFI No
Date Transmitted:	Date Received:
Date Response Requested:	Date Received: Date Response Transmitted:
Cultinate	
Specification Section and Paragraph:	
Drawing References:	
NAMED DO DE A TAOM DE OMEGNED	
INTERPRETATION REQUESTED:	
Signature:	Date:
CONSTRUCTION MANAGEMENT ENG	GINEER'S RESPONSE:

WORK CHANGE DIRECTIVE NO.

DATE OF ISSUANCE:	EFFECTIVE	DATE:
CONTRACTOR:		
Contract:		
You are directed to proceed Description:	promptly with the following change(s):	
Purpose of Work Change Di	rective:	
Attachments: (List documen	ats supporting change)	
Estimated change in Contr	ract Price and Contract Times:	
Contract Price \$	(increase/decrease) Contract Time	days (increase/decrease)
MFD Price \$	(increase/decrease) MFD %	
	rease, the estimated amounts are not to be	
Recommended for Approval by	y Construction Management Engineer:	Date
Authorized for Owner by:	_	Date
Accepted for Contractor by:		Date
Approved by Northeast Maryla	and Waste Disposal Authority:	Date:

PROPOSAL REQUEST

Proposal Request No.:	Date:
Contract Name and No.:	
Contractor:	
Other Contracts Involved in Prop	osed Change:
described below. If the associate	nit a complete Change Order proposal for the proposed modification of Change Order proposal is approved, a Change Order will be issued to of Work. This Proposal Request is not a Change Order or an authorization of described below.
SCOPE OF PROPOSED W	ORK:
1. Item: 2. Item: 3. Item:	
Proposal Requested By:	

CHANGE ORDER PROPOSAL

Change Order Proposal No.:	Date:		
Submitted in Response to Proposal Request No.:			
Contract Name and No.:			
Contractor:			
Subject:			
The following changes to the Contract are proposed	:		
SCOPE OF WORK: (attach and list supporting inform	nation as required)		
1. Item:	• /		
2. Item:			
JUSTIFICATION:			
1. Item:			
2. <i>Item</i> :			
CHANGES IN CONTRACT PRICE AND Company of the propose that the Contract Price and Contract Times For Contract Price, when requested by CONSTRUCTION Supplier quotations, MFD price and percentage, and other For Contract Times, state increase, decrease, or no change payment, and Milestones, if any. If increase or decrease, states	mes be changed as f N MANAGEMENT ENG information required. to Contract Times for S	Collows: FINEER, attach detailed Substantial Completion, 1 lays for changes to Contr	readiness for final act Times.
Description	Amount	Contract Tir Substantial	nes (days) Final
1. Item	\$0.00	0	0
2. Item	\$0.00	0	0
Total This Change Order Proposal	\$0.00	0	0
Changes to Milestones, if any: The adjustment proposed is the entire adjustment to t as a result of the proposed change. Change Order Proposal By:			res it is entitled
Signature of Proposer:			

CHANGE ORDER

You are directed to make the following changes in the Contract Documents:

Description: 1. *Item*:

CHANGE IN CONTRACT I	PRICE	CHA	ANGE IN CONTRACT TIMES
Original Contract Price:		Original Contrac Substantial Co Ready for final (days or dates)	t Times: mpletion: l payment:
Net increase (decrease) from previous Chang: \$:		Substantial Co	previous Change Orders No to mpletion: l payment:
Contract Price prior to this Change Order:		Substantial Co Ready for final (days or dates)	
Net increase (decrease) of this Change Order \$		Substantial Co Ready for final (days)	crease) of this Change Order impletion: I payment:
Contract Price with all approved Change Ord		Contract Times v Substantial Co	with all approved Change Orders mpletion: l payment:
RECOMMENDED: By: Construction Management Engineer	RECOMMENDED: By: Project Manager, I Resource Manager		
Date: APPROVED:	Date:APPROVED:		Date:ACCEPTED:
By: Section Chief, Recycling and Resource Management Division	By: Representative, N Waste Disposal A	Northeast Maryland authority	By:(Contractor)

Date: ______ Date: _____

SECTION 01 31 19.13 PRECONSTRUCTION MEETING

1. **GENERAL**

1.1 <u>Description</u>

- A. The Preconstruction Meeting will be held to establish a working understanding among the parties as to the Work and to discuss the Preliminary Schedules, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.
- B. CONTRACTOR shall attend the meeting prepared to discuss all items on the agenda. The representatives present for each party shall be authorized to act on their behalf.
- C. Purpose of the meeting is to designate responsible personnel, establish working relationships, and establish administrative provisions for the Project. Matters requiring coordination will be discussed and procedures for handling such matters will be established.
- D. Date, Time and Location: Meeting will be held after execution of the Contract and before Work starts at the Site. CONSTRUCTION MANAGEMENT ENGINEER will determine the date, time, and location of the meeting and advise the interested and involved parties.
- E. CONSTRUCTION MANAGEMENT ENGINEER will distribute an agenda and preside at the meeting. CONSTRUCTION MANAGEMENT ENGINEER will prepare and distribute meeting minutes to all meeting participants and others as requested. CONTRACTOR will review the draft minutes and provide written comment or acceptance to all within five (5) calendar days.
- F. CONTRACTOR shall provide data required and contribute appropriate items for discussion. Unless previously submitted to OWNER and CONSTRUCTION MANAGEMENT ENGINEER, CONTRACTOR shall bring to the meeting a draft of each of the following or any other pertinent (relevant) information:
 - 1. Progress Schedule.
 - 2. List of required Shop Drawings and submittals.
 - 3. Schedule of Values.
 - 4. Contractor's Site-Specific Health and Safety Plan.
 - 5. List of emergency contact information.

1.1.1 Required Attendance

- A. Meeting shall be attended by CONTRACTOR'S Project Manager, Site Superintendent, and major Subcontractors and major equipment Suppliers, as CONTRACTOR deems appropriate.
- B. Other attendees will be representatives of:
 - 1. Montgomery County Department of Environmental Protection (OWNER).
 - 2. CONSTRUCTION MANAGEMENT ENGINEER.
 - 3. Northeast Maryland Waste Disposal Authority designee.
 - 4. Governmental agencies having control or responsibility, if available.
 - 5. Others as requested by OWNER, CONTRACTOR, or CONSTRUCTION MANAGEMENT ENGINEER.

1.1.2 Agenda

- A. Agenda: CONTRACTOR shall be prepared to discuss the following:
 - 1. Designation of responsible personnel.
 - 2. Communications and correspondence.
 - 3. Coordination with other contractors.
 - 4. Emergency contact information.
 - 5. Review of Scope of Work.
 - 6. Review of Contract Times, Milestones, and completion dates.
 - 7. Subcontractors.
 - 8. Progress Schedule.
 - 9. Schedule of Values.
 - 10. Project coordination and coordination with OWNER'S operations.
 - 11. Progress meetings.
 - 12. Submittals and Shop Drawings: processing and schedule of submittals.
 - 13. Substitutions.
 - 14. Owner's tax-exempt status.
 - 15. Payments, retainage, payrolls, and Substantial Completion.
 - 16. Processing of Field Orders and Change Orders.
 - 17. Use of premises, security, housekeeping, safety, CONTRACTOR'S responsibility for safety and first aid procedures, Site access.
 - 18. Field offices, trailers, temporary facilities.
 - 19. Storage of materials.
 - 20. Construction photographs.
 - 21. Record drawings.
 - 22. Clarifications.
 - 23. Requirements for copies of Contract Documents and availability.
 - 24. CONTRACTOR correction period.
 - 25. Layouts and surveys.
 - 26. Hours of Work and overtime.

- 27. Restoration.
- 28. Permits.
- 29. Insurance in force.
- 30. Financing.
- 31. Disposal of demolition materials.
- 32. Next meeting.
- 33. General discussion and questions.
- 34. Site visit if required.

1.2 <u>References</u>

A. Not used.

1.3 **Definitions**

A. Not used.

1.4 Qualifications

A. Not used.

1.5 **Submittals**

A. Not used.

1.6 Safety

A. Not used.

1.7 **Quality Assurance**

A. Not used.

1.8 Product Delivery, Handling, and Storage

A. Not used.

1.9 Schedule

A. Not used.

1.10 Contracts

A. Not used.

1.11 Work By Others

A. Not used.

1.12 Sequence of Work

A. Not used.

1.13 <u>Contractor's Use of Premises</u>

A. Not used.

2. <u>MATERIALS</u>

A. Not used.

3. <u>EXECUTION</u>

A. Not used.

-- End of Section --

SECTION 01 31 19.23 PROGRESS MEETINGS

1. **GENERAL**

1.1 Description

A. Progress meetings will be held throughout the Project. CONTRACTOR shall attend each meeting prepared to discuss all items on the agenda. The representatives present for each party shall be authorized to act on their behalf.

B. Date and Time:

- 1. Every two (2) weeks on a day and time agreeable to OWNER, CONSTRUCTION MANAGEMENT ENGINEER, and CONTRACTOR.
- 2. Frequency may be adjusted as required by progress of Work.
- C. Place: CONTRACTOR'S or CONSTRUCTION MANAGEMENT ENGINEER'S trailer or other mutually agreed upon location.
- D. OWNER and CONSTRUCTION MANAGEMENT ENGINEER will preside at meetings. CONSTRUCTION MANAGEMENT ENGINEER will prepare and distribute meeting minutes to all meeting participants and others as requested. CONTRACTOR will review the draft minutes and provide written comment or acceptance to all within five (5) calendar days.
- E. CONTRACTOR shall provide to the CONSTRUCTION MANAGEMENT ENGINEER the following data a minimum of two (2) days prior to the meeting:
 - 1. List of work accomplished since the previous progress meeting
 - 2. Schedule of Work with specific starting and ending dates for each task, planned until the next progress meeting
 - 3. "Look-ahead" Schedule of Work for major shutdowns, major equipment installations, and other important milestones
 - 4. List of upcoming planned time off, including dates, for personnel with significant roles on the project and designated contact person during their absence

1.1.1 Minimum Attendance

A. CONTRACTOR:

1. CONTRACTOR'S Project Manager.

- 2. CONTRACTOR'S Site Superintendent.
- 3. When needed for the discussion of a particular agenda item, CONTRACTOR shall require representatives of Subcontractors or Suppliers to attend a meeting.
- B. OWNER'S Project Manager.
- C. CONSTRUCTION MANAGEMENT ENGINEER.
- D. Northeast Maryland Waste Disposal Authority.
- E. Others, as appropriate.

1.1.2 Agenda

- A. Agenda will include, but will not necessarily be limited to, the following:
 - 1. Review and comment on minutes of previous meeting.
 - 2. Review of progress since the previous meeting.
 - 3. Planned progress for next period.
 - 4. Review of overall project schedule, including offsite fabrication and delivery schedules and corrective measures, if required.
 - 5. Review of status of critical submittals, including Shop Drawings and Applications for Payment.
 - 6. Review of RFIs, Field Orders, Work Change Directives, Proposals, Change Order Proposals, and Change Orders.
 - 7. Problems, conflicts, and observations.
 - 8. Quality standards and control.
 - 9. Coordination between parties.
 - 10. Compliance and safety concerns including inclement weather planning and preparation.
 - 11. Permits.
 - 12. Construction photographs.
 - 13. Record drawings.

1.2	References
	B. CONSTRUCTION MANAGEMENT ENGINEER will provide an adequate number of copies of the agenda for each attendee.
	15. Other business.
	14. Punch list status.

A. Not used.

1.3 <u>Definitions</u>

A. Not used. Qualifications

A. Not used.

1.5 **Submittals**

A. Not used.

1.6 Safety

1.4

A. Not used.

1.7 **Quality Assurance**

A. Not used.

1.8 Product Delivery, Handling, and Storage

A. Not used.

1.9 Schedule

A. Not used.

1.10 Contracts

A. Not used.

1.11 Work By Others

A. Not used.

1.12 Sequence of Work

A. Not used.

1.13 <u>Contractor's Use of Premises</u>

A. Not used.

2. <u>MATERIALS</u>

A. Not used.

3. <u>EXECUTION</u>

A. Not used.

-- End of Section --

SECTION 01 32 33 PHOTOGRAPHIC DOCUMENTATION

1. **GENERAL**

1.1 <u>Description</u>

1.1.1 Scope of Work

- A. CONTRACTOR shall designate onsite personnel to perform services specified, including:
 - 1. Digital photography.
- B. Provide photographic documentation for the following:
 - 1. Preconstruction.
 - 2. Construction progress.
 - 3. Final.

C. Image Quality:

- 1. All photographic documentation shall be in color.
- 2. Photographic images shall be suitably staged and set up ("framed"), focused, and with adequate lighting.
- 3. For still photographs, use digital camera with minimum 10.1-megapixel resolution.

1.1.2 Related Work Specified Elsewhere

- A. Section 00 73 00, Supplementary Conditions.
- B. Section 01 33 00, Submittals.

1.2 References

A. Not used.

1.3 Definitions

A. Not used.

1.4 Qualifications

A. Not used.

1.5 Submittals

- A. Frequency of Photographic Documentation Submittals:
 - 1. Preconstruction—Submit preconstruction photographic documentation (online and USB drives) prior to mobilizing to and disturbing the Site. Provide preconstruction photographic documentation no later than first Application for Payment, unless other schedule is accepted by CONSTRUCTION MANAGEMENT ENGINEER.
 - 2. Progress—Provide construction progress photographic documentation (online USB drives) monthly. Submit with each Application for Payment, unless otherwise agreed to by CONSTRUCTION MANAGEMENT ENGINEER.
 - 3. Final—Submit acceptable final photographic documentation (online and USB drives) prior to submitting final Application for Payment.

B. Photographic Prints:

- 1. Print Size and Finish:
 - a. Provide the following information on back of each print and front of each USB drive containing photographic documentation:
 - 1) Date photograph was taken.
 - 2) Project name.
 - 3) Description of view shown in photograph.
 - 4) Digital File name.

C. Digital Files of Photographs:

- 1. For each photograph taken, provide high-quality digital image on a USB drive in uncompressed "*.JPG" or "TIF" file format. USB drive shall be compatible with Microsoft Windows 10.
- 2. Image resolution shall be sufficient for clear, high-resolution prints. Resolution shall be the maximum provided by the camera.
- 3. Provide a date stamp on the front of each picture.
- 4. Post photographic images online and provide two (2) copies of each USB drive with photographic images.

- 5. Provide, with each USB drive and online, a photo log with the following information:
 - a. Digital file name.
 - b. Date photograph was taken.
 - c. Project name.
 - d. Description of view shown in photograph.
- 6. Label each USB drive with Project Name, date range of photos, and a brief description.

1.6 Safety

A. Not used.

1.7 **Quality Assurance**

A. CONSTRUCTION MANAGEMENT ENGINEER will approve the views to be taken and select time at which images will be taken. Photographic subjects, views, and angles will vary with progress of the Work.

1.8 **Product Delivery, Handling, and Storage**

A. Not used.

1.9 Schedule

A. Not used.

2. <u>MATERIALS</u>

A. Not used.

3. <u>EXECUTION</u>

3.1 <u>Preconstruction Photographic Documentation</u>

- A. Preconstruction Photographic Documentation:
 - 1. Obtain and submit sufficient preconstruction photographic documentation to record Site conditions prior to construction. Photographs shall document all work areas.

- 2. Furnish to CONSTRUCTION MANAGEMENT ENGINEER specified number of photographs. Preconstruction photographs are not part of required number of construction progress photographs specified in Paragraph 1.5 of this Section.
- B. If dispute arises and preconstruction photographic documentation was not submitted prior to the dispute, restore disputed area to extent directed by CONSTRUCTION MANAGEMENT ENGINEER and to complete satisfaction of OWNER.

3.2 Construction Progress Photographic Documentation

A. Progress Photographs:

- 1. Take photographs on a regular basis to document progress of the Work. At minimum, photographs shall be taken once per day of each area where work is being performed.
- 2. The minimum of weekly progress photographs taken shall be twenty-five (25). Submit additional monthly photographs as necessary to adequately document all aspects of the progress of Work.
- 3. Provide interior and exterior photographic documentation of each structure as directed by CONSTRUCTION MANAGEMENT ENGINEER.
- 4. Provide photographic documentation of all material deliveries, stored materials, and representative material assembly and testing.

3.3 Final Photographic Documentation

A. Final Photographs:

- 1. Take photographs at time and day acceptable to CONSTRUCTION MANAGEMENT ENGINEER. Do not take final photographs prior to Substantial Completion. Work documented in final photographs shall be generally complete, including painting, furnishings, landscaping, and other visible Work.
- 2. Take a minimum four hundred fifty (450) final photographs, based on scope of Work at the time Contract Times commence running. Proportionately modify the number of final photographs if scope of Project is modified. Final photographs are not part of construction progress photographs required under Paragraph 3.2.A of this Section.

-- End of Section --

SECTION 01 33 00 SUBMITTALS

1. **GENERAL**

1.1 <u>Description</u>

1.1.1 Scope of Work

- A. This Section includes general requirements and procedures related to the CONTRACTOR'S responsibilities for preparing and transmitting submittals to the CONSTRUCTION MANAGMENT ENGINEER to demonstrate that the performance of the Work will be in accordance with the Contract requirements. Submittals include schedules, test results, topographic surveys, CONTRACTOR'S drawings, samples, manuals, methods of construction, and record drawings. Other requirements for submittals are specified under applicable sections of the Project Manual.
- B. CONTRACTOR shall provide submittals in accordance with the General Conditions as modified by the Supplementary Conditions, and this Section, well in advance of need for the material or equipment, or procedure (as applicable), in the Work and with ample time required for delivery of material or equipment and to implement procedures following CONSTRUCTION MANAGMENT ENGINEER'S written approval or acceptance of the associated submittal.
- C. Work covered by a submittal will not be included in progress payments until written approval or acceptance of related submittals has been obtained in accordance with the Contract Documents.

1.1.2 Related Work Specified Elsewhere

A. Not used.

1.2 References

- A. Section 00 73 00, Supplementary Conditions.
- B. Section 01 70 00, Execution and Closeout Requirements.

1.3 <u>Definitions</u>

A. Not used.

1.4 Qualifications

A. Not used.

1.5 Submittals

- A. Not later than twenty-one (21) calendar days after the receipt of Notice to Proceed, the CONTRACTOR shall submit in writing a list of materials and equipment that will be purchased, giving name, address, and telephone number of supplier, manufacturer, or processor. No material shall be incorporated into the Work until written approval of the source has been given. Delivery of materials to the Contract Site prior to written approval is made at the CONTRACTOR'S risk and is subject to immediate removal at no cost to the OWNER should it be determined that the source is not acceptable.
- B. Submittals shall be scheduled and coordinated with the CONSTRUCTION MANAGMENT ENGINEER and CONTRACTOR'S Construction Schedule.
- C. A complete Submittal Schedule and list of required submittals shall be submitted prior to the Preconstruction Meeting. The schedule for submission of submittals shall be arranged so that related equipment items are submitted concurrently. The CONSTRUCTION MANAGMENT ENGINEER may require changes to the Submittal Schedule to permit concurrent review of related equipment.
- D. No progress payment shall be made to CONTRACTOR until acceptable Construction Schedule, Submittal Schedule and Schedule of Values are submitted to CONSTRUCTION MANAGMENT ENGINEER and approved.

1.6 Safety

A. Not used.

1.7 **Quality Assurance**

A. Not used.

1.8 Product Delivery, Handling, and Storage

A. The address for the Administrative Area at the Site is:

600 East Gude Drive Rockville, Maryland 20850

B. The material delivery address for the Site is:

Incinerator Lane Rockville, Maryland 20850 C. The mailing address for OWNER is:

Montgomery County
Resource Conversion Section
Recycling and Resource Management Division
Department of Environmental Protection
16101 Frederick Road
Derwood, Maryland 20855

D. The mailing address for the Northeast Maryland Waste Disposal Authority is:

Northeast Maryland Waste Disposal Authority Tower II, Suite 402 100 S. Charles Street Baltimore, Maryland 21201-2705

E. The mailing address for CONSTRUCTION MANAGMENT ENGINEER is:

SCS Engineers 600 East Gude Drive Rockville, Maryland 20850

1.9 <u>Schedule</u>

A. Not used.

1.9.1 Construction Schedule (Schedule of Work)

- A. At or before the preconstruction meeting, CONTRACTOR shall prepare and submit for review to the CONSTRUCTION MANAGMENT ENGINEER an "expanded" Construction Schedule showing the order in which he/she proposes to carry out the work and the dates upon which he/she proposes to start and complete each major work item. Overlapping work items in sufficient detail shall be provided for approval. The expanded Schedule shall be an elaboration of the schedule included with the CONTRACTOR'S proposal with completion dates remaining unchanged. The Schedule shall show each major work item provided in the Contract, and shall include the dates for submittals, sample testing, approval of materials and CONTRACTOR'S drawings, and the procurement of materials and equipment. The Construction Schedule shall be in chart form showing expected completion percentages and arranged to record actual completion percentages at stated intervals. The Schedule will outline in detail the proposed equipment, manpower, and production rates necessary to achieve the Schedule.
- B. The CONTRACTOR shall update the Schedule every month with any and all changes in equipment, manpower, etc. annotated. The Schedule shall be prepared in Microsoft Project and the CONTRACTOR shall provide the Schedule to the CONSTRUCTION

- MANAGMENT ENGINEER for review in Microsoft Project format and PDF (portable document format).
- C. The CONSTRUCTION MANAGMENT ENGINEER may require and the CONTRACTOR shall furnish such additional information and data as required to justify the basis of the Schedule.
- D. The accepted Schedule shall be kept up to date as work progresses, including work added by change order, and shall be submitted to the CONSTRUCTION MANAGMENT ENGINEER every month and with the request for payment. If the CONTRACTOR fails to submit the updated Schedule within the time prescribed, the CONSTRUCTION MANAGMENT ENGINEER may withhold approval of progress payment estimates until such time as the CONTRACTOR submits the updated Schedule.
- E. The Schedule shall determine the order in which the Work is to proceed. However, the CONSTRUCTION MANAGMENT ENGINEER may request and authorize minor changes to this Schedule whenever such changes are of advantage to or necessary for the operations of the OWNER.

1.10 Contractor's Submittals

1.10.1 General

- A. The CONTRACTOR'S drawings shall be neat in appearance, legible, and explicit to enable proper review and ensure Contract compliance. They shall be complete and detailed to show fabrication, assembly and installation details, wiring and control diagrams, catalog data, pamphlets, descriptive literature, and performance and test data. They shall be accompanied by calculations or other sufficient information to provide a comprehensive description of the structure, machine, or system provided, and its intended manner of use. If the CONTRACTOR'S drawings deviate from the Contract Documents, the CONTRACTOR shall advise the CONSTRUCTION MANAGMENT ENGINEER in writing with the submittal and state the reason therefore.
- B. No portion of the work requiring a CONTRACTOR'S drawing shall be started, nor shall any materials be fabricated, delivered to the Site, or installed, prior to the written approval by the CONSTRUCTION MANAGMENT ENGINEER. Fabrication performed, materials purchased, or onsite construction accomplished that does not conform to approved CONTRACTOR'S drawings shall be at the CONTRACTOR'S risk. The OWNER will not be liable for any expense or delay due to corrections or remedies to accomplish conformity.
- C. The review and approval of CONTRACTOR'S drawings by the CONSTRUCTION MANAGMENT ENGINEER shall not relieve the CONTRACTOR from his responsibility with regard to the fulfillment of the terms of the Contract. All risks of

- error and omission are assumed by the CONTRACTOR, and the CONSTRUCTION MANAGMENT ENGINEER will have no responsibility.
- D. Contract work, materials, fabrication, and installation shall conform with approved CONTRACTOR'S drawings.

1.10.2 Shop Drawings

A. Shop drawings shall show types; sizes; accessories; layouts, including plans, elevations, and sectional views; components; assembly and installation details; and all other information required to illustrate how applicable portions of the Contract requirements will be fabricated and/or installed. In the case of fixed mechanical and electric equipment, layout drawings drawn to scale shall be submitted to show required clearances for operation, maintenance, and replacement of parts. This will include manufacturer's certified testing data, catalog cuts, pamphlets, descriptive literature, installation, and application recommendations, as required. Shop drawings for closely related items such as a well head and piping, and geosynthetics, shall be submitted together. Additional shop drawings and information required will be listed in appropriate specification sections. Shop drawings shall be specific for this project. Shop drawings which provide only generic information or are of a generic nature are not sufficient.

1.10.3 Catalog Data

- A. Submittals shall include the manufacturer's name, trade name, place of manufacture, catalog model number, complete part number, nameplate data, size, layout dimensions, capacity, project specification, and paragraph reference.
- B. Submittals for each manufactured item shall be current manufacturer's descriptive literature of cataloged products, equipment drawings, diagrams, performance and characteristic curves, and catalog data sheets.
- C. Clearly indicate proposed unit on all generalized cut sheets. If the catalog data provided has multiple options (dimensions, sizes, optional accessories, etc.) of a piece of equipment proposed for this project, CONTRACTOR must clearly and visibly indicate which option is proposed for this specific project site. Catalog data with multiple options and no indication of proposed selection from CONTRACTOR will be rejected.

1.10.4 Installation Drawings

A. Submit installation drawings that depict Contractor-designed items and methods of construction. Review and written approval of such drawings by the CONSTRUCTION MANAGMENT ENGINEER shall not relieve the CONTRACTOR from his responsibility with regard to the fulfillment of the terms of the Contract. All risks of error are assumed by the CONTRACTOR.

1.10.5 Material List

A. The CONTRACTOR shall submit, along with Shop Drawings, a materials list which shall include full information, including manufacturer's complete part number, regarding all components of the equipment. Materials of construction shall be presented in the listing by ASTM reference and grade.

1.10.6 Manufacturer's Installation Recommendations

A. Manufacturer's installation recommendations and instructions shall provide written detailed step-by-step preparation and installation of the materials and products, including recommended quality control testing, seaming and joining of geosynthetics, pipe joining, supports and welding, etc.

1.10.7 Method of Construction

- A. When so specified or directed by the CONSTRUCTION MANAGMENT ENGINEER, submit proposed methods of construction for specific portions of the Work. This submittal shall include a detailed written description of all phases of the construction operation to fully explain to the CONSTRUCTION MANAGMENT ENGINEER the proposed method of construction. If required by the specifications, submit installation drawings to supplement the description. Review and approval by the CONSTRUCTION MANAGMENT ENGINEER will be in accordance with the approval process herein and shall not relieve the CONTRACTOR from his responsibility with regard to fulfillment of the terms of the Contract. All risks associated with the proposed method remain the CONTRACTOR'S responsibility, and therefore the CONSTRUCTION MANAGMENT ENGINEER shall have no responsibility.
- B. After review and written approval, if, in the opinion of the CONTRACTOR, modifications are necessary, submit such modifications in detail, including reasons for the modifications. Modifications shall not be implemented without review and written approval by the CONSTRUCTION MANAGMENT ENGINEER.

1.10.8 Closeout Submittals

- A. Operation and Maintenance Data
 - 1. Submit in PDF composite electronic indexed file.
 - 2. Submit data bound in eight and a half (8½)- by eleven (11)-inch text pages, three (3)-ring binders with durable plastic covers.
 - 3. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS, GUDE LANDFILL REMEDIATION," and subject matter of binder when multiple binders are required.

- 4. Internally subdivide binder contents with permanent page dividers, logically organized as described below, with tab titling clearly printed under reinforced laminated plastic tabs.
- 5. Drawings—Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- 6. Contents—Prepare table of contents for each volume, with each product or system description identified, typed on white paper, in three (3) parts as follows:
 - a. Part 1: Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, Subcontractors, and major equipment Suppliers.
 - b. Part 2: Operation and maintenance instructions, arranged by system and subdivided by Specification Section. For each category, identify names, addresses, and telephone numbers of Subcontractors and Suppliers. Include the following:
 - 1) Significant design criteria.
 - 2) List of equipment.
 - 3) Parts list for each component.
 - 4) Operating instructions.
 - 5) Maintenance instructions for equipment and systems.
 - 6) Maintenance instructions for [special] finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
 - 7) Safety precautions to be taken when operating and maintaining or working near equipment.
 - c. Part 3 Project documents and certificates, including the following:
 - 1) Shop Drawings and product data.
 - 2) Certificates.
 - 3) Originals of warranties.

B. Manual for Equipment and Systems

- 1. Submit four (4) copies of preliminary draft or proposed formats and outlines of contents before start of Work. CONSTRUCTION MANAGEMENT ENGINEER will review draft and return one (1) copy with comments.
- 2. For equipment, or component parts of equipment put into service during construction and operated by OWNER, submit documents within ten (10) calendar days after acceptance.
- 3. Submit four (4) copies of completed volumes before Substantial Completion, fifteen (15) calendar days prior to final inspection. Draft copy will be reviewed and returned after final inspection, with CONSTRUCTION MANAGMENT ENGINEER comments. Revise content of document sets as required prior to final submission.
- 4. Submit four (4) sets of revised final volumes within fourteen (14) calendar days after receipt of CONSTRUCTION MANAGMENT ENGINEER'S comments.
- 5. Submit in PDF composite electronic indexed file of final manual within fourteen (14) calendar days after receipt of CONSTRUCTION MANAGMENT ENGINEER'S comments.
- 6. Each Item of Equipment and Each System—Include description of unit or system and component parts. Identify function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and model number of replaceable parts.
- 7. Panelboard Circuit Directories—Provide electrical service characteristics, controls, and communications.
 - a. Include color-coded wiring diagrams as installed.
- 8. Operating Procedures—Include startup, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shutdown, and emergency instructions. Include summer, winter, and special operating instructions.
- 9. Maintenance Requirements—Include routine procedures and guide for preventative maintenance and troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- 10. Include servicing and lubrication schedule and list of lubricants required.
- 11. Include manufacturer's printed operation and maintenance instructions.

- 12. Include sequence of operation by controls manufacturer.
- 13. Include original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- 14. Include control diagrams by controls manufacturer as installed.
- 15. Include CONTRACTOR'S coordination drawings with color-coded piping diagrams as installed.
- 16. Include charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- 17. Include list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- 18. Additional Requirements—As specified in individual product Specification Sections.
- 19. Include listing in table of contents for design data with tabbed dividers and space for insertion of data.

C. Spare Parts and Maintenance Products

1. Furnish spare parts, maintenance, and extra products in quantities specified in individual Specification Sections.

D. Product Warranties

- 1. Obtain warranties executed by responsible Subcontractors, Suppliers, and manufacturers within ten (10) calendar days after completion of applicable item of Work.
- 2. Execute and assemble transferable warranty documents from Subcontractors, Suppliers, and manufacturers.
- 3. Verify documents are in proper form, contain full information, and are notarized.
- 4. Submit prior to final Application for Payment.

E. Time of Submittals:

1. For equipment or component parts of equipment put into service during construction with OWNER'S permission, submit documents within ten (10) calendar days after acceptance.

- 2. Make other submittals within ten (10) calendar days after date of Substantial Completion, prior to final Application for Payment.
- 3. For items of Work for which acceptance is delayed beyond Substantial Completion, submit within ten (10) calendar days after acceptance, listing date of acceptance as beginning of warranty or bond period.

1.10.9 Submittal Process

1.10.9.1 General

A. Each CONTRACTOR'S submittal shall have affixed to it the following certification statement signed by the CONTRACTOR:

"Certification Statement:

By this submittal, I hereby represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers, and pertinent data, and I have checked and coordinated each item with other applicable approved drawings and all contract requirements."

1.10.9.2 Identification

- A. With the first submittal, submit a CONTRACTOR'S drawing Submittal Schedule listing as near as practical, by specification section number, all submittals required and approximate date the submittal will be forwarded. All submittals for approval shall have the following identification data, as applicable:
 - 1. Submittal Number.
 - 2. OWNER'S name.
 - 3. Project name and location.
 - 4. Product identification.
 - 5. Drawing title, drawing number, revision number, and date of drawing and revision.
 - 6. Applicable Contract Drawing numbers and Specification section and paragraph numbers.
 - 7. Subcontractor's, vendor's, and/or manufacturer's name, address, and phone number.
 - 8. CONTRACTOR'S certification statement.

- B. Submittal Identification System: Use the following submittal identification system, consisting of submittal number and review cycle number.
 - 1. Submittal Number: Shall be separate and unique number correlating to each individual submittal required. CONTRACTOR shall assign submittal number as follows:
 - a. First part of submittal number shall be the applicable Specification section number, followed by a hyphen.
 - b. Second part of submittal number shall be a three (3)-digit number (sequentially numbered from 001 through 999) assigned to each separate and unique submittal provided under the associated Specification. Section 31 05 19.13, Geotextiles, would be "31 05 19.13-003."
 - 2. Review Cycle Number: Shall be a letter designation indicating the initial submittal or re-submittal associated with each submittal number:
 - a. "A" = Initial (first) submittal.
 - b. "B" = Second submittal (e.g., first re-submittal).
 - c. "C" = Third submittal (e.g., second re-submittal).
 - 3. Examples:

	Submittal Identification	
Example Description	Submittal No.	Review Cycle
Initial (first) review cycle of the third submittal provided under Section 31 05 19.13, Geotextiles	31 05 19.13-003-	A
Second review cycle (first re-submittal) of third submittal provided under Section 31 05 19.13, Geotextiles	31 05 19.13 003-	В

C. For catalog product data or brochures submitted in packages of multiple items, the identification is needed only on the exterior. In such instances, the identification shall include page and catalog item numbers for items submitted for approval. If one (1) or more of the items in such a submittal are not approved, resubmittal of only the unapproved items is required. Catalog, product data, or brochures containing various products, sizes, and materials shall be highlighted to show the particular item being submitted. Likewise, items not applicable to the Contract shall be marked "not applicable" or crossed out.

1.10.9.3 Space

A. Vacant space of approximately two and a half (2.5) inches high by four (4) inches wide shall be provided adjacent to the identification data to receive the CONSTRUCTION MANAGMENT ENGINEER'S status stamp.

1.10.9.4 Number of Copies

A. For the original submittal and each subsequent resubmittal that may be required, submit two (2) legible prints and an electronic PDF document of all shop and working drawings, and three (3) copies of catalog data, method of construction, and manufacturer's installation recommendation to the CONSTRUCTION MANAGMENT ENGINEER for approval. One (1) PDF of CONTRACTOR'S submittals will be returned to the CONTRACTOR with any comments from the CONSTRUCTION MANAGMENT ENGINEER.

1.10.9.5 Approval Process

A. Each submittal shall be in accordance with the CONTRACTOR'S drawings submission schedule. The submittal review timeframe table below indicates the time to allow for checking and appropriate action by the CONSTRUCTION MANAGMENT ENGINEER.

	Review Timeframe
Submittal Type	(calendar days)
Earthwork pre-construction and	7
frequency material tests, samples	
Written plans (e.g. environmental control	20
plans, geosynthetic installation plans),	
qualifications	
Other submittals	20

- B. Contractor's drawings will be returned stamped with one (1) of the following classifications:
 - 1. APPROVED—No corrections, no marks.
 - 2. APPROVED AS NOTED—A few minor corrections. All items may be fabricated as marked without further resubmission. Resubmit a corrected copy to the CONSTRUCTION MANAGMENT ENGINEER.
 - REVISE AND RESUBMIT—Minor corrections. Items not noted to be revised and
 corrected may be fabricated. Resubmit drawings as per original submissions with
 corrections noted. Allow time based on the submittal review timeframe table for
 checking and appropriate action by the CONSTRUCTION MANAGMENT
 ENGINEER.
 - 4. NOT APPROVED—Requires corrections or is otherwise not in accordance with the contract documents. No items shall be fabricated. Allow time based on the submittal review timeframe table for checking and appropriate action by the CONSTRUCTION MANAGMENT ENGINEER.

1.11 Samples

1.11.1 General

- A. The CONTRACTOR is required to collect and test material samples to certify that they meet the requirements of these Specifications. The cost of sample testing shall be borne by the CONTRACTOR. These certified test results shall be submitted by the CONTRACTOR to the CONSTRUCTION MANAGMENT ENGINEER for approval of the material. The CONSTRUCTION MANAGMENT ENGINEER may conduct separate testing of material samples to confirm test results.
- B. As soon as practicable after the issuance of the Notice to Proceed, the CONTRACTOR shall submit names of material suppliers and borrow sources, along with samples required by the Specifications or requested by the CONSTRUCTION MANAGMENT ENGINEER. Unless otherwise specified, the original submittal shall be a sample of each item. Written approval shall be obtained from the CONSTRUCTION MANAGMENT ENGINEER prior to delivery of the material to the Site. Such samples shall be representative of the actual material proposed for use in the project and of sufficient size to demonstrate design, color, texture, and finish when these attributes will be exposed to view. If samples deviate from requirements in the Contract Documents, the CONTRACTOR shall so advise the CONSTRUCTION MANAGMENT ENGINEER in writing with the submittal and state the reason therefore.

1.11.2 Identification

- A. Each sample or laboratory test data results shall have the following identification data permanently attached:
 - 1. Owner.
 - 2. Project name and location.
 - 3. Applicable Contract Drawing and/or Specification section number.
 - 4. Subcontractor's, vendor's, and/or manufacturer's name, address, and phone number.
- B. Mail under separate cover a letter submitting each shipment of samples containing the identification information listed herein. Enclose a copy of this letter with the shipment.

1.11.3 Approval Process

A. Allow seven (7) calendar days for checking and appropriate action by the CONSTRUCTION MANAGMENT ENGINEER. Certain samples may be tested for specified requirements by the OWNER before approval is given. Failure of a sample

to pass such tests will be sufficient cause for refusal of that material and its source. Rejected samples will be returned upon request, and any or all resubmittals required shall consist of new samples and an additional seven (7) calendar days for checking and approval. All sample testing will be performed by the CONTRACTOR at the CONTRACTOR'S own expense. Upon approval, one (1) sample so noted will be returned and the remainder will be retained by the CONSTRUCTION MANAGMENT ENGINEER until completion of the work. When requested, all but one (1) approved sample will be returned for installation provided their identity is maintained in an approved manner until final acceptance of the project.

B. Samples of various materials or equipment delivered to the Site may be taken by the CONSTRUCTION MANAGMENT ENGINEER for testing. Samples failing to meet the requirements of this Contract will automatically void previous approvals, and resubmittal or retesting of the samples will be required.

1.12 Record Documents

- A. The CONTRACTOR shall keep one (1) record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications at the Site in good order and annotated to show all revisions made during construction. Such annotations shall be kept current. These record documents together with all approved Samples and Shop Drawings, inspection reports, test results and Manufacturer's instructions will be available to OWNER, CONSTRUCTION MANAGMENT ENGINEER, and the Northeast Maryland Waste Disposal Authority for reference at any time. Failure to maintain current record documents will be cause to withhold progress payments. Record drawings shall be available to the OWNER, CONSTRUCTION MANAGMENT ENGINEER, and the Northeast Maryland Waste Disposal Authority at all times during the life of the Contract.
- B. All drawings shall be made a part of the record documents. Record Drawings (As-Builts) shall include the following:
 - 1. Contract Drawings—Annotate or redraft, as required, to show all revisions, substitutions, variations, omissions, and discrepancies made or discovered during construction. These shall include, but are not limited to, location and depth of utilities, piping, conduits, manholes, excavations, piping connections, and other equipment. Revisions shall be made and shown on all drawing views with actual dimensions established to permanent points.
 - 2. Installation Drawings—Same as Contract Drawings above when installation drawings are required. Include, for example, layout and piping connections and well head assembly. Sections and details shall be added, as required, for clarity.
- C. The scanned drawing sets shall be complete. Each individual sheet contained in the Contract Drawings shall be included in the electronic submittal, with each sheet being

converted into an individual TIF (tagged image file). The plan sheets shall be scanned in .tif format Group 4 at four hundred (400) dpi resolution to maintain legibility of each drawing. Then, the TIF images shall be embedded into a single PDF file representing the complete plan set.

- D. In addition to PDFs, CAD files (AutoCAD) of CONTRACTOR prepared Record Drawings shall be submitted.
- E. Prior to inspection for Substantial Completion, submit two (2) copies and PDF files of Record Drawings (As-Builts) to CONSTRUCTION MANAGMENT ENGINEER for review. Plot and print each Drawing, whether or not changes and additional information were recorded.
- F. At the completion of the Contract, or at the CONSTRUCTION MANAGMENT ENGINEER'S request and before final payment is made, furnish the CONSTRUCTION MANAGMENT ENGINEER one (1) set of reproducibles and two (2) copies of the final Record Documents. Include two (2) sets of Record Documents in electronic format on USB drive.
- G. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to CONSTRUCTION MANAGMENT ENGINEER for OWNER.

2. <u>MATERIALS</u>

A. Not used.

3. <u>EXECUTION</u>

A. Not used.

-- End of Section --

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SECTION 01 40 00 QUALITY CONTROL

1. **GENERAL**

1.1 <u>Description</u>

1.1.1 Scope of Work

A. This Section includes requirements of a general nature related to the CONTRACTOR'S responsibility for quality control involving inspections, tests, certificates, and reports. Requirements for general quality control applicable to geosynthetics are included herein, and additional quality control for specific products are included in individual Specification Sections.

1.1.2 Related Work Specified Elsewhere

A. Not used.

1.2 References

A. Not used.

1.3 Definitions

- A. Geosynthetics Testing Laboratory—the CONTRACTOR'S independent geosynthetics testing laboratory, approved by the CONSTRUCTION MANAGEMENT ENGINEER, that shall perform the required preconstruction and frequency testing and quality control (QC) testing on samples supplied by and at the expense of the CONTRACTOR.
- B. Geosynthetics Installer shall be responsible for the installation of geomembrane, geocomposite, and geotextiles in accordance with the Contract Documents. The Geosynthetics Installer shall provide sufficient evidence of installation experience and competence with geosynthetics, and shall demonstrate an acceptable level of training and supervision will be utilized in order to ensure the quality of the installation. The CONTACTOR shall be responsible for the performance of the Geosynthetics Installer.
- C. Geotechnical Testing Laboratory—the CONTRACTOR'S independent soils testing laboratory, approved by the CONSTRUCTION MANAGEMENT ENGINEER, that shall perform the required preconstruction and frequency testing and QC testing on samples supplied by and at the expense of the CONTRACTOR.

1.4 Qualifications

- A. Geosynthetics Testing Laboratory shall be accredited via the Geosynthetic Accreditation Institute's Laboratory Accreditation Program for the tests the QC Laboratory will be required to perform. The Geosynthetics Testing Laboratory shall have provided QC testing of the proposed geosynthetics and geosynthetic seams for at least five (5) completed projects having a total minimum area of ten (10) million square feet.
- B. Geosynthetics Installer must be qualified to install geomembrane, geocomposite, and geotextiles in accordance with the following:
 - 1. The Geosynthetics Installer shall be a specialist in the installation of geomembrane (linear low-density polyethylene [LLDPE]). The Geosynthetics Installer shall demonstrate a minimum of twenty-five (25) million square feet of geomembrane (LLDPE) during the last five (5) years, as applicable, and shall have at least five (5) continuous years of experience in the installation of geomembrane (LLDPE). In addition, the Geosynthetics Installer shall be an "Approved Installer" of the geomembrane manufacturer (LLDPE), if the manufacturer approves installers.
 - 2. The Geosynthetics Installer shall be a specialist in the installation of geocomposite. The Geosynthetics Installer shall provide a field superintendent with demonstrated experience in field seaming, field testing, and other pertinent aspects of geocomposite installation, as applicable.
 - 3. The Geosynthetics Installer shall be a specialist in the installation of polyester and/or polypropylene geotextile, and have a minimum of three (3) years' experience of geotextile installation and have installed a minimum of five (5) million square feet of said geotextile fabric that was used in successful installations.
 - 4. The Geosynthetics Installer shall have a field superintendent with demonstrated experience in field seaming, field testing, and other pertinent aspects of the installation of geomembrane (LLDPE). The field superintendent shall be qualified to inspect the prepared Closure Cap Subgrade and supervise any corrective work required; supervise the unloading, handling, storage, unrolling, and placement of all geomembrane liner sheets; perform all field seaming operations and testing of geomembrane liner; perform all repairs to damaged geomembrane materials; and supervise the placement of the overlying Vegetative Support Soil.
 - 5. The Geosynthetics Installer shall have a field crew foreman with successful installation experience for fifty (50) acres geomembrane (LLDPE) on a minimum of five (5) different projects. The foreman shall also have a minimum of three (3) continuous years of experience welding geomembrane (LLDPE).
 - 6. The Geosynthetics Installer shall meet the requirement for each welding technician to have a minimum of one (1) year of continuous experience welding or ten thousand (10,000) feet of seaming experience for geomembrane (LLDPE).

C. Geotechnical Testing Laboratory must meet "Recommended Requirements for Independent Laboratory Qualification," latest edition, published by American Council of Independent Laboratories and shall have a business license to operate in the State of Maryland.

1.5 **Submittals**

- A. Geosynthetics Testing Laboratory qualifications.
- B. Geosynthetics Installer:
 - 1. Documentation to verify the installer's experience in geosynthetics, including approval and certification of the geosynthetics manufacturer.
 - 2. Qualifications and references for the field superintendent, field crew foremen, and welding technicians shall be submitted to the CONSTRUCTION MANAGEMENT ENGINEER for approval at least twenty (20) calendar days prior to the commencement of geosynthetic installation activities. The CONSTRUCTION MANAGEMENT ENGINEER reserves the right to reject any field superintendent based on the information submitted. Any rejected field superintendent shall be replaced with no delay in the Contract Schedule and at no additional cost to the OWNER.
- C. Geosynthetics Installer's Installation Plan shall be submitted for approval at least twenty (20) calendar days prior to delivery of the geosynthetic materials to the site. The CONSTRUCTION MANAGEMENT ENGINEER reserves the right to require changes to the Installation Plan.
 - 1. Geosynthetic Installer's proposed construction repair procedures.
 - 2. Geosynthetic Installer's proposed field seaming procedures and techniques, including methods, overlap, personnel identification, quality assurance/quality control of seaming operations, operating temperatures, and preparation of materials.
 - 3. Geosynthetic Installer's nondestructive and destructive seam testing procedures, including type(s) of tests, a list of equipment required, frequency of tests with locations, methods, qualifications of personnel that perform the tests, and acceptance/rejection criteria for tested seams, as well as recommended repair procedures to remediate those welded seams which fail the required test procedures.
 - 4. Geosynthetic Installer's proposed installation panel layout drawings for the geomembranes to be installed (LLDPE). These proposed layout drawings shall identify the proposed installed configuration of the noted geosynthetic panels and identify each sheet. The layout drawings shall also include anchor trench and pipe penetration details. To accommodate in-field conditions, these proposed layouts may

be modified during installation with the written approval of the CONSTRUCTION MANAGEMENT ENGINEER. The geomembrane panels shall be placed in the Work area to permit termination in the perimeter anchor trench or as required by the governing Contract Drawings. The layout of geosynthetics panels/sheets shall minimize the length of field seaming required and locate seams where applied stresses will be minimal. Panel/sheet layout shall take into consideration any expansion and contraction anticipated due to ambient temperature variations. The upgradient panels of the geosynthetic shall overlap the downgradient panels.

- 5. Geosynthetic Installer's daily QC log format to be used during geomembrane liner installation.
- 6. Work plan for geosynthetics installation including manpower and equipment requirements.
- D. Geotechnical Testing Laboratory qualifications.
- E. Qualifications for changes to previously approved personnel, testing laboratories, and manufacturers shall be submitted and approved by the CONSTRUCTION MANAGEMENT ENGINEER prior to commencement or the continuation of work.

1.6 Safety

A. Not used.

1.7 Quality Assurance

- A. Maryland Department of the Environment (MDE) will perform quality assurance inspections and reviews of the closure cap system throughout construction. MDE approval is required at certain stages of each system installation, as indicated in the Sequence of Construction on the Contract Drawings. The CONSTRUCTION MANAGEMENT ENGINEER will coordinate with MDE to schedule site visits and will submit required surveys and test results to MDE for review in advance of the scheduled site visit. The CONTRACTOR is responsible for providing required surveys and test results to the CONSTRUCTION MANAGEMENT ENGINEER in a timely manner to minimize potential delays. CONTRACTOR should expect that MDE approval will take seven (7) calendar days for each stage of approval.
- B. MDE-required surveys and test results include topographic surveys demonstrating compliance with the grading plans and/or required material thicknesses, soil compaction test results demonstrating compliance with the specifications, and photographs of the finished surfaces. The CONTRACTOR shall provide additional information as requested by MDE.

1.8 Product Delivery, Handling, and Storage

A. Not used.

1.9 Schedule

A. Not used.

1.10 Inspection

- A. The CONSTRUCTION MANAGEMENT ENGINEER has the right to inspect all materials and equipment at all stages of development or fabrication, and shall be allowed access to the site and to the CONTRACTOR'S and supplier's shops to conduct such inspections. Onsite work will be subjected to continuous inspection. Inspection by the CONSTRUCTION MANAGEMENT ENGINEER will not release the CONTRACTOR from responsibility or liability with respect to material or equipment. The CONSTRUCTION MANAGEMENT ENGINEER will provide the CONTRACTOR a minimum of twenty-four (24) hours' notice prior to offsite inspections.
- B. When a shop test of mechanical equipment is required by the manufacturer before shipment to the Contract Site, the CONTRACTOR shall give the CONSTRUCTION MANAGEMENT ENGINEER a minimum of ten (10) working days written notice of the time of the required test. The CONTRACTOR shall ensure that the test site is safe, accessible, dry, ventilated, and well lit. Work involved with the installation of such equipment shall not proceed until the test results are approved by the CONSTRUCTION MANAGEMENT ENGINEER.
- C. When local codes or laws require approval or inspection of the work by other agencies or organizations before installation or operation, the CONTRACTOR shall obtain such approval and submit one (1) signed original and three (3) copies of the approval to the CONSTRUCTION MANAGEMENT ENGINEER.

1.11 Testing

A. All QC Laboratory testing (not including manufacturers' internal quality assurance) shall be performed by an independent testing laboratory, as approved by the CONSTRUCTION MANAGEMENT ENGINEER, with materials to be tested furnished by the CONTRACTOR and at the expense of the CONTRACTOR.

1.11.1 Field and Laboratory

- A. The CONTRACTOR shall contract with an independent QC Laboratory to perform laboratory testing as required by these Specifications, including the following periodic inspections, engineering, and associated services:
 - 1. Soils—Inspect and test the placement and compaction of fills. Perform field density testing using a Troxler 3401 series nuclear moisture-density gauge (or approved equal) to assess the adequacy of compaction. Inspect subgrades and foundations.

- 2. Concrete—Inspect forms, reinforcement, and placement; witness CONTRACTOR'S slump and air entrainment tests; make cylinder samples and store them onsite; perform seven (7)- and twenty-eight (28)-day unconfined compression tests on the cylinders.
- B. The CONTRACTOR shall include the cost of QC Laboratory services in their proposal.
- C. The CONTRACTOR shall cooperate with the CONSTRUCTION MANAGEMENT ENGINEER and the QC Laboratory and provide at least twenty-four (24) hours' notice prior to specified testing. The CONTRACTOR shall provide labor, materials, and testing facilities at the site as required by the Specifications and the approved subcontractor.
- D. The CONTRACTOR shall be solely responsible for the adequate stability of cut soil slopes at the site and for providing a safe working condition within the excavated areas.

1.11.2 Other Testing

A. Test procedures and requirements are specified in the appropriate Specification Section.

1.12 Reports

1.12.1 Certified Test Reports

A. Where transcripts or certified test reports are required by the Contract Documents, the CONTRACTOR shall submit them for approval by the CONSTRUCTION MANAGEMENT ENGINEER. Approval shall be obtained before delivery of any material to the site. Transcripts of test reports shall be accompanied by a notarized certificate in the form of a letter from the manufacturer or supplier certifying that the tested material meets the specified requirements and is of the same type, quality, manufacturer, and make as that specified. The certificate shall be signed by an officer of the manufacturer or supplier.

1.12.2 Certificate of Compliance

- A. At the option of the CONSTRUCTION MANAGEMENT ENGINEER, or where specified, the CONTRACTOR may, in lieu of the required tests, submit for approval a notarized Certificate of Compliance in the form of a letter from the manufacturer. The Certificate shall include identification of the materials manufactured and shall state the following:
 - 1. Manufacturer has performed all required tests.
 - 2. Materials supplied meet all test requirements.
 - 3. Tests were performed within six (6) months of submittal of the Certificate.

- 4. Materials that were tested are of the same type, quality, manufacture, and make as those specified.
- B. A Certification of Compliance may be provided for the geomembrane, cementitious materials, landfill gas pipes, landfill gas pipe fittings, and landfill gas valves.
- C. The Certificate shall be signed by an officer of the manufacturer. Materials shall not be delivered until the CONSTRUCTION MANAGEMENT ENGINEER approves the Certificate.

1.12.3 Manufacturer's Certificates

- A. The CONTRACTOR shall submit Manufacturer's Certificates for the installation of those items listed in the Specifications.
- B. Manufacturer's Certificates shall state that the equipment has been installed under the supervision of the manufacturer's authorized representative, that it has been adjusted and initially operated in the presence of the manufacturer's authorized representative, and that it is operating in accordance with the specified requirements to the manufacturer's satisfaction.

1.13 <u>Manufacturer Services</u>

A. When required, manufacturer services are specified in appropriate Specification Sections.

1.14 **Equipment Calibration**

- A. All field test equipment will be kept under control of the CONTRACTOR. The CONTRACTOR will be fully trained in the use of equipment, test procedures, and interpretation of results for each piece of test equipment. A copy of the Calibration Certificate will be kept by the CONTRACTOR and supplied to the CONSTRUCTION MANAGEMENT ENGINEER.
- B. Calibration of nuclear-density gauges shall conform to the frequencies and methods outlined in ASTM D2922-78 and D3017. Unstable or erratic gauges shall not be used in density testing and shall be immediately removed from the site.

2. <u>MATERIALS</u>

A. Not used.

3. <u>EXECUTION</u>

A. Not used.

-- End of Section --

SECTION 01 45 00 HEALTH AND SAFETY

1. **GENERAL**

1.1 <u>Description</u>

1.1.1 Scope of Work

- A. Site-specific safety and health procedures are required due to the hazardous conditions potentially present on site during landfill closure activities. These procedures must be written by the CONTRACTOR'S certified industrial hygienist and submitted to the CONSTRUCTION MANAGEMENT ENGINEER prior to the initiation of the landfill closure activities. The CONTRACTOR shall implement, maintain, and enforce these procedures at the appropriate time prior to and during all phases of the project.
 - 1. Provisions of this Section provide additional guidance to activities in which the CONTRACTOR will or may come into contact with solid waste materials, liquids, or gas due to intrusive activities into the waste fill area. This includes, at a minimum, waste excavation and relocation, leachate outbreaks, installation of the gabion drainage structures, landfill gas extraction well and pipeline installation, subgrade preparation, and closure cap construction.
 - 2. The CONTRACTOR shall employ such procedures and provide protection equipment as necessary to protect workers and other persons in conformance with Health and Safety Regulations for Hazardous Operations, 29 Code of Federal Regulations (CFR) 1926.120.
- B. The Site Safety and Health Plan shall be consistent with the requirements and guidance provided in the following regulations:
 - 1. Occupational Safety and Health Administration (OSHA) Standards and Regulations contained in 29 CFR 1926.
 - 2. Maryland Occupational Safety and Health (MOSH) Standards and Regulations applicable regulations.
- C. The Site Safety and Health Plan will include at a minimum the following components:
 - 1. Site overview, including identification of potential intrusive activities and type of waste or hazards, such as leachate discharge, landfill gases, anticipated to be encountered.
 - 2. Names of key personnel and alternates responsible for site safety and health.

- 3. Accident Prevention Plan that addresses the safety hazards expected, personnel responsibilities, task-specific safety procedures, subcontractor supervision, safety meetings, fire prevention and protection, site housekeeping, mechanical equipment inspection, first aid and medical concerns, sanitation, accident reporting, and daily safety inspections conducted by CONTRACTOR personnel.
- 4. Employee training requirements.
- 5. Personal protective equipment (PPE) requirements for each intrusive work operation, including types/materials, respiratory protection, and site-specific action levels dictating decisions to upgrade or downgrade and description of decontamination procedures and policies.
- 6. Location, frequency, and type of air monitoring to be conducted, including instrumentation, methods of maintenance, and calibration of monitoring and sampling equipment to be used. At minimum, the CONTRACTOR shall continuously monitor air quality in the vicinity of all open excavations and boreholes.
- 7. Site control measures, including communications, security, and site access.
- 8. Heat and cold stress monitoring.
- 9. Confined Space Entry.
- 10. Personnel and equipment decontamination procedures.
- 11. Emergency Response Plan and contingency procedures, including:
 - a. Emergency vehicular access.
 - b. Evacuation procedures of personnel from the work area.
 - c. Methods of preventing and containing fire and explosion.
 - d. Hazardous waste containment.
 - e. Severe weather preparedness.
 - f. On site first aid, automatic external defibrillator (AED), eye wash, fire suppression, protective gear, and other emergency equipment to be maintained by the CONTRACTOR on site.
 - g. Listing of emergency contact personnel with phone numbers, to include the CONTRACTOR, OWNER, CONSTRUCTION MANAGEMENT ENGINEER, Maryland Department of the Environment, fire officials,

ambulance service, state and local law enforcement, and local hospitals (with routes to hospitals).

- 12. Logs, reports, and recordkeeping.
- D. The Site Safety and Health Plan shall be submitted to the CONSTRUCTION MANAGEMENT ENGINEER at minimum twenty (20) days prior to the Notice to Proceed. Submittal of this plan is for information only. The CONTRACTOR is liable for the health and safety of all its employees and agents and shall indemnify the OWNER, the Northeast Maryland Waste Disposal Authority, and CONSTRUCTION MANAGEMENT ENGINEER from any defense costs and damages attributable to any claim of any of its employees, independent contractors or agents for injuries at the Site.
- E. Specifications delineated in this Section are in addition to or an amplification of procedures and requirements of the above-referenced regulations and documents.
- F. Should any unforeseen or site-specific safety factors, health hazard, or conditions become evident during the performance of work at this site, the CONTRACTOR shall notify the CONSTRUCTION MANAGEMENT ENGINEER verbally and in writing as soon as possible for resolution. The CONTRACTOR shall take prudent action to establish and maintain safe working conditions and to safeguard employees, the surrounding community, and the environment.
- G. Any changes, updates, revisions, etc. to the Site Safety and Health Plan shall be submitted to the CONSTRUCTION MANAGEMENT ENGINEER in writing and approved prior to implementation.
- H. Any disregard for the provision of these Specifications shall be deemed just and sufficient cause for termination of Contract or any Subcontract without compromise or prejudice to the rights of the OWNER.
- I. The Site Safety and Health Plan developed by the CONTRACTOR shall include provisions for work related to initial site preparation prior to implementation of the intrusive activities such as, but not limited to, waste excavation and handling and other activities described in the Contract. It shall be the responsibility of the CONTRACTOR to conduct whatever testing and monitoring is necessary to ensure a safe operation.
- J. The following landfill and landfill gas related information is included to assist the CONTRACTOR in developing a Site Safety and Health Plan and is not intended to encompass all steps that may be necessary to protect the workers or to comply with applicable regulations. Landfills have the potential to create hazardous conditions if working conditions are not controlled or recognized. Some potential hazards may include:
 - 1. Spontaneous fire from exposed and/or decomposing refuse.

- 2. Fires and explosions from the presence of methane gas.
- 3. Underground fires if too much oxygen is introduced into the waste mass.
- 4. Oxygen deficiency from landfill gases in underground trenches, vaults, conduits and structures.
- 5. Presence of hydrogen sulfide, or other highly toxic and flammable gases.
- 6. Caving of trenches and excavations when working over or in refuse fills.
- K. The CONTRACTOR shall be solely responsible for initiating, maintaining, and supervising all the health and safety precautions and programs for personnel and site property during all phases of the project, including during activities that utilize intrusive activities that may lead to encountering solid waste, leachate or landfill gas. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in performance of their work, nor for the compliance with applicable health and safety laws and regulations.

1.1.2 Related Work Specified Elsewhere

A. Not used.

1.2 References

A. Not used.

1.3 Definitions

A. Not used.

1.4 Qualifications

A. Not used.

1.5 Submittals

- A. Health and safety personnel qualifications and certifications.
- B. Site Safety and Health Plan.
- C. CONTRACTOR shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site.

1.6 Safety

- A. CONTRACTOR shall comply with all applicable laws and regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. CONTRACTOR shall notify owners of adjacent property and of underground facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.
- B. CONTRACTOR shall comply with the applicable requirements of OWNER'S safety programs, if any. The Supplementary Conditions identify any OWNER'S safety programs that are applicable to the Work.
- C. CONTRACTOR shall inform OWNER and CONSTRUCTION MANAGEMENT ENGINEER of the specific requirements of CONTRACTOR'S safety program with which OWNER'S and CONSTRUCTION MANAGEMENT ENGINEER'S employees and representatives must comply while at the Site. While at the Site, OWNER'S and CONSTRUCTION MANAGEMENT ENGINEER'S employees and representatives shall comply with the specific applicable requirements of CONTRACTOR'S safety programs of which OWNER and CONSTRUCTION MANAGEMENT ENGINEER have been informed.
- D. All damage, injury, or loss to any property caused, directly or indirectly, in whole or in part, by CONTRACTOR, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by CONTRACTOR (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of OWNER or CONSTRUCTION MANAGEMENT ENGINEER or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of CONTRACTOR or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
- E. CONTRACTOR'S duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed until Final Acceptance.
- F. All persons entering and working in confined spaces are required to follow the requirements of 29 CFR 1910.146 and 29 CFR 1926.

1.7 **Quality Assurance**

A. Not used.

1.8 **Product Delivery, Handling, and Storage**

A. Not used.

1.9 Schedule

A. Not used.

1.10 Safety Representative

A. CONTRACTOR shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs. The safety representative may not be the same person as the Site Superintendent.

1.11 Hazard Communication Programs

- A. CONTRACTOR shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with laws or regulations.
- B. CONTRACTOR shall provide a centralized location for the maintenance of the material safety data sheets or other hazard communication information required to be made available by any employer on the Site. Location of the material safety data sheets or other hazard communication information shall be readily accessible to the employees of any employer on the Site.

1.12 Site Control

- A. The CONTRACTOR shall restrict personnel access to site areas where intrusive activities are occurring.
- B. In order to restrict unauthorized access to the Site during periods of intrusive activities into the waste fill area, sufficient barricades/fencing shall be provided and maintained if necessary to leave open holes or pits overnight. Vehicular access to areas of the Site where intrusive activities are conducted shall be restricted to authorized vehicles only.

1.13 <u>Training Requirements</u>

A. Qualified personnel shall certify that all CONTRACTOR and Subcontractor personnel performing intrusive work into the waste fill areas shall have received appropriate health and safety training in accordance with OSHA and MOSH for the planned work activities. Documentation of all such training shall be submitted to the CONSTRUCTION MANAGEMENT ENGINEER and OWNER before any employees will be allowed to

- perform intrusive work activities, and no unsatisfactorily trained personnel will be allowed to perform intrusive work activities.
- B. In addition to the above training, prior to conducting intrusive work activities, all personnel directly involved with the Work (including visitors), shall read and sign the Site Safety and Health Plan and be familiar with the use of safety, respiratory, and protective equipment, and with the health, safety, and security procedures.

1.14 First Aid Requirements

A. The CONTRACTOR shall have at least one (1) certified First Aid Technician on the Site at all active times during the execution of intrusive work activities; this First Aid Technician must be certified by the American Red Cross or other approved agency in first aid and cardiopulmonary resuscitation (CPR) (including use of an AED).

1.15 Emergency Response and Contingency Procedures

- A. As part of the Site Safety and Health Plan, the CONTRACTOR shall develop site-specific emergency response and contingency plans for exposure to leachate, personal injury, potential or actual fire or explosion, and environmental accident. These plans shall include evacuation procedures and routes to places of refuge or safe distances from the danger area.
- B. In case of emergency, the CONTRACTOR shall take diligent action to remove or reduce the cause of the emergency, to alert the OWNER and the CONSTRUCTION MANAGEMENT ENGINEER, and institute measures necessary to prevent any repetition of the conditions or actions leading to, or resulting in, the emergency. Written notification of emergencies must be provided to the CONSTRUCTION MANAGEMENT ENGINEER within twenty-four (24) hours.
- C. The CONTRACTOR shall pre-arrange for emergency medical care services at a primary and alternate medical facility located near the Site and shall establish emergency routes. Arrangements for notifying medical staff of the need to contact contaminated skin and/or clothing must be made.
- D. A list of emergency contacts and phone numbers shall be included in the plan and also posted onsite.

1.16 <u>Personnel Protective Equipment Requirements</u>

A. The CONTRACTOR shall provide all onsite personnel with appropriate PPE, and shall ensure that all safety equipment and protective clothing is kept clean and well maintained.

1.17 Personal Hygiene and Contamination

- A. The CONTRACTOR shall specify personal hygiene concerns and requirements for this site in the Site Safety and Health Plan. The CONTRACTOR shall be required to provide and require that personnel use appropriate storage and disposal for used disposable clothing, and to provide a break area.
- B. The CONTRACTOR shall specify required decontamination procedures for both personnel and equipment in the Site Safety and Health Plan, including procedures for removing contaminated clothing, cleaning personnel and equipment, disposing of disposable clothing, and laundering of reusable clothing.

1.18 **Air Monitoring**

- A. The CONTRACTOR shall develop and implement an air monitoring program conforming with federal, state, and local regulations to detect and quantify methane, volatile organic compounds, carbon dioxide, hydrogen sulfide, and general airborne dust monitoring associated with the intrusive work activities into the waste fill areas. In addition, the CONTRACTOR shall determine appropriate safety and personnel protective measures to be implemented during work operations, to document employee exposures, and to assess offsite migration of contaminants potentially released during intrusive work activities so that appropriate control measures and/or contingency plans can be implemented.
- B. The CONTRACTOR shall be responsible for establishing and documenting baseline (background) air quality conditions using direct-reading instruments prior to commencement of, during, and after completion of work operations.
- C. The CONTRACTOR shall establish action levels for oxygen, methane, volatile organics, and dust in order to direct determination of upgrading and PPE adequacy and to determine appropriate implementation of offsite response procedures for contingency planning. These action levels shall be based upon OSHA permissible exposure limits.

1.19 Logs, Reports, and Recordkeeping

A. The CONTRACTOR shall maintain logs and reports covering the implementation of the Site Safety and Health Plan according to these Specifications and including daily training logs, employee/visitor logs, security logs, air monitoring logs, daily safety logs, and medical certification records.

1.20 Onsite Medical Monitoring

A. The Site Safety and Health Plan must include procedures for monitoring personnel for heat and cold stress. Monitoring shall be performed by a person with a current first aid/CPR certification or who has been trained to recognize the symptoms of heat or cold stress and will comply with the applicable requirements of OSHA and MOSH.

2. <u>MATERIALS</u>

2.1 Emergency Equipment and First Aid

- A. Emergency eyewashes and showers proposed shall comply with ANSI/ISEA Z358.1.
- B. First aid kits proposed shall comply with ANSI/ISEA Z308.1.
- C. Fire extinguishers shall be of sufficient size and type at site facilities and in all vehicles and at any other site locations where flammable or combustible materials present a fire risk.
 - 1. Submit documentation that extinguishers and any proposed foams are free of perand polyfluoroalkyl substances (PFAS).
 - 2. Fire extinguishers must be maintained for the duration of the Work.
- D. AED's shall be FDA approved.

3. **EXECUTION**

A. Not used.

-- End of Section --

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SECTION 01 50 00 MOBILIZATION, DEMOBILIZATION, AND TRAFFIC CONTROL

1. **GENERAL**

1.1 <u>Description</u>

1.1.1 Scope of Work

- A. Perform construction preparatory operations, including the movement of personnel and equipment to the project site and for the establishment of CONTRACTOR'S trailer, OWNER/CONSTRUCTION MANAGEMENT ENGINEER'S trailer, buildings, and other facilities necessary to begin work. Provide construction closeout operations, including removal of equipment and personnel from the project site, removal of CONTRACTOR'S trailer, OWNER/CONSTRUCTION MANAGEMENT ENGINEER'S trailer, buildings and other facilities, cleanup and site restoration.
- B. The CONTRACTOR is responsible for maintenance of traffic control for the movement of personnel, equipment, and materials to and from the project site, including the entrances located at 600 East Gude Drive and Incinerator Lane off of Southlawn Lane. The CONTRACTOR shall prepare a Temporary Traffic Control Plan in accordance with the most recent Montgomery County Work Zone Traffic Control Standards Book requirements and the Attachment C, Temporary Traffic Control Plan Requirements.

1.1.2 Related Work Specified Elsewhere

A. Section 01 57 19, Temporary Environmental Controls.

1.2 References

A. Not used.

1.3 Definitions

A. Not used.

1.4 Qualifications

A. Not used.

1.5 Submittals

A. Not used.

1.6 Safety

A. Not used.

1.7 **Quality Assurance**

A. Not used.

1.8 Product Delivery, Handling, and Storage

A. Not used.

1.9 Schedule

A. Not used.

1.10 Traffic Control

A. Maintain traffic control, both vehicular and pedestrian, on any facility affected by the Work. Provide regular maintenance, sweeping, and dust control on access roadways, including the 600 East Gude Drive and Incinerator Lane Facility entrances, as required by the CONSTRUCTION MANAGEMENT ENGINEER and in accordance with Specification Section 01 57 19, Temporary Environmental Controls.

2. MATERIALS

A. All materials used for traffic maintenance, whether temporary or permanent, shall be approved in writing by the CONSTRUCTION MANAGEMENT ENGINEER.

3. EXECUTION

- A. All work performed in providing facilities and services shall be done in a safe and workmanlike manner.
- B. CONTRACTOR shall provide all labor, materials, and equipment necessary to maintain vehicular and pedestrian traffic throughout the project duration. CONTRACTOR shall be responsible for obtaining all permits, approvals, and pay any fees necessary from local, OWNER, and state regulatory agencies required to access public roads with earth moving equipment. Signs, light, barricades, flaggers and other manpower shall be provided wherever necessary to protect the traveling public and other contractors and tenants of 600 East Gude Drive from hazardous conditions in accordance with local, OWNER, and state transportation and Occupational Safety and Health Administration requirements. Temporary Traffic Control Plan shall be developed by CONTRACTOR and submitted to CONSTRUCTION MANAGEMENT ENGINEER in accordance with the most recent Montgomery County Work Zone Traffic Control Standards Book and the requirements in Attachment C of the Project Manual. If extended sidewalk

- closures (more than fifteen [15] days) and /or roadway/lane closures of any duration are anticipated the CONTRACTOR shall receive the required approvals from Montgomery County Department of Permitting Services.
- C. The CONTRACTOR shall contact Utility Locating Company three (3) days prior to starting any work shown on these plans to confirm and identify the location of all utilities and protection requirements of the respective service lines within the limits of work.
- D. Prior to initiating construction, the CONTRACTOR shall inspect the site and identify monitoring wells and existing surface conditions.
- E. Due to the sensitive nature of the site, the CONTRACTOR shall not engage in work outside the limits of disturbance without the express written direction of the CONSTRUCTION MANAGEMENT ENGINEER.
- F. CONTRACTOR shall keep the premises free from accumulations of waste materials, rubbish and other debris resulting from the Work, on a daily basis. Failure to comply herewith constitutes grounds for the CONSTRUCTION MANAGEMENT ENGINEER to recommend not to approve payment.
- G. At the completion of the work, CONTRACTOR shall remove all waste materials, rubbish and debris from and about the premises as well as all tools, construction equipment and machinery, surplus materials, and shall leave the site clean and ready for occupancy by OWNER. CONTRACTOR shall restore to their original condition those portions of the site not designated for alteration by the Contract Documents.

-- End of Section --

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SECTION 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS

1. **GENERAL**

1.1 Description

1.1.1 Scope of Work

A. Not used.

1.1.2 Related Work Specified Elsewhere

A. Not used.

1.2 References

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

1.2.1 U.S. National Archives And Records Administration (NARA)

- A. 29 CFR 1910.120: Hazardous Waste Operations and Emergency Response.
- B. 40 CFR 112: Oil Pollution Prevention.
- C. 40 CFR 261: Identification and Listing of Hazardous Waste.
- D. 40 CFR 300: National Oil and Hazardous Substances Pollution Contingency Plan.
- E. 49 CFR 171: General Information, Regulations, and Definitions.
- F. 49 CFR 172: Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements.
- G. 49 CFR 173: Shippers General Requirements for Shipments and Packagings.

1.3 <u>Definitions</u>

A. CONTRACTOR Generated Solid Waste—CONTRACTOR generated solid waste is a solid, liquid, semi-solid, or contained gaseous waste that has been generated by the CONTRACTOR'S operations and does not include solid waste that is currently onsite in the Landfill. A solid waste can be a hazardous waste, non-hazardous waste, or non-Resource Conservation and Recovery Act (RCRA) regulated waste.

- B. CONTRACTOR Generated Hazardous Waste—CONTRACTOR generated hazardous waste is materials that, if abandoned or disposed of, may meet the definition of a hazardous waste. These waste streams would typically consist of material brought on site by the CONTRACTOR to execute work but are not fully consumed during the course of construction. Examples include, but are not limited to, excess paint thinners (i.e. methyl ethyl ketone, toluene), waste thinners, excess paints, excess solvents, waste solvents, excess pesticides, and contaminated pesticide equipment rinse water.
- C. Environmental Pollution and Damage—Environmental pollution and damage is the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade the environment aesthetically, culturally or historically.
- D. *Environmental Protection*—Environmental protection is the prevention/control of pollution and habitat disruption that may occur to the environment during construction. The control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

E. Hazardous Materials—

- 1. Hazardous materials as defined in 49 CFR 171 and listed in 49 CFR 172.
- 2. Hazardous material is any material that: Is regulated as a hazardous material in accordance with 49 CFR 173; or requires a Safety Data Sheet (SDS) in accordance with 29 CFR 1910.120; or during end use, treatment, handling, packaging, storage, transportation, or disposal meets or has components that meet or have potential to meet the definition of a hazardous waste as defined by 40 CFR 261 Subparts A, B, C, or D. Designation of a material by this definition, when separately regulated or controlled by other sections or directives, does not eliminate the need for adherence to that hazard-specific guidance which takes precedence over this section for "control" purposes. Such material includes ammunition, weapons, explosive actuated devices, propellants, pyrotechnics, chemical and biological warfare materials, medical and pharmaceutical supplies, medical waste and infectious materials, bulk fuels, radioactive materials, and other materials such as asbestos, mercury, and polychlorinated biphenyls (PCBs).
- F. *Hazardous Waste*—Hazardous Waste is any material that meets the definition of a solid waste and exhibit a hazardous characteristic (ignitability, corrosivity, reactivity, or toxicity) as specified in 40 CFR 261, Subpart C, or contains a listed hazardous waste as identified in 40 CFR 261, Subpart D.

- G. National Pollutant Discharge Elimination System (NPDES)—The NPDES permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States.
- H. Surface Discharge—Surface discharge means discharge of water into drainage ditches, storm sewers, creeks or "waters of the United States." Surface discharges are discrete, identifiable sources and require a permit from the governing agency. Comply with federal, state, and local laws and regulations.
- I. *Stormwater*—Stormwater is any precipitation in an urban or suburban area that does not evaporate or soak into the ground, but instead collects and flows into storm drains, rivers, and streams.
- J. Waters of the United States—Waters of the United States means Federally jurisdictional waters, including wetlands, that are subject to regulation under Section 404 of the Clean Water Act or navigable waters, as defined under the Rivers and Harbors Act.
- K. Wetlands—Wetlands are those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

1.4 Qualifications

A. Not used.

1.5 **Submittals**

- A. Environmental Protection Plan.
- B. Dust Control Plan.
- C. Waste Determination Documentation (if determination needed).
- D. Disposal Documentation for Hazardous and Regulated Waste (if disposal required).

1.6 Safety

A. Not used.

1.7 Quality Assurance

A. Not used.

1.8 **Product Delivery, Handling, and Storage**

A. Not used.

1.9 Schedule

A. Not used.

2. MATERIALS

- A. Odor Control Foam: Rusmar AC-645 or approved equal.
- B. Odor Control Blanket: LSC Environmental Products Posi-Shell or approved equal.
- C. Odor Control Granule Sleeves: Rusmar RusScent Sleeves and Granules or approved equal.
- D. Odor Control Misting System: Rusmar RusScent Misting Liquids or approved equal.

3. EXECUTION

3.1 Environmental Protection Plan (EPP)

- A. The purpose of the EPP is to present an overview of known or potential environmental issues that must be considered and addressed during construction. Include in the EPP measures for protecting natural resources, required reports, and other measures to be taken. Submit the EPP within thirty (30) calendar days after Contract award and not less than seven (7) calendar days before the preconstruction meeting. Revise the EPP throughout the project to include any reporting requirements, changes in site conditions, or contract modifications that change the project scope of work in a way that could have an environmental impact. No requirement in this Section will relieve the CONTRACTOR of any applicable federal, state, and local environmental protection laws and regulations. During construction, identify, implement, and submit for approval any additional requirements to be included in the EPP. Maintain the current version onsite.
- B. The EPP includes, but is not limited to, the following elements:
 - 1. A brief description of each specific plan required by environmental permit and as required in this Specification Section.
 - 2. A copy of any standard or project-specific operating procedures that will be used to effectively manage and protect the environment on the project site.

- 3. Communication and training procedures that will be used to convey environmental management requirements to CONTRACTOR employees and subcontractors.
- 4. Emergency contact information in case of an environmental impact. Provide name, title/project role, cell phone number, and e-mail address for at least two (2) responsible personnel who have authority to mobilize resources to address environmental issues.
- 5. Procedures to prevent releases to the environment and notifications in the event of a release to the environment.
- 6. Dust Control Plan identifying the means and methods for controlling dust from roadways and construction surfaces throughout construction, including manufacturer data for dust control agent(s), should any be proposed, for prior approval before use. The CONTRACTOR shall provide sufficient documentation from the manufacturer of the dust control agent(s) confirming their use is appropriate for the site and for the various potential application areas (slopes, roadways, etc.). The CONTRACTOR shall also demonstrate through documentation that the particular dust control agent(s) proposed for the project do not detrimentally impact the environment, including receiving waters.
- 7. Tracked Soil Plan describing the equipment and methods the CONTRACTOR will utilize and the frequency of cleaning to meet the requirements of Paragraph 3.3 "Tracked Soil."
- 8. Noise Suppression Plan describing the means and methods for minimizing noise during construction and compliance with the Montgomery County Noise Control Law.
- 9. Odor Control Plan describing the materials and methods to be utilized for odor control, including the odor control foam, odor control blanket, odor control granule sleeves, and odor control misting system as required in this specification. The Plan shall include details from the manufacturers such as product cut sheets, mixing rates, application rates, duration of effectiveness, application equipment requirements, etc. The CONTRACTOR shall list the types and quantities of materials that will be onsite prior to the start of waste excavation, the expected number of calendar days the materials can be utilized or the areal coverage of the materials, and the time required to have additional materials onsite.
- 10. Petroleum, oil, and lubricant (POL) Storage Plan for location, operation, maintenance, inspection, and monitoring of a temporary fueling operation, if the CONTRACTOR opts to use one. Describe how POL tanks and containers will be stored, managed, and inspected and what protections will be provided. Include a Spill Prevention, Control, and Countermeasure (SPCC) Plan meeting the requirements of 40 CFR 112.

3.2 **Dust Control**

- A. Keep dust down at all times, including during nonworking periods. Sprinkle or treat, with dust suppressants, the soil at the site, haul roads, and other areas disturbed by operations. CONTRACTOR may apply water, or a commercial dust control agent approved in the Dust Control Plan.
- B. CONTRACTOR shall be responsible for controlling objectionable dust caused by the operation of vehicles and equipment, clearing, or other source, and shall prevent dust from leaving the site. Dust shall be controlled when encountering visible and/or noticeable airborne dust in or surrounding the project areas, or at the request of the CONSTRUCTION MANAGEMENT ENGINEER. Visible dust conditions are those where airborne dust is visible for greater than a five (5) minute period.
- C. The CONSTRUCTION MANAGEMENT ENGINEER will require a temporary shutdown of all CONTRACTOR operations if dust is not controlled in accordance with these Specifications. Earthmoving activities occurring on unpaved surfaces shall be suspended when winds exceed twenty-five (25) miles per hour and visible dust plumes occur. All earthmoving activities will be suspended when wind speeds are greater than thirty (30) miles per hour regardless of presence or extent of dust plume.
- D. The CONSTRUCTION MANAGEMENT ENGINEER may restrict construction vehicle traffic to fifteen (15) miles per hour unless the road surface and surrounding area is sufficiently stabilized to prevent visible dust emissions.
- E. Any schedule delays or additional costs incurred by the CONTRACTOR due to temporary shutdown due to lack of dust control shall have no impact on the overall construction schedule or result in any additional cost to the OWNER.
- F. CONTRACTOR is responsible for obtaining water for dust suppression and for any permits, approvals, or payment required.

3.3 Tracked Soil

A. CONTRACTOR shall be responsible for ensuring dirt and mud is not tracked onto Incinerator Lane or Southlawn Lane. CONTRACTOR shall clean and maintain all roads free of dirt and mud during construction on a daily basis. Dry power brooming will not be permitted. Instead, use vacuuming, wet mopping, wet sweeping, or wet power brooming.

3.4 Noise

A. Make the maximum use of low-noise emission products such as adequate mufflers to control engine noise, localized or directional vehicle backup alarms, white noise vehicle backup alarms, or backup alarms that self-adjust to ambient noise levels.

B. Keep construction activities under surveillance and control to minimize environmental damage by noise. Comply with the provisions of the Montgomery County Noise Control Law.

3.5 Odors

- A. The CONTRACTOR shall make efforts to reduce potential odors from migrating to surrounding properties, particularly the Derwood Station community near the northwest slope of the Landfill.
- B. The CONTRACTOR shall provide 260 odor control granule sleeves and attach them every 10 linear feet to the chain-link fence along the base of Northwest Slope. They shall be refreshed every 3 months during waste excavation activities as needed for odor control or as directed by the CONSTRUCTION MANAGEMENT ENGINEER.
- C. The CONTRACTOR shall have an odor control foam and an odor control misting system onsite during waste excavation and placement.
- D. When odors are present, the CONSTRUCTION MANAGEMENT ENGINEER may require the CONTRACTOR to initiate odor control at the waste excavation and/or placement area.
- E. Odor control mist or foam shall be applied at rates identified in the approved Odor Control Plan.
- F. If the odor control mist and foam are deemed insufficient, the CONSTRUCTION MANAGEMENT ENGINEER may require application of an odor control blanket. The CONTRACTOR shall cover waste with daily cover soil and cease waste excavation and relocation activities until the odor control blanket is applied over exposed waste.
- G. If the odor control methods are deemed insufficient by the CONSTRUCTION MANAGEMENT ENGINEER because of weather conditions, the CONTRACTOR shall cover waste with daily cover soil and cease waste excavation and relocation activities until more favorable weather conditions exist as approved by the CONSTRUCTION MANAGEMENT ENGINEER.

3.6 Burning

A. Burning is prohibited at the site.

3.7 Petroleum, Oil, Lubricant (POL) Storage and Fueling

A. POL products include flammable or combustible liquids, such as gasoline, diesel, lubricating oil, used engine oil, hydraulic oil, mineral oil, and cooking oil. Store POL products and fuel equipment and motor vehicles in a manner that affords the maximum

protection against spills into the environment. Manage and store POL products in accordance with EPA 40 CFR 112, and other federal, state, regional, and local laws and regulations. Use secondary containments, dikes, curbs, and other barriers, to prevent POL products from spilling and entering the ground, storm or sewer drains, stormwater ditches or canals, or navigable waters of the United States. Storage of fuel on the project site must be in accordance with EPA, state, and local laws and regulations.

- B. Provide secondary containment and overfill protection for POL storage tanks. Only aboveground storage tanks are allowed. A berm used to provide secondary containment must be of sufficient size and strength to contain the contents of the tanks plus five (5) inches freeboard for precipitation. Construct the berm to be impervious to POL for seventy-two (72) hours that no discharge will permeate, drain, infiltrate, or otherwise escape before cleanup occurs. Use drip pans during oil transfer operations; adequate absorbent material must be onsite to clean up any spills and prevent releases to the environment. Cover tanks and drip pans during inclement weather. Provide procedures and equipment to prevent overfilling of tanks.
- C. Monitor and remove any rainwater that accumulates in open containment dikes or berms. Inspect the accumulated rainwater prior to draining from a containment dike to the environment, to determine there is no oil sheen present.
- D. Exercise due diligence to prevent, contain, and respond to spills of hazardous material, hazardous substances, hazardous waste, sewage, regulated gas, petroleum, lubrication oil, and other substances regulated in accordance with 40 CFR 300. Maintain spill cleanup equipment and materials at the work site. In the event of a spill, take prompt, effective action to stop, contain, curtail, or otherwise limit the amount, duration, and severity of the spill/release. In the event of any releases of oil and hazardous substances, immediately notify the CONSTRUCTION MANAGEMENT ENGINEER. Contain and clean up these spills without cost to the OWNER.

-- End of Section --

SECTION 01 58 13 PROJECT IDENTIFICATION AND SIGNS

1. **GENERAL**

1.1 Description

1.1.1 Scope of Work

- A. Furnish, install, and maintain temporary project identification and informational signs.
- B. The following signs shall be provided:
 - 1. Project Identification Sign.
- C. No signs, except those specified, shall be displayed unless approved by OWNER.

1.1.2 Related Work Specified Elsewhere

A. Not used.

1.2 <u>References</u>

A. Not used.

1.3 <u>Definitions</u>

A. Not used.

1.4 Qualifications

A. Not used.

1.5 **Submittals**

- A. Submit for approval the following:
 - 1. Type and grade of materials.
 - 2. Layout, size, trim, framing, supports, and coatings.
 - 3. Size and style of lettering.
 - 4. Samples of colors.

1.6 Safety

A. Not used.

1.7 **Quality Assurance**

A. Not used.

1.8 **Product Delivery, Handling, and Storage**

A. Not used.

1.9 Schedule

A. Not used.

2. <u>MATERIALS</u>

2.1 Design

A. Design of Project Identification Sign shall conform to the size, layout and information shown in Figure A.

2.2 Fabrication

- A. Use three-quarter (3/4)-inch Medium Density Overlay (MDO), unless shown otherwise.
- B. Design signs and supports to withstand a seventy-five (75) mile per hour wind.
- C. Paint with exterior gloss-finish enamel. Sign painter shall be a professional in the type work required.

FIGURE A

GUDE LANDFILL REMEDIATION

Contracted by the Northeast Maryland Waste Disposal Authority

For More Information Call: XXX-XXXX





8-FT

3. <u>EXECUTION</u>

4-FT

3.1 <u>Installation and Maintenance</u>

- A. Location of sign shall be as shown or directed by OWNER.
- B. Maintain sign so it is clean, legible, and upright. Keep grass and weeds cut away from sign.
- C. Repair and repaint damaged sign. Relocate sign as required by progress of the Work. Update information as conditions change, including, but not limited to change in County Executive administration.
- D. Remove sign at time of final acceptance or when directed by OWNER.

-- End of Section --

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SECTION 01 59 00 TEMPORARY FACILITIES AND CONTROLS

1. GENERAL

1.1 <u>Description</u>

1.1.1 Scope of Work

A. This Section includes the requirements for field office construction, maintenance, and removal. The CONTRACTOR shall provide field offices as specified herein at his own expense.

1.1.2 Related Work Specified Elsewhere

A. Not used.

1.2 References

A. Not used.

1.3 <u>Definitions</u>

A. Not used.

1.4 Qualifications

A. Not used.

1.5 **Submittals**

A. Not used.

1.6 Safety

A. Not used.

1.7 **Quality Assurance**

A. Not used.

1.8 **Product Delivery, Handling, and Storage**

A. Not used.

1.9 Schedule

- A. Field offices shall be ready for occupancy fifteen (15) calendar days prior to groundbreaking on site.
- B. Maintain storage areas and sheds until readiness for final payment, unless otherwise approved by OWNER.

2. MATERIALS

A. Materials, equipment, and furnishings shall be new or used, and adequate for the required purpose. The CONTRACTOR shall furnish and install all needed aggregate and piping for drainage, and maintain ingress and egress roadways for the designated field staging areas.

3. EXECUTION

3.1 Preparation

A. Fill grade sites for temporary structures to provide drainage away from buildings, and install office spaces ready for occupancy.

3.2 <u>Construction</u>

- A. Construction specifications include the following:
 - Portable or mobile buildings/trailers, or buildings constructed with floors raised aboveground, securely fixed to foundations, with steps and landings at entrance doors.
 - 2. Structurally sound foundation and superstructure.
 - 3. Completely weathertight and insulated floors, walls, and ceilings.
 - 4. Exterior finish acceptable to OWNER.
 - 5. Interior materials in offices shall be sheet-type for walls and ceilings, finished or painted, resilient floors and bases in like new condition.
 - 6. Size: minimum one hundred fifty (150) square feet floor area.
 - 7. Windows: ten (10) percent of floor area with operable sash and screens. Windows shall be furnished with locks and exterior security bars approved by the OWNER.
 - 8. Two (2) means of ingress and egress, each with landing, stairs, and handrails conforming to local building codes.

9. Interior materials in storage sheds will be as required to provide specified conditions for the storage of products.

3.3 Minimum Services

- A. Provide the following for each office:
 - 1. Electrical System:
 - a. CONTRACTOR shall make all provisions for obtaining temporary electrical services for the office space. Cost of installation, maintenance, monthly charges, and removal shall be the responsibility of CONTRACTOR.
 - b. Interior lighting of fifty (50) foot-candles at desktop height.
 - c. Exterior light at entrance.
 - d. Minimum four (4) one hundred twenty (120)-volt, wall-mounted, convenience electrical receptacles.
 - e. No generators are permitted for offices.
 - 2. Heating, Ventilating, and Air Conditioning System:
 - a. Automatic heating to maintain minimum sixty-five (65) degrees Fahrenheit in the cold weather. Furnish and pay for all fuel and utility costs.
 - b. Automatic cooling to maintain maximum seventy-five (75) degrees Fahrenheit in warm weather.
 - 3. Telephone Service:
 - a. Dedicated telephone service for each office, including payment of installation charges.
 - b. Pay local and long distance charges for the duration of the Project.
 - 4. Internet Service:
 - a. Provide all equipment necessary for high speed internet service by 4G LTE wireless broadband with forty (40) gigabytes per month of data at a minimum.
 - b. Pay all charges for internet service for the duration of the Project.

5. Water and Sewerage:

- a. Provide a suitably enclosed chemical or self-contained toilet located near field offices. Toilets shall be serviced, at minimum weekly, kept clean and supplied throughout course of work.
- b. Provide drinking water and dispenser. Dispenser shall have hot and cold taps and a cup dispenser. Supply refill water containers as necessary.
- c. Provide waterless hand sanitizer and paper towels. Keep adequate supplies throughout the course of work.
- B. Should actions of utility companies delay the complete set up of the field office, CONTRACTOR shall provide temporary electricity, heat, water supply, and sanitary facilities as required at no additional cost to the OWNER.
- C. No separate payment shall be made for the Inspector's office, facilities, and temporary power. All costs associated with providing and maintaining said facilities, including electric, shall be included in the price of mobilization.

3.4 **CONTRACTOR'S Office and Facilities**

- A. CONTRACTOR shall provide a field office for use by CONTRACTOR with the minimum facilities specified. Provide required storage and work sheds.
- B. Field Office and Furnishings:
 - 1. Telephone, fax, and high speed internet service.
 - 2. Six (6) safety vests and protective helmets for visitors' use.
 - 3. Identifying exterior sign acceptable to the OWNER, at least twenty-four (24) inches by thirty-six (36) inches in size. Text shall be four (4) inches high, Arial font, unless otherwise approved by the OWNER. At minimum, the sign shall read "CONTRACTOR'S OFFICE."
 - 4. A large table, chairs, and sufficient room to seat a minimum of ten (10) people for progress meetings and other meetings. The space shall be separated from offices by internal walls and doors.
 - 5. Other furnishings at CONTRACTOR'S option.
- C. Provide one (1) set of Contract Documents in the field office for ready reference by interested parties.

3.5 OWNER/CONSTRUCTION MANAGEMENT ENGINEER'S Office

- A. CONTRACTOR shall provide and maintain one (1) separate trailer or structure for the sole use as a field office for the OWNER /CONSTRUCTION MANAGEMENT ENGINEER. Provide the office at a location approved by the OWNER.
- B. Allocate five (5) reserved parking spaces for use by the OWNER/CONSTRUCTION MANAGEMENT ENGINEER in close proximity to the field office. Parking area shall be paved with asphalt concrete or crushed stone, and shall include a walkway of asphalt, concrete, crushed stone, or material acceptable to the CONSTRUCTION MANAGEMENT ENGINEER, between the parking area and the field office.
- C. The field office shall include two (2) office spaces and a separate space for a large table, chairs, and sufficient room to seat a minimum of ten (10) people for meetings. The meeting space shall be separated from offices by internal walls and doors.
- D. The CONSTRUCTION MANAGEMENT ENGINEER will provide some furnishings and equipment for the duration of the Work.
- E. CONTRACTOR shall provide the following furnishings and equipment for the duration of the Work:
 - 1. One (1) thirty-five (35) gallon waste basket for mixed containers.
 - 2. One (1) sixty-five (65) gallon waste basket for recyclable fiber.
 - 3. Suitable mat or carpet at each doorway.
 - 4. One (1) tack board thirty (30) inches by thirty-six (36) inches, with thumbtacks.
 - 5. One (1) white board for use with dry markers, approximately four (4.0) feet by four (4.0) feet, with marker holding tray, installed by CONTRACTOR at a location directed by CONSTRUCTION MANAGEMENT ENGINEER in the field. Provide a supply of colored markers and eraser for the white board.
 - 6. Fire extinguishers and associated signage, and smoke detector, per local codes. At minimum provide two (2) wall-mounted fire extinguishers and one (1) battery operated ceiling-mounted smoke detector.
 - 7. Identifying exterior sign acceptable to the OWNER, at least twenty-four (24) inches by thirty-six (36) inches in size. Text shall be four (4) inches high, Arial font, unless otherwise approved by the OWNER. At minimum, the sign shall read "CONSTRUCTION MANAGEMENT ENGINEER'S OFFICE."
 - 8. First aid kit, by Zee Medical Service Co., Item 0125, "Kit, Utility, Metal, Full (ANSI)", (800) 225-5933), www.zeemedical.com, or equal.

- 9. Six (6) ANSI approved protective helmets for use by visitors—white with ratchet suspension.
- 10. One (1) battery powered, wall mount clock.
- 11. Six (6) safety vests—fluorescent lime with orange and silver stripes.
- 12. Six (6) safety glasses—clear poly carbonate lenses, ANSI Z87.1 compliant.

3.6 Storage Areas and Sheds

A. Size to storage requirements for products of individual sections. Allow for access, orderly provision for maintenance, and for inspection of products.

3.7 **Maintenance and Cleaning**

- A. CONTRACTOR shall be responsible for janitorial, cleaning and maintenance services for both offices and the storage areas.
 - 1. Provide toner or ink cartridges for printer, copier, and fax machine, as required.
 - 2. Provide colored dry markers.
 - 3. Provide bottled water and disposable cups.
 - 4. Replenish contents of the first-aid kit as required.
 - 5. Immediately repair malfunctioning, damaged, leaking, or defective field office systems and equipment.
 - 6. Provide all supplies, including toner and paper, and pay for maintenance on the multifunction laser printer.
 - 7. Promptly provide snow removal for the field office, including parking area, walkways, and stairs/landings.
 - 8. Provide continuous maintenance and janitorial service of the field office and sanitary facilities. Clean the field offices at least once per week and properly dispose of trash.
 - 9. Provide waterless soap, paper towels, cleansers, sanitary supplies, and janitorial implements in the OWNER/CONSTRUCTION MANAGEMENT ENGINEER's office.

3.8 Removal

A. Remove the field offices and furnishings when directed by the CONSTRUCTION MANAGEMENT ENGINEER. Restore site to preconstruction conditions.

-- End of Section --

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SECTION 01 70 00 EXECUTION AND CLOSEOUT REQUIREMENTS

1. **GENERAL**

1.1 Description

1.1.1 Scope of Work

A. This Specification includes the execution and closeout procedures, including surveys, field engineering, and contract closeout.

1.1.2 Related Work Specified Elsewhere

A. Not used.

1.2 References

A. Not used.

1.3 <u>Definitions</u>

A. Not used.

1.4 Qualifications

A. Not used.

1.5 Submittals

A. Submit the following:

- 1. Submit resume of CONTRACTOR'S field engineer to CONSTRUCTION MANAGEMENT ENGINEER prior to the Preconstruction Meeting for approval.
- 2. Submit name and address of CONTRACTOR'S surveyor to CONSTRUCTION MANAGEMENT ENGINEER.
- 3. On request of CONSTRUCTION MANAGEMENT ENGINEER, submit documentation to verify accuracy of field engineering work.
- 4. Submit certificate signed by Maryland registered engineer or surveyor certifying that elevations (lines and grades) and locations of Work are in conformance with Contract Documents. Explain all deviations.

- B. Submit copies of field notes to CONSTRUCTION MANAGEMENT ENGINEER.
- C. Four (4) copies of each survey listed in Table 01 70 00 shall be submitted by the CONTRACTOR in reproducible drawings and one (1) portable document format (PDF) electronic version and one (1) AutoCAD electronic version in 2013 or newer format.
- D. At the completion of the Contract, or at the CONSTRUCTION MANAGEMENT ENGINEER'S request and before final payment is made, the CONTRACTOR shall furnish the CONSTRUCTION MANAGEMENT ENGINEER four (4) sets of paper drawings and one (1) PDF electronic version and one (1) AutoCAD electronic version of the final record drawings (as-builts) reflecting all revisions herein described.

1.6 Safety

A. Not used.

1.7 Quality Assurance

A. Not used.

1.8 Product Delivery, Handling, and Storage

A. Not used.

1.9 Schedule

A. Not used.

1.10 Surveying

- A. Surveys shall be field run by an independent surveyor licensed in the State of Maryland.
- B. The OWNER has established benchmarks with horizontal and vertical control as shown on the plans for use by the CONTRACTOR. Control datum for survey is indicated on the Drawings. Promptly notify CONSTRUCTION MANAGEMENT ENGINEER of any discrepancies discovered with the survey control.
- C. CONTRACTOR shall establish, maintain, and protect new control points for this project. New control points shall be surveyed to at least second order accuracy (e.g. 1:10000) and tied into the existing network.
- D. CONTRACTOR shall locate and protect survey control and reference points within the limit of Work. Existing property markers along the limit of the Work are located where identified in Attachment D, Property Markers. Should any property markers and benchmarks be destroyed, the replacement cost shall be borne by the CONTRACTOR.

- The CONTRACTOR shall assume the entire expense of rectifying work improperly constructed due to failure to maintain and protect established survey points and benchmarks.
- E. The CONTRACTOR shall be responsible for verification of the information provided by OWNER. The Contract Drawings provided to the CONTRACTOR consist of elevations and contours based on aerial topography combined with some areas of field run topography. Additionally, the Site is prone to settlement as a landfill, and as a result, all indicated elevations and contours are approximate. Accordingly, elevations shown on these plans are to be adjusted to reflect field conditions, relative dimensioning, and minimum or maximum grades where necessary and approved by the CONSTRUCTION MANAGEMENT ENGINEER.
- F. Verify setbacks and easements; confirm Drawing dimensions and elevations.
- G. Provide all surveying equipment required including transit, level, stakes, and required surveying accessories.
- H. Provide field engineering services. Establish elevations, lines, and levels using recognized engineering survey practices.
- I. Furnish all required lines and grades for construction of operations. Check all piping, other materials, and equipment.
- J. Survey, locate, and record and redline Drawings to accurately represent all utilities and buried structures prior to backfilling.
- K. CONTRACTOR shall develop and make all detail surveys and measurements needed for construction including slope stakes, batter boards, piping layouts, and all other working lines, elevations, and cut sheets.
- L. As a minimum survey control requirement, maintain a transit and leveling instrument onsite at all times and a skilled instrument person employed or obtained whenever necessary for layout work.
- M. CONTRACTOR shall keep neat, legible field notes of all measurements and calculations made by the CONTRACTOR while surveying and laying out the Work proposed in this Contract.
- N. Surveys shall be performed at the milestones indicated in Table 01 70 00-1 as Work progresses through each phase. Surveys will be performed at these milestones only in areas where the milestone has been reached. Ultimately, the entire Limit of Disturbance shall be surveyed for each milestone. The as-built drawings shall include survey information presented as one complete survey for each milestone.

TABLE 01 70 00-1 Required Surveys

Required Survey
Survey ground surface elevation immediately after mowing and
clearing each phase and before existing cover soil removal.
Survey ground surface elevation after existing cover soil has been
stripped before any waste is excavated or placed. Existing cover soil
stockpiles do not need to be surveyed.
Survey ground surface elevation after waste has been excavated and
waste and soil have been placed, compacted, and finished to meet
regraded waste elevation (bottom of subgrade elevation).
Survey ground surface elevation after Closure Cap Subgrade soil has
been placed, compacted, and finished to meet subgrade elevation.
Survey ground surface elevation and areal extent of cap geosynthetics
er placement and meet survey requirements noted in Section 31 05
19.16, Geomembrane.
Survey elevation and horizontal location of top of pipes, valves, and
ondensate drains before completion of Vegetative Support Soil accement.
been placed, compacted, and finished.
vey ground surface elevation after Topsoil has been placed,
compacted, and finished to meet final grade.
Survey final site after removal of Sediment Basin No. 1 and
installation of all drainage features and all recreational features.
Survey:
 Horizontal and vertical locations of storm drain pipes,
manholes, and inlets (including invert elevations); • Access road locations;
 Horizontal and vertical locations of groundwater monitoring
wells (including top of casing elevation and ground surface
elevation);
Horizontal and vertical locations of landfill gas monitoring
probes (including top of casing elevation and ground surface
elevation);
 Horizontal and vertical locations of piezometers (including top
of casing elevation and ground surface elevation);
 Horizontal and vertical locations of condensate sumps;
• Chain link fence and gate locations;
Recreational feature locations;
Horizontal and vertical locations of property corner
monuments and line-of-site markers along the limit of new
chain link fence installation along the Northwest Slope.

- O. Surveys at a minimum shall include the following where applicable:
 - 1. Horizontal and vertical location of any installed buried piping or utilities including but not limited to landfill gas, stormwater culverts, and electrical service.
 - 2. Survey points shall include all slope features and grade breaks such that an accurate ground surface model can be generated from the survey data. The maximum spacing between survey points shall be twenty-five (25) feet and the survey tolerance shall be one-tenth (0.1) foot.

1.11 CONTRACTOR'S Field Engineer

- A. CONTRACTOR shall employ and retain at the work site a full-time field engineer capable of performing all engineering tasks required of the CONTRACTOR. Tasks include, but are not limited to:
 - 1. Daily reports of Project activity to be submitted to the CONSTRUCTION MANAGEMENT ENGINEER with all pertinent information pertaining to the Project as follows:
 - a. Numbers of employees onsite.
 - b. Subcontractor's employees onsite.
 - c. Breakdown of employees by trade.
 - d. Major equipment and materials installed.
 - e. Major construction equipment utilized.
 - f. Location of all areas in which construction was done.
 - g. Materials and equipment received.
 - h. Quantity of the items completed or in progress with daily as well as cumulative quantity of work done for each item.
 - i. Adherence to the construction schedule and construction sequencing.
 - i. Weather conditions.
 - k. Health and Safety.
 - 1. Sign-in sheet for all visitors.

- 2. Submit two (2) copies of CONTRACTOR'S daily report to the CONSTRUCTION MANAGEMENT ENGINEER'S field office by 9:00 a.m. the next working day after the Work was performed. Daily reports shall be signed by a responsible member of CONTRACTOR'S staff.
- 3. Maintain field office files and drawings, record drawings, and coordinate engineering services with subcontractors. Prepare layout and coordination drawings for construction operations.
- 4. Check and coordinate Work for conflicts and interferences, and immediately advise CONSTRUCTION MANAGEMENT ENGINEER of all discrepancies noted.
- 5. Cooperate with CONSTRUCTION MANAGEMENT ENGINEER in field inspections as required.
- 6. Review and coordinate Shop Drawing and other submittals.
- 7. Attend all progress meetings.

1.12 **Qualifications of Field Engineer**

A. Qualified individual (engineer, experienced personnel, or Maryland registered land surveyor), having completed comparable projects to this Work and having a minimum of five (5) years' experience conducting similar functions and acceptable to CONSTRUCTION MANAGEMENT ENGINEER. Submit for OWNER'S approval.

1.13 Project Record As-Built Documents

- A. Maintain onsite one (1) set of the following record documents; record actual revisions to the Work. Record documents include:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders Change Orders, Work Change Directives, Field Orders and other modifications to the Contract.
 - 5. Written interpretations and clarifications.
 - 6. Approved Shop Drawings, product data, and Samples.
 - 7. Inspection reports.

- 8. Laboratory test records.
- 9. Field test reports and records Factory test reports and records.
- 10. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by OWNER.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress, not less than weekly.
- E. Specifications—Legibly mark and record, at each product section, description of actual products installed, including the following:
 - 1. Manufacturer's name and product model and number.
 - 2. Product substitutions or alternates used.
 - 3. Changes made by Addenda, Requests For Interpretation, Field Orders, and Change Orders.
- F. Record Drawings—Legibly mark each item to record actual construction as follows:
 - 1. Include Contract modifications such as Addenda, supplementary instructions, Work Change Directives, Field Orders, minor changes in the Work, and Change Orders.
 - 2. Include locations of concealed elements of the Work, such as anchor trench locations, limits of geosynthetic closure cap, weld locations, seam locations, below grade piping, and locations of samples taken of geosynthetic components for destructive and nondestructive testing.
 - 3. Identify depth of buried utility lines and provide dimensions showing distances from permanent facility components that are parallel to utilities.
 - 4. Dimension ends, corners, and junctions of buried utilities to permanent facility components using triangulation.
 - 5. Identify and locate existing buried or concealed items encountered during Project.
 - 6. Measured depths of foundations in relation to ground elevation.
 - 7. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

- 8. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
- 9. Field changes of dimension and detail.
- G. Where the Contract Drawings are not of sufficient size, scale, or detail, the CONTRACTOR shall furnish its own drawings for incorporation of details and dimensions using AutoCAD.
- H. The final submittal of record ("as-built") drawings shall be stamped "Record Drawing," signed and dated in blue ink by the CONTRACTOR and shall be delivered to the CONSTRUCTION MANAGEMENT ENGINEER.

1.14 Cleanup

- A. Construction cleanup shall proceed as construction progresses and shall consist of the removal of all mud, dirt, trash, debris, and surplus excavated material. All cleaning materials and equipment used shall be selected and employed with care to avoid scratching, marring, defacing, staining, or discoloring the surfaces cleaned.
- B. Immediately prior to the CONTRACTOR'S written request for a final inspection of the Contract Work, or any portion thereof, perform final cleanup.
- C. In addition to the normal "broom clean" requirements, the exposed surfaces of the following materials shall be cleaned as listed herein:
 - 1. Access roads—Remove mud, dirt, and redress.
 - 2. Other surfaces—Remove all blemishes. Leave clean, uniform, and dust free.
 - 3. Premises and site—Remove all trash, debris, and surplus excavated material.
- D. No items shall remain on or be discarded on this site, or any other OWNER'S site. Items and excess materials that are to be discarded shall be removed to the active landfill. Leave premises orderly and "broom clean."

1.15 Restoration and Restabilization

- A. All areas disturbed by the CONTRACTOR'S operation shall be restored and restabilized as specified herein. This shall include, but not be limited to, staging and stockpiling areas, offsite borrow areas, construction strips, access to roads, and all areas within the Limit of Work.
- B. Final restoration and restabilization shall proceed in accordance with the Construction Schedule. This shall include seeding and/or sodding of disturbed areas and outside slopes of landfill cells. Disassemble and removal all temporary construction facilities constructed by the CONTRACTOR and leave the Site in an orderly and restored condition as required by the Contract Documents.

- C. Preserve signs, guard rails, property corner monuments, line-of-sight markers, groundwater monitoring wells, landfill gas monitoring probes, and fences, and maintain in their existing locations and condition unless written permission is obtained from the CONSTRUCTION MANAGEMENT ENGINEER for their removal and restoration or replacement. Remove such conflicting facilities when grading operations begin and store in a manner to keep them clean and in their existing condition. Restore to their locations before removal or such new locations as directed. Repair or replace damaged items when directed, at no cost to the OWNER.
- D. Restabilization of turf areas shall be performed in accordance with Section 32 92 19, Upland Meadow Establishment.
- E. Gravel surfaces and access roads shall be repaired and restored as near as practicable to "like new" condition.

1.16 <u>Disposal of Waste and Excess Materials</u>

- A. Construction waste and excess construction materials shall be disposed by the CONTRACTOR at offsite locations in accordance with applicable local, state, and federal regulations.
- B. Waste and excess material disposed of in an unauthorized area shall be removed by the CONTRACTOR and the area shall be restored as near as practicable to its condition before disturbance, at no cost to the OWNER.

1.17 Removal of Rejected Material

A. Material delivered to the Contract site by the CONTRACTOR, which has been determined by the CONSTRUCTION MANAGEMENT ENGINEER to be unsuitable or not in accordance with the Contract Documents, shall be removed from the Work site and disposed of in an approved area at no cost to the OWNER.

2. <u>MATERIALS</u>

A. Not used.

3. <u>EXECUTION</u>

3.1 Protection of Existing Infrastructure

A. The CONTRACTOR shall protect all existing infrastructure not to be demolished as identified in the Contract Documents. Damage by the CONTRACTOR to existing infrastructure will be repaired at the CONTRACTOR'S expense.

- B. The CONTRACTOR shall provide for the protection and preservation of the existing monitoring wells located within the project area. Any damage to these items caused by the CONTRACTOR'S activities shall be repaired by the CONTRACTOR at no additional expense to the OWNER.
- C. The CONTRACTOR shall restore all roads, paved surface and access roads intended to remain that have been damaged during the construction of the landfill closure cap to their original condition.

3.2 Project Closeout and Warranty

- A. Upon receiving the CONTRACTOR'S written request for substantial completion inspection, the CONSTRUCTION MANAGEMENT ENGINEER will perform a walk-through of the Site area with the CONTRACTOR'S and the OWNER's representative(s). The CONSTRUCTION MANAGEMENT ENGINEER shall identify and document, via a punch list, the additional construction items required to declare "substantial completion" of the Contract. If, in the opinion of the CONSTRUCTION MANAGEMENT ENGINEER, the Site area can be fully utilized for purposes for which it was intended, a "Certificate of Substantial Completion" shall be issued. If, in the opinion of the CONSTRUCTION MANAGEMENT ENGINEER, the Site area cannot be fully utilized for purposes for which it was intended, no "Certificate of Substantial Completion" will be issued and another walk-through will be scheduled. All punch list items identified during the walk-throughs shall be addressed to the satisfaction of the CONSTRUCTION MANAGEMENT ENGINEER. Final payment will not be made until all of the punch list items are resolved to the satisfaction of the CONSTRUCTION MANAGEMENT ENGINEER.
- B. Unless otherwise specified in the Contract Documents, the CONTRACTOR guarantees and warrants all materials, supplies, and equipment furnished and all work performed under the Contract for a period of twelve (12) months after the date of Substantial Completion as determined by the CONSTRUCTION MANAGEMENT ENGINEER.
- C. The CONTRACTOR is responsible for establishment and maintenance of the upland meadow (meadow mix #1, meadow mix #2, and meadow mix #3) for a three (3)-year period as specified in Section 32 92 19 UPLAND MEADOW ESTABLISHMENT.

-- End of Section -

SECTION 02 41 00 DEMOLITION

1. **GENERAL**

1.1 <u>Description</u>

1.1.1 Scope of Work

A. Demolition, removal, and disposal of selected structures shall be in accordance with Contract Drawings, and shall include, but is not limited to: gabion down chutes, stormdrains, stormdrain inlets and manholes, access roads, landfill gas piping, landfill gas extraction wells, and condensate sumps.

1.1.2 Related Work Specified Elsewhere

- A. Section 01 20 00, Measurement and Payment.
- B. Section 01 33 00, Submittals.

1.2 References

- A. American National Standards Institute (ANSI).
- B. American Society of Safety Engineers (ASSE).
- C. ASTM International (ASTM).
- D. National Fire Protection Agency (NFPA).

1.3 Definitions

- A. Remove: Detach items from existing construction and legally dispose of them offsite unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to OWNER at Site.
- C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 Qualifications

A. Not used.

1.5 **Submittals**

A. Not used.

1.6 Safety

A. Not used.

1.7 **Quality Assurance**

A. Not used.

1.8 **Product Delivery, Handling, and Storage**

A. Not used.

1.9 Schedule

A. Not used.

1.10 Field Conditions

- A. Notify OWNER of discrepancies between existing conditions and Contract Drawings before proceeding with selective demolition.
- B. Hazardous Materials—It is not expected that hazardous materials will be encountered in the Work. If suspected hazardous materials are encountered, do not disturb; immediately notify CONSTRUCTION MANAGEMENT ENGINEER and proceed as detailed in Paragraph "Unusual Waste" in Specification Section 02 61 13.13, Waste Excavation and Material Handling.
- C. Storage or sale of removed items or materials onsite is not permitted.
- D. Utility Service—Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1.11 Warranty

A. Existing Warranties—Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

2. <u>MATERIALS</u>

2.1 Flowable Fill

A. Flowable fill materials shall be in accordance with Section 314 of the latest edition of the Maryland Department of Transportation (MDOT) State Highway Administration SHA Standard Specifications for Construction and Materials.

3. <u>EXECUTION</u>

3.1 General

- A. Evaluate existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- B. Demolish and remove existing construction only to the extent required by new construction and as indicated on Contract Drawings.
- C. Existing Items to Remain—Protect construction indicated to remain against damage and soiling during selective demolition.
- D. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- E. Comply with ANSI/ASSE A10.6 and NFPA 241.

3.2 Drainage Structure Demolition and Abandonment

- A. Existing gabion downchutes, riprap, and drainage structures shall be removed incrementally during grading and excavation activities in those areas. Existing downchutes shall not be disturbed until necessary for cap construction.
- B. CONTRACTOR must maintain erosion and sediment control and slope stability at all times.
- C. Existing culverts and drainage structures shall be removed from excavation areas at the locations indicated on the Contract Drawings.
- D. Existing culverts and drainage structures in waste placement areas shall be backfilled with flowable fill materials in accordance with Section 314 of the latest edition of the MDOT SHA Standard Specifications for Construction and Materials and left in place.

3.3 Landfill Gas Collection System Demolition and Abandonment

A. The existing landfill gas collection system demolition and abandonment is to be performed in accordance with the Landfill Gas Collection System Work Plan

prepared by the CONTRACTOR and approved by the CONSTRUCTION MANAGEMENT ENGINEER as identified on the Contract Drawings.

- B. Demolish and remove existing above grade PVC pipe, supports, and stakes as work progresses across the site.
- C. Existing landfill gas extraction wells are to be cut, the wellheads removed, and the existing casing capped a minimum of twelve (12) inches below the bottom of subgrade as shown on the Contract Drawings.
- D. Existing condensate drains/traps are to be cut and the existing casing capped a minimum of twelve (12) inches below the bottom of subgrade.
- E. Existing HDPE condensate sumps lids are to be removed and shall be broken/cut at least four (4) feet below grade or removed in their entirety and backfilled with No. 57 stone. No sharp points/edges are to remain along the broken/cut.

3.4 Disposal of Demolished Materials

- A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain OWNER'S property, CONTRACTOR must transport demolished materials for offsite disposal.
- B. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- C. Do not burn demolished materials.

-- End of Section --

SECTION 02 61 13.13 WASTE EXCAVATION AND MATERIAL HANDLING

1. **GENERAL**

1.1 Description

1.1.1 Scope of Work

A. The work shall consist of excavation, transportation, and placement of municipal solid waste for onsite waste relocation activities and the associated leachate management necessary to facilitate construction.

1.1.2 Related Work Specified Elsewhere

- A. Section 01 45 00, Health and Safety.
- B. Section 01 57 19, Temporary Environmental Controls.
- C. Section 31 05 15, Earthwork.
- D. Section 31 05 16, Aggregates.
- E. Section 31 09 13, Settlement Plates.
- F. Section 31 25 00, Erosion and Sediment Control.

1.2 References

A. Not used.

1.3 Definitions

- A. Cover Soil—Existing soil that is to be removed prior to waste excavation and stockpiled for use as common borrow and/or subgrade material. Refer to Section 31 05 15, Earthwork.
- B. Hazardous Waste—Any material that meets the definition of a solid waste and exhibits a hazardous characteristic (ignitability, corrosivity, reactivity, or toxicity) as specified in 40 CFR 261, Subpart C, or contains a listed hazardous waste as identified in 40 CFR 261, Subpart D.
- C. Waste—Municipal solid waste, construction and demolition debris, incinerator ash, and residual existing cover soil that remains after cover soil removal requiring excavation and relocation under this contract.

D. Unusual Waste—Solid waste that may not be considered municipal, including: waste with oil like sheen and/or odor; drums or tanks containing waste or liquid (unless empty and flattened); tires; and any waste suspect of being hazardous in nature.

1.4 Qualifications

A. Not used.

1.5 Submittals

A. Not used.

1.6 Safety

A. Safety shall be in accordance with Specification Section 01 45 00, Health and Safety.

1.7 **Quality Assurance**

A. Not used.

1.8 **Product Delivery, Handling, and Storage**

A. Not used.

1.9 Schedule

A. Not used.

2. <u>MATERIALS</u>

A. Daily Cover soil shall consist of General Fill or Closure Cap Subgrade as defined in Specification Section 31 05 15, Earthwork.

3. <u>EXECUTION</u>

3.1 Existing Structures and Utilities

A. Refer to Section 31 05 15, Earthwork, for excavation near existing environmental features such as monitoring wells, piezometers, and landfill gas extraction and monitoring wells.

3.2 Waste Relocation

- A. The CONTRACTOR is responsible for excavating, transporting, placing, and compacting existing waste as required to achieve the design grades and address leachate seeps and ponded leachate encountered during construction.
- B. While working in waste, equipment operators may be exposed to landfill gas or leachate. The CONTRACTOR is responsible for providing safe working conditions and proper equipment to handle the potential environment in accordance with Specification Section 01 45 00, Health and Safety.
- C. Refer to Section 31 05 15, Earthwork, for requirements that relate to the removal of existing cover soil.
- D. Approximate volumes of material excavation and anticipated placement volume in each subgrade phase are listed in the following table for planning purposes. Waste and soil volume will change from its in-situ state when it is moved and compacted, and is expected to fill less volume. Available placement volume includes volume for waste and for daily cover soil, when used. The CONSTRUCTION MANAGEMENT ENGINEER will track excavated and placed waste and soil volumes throughout the project and may direct the CONTRACTOR to make minor grading changes in areas where grading is not complete to accommodate variations in quantities.

	Approximate	
	Excavation/Relocation	Anticipated
	Volume after Cover Soil	Placement Volume
Phase	Removal (CY)	(CY)
S-I	36,000	30,800
S-II	34,000	35,000
S-III	41,000	40,800
S-IV	51,000	43,800
S-V	57,000	56,400
S-VI	25,000	22,000
S-VII	38,000	32,400
TOTALS	282,000	261,200

Common borrow may be utilized to reach grades where anticipated placement volume is less than the excavation/relocation volume.

E. The CONTRACTOR may open new subgrade phases before existing subgrade phases are complete in accordance with the requirements defined in the Sequence of Construction on the Contract Drawings. This will allow the CONTRACTOR to manage waste volumes between phases, because waste excavation volumes and available placement volumes in each phase will not balance exactly.

3.2.1 Excavation

- A. Waste excavation and relocation is required to meet subgrade elevations as shown on the Contract Drawings.
- B. Waste shall only be excavated in active phases as defined on the Contract Drawings.
- C. Waste placement site shall be prepared to accept waste prior to beginning excavation.
- D. Waste shall be excavated to the depth and extent shown on the Contract Drawings and in accordance with the details and sequence on the Contract Drawings.
- E. No waste may be protruding from the regraded waste finished surface. Any protruding waste must be removed, reincorporated into the fill, and recompacted to prevent potential damage to the geosynthetic closure cap.
- F. Compact waste at bottom of excavation before filling on top of it. Waste shall be compacted by a minimum of three (3) passes of construction equipment with a minimum ground pressure of six (6) pounds per square inch.
- G. Exposed waste shall be covered at the end of each day as described in Paragraph 3.2.4 "Daily Cover."
- H. The CONTRACTOR shall be prepared for encountering unusual waste and leachate. The CONSTRUCTION MANAGEMENT ENGINEER shall be notified immediately if unusual waste is encountered. The CONTRACTOR shall record the incidents in their daily logs. The CONTRACTOR shall establish subcontracts and agreements to sample, analyze, characterize, transport, and dispose of hazardous waste before waste excavation begins to avoid delays in executing the Work if potentially hazardous waste is encountered. Unusual waste shall be managed as described in Paragraph 3.2.6 "Unusual Waste."

3.2.2 Waste Transport

- A. Waste material shall be transported in water-tight trucks or containers from location of excavation to location of placement. No interim stockpiling of waste material is allowed. Do not overfill trucks/containers to minimize spillage. Waste must be controlled so it does not blow from the trucks/containers. Truck/containers will need to be covered if waste is blowing from them.
- B. No waste may be placed or transported over subgrade soils.
- C. Waste must remain on the property during all construction activities.

D. The CONTRACTOR shall take measures to prevent windblown litter and debris and shall clean up litter and debris that results from handling waste every day.

3.2.3 Waste Placement

- A. Waste shall be placed onsite in areas indicated on the Contract Drawings to achieve bottom of subgrade elevations.
- B. Waste shall only be placed in active phases. More than one phase may be active at the same time as defined on the Contract Drawings.
- C. Waste is to be placed in maximum eight (8)-inch loose lifts and compacted by a minimum of three (3) passes of construction equipment with a minimum ground pressure of six (6) pounds per square inch. Compaction with a bulldozer (not low ground pressure) is acceptable. Landfill compactors or soil compactors are not required.
- D. No waste may be protruding from the finished surface. Any protruding waste must be removed, reincorporated into the fill, and recompacted to prevent potential damage to the geosynthetic closure cap.

3.2.4 Daily Cover

- A. All waste in excavation areas and placement areas must be covered at the end of each working day or before a precipitation event if more than 0.5 inches of rain is forecast by the National Oceanic and Atmospheric Administration. Options for covering include:
 - 1. Tarps: Tarps must be free of holes or other damage to prevent precipitation from entering the waste. Tarps shall have a minimum thickness of ten (10) mils. The tarp shall be water resistant, seamed, and shed rainwater off the area preventing precipitation from infiltrating into the soils. The tarp shall be extended over the exposed waste and anchored at the perimeter and ballasted to prevent it from being removed or damaged by wind. The tarp interior shall be properly anchored using ultraviolet (UV)-resistant sandbags as needed. Each sandbag shall be filled with sand or other ballast and secured with UV-resistant nylon rope. Sandbags and rope shall be UV-resistant for two (2) years of exposure.
 - 2. Daily Cover: Daily cover soil shall be uniformly placed and compacted to a six (6)-inch thickness. Daily cover soil can be common borrow or Closure Cap Subgrade soil. Waste placed to the regraded waste elevation should be covered directly with Closure Cap Subgrade (specified in Specification Section 31 05 15, Earthwork).

3.2.5 Leachate Management

A. Leachate Pumping from Northwest Slope

- 1. A minimum of 30 calendar days before waste excavation begins, the CONTRACTOR shall pump leachate from the six (6) existing Dewatering Sumps along the top of the Northwest Slope where shown on the Contract Drawings. Leachate shall be pumped into tanker trucks for transport offsite for treatment and disposal. The CONTRACTOR shall provide pumps capable of pumping 50 gallons per minute for each Dewatering Sump and one backup pump, a power source for operating the pumps, and tanker trucks for containing and hauling leachate.
- 2. The CONTRACTOR should anticipate hauling 50,000 to 75,000 gallons per day of leachate when pumping begins.
- 3. The CONTRACTOR shall pump leachate continuously during working hours to remove as much leachate as possible before waste excavation begins. If the sumps run dry, the CONTRACTOR may cease pumping for 48 to 72 hours and then resume pumping. Based on previous observations, it is anticipated that if the wells run dry during pumping, ceasing pumping will allow leachate from the surrounding area to flow to the sumps.
- 4. The CONTRACTOR shall record the following information in an electronic log on a daily basis and provide the updated log to the CONSTRUCTION MANAGEMENT ENGINEER daily:
 - i. Date
 - ii. Dewatering Sump name
 - iii. Leachate depth in sump before pumping
 - iv. Pump start time
 - v. Pump stop time
 - vi. Leachate depth in sump after pumping
 - vii. Estimated volume of leachate pumped
 - viii. Description of any pump downtime and efforts to re-start the pump
 - ix. If the sump went dry
 - x. Any other details needed to manage the leachate pumping operation
- The CONTRACTOR shall continue pumping from the Dewatering Sumps until the Northwest Slope excavation is complete or until the CONSTRUCTION MANAGEMENT ENGINEER provides written direction to cease pumping operations.

B. Leachate Management During Excavation

1. The CONTRACTOR is responsible for the management of any leachate encountered and shall notify the CONSTRUCTION MANAGEMENT ENGINEER immediately upon encountering leachate. In case of encountering perched or ponded leachate during waste excavation, the CONTRACTOR shall excavate into the waste away from the perimeter of the Landfill to remove the

- barrier that is holding leachate until the leachate is redirected into the underlying waste mass and is no longer ponded.
- 2. If the ponded leachate is encountered at the bottom of subgrade elevation and it has been drained back into the Landfill through additional excavation, backfill the additional excavation with No. 2 Stone as specified in Specification Section 31 05 16, Aggregates, as directed by the CONSTRUCTION MANAGEMENT ENGINEER. Cover the stone with twelve (12) inches of common borrow before placing Closure Cap Subgrade.
- 3. In the instance where leachate cannot be redirected into the underlying waste, the CONTRACTOR is to notify the CONSTRUCTION MANAGEMENT ENGINEER. If agreed to in writing by the CONSTRUCTION MANAGEMENT ENGINEER, the CONTRACTOR must pump the leachate from the excavation area into tanker trucks and dispose of the leachate offsite. The CONTRACTOR must provide pumps, a power source for operating the pumps, and tanker trucks.
- 4. The CONTRACTOR shall have a pump capable of pumping 100 gallons per minute, a tanker truck with a minimum capacity of 5,000 gallons, and 20 tons of No. 2 Stone available on site before waste excavation begins. Additional pumps and tanker trucks may be required as the excavation progresses to maintain the desired production rate.

C. Leachate Disposal

- 1. Up to twenty thousand (20,000) gallons per day of leachate may be hauled to the Oaks Landfill (6001 Olney Laytonsville Rd, Gaithersburg, MD 20882). The CONTRACTOR shall communicate to the CONSTRUCTION MANAGEMENT ENGINEER the anticipated volume of leachate to be hauled a minimum of forty-eight (48) hours prior to anticipated disposal and receive written authorization prior to disposal. The daily leachate disposal capacity at Oaks Landfill may vary throughout the project. Oaks Landfill can accept leachate from 8 a.m. to 4 p.m., Monday through Friday. Trucks not associated with this project also haul leachate to the Oaks Landfill and some queueing time should be anticipated.
- 2. For leachate that cannot be accommodated at the Oaks Landfill, the CONTRACTOR must dispose of leachate offsite at a third-party facility in accordance with applicable regulatory and permit requirements. The CONTRACTOR is responsible for obtaining any permits or agreements from the third-party facility prior to the start of waste excavation. Copies of permits and agreements shall be provided to the CONSTRUCTION MANAGEMENT ENGINEER within forty-eight (48) hours of receipt and before any leachate is hauled to a third-party facility.

- 3. Tickets for disposal of the leachate at a third-party facility shall be provided to the CONSTRUCTION MANAGEMENT ENGINEER within twenty-four (24) hours of the disposal for records and payment purposes.
- 4. Leachate may be stored onsite temporarily in frac tanks or tanker trucks with written permission from the CONSTRUCTION MANAGEMENT ENGINEER to accommodate the varying disposal capacity at the Oaks Landfill or the receiving hours at the Oaks Landfill or a third-party facility.

3.2.6 Unusual Waste

- A. Tires: Tires encountered during waste excavation are to be managed by the CONTRACTOR in accordance with COMAR 26.04.08. They must be transported by a licensed hauler to a licensed collection facility. They may be stockpiled temporarily onsite until a full load is ready for transport and disposal.
- B. Potentially Hazardous Waste: Potentially hazardous waste includes waste with oil like sheen and/or odor; drums or tanks containing waste or liquid (unless empty and flattened); and any waste suspect of being hazardous in nature.
 - Potentially hazardous waste shall not be disturbed until the CONSTRUCTION MANAGEMENT ENGINEER is notified and has approved a plan of action in writing. The CONSTRUCTION MANAGEMENT ENGINEER will determine if the material can be excavated and placed back in the Landfill or if must be characterized.
 - 2. The CONTRACTOR may move to a new location within the active construction phase and continue waste excavation while the plan of action is being determined for managing the potentially hazardous waste.
 - 3. If the CONSTRUCTION MANAGEMENT ENGINEER determines the material must be characterized, the CONTRACTOR shall characterize the waste in accordance with the requirements of 40 CFR 261 and submit a report summarizing and containing the results of the testing within five (5) calendar days of receipt of the test results.
 - 4. If the waste is determined to be hazardous, store hazardous waste onsite in approved containers in accordance with 49 CFR 173 and 49 CFR 178. Provide the CONSTRUCTION MANAGEMENT ENGINEER with a copy of the signed hazardous waste manifests for review and approval before waste is transported offsite.
 - 5. Hazardous waste shall be transported and disposed in accordance with 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 40 CFR 265, 40 CFR 266, and 40 CFR 268 within sixty (60) days after the materials have been characterized.

3.2.7 Landfill Gas Wellfield Management

A. Coordinate with the CONSTRUCTION MANAGEMENT ENGINEER and the OWNER'S Landfill Gas Operations and Maintenance Contractor for the temporary disconnection and reconnection of landfill gas wells in the active waste excavation and placement areas as detailed in Specification Section 33 51 10.

-- End of Section --

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SECTION 03 05 16 PRECAST CONCRETE STRUCTURES

1. **GENERAL**

1.1 <u>Description</u>

1.1.1 Scope of Work

A. Provide precast structures including riser structures, reinforced concrete pipe, inlet structures, manholes, and box culverts.

1.1.2 Related Work Specified Elsewhere

A. Section 01 33 00, Submittals.

1.2 References

A. Not used.

1.3 <u>Definitions</u>

B. Not used.

1.4 Qualifications

A. Not used.

1.5 **Submittals**

- A. The CONTRACTOR is to submit the following in accordance with Section 01 33 00, Submittals:
 - 1. Shop drawings showing complete details, pertinent calculations including buoyancy calculations, design loads, materials, strengths, sizes and thicknesses, joint and connection design, and details for all precast structures.

1.6 Safety

A. Not used.

1.7 Quality Assurance

A. Precast concrete shall be supplied by a qualified firm with a minimum of two (2) years of continuous operation experience.

- B. The CONSTRUCTION MANAGEMENT ENGINEER may inspect and test all precast structures, fittings, and joint material after delivery to the site or at the factory. The manufacturer or supplier shall furnish materials for the tests and labor as required to assist the CONSTRUCTION MANAGEMENT ENGINEER with the tests. The CONSTRUCTION MANAGEMENT ENGINEER may perform, on a continual basis, plant certification and in-process inspections.
- C. The manufacturer or supplier shall provide to the CONSTRUCTION MANAGEMENT ENGINEER, prior to delivery of precast structures, a Certificate of Compliance with the CONTRACTOR'S name, section sizes, footage, or number of pieces required to fill the order.
- D. Only the CONSTRUCTION MANAGEMENT ENGINEER-approved precast concrete structures shall be shipped to the Site.

1.8 Product Delivery, Handling, and Storage

- A. Precast structures are considered suitable for handling to transport to the Site after the concrete has cured to minimum strength of 80 percent of the design strength.
- B. Delivery of precast structures shall be coordinated with installation or shall be unloaded with proper equipment near as practicable to point of final placement. They shall be stored off the ground on wood blocks, pallets, or other appropriate means away from brush, poison oak or ivy, and in an accessible area for inspection. Excavated or other material shall not be placed over or against the stored precast structures.
- C. Precast structures and appurtenances shall be unloaded and handled with crane, backhoe, or equipment of adequate capacity, equipped with appropriate slings and lifting devices to protect the material from damage.
- D. If damage occurs and is deemed repairable, it shall be repaired as directed by the CONSTRUCTION MANAGEMENT ENGINEER in accordance with approved manufacturer's recommendations. If damage is not repairable in the opinion of the CONSTRUCTION MANAGEMENT ENGINEER, such items of material will be rejected and shall be removed and replaced at the CONTRACTOR'S expense.

2. MATERIALS

2.1 <u>Precast Concrete Structures</u>

- A. Precast concrete structures shall meet requirements and configurations as indicated on the Contract Drawings.
- B. Each precast concrete section shall be clearly marked on the inside with the following information: ASTM designation, structure or inlet size, date of manufacture, and name or trademark of manufacturer.

C. Concrete shall be designed to obtain a strength of four thousand (4,000) pounds per square inch in twenty-eight (28) days.

2.3 Bedding

A. Bedding shall be Granular Fill shall be as specified in Section 31 05 16, Aggregates.

2.4 **Source Quality Control**

A. Concrete compressive strength shall be determined from compressive tests made on concrete cylinders. Unless otherwise specified, the manufacturer shall retain an independent testing facility approved by the CONSTRUCTION MANAGEMENT ENGINEER for the purpose of molding, capping, and testing concrete cylinders in accordance with appropriate ASTM requirements. The CONSTRUCTION MANAGEMENT ENGINEER reserves the right to require core samples of finished products when the CONSTRUCTION MANAGEMENT ENGINEER deems it necessary. When requested, the manufacturer or supplier shall provide the CONSTRUCTION MANAGEMENT ENGINEER compressive test specimens for testing. This is in addition to the above requirements and does not relieve the manufacturer or supplier of the responsibility of monitoring the quality of the concrete as specified.

3. <u>EXECUTION</u>

3.1 Precast Concrete Structures

- A. Place axis of precast structures directly over the centerline of the pipes unless otherwise specified.
- B. Structure sections shall be installed in accordance with the structure manufacturer's written assembly instructions and the Drawings.

-- End of Section --

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SECTION 03 30 53 MISCELLANEOUS CAST-IN-PLACE CONCRETE

1. **GENERAL**

1.1 Description

1.1.1 Scope of Work

A. Construct cast-in-place concrete structures in accordance with the most recent version of the Maryland Department of Transportation (MDOT) State Highway Administration (SHA) Standard Specifications for Construction and Materials.

1.1.2 Related Work Specified Elsewhere

A. Section 01 33 00, Submittals.

1.2 References

1.2.1 American Concrete Institute (ACI)

- A. ACI 117 Specifications for Tolerances for Concrete Construction and Materials and Commentary.
- B. ACI 301 Specifications for Structural Concrete.
- C. ACI 302.1R Guide for Concrete Floor and Slab Construction.
- D. ACI 304R Guide for Measuring, Mixing, Transporting, and Placing Concrete.
- E. ACI 305R Guide to Hot Weather Concreting.
- F. ACI 306R Guide to Cold Weather Concreting.
- G. ACI 318 and Commentary (ACI 318R-14).
- H. ACI 347R Guide to Formwork for Concrete.
- I. ACI SP-66 ACI Detailing Manual.

1.2.2 **ASTM International (ASTM)**

A. ASTM A1064 Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

- B. ASTM A615 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
- C. ASTM C1064 Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.
- D. ASTM C1157 Standard Performance Specification for Hydraulic Cement.
- E. ASTM C1260 Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method).
- F. ASTM C143 Standard Test Method for Slump of Hydraulic-Cement Concrete.
- G. ASTM C150 Standard Specification for Portland Cement.
- H. ASTM C1567 Standard Test Method for Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method).
- I. ASTM C1602 Standard Specification for Mixing Water Used in Production of Hydraulic Cement Concrete.
- J. ASTM C172 Standard Practice for Sampling Freshly Mixed Concrete.
- K. ASTM C173 Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
- L. ASTM C231 Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
- M. ASTM C260 Standard Specification for Air-Entraining Admixtures for Concrete.
- N. ASTM C309 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
- O. ASTM C31 Standard Practice for Making and Curing Concrete Test Specimens in the Field.
- P. ASTM C33 Standard Specification for Concrete Aggregates.
- Q. ASTM C39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- R. ASTM C494 Standard Specification for Chemical Admixtures for Concrete.
- S. ASTM C595 Standard Specification for Blended Hydraulic Cements.

- T. ASTM C618 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
- U. ASTM C685 Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing.
- V. ASTM C920 Standard Specification for Elastomeric Joint Sealants.
- W. ASTM C94 Standard Specification for Ready-Mixed Concrete.
- X. ASTM C989 Standard Specification for Slag Cement for Use in Concrete and Mortars.
- Y. ASTM D1752 Standard Specification for Preformed Sponge Rubber, Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.
- Z. ASTM D412 Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers Tension.
- AA. ASTM D471 Standard Test Method for Rubber Property Effect of Liquids.
- BB. ASTM D75 Standard Practice for Sampling Aggregates.
- CC. ASTM D98 Calcium Chloride.
- DD. ASTM E96 Standard Test Methods for Water Vapor Transmission of Materials.

1.2.3 MDOT SHA

- A. Section 420 Portland Cement Concrete Structures
- B. Section 902 Portland Cement Concrete and Related Products

1.3 <u>Definitions</u>

A. Not used.

1.4 Qualifications

A. Not used.

1.5 **Submittals**

- A. The CONTRACTOR is to submit the following in accordance with Section 01 33 00, Submittals:
 - 1. Shop Drawings:
 - a. Installation Drawings.
 - 2. Product Data:
 - a. Air-Entraining Admixture Accelerating Admixture.
 - b. Water-Reducing or Retarding Admixture Curing Materials.
 - c. Mix Design Data; Ready-Mix Concrete.
 - d. Curing Compound.
 - e. Mechanical Reinforcing Bar Connectors.
 - 3. Test Reports:
 - a. Aggregates.
 - b. Concrete Mixture Proportions; Compressive Strength Testing; Slump.
 - c. Air Content Water.
 - 4. Certificates:
 - a. Cementitious Materials Pozzolan.
 - b. Delivery Tickets.

1.6 Safety

A. Safety shall be in accordance with Specification Section 01 45 00, Health and Safety.

1.7 **Quality Assurance**

A. Indicate specific locations of concrete placement, forms, steel reinforcement, joints, and accessories on installation drawings and include, but not be limited to, square meters feet of concrete placements, thicknesses and widths, plan dimensions, and arrangement of cast-in-place concrete section.

1.8 Product Delivery, Handling, and Storage

A. Not used.

1.9 Schedule

A. Not used.

2. <u>MATERIALS</u>

2.1 System Description

A. The CONSTRUCTION MANAGEMENT ENGINEER retains the option to sample and test aggregates and concrete to determine compliance with the specifications. Provide facilities and labor as may be necessary to assist the CONSTRUCTION MANAGEMENT ENGINEER in procurement of representative test samples. Obtain samples of aggregates at the point of batching in accordance with ASTM D75. Sample concrete in accordance with ASTM C172. Determine slump and air content in accordance with ASTM C143 and ASTM C231, respectively, when cylinders are molded. Prepare, cure, and transport compression test specimens in accordance with ASTM C39. Take samples for strength tests not less than once each shift in which concrete is produced. Provide a minimum of five (5) specimens from each sample; two (2) to be tested at twenty-eight (28) days (ninety [90] days if pozzolan is used) for acceptance, two (2) will be tested at seven (7) days for information and one (1) held in reserve.

2.1.1 Strength

A. Acceptance test results are the average strengths of two (2) specimens tested at twenty-eight (28) days (ninety [90] days if pozzolan is used). The strength of the concrete is considered satisfactory so long as the average of three (3) consecutive acceptance test results equal or exceed the specified compressive strength, f'c, but not more than twenty (20) percent, and no individual acceptance test result falls below f'c by more than five hundred (500) pounds per square inch (psi).

2.1.2 Construction Tolerances

A. Apply a Class "C" finish to all surfaces except those specified to receive a Class "D" finish. Apply a Class "D" finish to all post-construction surfaces which will be permanently concealed. Surface requirements for the classes of finish required are as specified in ACI 117.

2.1.3 Concrete Mixture Proportions

A. Concrete mixture proportions are the responsibility of the CONTRACTOR. Mixture proportions must include the dry weights of cementitious material(s); the nominal

maximum size of the coarse aggregate; the specific gravities, absorptions, and saturated surface-dry weights of fine and coarse aggregates; the quantities, types, and names of admixtures; and quantity of water per cubic meter yard of concrete. Provide materials included in the mixture proportions of the same type and from the same source as will be used on the project. The specified compressive strength f'c is four thousand (4,000) psi at twenty-eight (28) days (ninety [90] days if pozzolan is used). The maximum nominal size coarse aggregate is 1 inch, in accordance with ACI 304R. The air content must be between four and a half (4.5) and seven and a half (7.5) percent with a slump between fifty (50) and one hundred twenty-five (125) mm two (2) and five (5) inches. The maximum water-cementitious material ratio is 0.50. Submit the applicable test reports and mixture proportions that will produce concrete of the quality required, seven (7) calendar days prior to placement of concrete.

2.2 **Products**

A. Submit manufacturer's literature from suppliers which demonstrates compliance with applicable specifications for the specified materials.

2.2.1 Cementitious Materials

A. Submit manufacturer's certificates of compliance, accompanied by mill test reports, attesting that the concrete materials meet the requirements of the specifications. Provide cementitious materials that conform to the appropriate specifications listed:

2.2.1.1 Portland Cement

A. ASTM C150, Type II, with tri-calcium aluminates (C3A) content less than ten (10) percent and a maximum cement-alkali content of eight-tenths (0.80) percent Na2Oe (sodium oxide) equivalent.

2.2.1.2 Pozzolan

A. Provide pozzolan that conforms to ASTM C618, Class F, including requirements of Tables 1A and 2A.

2.2.2 Aggregates

A. Provide fine and coarse aggregates that meet the quality and grading requirements of ASTM C33 and test and evaluate for alkali-aggregate reactivity in accordance with ASTM C1260. Perform evaluation of fine and coarse aggregates separately and in combination, matching the proposed mix design proportioning. All results of the separate and combination testing must have a measured expansion less than eight one-hundredths (0.08) percent at twenty-eight (28) days after casting. If the test data indicates an expansion of eight one-hundredths (0.08) percent or greater, reject the aggregate(s). Submit certificates of compliance and test reports for aggregates showing

the material(s) meets the quality and grading requirements of the specifications under which it is furnished.

2.2.3 Admixtures

A. Provide admixtures, when required or approved, in compliance with the appropriate specification listed. Retest chemical admixtures that have been in storage at the project site, for longer than six (6) months or that have been subjected to freezing, at the expense of the CONTRACTOR at the request of the CONSTRUCTION MANAGEMENT ENGINEER and will be rejected if test results are not satisfactory.

2.2.3.1 Air-Entraining Admixture

A. Provide air-entraining admixture that meets the requirements of ASTM C260.

2.2.3.2 Accelerating Admixture

A. Provide calcium chloride meeting the requirements of ASTM D98. Other accelerators must meet the requirements of ASTM C494, Type C or E.

2.2.3.3 Water-Reducing or Retarding Admixture

A. Provide water-reducing or retarding admixture meeting the requirements of ASTM C494, Type A, B, or D.

2.2.4 Water

A. Mixing and curing water in compliance with the requirements of ASTM C1602; free of injurious amounts of oil, acid, salt, or alkali. Submit test report showing water complies with ASTM C1602.

2.2.5 Reinforcing Steel

A. Provide reinforcing bars conforming to the requirements of ASTM A615, Grade 60, deformed. Provide welded steel wire reinforcement conforming to the requirements of ASTM A1064. Detail reinforcement not indicated in accordance with ACI 301 and ACI SP-66. Provide mechanical reinforcing bar connectors in accordance with ACI 301 and provide one hundred twenty-five (125) percent minimum yield strength of the reinforcement bar.

2.2.6 Formwork

A. Design and engineer the formwork as well as its construction in accordance with ACI 301 Section 2 and 5 and ACI 347R. Fabricate of wood, steel, or other approved material. Submit formwork design to the CONSTRUCTION MANAGEMENT

ENGINEER for written approval at least seven (7) calendar days prior to the first concrete placement.

2.2.7 Form Coatings

A. Provide form coating in accordance with ACI 301.

2.2.8 Curing Materials

A. Provide curing materials in accordance with ACI 301, Section 5.

2.3 Ready-Mix Concrete

- A. Provide ready-mix concrete with mix design data conforming to ACI 301 Part 2. Submit delivery tickets in accordance with ASTM C94 for each ready-mix concrete delivery, include the following additional information:
 - 1. Type and brand of cement.
 - 2. Cement content in forty-three (43)-kilogram ninety-four (94)-pound bags per cubic meter yard of concrete.
 - 3. Maximum size of aggregate.
 - 4. Amount and brand name of admixture.
 - 5. Total water content expressed by water cementitious material ratio.

2.4 Accessories

2.4.1 Curing Compound

A. Provide curing compound conforming to ASTM C309. Submit manufactures instructions for placing curing compound.

3. <u>EXECUTION</u>

3.1 Preparation

- A. For sub-grade footers, excavate Vegetative Support Soil and Topsoil to install formwork. If excavation is made with clean lines and dimensions, forming is not required.
- B. Forms must be properly aligned, adequately supported, and mortar-tight. Provide smooth form surfaces, free from irregularities, dents, sags, or holes when used for

permanently exposed faces. Chamfer all exposed joints and edges, unless otherwise indicated.

3.1.1 Production of Concrete

3.1.1.1 Ready-Mixed Concrete

A. Provide ready-mixed concrete conforming to ASTM C94 except as otherwise specified.

3.1.1.2 Concrete Made by Volumetric Batching and Continuous Mixing

A. Conform to ASTM C685.

3.1.1.3 Batching and Mixing Equipment

A. The option of using an onsite batching and mixing facility is available. The facility must provide sufficient batching and mixing equipment capacity to prevent cold joints. Submit the method of measuring materials, batching operation, and mixer for review, and manufacturer's data for batching and mixing equipment demonstrating compliance with the applicable specifications.

3.2 <u>Conveying and Placing Concrete</u>

A. Convey and place concrete in accordance with ACI 301, Section 5.

3.2.1 Cold-Weather Requirements

A. Place concrete in cold weather in accordance with ACI 306R.

3.2.2 Hot-Weather Requirements

A. Place concrete in hot weather in accordance with ACI 305R.

3.3 Finishing

3.3.1 Temperature Requirement

A. Do not finish or repair concrete when either the concrete or the ambient temperature is below fifty (50) degrees F.

3.3.2 Finishing Formed Surfaces

A. Remove all fins and loose materials, and surface defects including filling of tie holes. Repair all honeycomb areas and other defects. Remove all unsound concrete from areas to be repaired. Ream or chip surface defects greater than one-half (1/2) inch in diameter

and holes left by removal of tie rods in all surfaces not to receive additional concrete and fill with dry-pack mortar. Brush-coat the prepared area with an approved epoxy resin or latex bonding compound or with a neat cement grout after dampening and filling with mortar or concrete.

3.4 <u>Curing and Protection</u>

A. Cure and protect in accordance with ACI 301, Section 5.

3.5 Form Work

A. Provide form work in accordance with ACI 301, Section 2 and Section 5.

3.5.1 Removal of Forms

A. Remove forms in accordance with ACI 301, Section 2.

3.6 **Steel Reinforcing**

A. Reinforcement must be free from loose, flaky rust and scale, and free from oil, grease, or other coating which might destroy or reduce the reinforcement's bond with the concrete.

3.6.1 Fabrication

A. Shop fabricate steel reinforcement in accordance with ACI 318 and ACI SP-66. Provide shop details and bending in accordance with ACI 318 and ACI SP-66.

3.6.2 Splicing

A. Perform splices in accordance with ACI 318 and ACI SP-66.

3.6.3 Supports

A. Secure reinforcement in place by the use of metal or concrete supports, spacers, or ties.

3.7 <u>Embedded Items</u>

A. Before placing concrete, take care to determine that all embedded items are firmly and securely fastened in place. Provide embedded items free of oil and other foreign matter, such as loose coatings of rust, paint, and scale. Embedding of wood in concrete is permitted only when specifically authorized or directed.

3.8 Testing and Inspecting

A. Report the results of all tests and inspections conducted at the project site informally at the end of each shift. Deliver written results within two (2) calendar days after the end of each test or inspection.

3.8.1 Field Testing Technicians

A. The individuals who sample and test concrete must have demonstrated a knowledge and ability to perform the necessary test procedures equivalent to the ACI minimum guidelines for certification of Concrete Field Testing Technicians, Grade I.

3.8.2 Preparations for Placing

A. Inspect forms and embedded items in sufficient time prior to each concrete placement to certify that it is ready to receive concrete.

3.8.3 Sampling and Testing

- A. Obtain samples and test concrete for quality control during placement. Sample fresh concrete for testing in accordance with ASTM C172. Make six (6) test cylinders.
- B. Test concrete for compressive strength at seven (7) and twenty-eight (28) days for each design mix and for every fifty (50) cubic yards of concrete. Test two (2) cylinders at seven (7) days; two (2) cylinders at twenty-eight (28) days; and hold two (2) cylinders in reserve. Conform test specimens to ASTM C31.
- C. Perform compressive strength testing conforming to ASTM C39.
- D. Test slump for each design mix in accordance with ASTM C143. Check slump once during each shift that concrete is produced.
- E. Determine temperature of concrete at time of placement in accordance with ASTM C1064. Check concrete temperature at least once during each shift that concrete is placed.

3.8.4 Action Required

3.8.4.1 Placing

A. Do not begin placement until the availability of an adequate number of acceptable vibrators, which are in working order and have competent operators, has been verified. Discontinue placing if any lift is inadequately consolidated.

3.8.4.2 Air Content

A. Whenever an air content test result is outside the specification limits, adjust the dosage of the air-entrainment admixture prior to delivery of concrete to forms.

3.8.4.3 Slump

A. Whenever a slump test result is outside the specification limits, adjust the batch weights of water and fine aggregate prior to delivery of concrete to the forms. Make the adjustments so that the water-cementitious material ratio does not exceed that specified in the submitted concrete mixture proportion and the required concrete strength is still met.

-- End of Section -

SECTION 06 10 63 EXTERIOR ROUGH CARPENTRY

1. **GENERAL**

1.1 Related Documents

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

1.2 **Summary**

A. Section Includes:

- 1. Shade structure.
- 2. Signage.
- 3. Wood fence posts.
- 4. Wood guardrail.
- 5. Timber edging.
- 6. Disc golf tee box.

B. Related Requirements:

- 1. Section 03 30 53, Miscellaneous Cast-in-Place Concrete, for cast-in-place concrete footings.
- 2. Section 32 33 00, Site Furnishings, for custom site furnishings.

1.3 <u>Definitions</u>

- A. Boards: Lumber of less than 2 inches nominal (38 mm actual) in thickness and 2 inches nominal (38 mm actual) or greater in width.
- B. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) or greater but less than 5 inches nominal (114 mm actual) in least dimension.
- C. Timber: Lumber of 5 inches nominal (114 mm actual) or greater in least dimension.
- D. Retain paragraph and list below if lumber grading agencies are referenced with products.
- E. Lumber grading agencies, and the abbreviations used to reference them, include the following:

- 1. NeLMA: Northeastern Lumber Manufacturers' Association.
- 2. NLGA: National Lumber Grades Authority.
- 3. RIS: Redwood Inspection Service.
- 4. SPIB: The Southern Pine Inspection Bureau.
- 5. WCLIB: West Coast Lumber Inspection Bureau.
- 6. WWPA: Western Wood Products Association.

1.4 Action Submittals

A. Product Data: For preservative-treated wood products. Include chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.

1.5 <u>Informational Submittals</u>

A. Material Certificates:

- 1. For preservative-treated wood products. Indicate type of preservative used and net amount of preservative retained. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Site.
- 2. Certificates of Inspection: Issued by lumber grading agency for exposed wood products not marked with grade stamp.
- 3. Evaluation Reports: For preservative-treated wood products, from International Code Council Evaluation Service (ICC-ES).

1.6 Delivery, Storage, and Handling

A. Store materials under cover and protected from weather and contact with damp or wet surfaces. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

2. <u>MATERIALS</u>

2.1 Lumber, General

- A. Comply with Voluntary Product Standard 20 (DOC PS 20) and with grading rules of lumber grading agencies certified by American Lumber Standard Committee's (ALSC) Board of Review as applicable. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by ALSC's Board of Review.
- B. Factory mark each item with grade stamp of grading agency.

- 1. For items that are exposed to view in the completed Work, mark grade stamp on one end of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
- 2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry wood products.
- 3. Provide dressed lumber, smooth surface on all four sides (S4S), unless otherwise indicated.

C. Maximum Moisture Content:

- 1. Boards: 15 percent.
- 2. Dimension Lumber: 15 percent for 2-inch nominal (38-mm actual) thickness or less; 19 percent for more than 2-inch nominal (38-mm actual) thickness.
- 3. Timber. 19 percent

2.2 <u>Lumber</u>

A. Hand select wood for signage and shade structure for freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot holes, shake, splits, torn grain, and wane.

B. Dimension Lumber:

- 1. Shade Structure: Select Structural No. 2 or better grade, Architectural Tight-Knot R/S, Western Red Cedar
- 2. Signage: Grade C and better clear, Western Red Cedar.
- 3. Fence Posts: Grade C and better clear, Western Red Cedar.
- 4. Guardrail: Grade C and better clear, Western Red Cedar.
- 5. Cedar Edging: No. 2 Common, Northern White Cedar.
- 6. Disc Golf Tee Box: No. 2 Common, Northern White Cedar.

C. Boards:

- 1. Western red cedar, Grade B; NLGA, WCLIB, or WWPA.
- 2. Northern white cedar, No. 2 Common; NeLMA or NLGA.

2.3 Posts

- A. Dimension Lumber Posts: No. 2 grade:
 - 1. Northern species; NLGA.
 - 2. Western woods; WCLIB or WWPA.

2.4 <u>Fasteners</u>

- A. General: Provide fasteners of size and type indicated, acceptable to authorities having jurisdiction, and that comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches (38 mm) into wood substrate.
 - 1. California Redwood Association recommends stainless-steel fasteners or hot-dip galvanized-steel fasteners.
- B. Nails: ASTM F1667.
- C. Power-Driven Fasteners: ICC-ES AC70.
- D. Wood Screws and Lag Screws: ASME B18.2.1, ASME B18.6.1, or ICC-ES AC233.
- E. Carbon-Steel Bolts: ASTM A307 (ASTM F568M) with ASTM A563 (ASTM A563M) hex nuts and, where indicated, flat washers all hot-dip zinc coated.
- F. Stainless-Steel Bolts: ASTM F593, Alloy Group 1 or 2 (ASTM F738M, Grade A1 or Grade A4); with ASTM F594, Alloy Group 1 or 2 (ASTM F836M, Grade A1 or Grade A4) hex nuts and, where indicated, flat washers.
- G. Postinstalled Anchors: Stainless-steel, chemical or torque-controlled expansion anchors with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing according to ASTM E488, conducted by a qualified independent testing and inspecting agency.
 - 1. Stainless-steel bolts and nuts complying with ASTM F593 and ASTM F594, Alloy Group 1 or 2 (ASTM F738M and ASTM F836M, Grade A1 or Grade A4).

2.5 Metal Accessories

- A. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653/A653M, G90 (Z270) coating designation.
- B. Stainless-Steel Sheet: ASTM A666, Type 316.

3. <u>EXECUTION</u>

3.1 <u>Installation, General</u>

- A. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit work to other construction; scribe and cope as needed for accurate fit.
- B. Framing Standard: Comply with American Forest & Paper Association (AF&PA) Details for Conventional Wood Frame Construction (WCD1) unless otherwise indicated.
- C. Install metal framing anchors to comply with manufacturer's written instructions.
- D. Do not splice structural members between supports unless otherwise indicated.
- E. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
- F. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of members or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- G. Securely attach exterior rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. ICC-ES AC70 for power-driven fasteners.
 - 2. "Fastening Schedule" in ICC's International Building Code.
 - 3. "Fastener Schedule for Structural Members" and "Alternate Attachments" in ICC's International Residential Code for One- and Two-Family Dwellings.
- H. Use common wire nails unless otherwise indicated. Select fasteners of size that do not fully penetrate members where opposite side is exposed to view. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads unless otherwise indicated.
- I. Indicate locations of other fasteners, such as wood screws, bolts, and lag screws, on Contract Documents.

-- End of Section --

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SECTION 28 23 00 SITE SECURITY AND SURVEILLANCE

1. **GENERAL**

1.1 Description

1.1.1 Scope of Work

- A. This Section includes the furnishing and installation of cameras, control equipment, a video management system, and accessories required to provide full time surveillance and site security.
- B. Cellular video monitoring is to be provided for wireless remote access by the CONTRACTOR, CONSTRUCTION MANAGEMENT ENGINEER, and OWNER during and for the OWNER after construction.

1.1.2 Related Work Specified Elsewhere

- A. Section 01 33 00, Submittals.
- B. Section 00 73 00, Supplementary Conditions.

1.2 References

A. Not used.

1.3 Definitions

A. Not used.

1.4 Qualifications

- A. Cellular Video Monitoring System
 - 1. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three (3) years' experience and at least three (3) similar installations in Maryland.
 - 2. Installer: Authorized installer of specified manufacturer.

1.5 **Submittals**

A. Cellular Video Monitoring System

- 1. Shop drawings and site plan indicating proposed locations.
- 2. Product data.
- 3. Operation and Maintenance Manual.

1.6 Safety

A. Not used.

1.7 Quality Assurance

A. Not used.

1.8 **Product Delivery, Handling, and Storage**

A. Not used.

1.9 Schedule

A. Video surveillance will be operational fifteen (15) days prior to groundbreaking on site.

2. MATERIALS

2.1 <u>Cameras</u>

- A. Cameras are to be compatible with the Verizon Intelligent Video surveillance system.
- B. Cameras are to be solar powered and weatherproof.
- C. Cameras are to record high-definition video with a minimum 720p (1280 x 720 pixels) resolution.
- D. Cameras are to provide continuous live stream of video to be stored on a cloud-based service accessible on a computer or mobile device via the internet.

2.2 Video Management System

A. Cloud-based video management system (VMS) to provide centralized command and control to access and analyze live and stored video feed. VMS is to be compatible with the Verizon Intelligent Video surveillance system, such as BriefCam® Video Content Analytics or equal.

2.3 Locks

A. Existing fence and gate locks at the site will be used during construction.

3. <u>EXECUTION</u>

3.1 <u>Installation</u>

- A. Install cellular video monitoring system in accordance with manufacturer's recommendations.
- B. Set up VMS video feed analytics and notification mechanisms to alert the CONTRACTOR and OWNER in the case of unusual or unauthorized activity.
- C. At minimum, cameras are to be placed at each gated entrance (East Gude Drive near flare station, Southlawn Lane entrance, gate near Pond No. 1, and northwest gate near the Gude Trail) and the Administration Area.

3.2 **Monitoring**

A. Utilize VMS video feed analytics and notification mechanisms to analyze live video feed and alert the CONTRACTOR and OWNER in the case of unusual or unauthorized activity.

3.3 **Maintenance**

- A. Clean and repair video surveillance equipment as needed or as directed by the CONSTRUCTION MANAGEMENT ENGINEER or OWNER.
- B. Maintain VMS video feed analytics and notification mechanisms to alert the CONTRACTOR and OWNER in the case of unusual or unauthorized activity.
- C. Maintain existing fence and gate locks at the site. Repair or replace as needed.

3.4 Demonstration and Training

A. Prior to substantial completion, the CONTRACTOR is to provide a demonstration and training to the OWNER for the use and maintenance of the system.

-- End of Section --

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SECTION 31 05 15 EARTHWORK

1. **GENERAL**

1.1 <u>Description</u>

1.1.1 Scope of Work

A. This Section includes requirements for identifying acceptable onsite and/or offsite borrow material and for the installation of these materials. This includes preparation, transportation, placement, compaction, backfilling, testing, grading, waste excavation, and related items as indicated in the Contract Documents. Materials specified in this Specification Section shall be installed as shown on the Contract Drawings and as noted in Table 31 05 15-1 below.

TABLE 31 05 15-1 Location of Specified Materials

Specified Material	Location
Common Borrow	General fill areas outside the closure cap, daily cover over
	waste, and beneath Closure Cap Subgrade to meet grade
Closure Cap Subgrade	Soil layer below geosynthetics, landfill gas piping trench
	soil backfill (outside landfill Closure Cap)
Vegetative Support Soil	Soil layer over geosynthetics, landfill gas piping trench soil
	backfill (within landfill Closure Cap)
Low Permeability Soil	Sediment Basin No. 1 bottom section
Sediment Basin	Sediment Basin No. 1 embankment
Embankment Soil	
Sediment Basin Clay	Sediment Basin No. 1 embankment
Liner	

1.1.2 Related Work Specified Elsewhere

- A. Section 01 40 00, Quality Control.
- B. Section 01 45 00, Health and Safety.
- C. Section 01 57 19, Temporary Environmental Controls.
- D. Section 01 70 00, Execution and Closeout Requirements.
- E. Section 02 61 13.13, Waste Excavation and Material Handling.
- F. Section 31 05 16, Aggregates.
- G. Section 31 05 19.13, Geotextiles.

- H. Section 31 05 19.16, Geomembrane.
- I. Section 31 25 00, Erosion and Sediment Control.

1.2 References

A. Not used.

1.3 Definitions

A. Borrow material is defined as soil material transferred from one (1) location to another and shall be inclusive of onsite or offsite sources unless explicitly identified herein.

1.4 **Qualifications**

A. The Geotechnical Testing Laboratory is defined and shall meet the qualifications in Specification Section 01 40 00, Quality Control.

1.5 Submittals

1.5.1 Delivery Tickets

- A. The CONTRACTOR shall submit delivery tickets daily to the CONSTRUCTION MANAGEMENT ENGINEER for offsite materials and a load count for onsite materials. The delivery ticket for offsite material shall include:
 - 1. Name and location of supplier.
 - 2. Type and amount (weight) of material delivered.
- B. The load count for onsite material shall include:
 - 1. Number of loads of onsite material.
 - 2. Estimated volume (cubic yards) of each load.

1.5.2 Certified Test Reports

A. The CONTRACTOR shall submit to the CONSTRUCTION MANAGEMENT ENGINEER certified test reports, prepared by the Geotechnical Testing Laboratory, which present the results of preconstruction testing for each proposed offsite borrow material. If the test results show that the required properties, as outlined in this Specification Section, are not met, the CONSTRUCTION MANAGEMENT ENGINEER will require the CONTRACTOR to retest the material or to identify another offsite borrow material. Submit the reports a minimum of seven (7) calendar days before delivery of any materials to the site.

B. The CONTRACTOR shall also submit to the CONSTRUCTION MANAGEMENT ENGINEER one (1) copy of certified reports, prepared by the Geotechnical Testing Laboratory, which present the results of construction frequency and field permeability tests. These reports shall be submitted within fourteen (14) calendar days of the date that the respective samples were collected in the field.

1.6 Safety

A. Safety shall be in accordance with Specification Section 01 45 00, Health and Safety.

1.7 **Quality Assurance**

1.7.1 General

- A. The CONTRACTOR shall test materials to determine acceptability. Unless otherwise indicated, all testing shall be performed by the Geotechnical Testing Laboratory, approved by the CONSTRUCTION MANAGEMENT ENGINEER, with samples furnished by and at the expense of the CONTRACTOR.
- B. Placement and compaction of the borrow materials and performance of associated earthwork shall be subject to continuous inspection by the CONSTRUCTION MANAGEMENT ENGINEER. As the various earthwork is conducted, the CONSTRUCTION MANAGEMENT ENGINEER may monitor the lift thickness and compacted conditions of soil materials to verify compliance with the requirements specified herein. The CONSTRUCTION MANAGEMENT ENGINEER may periodically perform in-place field density tests of selected compacted lifts in accordance with the approved methods stated herein.

1.7.2 Preconstruction Testing

- A. The CONTRACTOR shall request of the CONSTRUCTION MANAGEMENT ENGINEER and arrange for a site inspection for each proposed soil borrow source prior to the commencement of material placement. For each borrow source inspection, the CONTRACTOR shall provide any equipment necessary to excavate test pits throughout the limits of the proposed source to provide the CONSTRUCTION MANAGEMENT ENGINEER with a thorough inspection of the type(s) and uniformity of materials encountered throughout the proposed source.
- B. Material that is not sourced from approved borrow pits with native soils shall be tested to confirm it meets the requirements for Category 1 soils (Residential Unrestricted Use Soil and Fill Material) as defined in Maryland Department of the Environment's "Fill Material and Soil Management" fact sheet:
 - (https://mde.maryland.gov/programs/LAND/MarylandBrownfieldVCP/Documents/FillMaterial andSoilManagementFactSheet82217.pdf).

C. Upon the CONSTRUCTION MANAGEMENT ENGINEER'S visual inspection of a proposed borrow source material(s), but prior to acceptance and delivery of said materials, preconstruction geotechnical testing of the materials from each proposed borrow source shall be performed by the CONTRACTOR to verify that the properties of the proposed borrow material(s) are in conformance with this Specification. The testing shall be performed on samples collected by the CONTRACTOR at locations determined by the CONSTRUCTION MANAGEMENT ENGINEER during the site inspection. The number of preconstruction tests to be performed by the Geotechnical Testing Laboratory at the expense of the CONTRACTOR is listed in Table 31 05 15-2.

TABLE 31 05 15-2 Laboratory Testing for Borrow Materials

Applicability	Laboratory Tests	ASTM Test Method	No. of Pre- Construction Acceptance Tests per Proposed Borrow Material	Frequency of One (1) Test Per Volume (cubic yard) for Each Approved Borrow Material During Construction
Closure Cap Subgrade, Vegetative Support Soil, Low Permeability Soil	Natural Moisture Content	ASTM D2216	3	5,000
Closure Cap Subgrade, Vegetative Support Soil, Low Permeability Soil	Particle Size Analysis (sieve)	ASTM D422	3	5,000
Closure Cap Subgrade, Vegetative Support Soil, Low Permeability Soil	Atterberg Limits	ASTM D4318	3	5,000
Closure Cap Subgrade, Vegetative Support Soil, Low Permeability Soil	Standard Proctor Compaction	ASTM D698	2	5,000
Vegetative Support Soil, Low Permeability Soil, Sediment Basin Clay Liner	Flexible-Wall Permeameter	ASTM D5084	3	3,000 (initial) 10,000 (maximum)
Sediment Basin Embankment Soil	Standard Proctor Compaction	ASTM D698	2	5,000
Vegetative Support Soil	Direct Shear	ASTM D3080	3	5,000

- D. If CONTRACTOR uses onsite material, preconstruction testing is also required.
- E. Based upon the results of each required Standard Proctor compaction test (ASTM D698), a remolded sample of Low Permeability Soil shall be prepared for permeability testing at a moisture content greater than +two (2.0) percent of the optimum moisture content and at a dry density value equal to ninety (90) percent of the soil's maximum dry density and at a dry density value equal to ninety-five (95) percent of the soil's maximum dry density. Each of the remolded samples shall then be subjected to flexible-wall permeability testing in accordance with ASTM D5084. Distilled water may be used as the permeant.

- F. If preconstruction permeability test results do not satisfy the Specifications, the CONTRACTOR may retest the material at a greater moisture content or degree of compaction. If the retested material meets the Specifications, the CONSTRUCTION MANAGEMENT ENGINEER may accept the material, and will require, the field moisture content and density to match the moisture content and densities used in the preconstruction tests at no cost to the OWNER. The CONSTRUCTION MANAGEMENT ENGINEER has the authority to reject any proposed borrow material that he believes is not suitable for construction based upon the results of the site inspection and/or preconstruction testing.
- G. Direct shear testing shall be performed at normal stresses of one hundred (100), two hundred (200), and four hundred (400) pounds per square foot.

1.7.3 Construction Testing Frequency

- A. The CONTRACTOR shall test representative samples from each approved borrow source at the frequency specified in Table 31 05 15-2 as the approved materials are delivered to the site. The samples shall be submitted to the Geotechnical Testing Laboratory by and at the expense of the CONTRACTOR for the required geotechnical testing to ensure that the physical and engineering properties of the materials remain consistent for the duration of the construction.
- B. Flexible-wall permeameter tests shall be performed on samples remolded in the Geotechnical Testing Laboratory from approved borrow material delivered to the site at an initial frequency of one (1) test per three thousand (3,000) cubic yards delivered. The frequency of permeability tests will decrease to one (1) test per ten thousand (10,000) cubic yards if three (3) consecutive tests meet the permeability requirement for a borrow material. The frequency of testing will return to one (1) test per three thousand (3,000) cubic yards if a different borrow source is used, if the grain-size distribution falls outside the range of previously approved samples as determined by the CONSTRUCTION MANAGEMENT ENGINEER, or at the CONSTRUCTION MANAGEMENT ENGINEER is written direction.
- C. Direct shear testing shall be performed at normal stresses of one hundred (100), two hundred (200), and four hundred (400) pounds per square foot.

1.7.4 Field Density Testing

A. As borrow materials are placed and compacted, material shall be tested by the Geotechnical Testing Laboratory to ensure that at least ninety (90) percent of the material's maximum dry density for each borrow source, as determined by the Standard Proctor compaction test (ASTM D698), has been achieved. Compaction for the materials associated with Sediment Basin embankment soil and clay liner shall be determined by the Standard Proctor compaction test (ASTM D698) and be at least ninety-five (95) percent of the material's maximum dry density.

B. Lift thickness and the initial (before compaction) moisture content of the delivered material shall be monitored by the Geotechnical Testing Laboratory to ensure conformance with the requirements specified herein. One (1) field moisture/density test shall be performed for each lift placed, for every 10,000 square feet of borrow material placed and for every fifty (50) linear feet of trench backfilled. Testing shall occur more frequently if so directed by the CONSTRUCTION MANAGEMENT ENGINEER. A Troxler 3401 series nuclear moisture-density gauge (or approved equal) shall be used in conjunction with ASTM D6938.

1.7.5 Quality Control Laboratory

A. The Geotechnical Testing Laboratory shall serve as the Quality Control Laboratory and shall meet the qualifications in Specification Section 01 40 00, Quality Control.

1.7.6 Dust Control

A. CONTRACTOR shall be responsible for all aspects of dust control as detailed in Specification Section 01 57 19, Temporary Environmental Controls.

1.8 **Product Delivery, Handling, and Storage**

A. CONTRACTOR shall maintain proper access and appropriate drainage and erosion and sediment controls for all material stored, whether generated onsite or furnished from an offsite source.

1.9 Schedule

A. Not used.

2. <u>MATERIALS</u>

2.1 Common Borrow

A. Common Borrow shall meet the requirements in Section 916 of the latest version of the Maryland Department of Transportation State Highway Administration Standard Specifications for Construction and Materials.

2.2 Closure Cap Subgrade

A. The CONTRACTOR shall obtain borrow materials from onsite sources first and shall use these borrow materials for onsite applications until exhausted or deemed unacceptable based on testing. Onsite materials shall only be used if these materials comply with the Contract Specifications or if they can be screened to meet the Contract Specifications. It is the responsibility of the CONTRACTOR to confirm if onsite materials meet the Specifications. Verification must be submitted to the

- CONSTRUCTION MANAGEMENT ENGINEER as required per the Specifications for both onsite and offsite borrow sources.
- B. This material shall be placed where indicated on the Contract Drawings. If the onsite borrow materials have been exhausted, the CONTRACTOR shall obtain offsite borrow material from approved sources.
- C. Material shall have a maximum dry density of at least one hundred (100) pounds per cubic foot as determined by the Standard Proctor test (ASTM D698), and shall be free of excess organic material, boulders, sharp stones, and stones larger than two (2) inches in their longest dimension.
- D. Material shall meet ASTM D2487, classification CL, CL-ML, SC, SM, SW, SP, GC, or GM or combinations thereof.

2.3 Vegetative Support Soil

- A. Material shall meet ASTM D2487, classification CL, CL-ML, SC, SM, SP, GC, or GM or combinations thereof, and shall be free of excess organic material, boulders, sharp stones, and stones larger than two (2) inches in their longest dimension.
- B. Vegetative Support Soil shall have a maximum permeability of 1×10⁻⁴ centimeters per second (cm/sec) when compacted to ninety (90) percent of the maximum dry density.
- C. D₈₅ of the material shall be greater than 0.089 millimeter.
- D. Material shall have a minimum internal friction angle of thirty (30) degrees as measured by ASTM D3080.

2.4 Topsoil

A. Topsoil is specified in Specification Section 32 92 19, Upland Meadow Establishment.

2.5 Low Permeability Soil

- A. Low Permeability Soil Layer soils shall be from the approved offsite borrow source(s) or cut to fill and shall be naturally occurring, inert, free of organics, waste, excess moisture, and miscellaneous or deleterious material, and shall not contain particles larger than one-half (0.5)-inch diameter when placed. The maximum allowable clod size of the material is two (2) inches. Low Permeability Soil Layer material shall classify as ML, MH, CL-ML, CL, or CH according to the Unified Soil Classification System, unless otherwise approved in writing by the CONSTRUCTION MANAGEMENT ENGINEER.
- B. Material shall have permeability, when compacted to at least ninety (90) percent of Standard Proctor, of 1×10⁻⁵ cm/sec or less.

2.6 <u>Sediment Basin Embankment Soil</u>

- A. Material shall consist of Common Borrow.
- B. The material shall be free of roots, stumps, wood, rubbish, stones greater than four (4) inches, frozen, or other objectionable materials.

2.7 Sediment Basin Clay Liner

- A. Material shall consist of soils classified as CL, GC, SC or CH according to the Unified Soil Classification System and must have at least thirty (30) percent passing the #200 sieve.
- B. The material shall be free of roots, stumps, wood, rubbish, stones greater than four (4) inches, frozen, or other objectionable materials.

3. EXECUTION

3.1 General

- A. Do not place, spread, or compact acceptable fill material while it is frozen or thawing, or place upon muddy, frozen or thawing ground, while the soil underneath is frozen or thawing, or during unfavorable weather conditions. When the Work is interrupted by rain, Work shall not be resumed until field tests indicate that the moisture content and density of the placement material are within the limits specified. A compacted layer that has been frozen shall be reworked, recompacted, and approved in accordance with the requirements specified herein, after thawing before the next lift is placed thereon.
- B. Thoroughly mix each lift before compaction to ensure uniform distribution of water content. Distribute rocks of permissible sizes throughout the fill material.
- C. Backfill around a structure or pipe shall be brought up evenly on all sides so that no unbalanced pressure will be imposed on the structure or pipe.
- D. Perform grading operations as shown on the Contract Drawings so that the ground surface will be well-drained at all times. Maintain benching and drainage ditches and keep them open and free from soil, debris, and leaves until final acceptance of the Work. Finish all grading on neat, regular lines conforming to the sections, lines, grades, and contours shown on the Contract Drawings, or if not shown, in accordance with the criteria set forth herein. Perform the grading work in proper sequence with all other associated operations.

3.2 Existing Cover Soil Excavation

- A. Existing cover soil thickness is generally two (2) feet. Test pit information identifying existing cover soil thickness is included in Attachment A.
- B. Remove twelve (12) inches of existing cover soil and stockpile in the active phase for use as common borrow and/or closure cap subgrade material.
- C. No waste or woody vegetation may be present in stockpiled material. Visual inspection will be required to determine the presence of waste.

3.3 Waste Relocation

A. Relocate waste as described in Specification Section 02 61 13.13, Waste Excavation and Material Handling.

3.4 Closure Cap Subgrade

- A. Closure Cap Subgrade shall be placed to the lines and grades shown on the Contract Drawings, to provide a stable base for the cap.
- B. The surface shall provide a smooth, firm, unyielding foundation for the geosynthetics, with no sudden, sharp, or abrupt changes or breaks in grade. No standing water or excessive moisture shall be allowed. The CONSTRUCTION MANAGEMENT ENGINEER shall have reviewed and accepted the subgrade immediately prior to covering.
- C. No protruding objects shall be on the subgrade surface. The CONTRACTOR shall employ inspection staff to ensure the subgrade is free of objects that may damage the geosynthetic closure cap.

3.5 Placement of Vegetative Support Soil

- A. Vegetative Support Soil shall be placed on top of the cap geosynthetics after their installation is approved in writing by the CONSTRUCTION MANAGEMENT ENGINEER.
- B. All material shall be back-dumped and spread over the cap geosynthetics. No construction equipment will be allowed to travel directly on the geosynthetics.
- C. Only the equipment used to spread the Vegetative Support Soil shall be allowed on the Vegetative Support Soil until the material is compacted to the design depth in accordance with these Specifications. A minimum fourteen (14)-inch loose lift shall be placed over the cap geosynthetics before equipment traverses the Vegetative Support Soil.

- D. The Vegetative Support Soil must be placed with low ground pressure track equipment as approved in writing by the CONSTRUCTION MANAGEMENT ENGINEER, with a maximum ground pressure of five (5) pounds per square inch. The soil material must be pushed into place and tracked-in a minimum of four (4) passes without rutting, settlement, or damage to the cap geosynthetics. Soil shall not be dropped on slopes. On slopes, Vegetative Support Soil shall be placed starting at the toe and proceeding up the slope. CONSTRUCTION MANAGEMENT ENGINEER shall verify that the Vegetative Support Soil has been tracked sufficiently. No compaction tests are required for the Vegetative Support Soil.
- E. Cover shall be placed such that no stretching, folding, or bridging of the cap geosynthetics occurs. Equipment shall be operated to avoid abrupt starts, stops, and turns.
- F. The CONTRACTOR shall place the Vegetative Support Soil over the cap geosynthetics in a minimum of two (2) lifts to the thickness shown on the Contract Drawings. The topsoil layer is to be placed in a single lift, following completion of the vegetative support layer. The Vegetative Support Soil thickness will be evaluated based on the differences between the surveys of the Cap Geosynthetics and Vegetative Support Soil. The Vegetative Support Soil and Topsoil grades must generally conform to the final grades shown on the Contract Drawings but shall be constructed based on the material thicknesses within the tolerances specified. This approach accommodates potential settlement that may occur between approval of Closure Cap Subgrade and placement of Vegetative Support Soil, which may not happen immediately following one another due to the project phasing requirements.
- G. Damage to any wells, piping, or other structures during grading shall be repaired by the CONTRACTOR at no additional cost to the OWNER. Compaction within three (3) feet of all such structures shall be done with small equipment (such as jumping jack, plate compactor, or walk-behind compactor) under close supervision by the CONSTRUCTION MANAGEMENT ENGINEER.
- H. The CONTRACTOR shall protect the Vegetative Support Soil from erosion until Topsoil placement.
- I. Material placed beyond the limits of the lines and grades shown on the Contract Drawings will not be accepted and shall be removed at the CONTRACTOR'S expense.
- J. The CONTRACTOR shall place a maximum of five (5) acres of Vegetative Support Soil prior to Topsoil placement. Seed and mulch immediately after Topsoil placement and before moving to the next section of vegetative soil placement.
- K. After precipitation events, the CONTRACTOR shall repair washouts, repair erosion damage, and place displaced soil back on the landfill cap in accordance with the Contract Drawings, at no cost to the OWNER.

L. The grading tolerance for the Vegetative Support Soil shall be -zero (0.0) foot, +one-tenth (0.1) foot, from required thickness.

3.6 Topsoil

- A. Place topsoil as described in Specification Section 32 92 19, Upland Meadow Establishment.
- B. The Topsoil must be placed with low ground pressure track equipment as approved in writing by the CONSTRUCTION MANAGEMENT ENGINEER, with a maximum ground pressure of five (5) pounds per square inch. The soil material must be pushed into place and tracked-in a minimum of four (4) passes without rutting, settlement, or damage to the cap geosynthetics. Soil shall not be dropped on slopes. On slopes, soil shall be placed starting at the toe and proceeding up the slope. CONSTRUCTION MANAGEMENT ENGINEER shall verify that the Topsoil has been tracked sufficiently. No compaction tests are required for the Topsoil.
- C. The Vegetative Support Soil and Topsoil grades must generally conform to the final grades shown on the Contract Drawings but shall be constructed based on the material thicknesses within the tolerances specified. This approach accommodates potential settlement that may occur between approval of Closure Cap Subgrade and placement of Vegetative Support Soil and Topsoil, which may not happen immediately following one another due to the project phasing requirements.
- D. The grading tolerance for the Topsoil shall be -zero (0.0) foot, +one-tenth (0.1) foot from required thickness.

3.7 Low Permeability Soil Placement

- A. The CONTRACTOR shall not place, spread, or compact the Low Permeability Soil Layer material while it is frozen or thawing, while the soil underneath it is frozen or thawing, or during unfavorable weather conditions. When the work is interrupted by rain or excessively cold weather, Low Permeability Soil Layer placement operations shall not be resumed until field tests indicate that the moisture content and dry density of the in-place Low Permeability Soil Layer material are within the limits specified. A compacted layer that has been frozen shall be reworked and recompacted after thawing before the next layer is placed on it.
- B. The Low Permeability Soil Layer shall be a minimum of one (1) foot in compacted thickness. The finished surface of the Low Permeability Soil Layer shall conform to the lines and grades shown on the Contract Drawings. The Low Permeability Soil Layer shall be constructed in six (6)-inch lifts (maximum compacted thickness) and compacted to a minimum of ninety (90) percent of its maximum dry density as determined by the Standard Proctor test (ASTM D698) or to a higher degree of

compaction required to achieve an in-place permeability of no greater than 1×10^{-5} cm/sec.

C. The CONTRACTOR shall thoroughly mix each loose lift before compaction to ensure uniform distribution of moisture and coarse fragments of permissible sizes throughout the fill material.

The finished surface of the Low Permeability Soil Layer shall be smooth, uniform, free of any objects larger than one-half (0.5) inch in diameter, and free of desiccation cracking. A smooth-drum roller shall be used to roll the Low Permeability Soil Layer surface prior to field survey for acceptance by the CONSTRUCTION MANAGEMENT ENGINEER. The constructed grades shall deviate no more than zero (0.0) foot, +two-tenths (0.2) feet from the Contract Drawings.

3.8 Anchor Trench Backfill

- A. Soils backfilled in the anchor trench shall be placed in eight (8)-inch lifts (maximum loose thickness) and compacted utilizing hand-held mechanical equipment to achieve the degree-of-compaction required. The soil in and around the anchor trench shall be compacted to a minimum of eighty-five (85) percent of maximum dry density as determined by the Standard Proctor test (ASTM D698).
- B. The in-place dry density and moisture content of the anchor trench backfill shall be determined at one hundred (100)-foot intervals within the anchor trench for each lift. The CONTRACTOR shall ensure the anchor trench is drained of water at all times. The CONTRACTOR shall submit his proposed anchor trench dewatering methods to the CONSTRUCTION MANAGEMENT ENGINEER prior to constructing the anchor trench.
- C. Any anchor trench material which becomes saturated, frozen, or is otherwise unacceptable as determined by the CONSTRUCTION MANAGEMENT ENGINEER shall be excavated, dried, and reworked accordingly, by and at the expense of the CONTRACTOR.

3.9 Excavation Near Existing Environmental Features

- A. Existing groundwater monitoring wells, piezometers, and landfill gas extraction and monitoring wells shall be protected during construction to maintain their integrity. If the CONTRACTOR damages or displaces groundwater monitoring wells, piezometers, or landfill gas extraction or monitoring wells, the CONTRACTOR must notify the CONSTRUCTION MANGEMENT ENGINEER immediately and repair or replace them at their own expense as required and approved by the CONSTRUCTION MANGEMENT ENGINEER.
- B. Landfill gas extraction wells that will be removed as part of this project do not require protection, repair, or replacement.

C. The CONTRACTOR shall not use machinery to excavate within two (2) feet of existing groundwater monitoring wells, piezometers, landfill gas extraction or monitoring wells, or any concrete or gravel pads surrounding them.

3.10 Sediment Basins

- A. The embankment and clay liner for Sediment Basin shall be constructed as shown on the Contract Drawings.
- B. Fill materials shall be placed in maximum eight (8)-inch loose lifts (before compaction) which are continuous over the entire length of fill.
- C. The in-place dry density shall not be less than ninety-five (95) percent of the maximum dry density with moisture content within ±two (2) percent of optimum. All compaction is to be determined by Standard Proctor test (ASTM D698).

3.11 Material Storage

A. All stockpiled soils shall be stored in active phases in a manner that will not erode and cause sedimentation. Establish adequate erosion and sediment controls according to Specification Section 31 25 00, Erosion and Sediment Control.

3.12 Dewatering and Drainage

- A. The CONTRACTOR is responsible for managing groundwater, perched water, leachate, and runoff during excavation and subsequent fill placement activities. The presence or absence of water or leachate shall not entitle the CONTRACTOR to additional compensation. Excavation is not expected below the groundwater table although there is potential to encounter perched water or leachate.
- B. Any liquids encountered during waste excavation shall be considered leachate. Stormwater runoff that has been in contact with waste shall be considered leachate. Leachate shall be managed as required in Specification Section 02 61 13.13, Waste Excavation and Material Handling.

3.13 Maintenance

- A. Protect newly graded areas from traffic and erosion. Keep free of trash and debris. Repair and reestablish grades in settled, eroded, and rutted areas to specified tolerances.
- B. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density and moisture range prior to further construction.

3.14 Finishing Work

- A. After earthwork is completed, the disturbed areas shall be finish graded. Any roots, sharp, angular stones larger than two (2) inches or rounded stones in excess of two (2) inches in their longest dimension, or other undesirable material shall be removed from the surface and the surface shall be prepared for vegetative stabilization.
- B. Unless otherwise specified by the CONSTRUCTION MANAGEMENT ENGINEER, the elevation of all drainage features and structures shall be within ±one-tenth (0.1) foot of those shown on the Contract Drawings.
- C. After the Closure Cap has been installed, the CONTRACTOR shall maintain the surface free of ruts, depressions, and damage resulting from the hauling and handling of any material, equipment, tools, etc. Damage shall be repaired by the CONTRACTOR as indicated on the Contract Drawings and/or specified in the Specifications.

3.15 Surveying

A. Surveying shall be in accordance with Specification Section 01 70 00, Execution and Closeout Requirements.

-- End of Section --

SECTION 31 05 16 AGGREGATES

1. **GENERAL**

1.1 <u>Description</u>

1.1.1 Scope of Work

A. The Work includes, but is not limited to, furnishing all materials, tools, equipment, labor and supervision for aggregates. Materials specified in this Specification Section shall be installed as shown on the Contract Drawings and as noted in Table 31 05 16-1 below.

TABLE 31 05 16-1 Location of Specified Materials

Specified Material	Location	
Granular Fill	Landfill Gas Vertical Wells, Storm Drain Pipe Bedding	
Crusher Run Aggregate /	Access Roads and Site Furnishings	
Graded Aggregate	Access Roads and Site I diffishings	
No. 2 Stone	Leachate Seep Repairs	
Class 0 Riprap	Erosion and Sediment Control Devices	
Class 1 Riprap	Closure Cap Tie-in	
Gabion Stone	Downchutes. Temporary Gabion Outlet Structures	
Pea Gravel / 3/8" Rounded	Concrete Footers, Box Culverts, LFG Header Isolation	
Pea Gravel	Valve	

1.1.2 Related Work Specified Elsewhere

- A. Section 01 70 00, Execution and Closeout Requirements.
- B. Section 31 05 15, Earthwork.
- C. Section 32 15 00, Aggregate Surfacing.

1.2 <u>References</u>

A. Not used.

1.3 <u>Definitions</u>

A. Not used.

1.4 Qualifications

A. Not used.

1.5 **Submittals**

1.5.1 Delivery Tickets

- A. CONTRACTOR shall submit delivery tickets daily to the CONSTRUCTION MANAGEMENT ENGINEER. The delivery ticket for offsite materials shall include, for each load of approved material:
 - 1. Name and location of supplier.
 - 2. Type and amount of material delivered.

1.5.2 Certified Test Reports

- A. The CONTRACTOR shall submit to the CONSTRUCTION MANAGEMENT ENGINEER required certified reports for each proposed borrow material. If all of the test results do not meet the specified physical properties, the CONSTRUCTION MANAGEMENT ENGINEER may require the CONTRACTOR to retest the material or to identify another borrow source. The CONTRACTOR shall submit the reports before delivery of any materials to the site.
- B. The CONTRACTOR shall submit to the CONSTRUCTION MANAGEMENT ENGINEER certified reports, prepared by the Geotechnical Testing Laboratory, which present the results of construction frequency and field permeability tests. These reports shall be submitted within fourteen (14) days of the date that the respective samples were collected in the field.
- C. Certified Test Reports are required for material sourced from offsite and onsite locations.

1.6 Safety

A. Safety shall be in accordance with Specification Section 01 45 00, Health and Safety.

1.7 **Quality Assurance**

1.7.1 General

A. The CONTRACTOR shall test materials as set forth in the applicable reference specifications and as required herein. Testing shall be performed by the Geotechnical Testing Laboratory or test results provided by the material supplier, approved by the CONSTRUCTION MANAGEMENT ENGINEER, with samples furnished by and at

the expense of the CONTRACTOR. Testing is required of both onsite and offsite materials used to meet the Contract Specifications.

1.7.2 Preconstruction Testing

A. Prior to delivery of any aggregate material, the CONTRACTOR shall notify the CONSTRUCTION MANAGEMENT ENGINEER in writing of the supplier and location of proposed aggregate borrow source(s). The CONSTRUCTION MANAGEMENT ENGINEER has the option to visit and inspect each proposed borrow source. During said inspection, the CONTRACTOR shall provide any equipment necessary to excavate test pits throughout the limits of the proposed source to assure the CONSTRUCTION MANAGEMENT ENGINEER of the material's uniformity. Upon visual acceptance by the CONSTRUCTION MANAGEMENT ENGINEER, material from each borrow source shall be obtained by the CONTRACTOR and transported to the Geotechnical Testing Laboratory to confirm that the proposed materials are in conformance with these Specifications.

1.7.3 Construction Frequency Testing

- A. Laboratory Testing—Throughout the construction, one (1) sample for every five hundred (500) tons of material from each approved aggregate borrow source shall be supplied to the Geotechnical Testing Laboratory by and at the expense of the CONTRACTOR to confirm the materials being delivered to the site are in conformance with these Specifications.
- B. Testing shall be performed by the CONTRACTOR as directed by the CONSTRUCTION MANAGEMENT ENGINEER when visual observations by the CONSTRUCTION MANAGEMENT ENGINEER of construction performance indicate a potential problem or significant deviation from required material properties.
- C. The CONSTRUCTION MANAGEMENT ENGINEER may examine each delivered load of material prior to placement. Any material containing organics, trash, or excessive fines or moisture, at the discretion of the CONSTRUCTION MANAGEMENT ENGINEER, will be classified as unsuitable and shall be rejected and not used for construction. The CONTRACTOR may propose to process the material and retest it at his sole expense to bring it into compliance with the specifications. Based on review of the results of any retest, the CONSTRUCTION MANAGEMENT ENGINEER may approve or reject the material. The CONTRACTOR shall remove and properly dispose of all rejected material at no additional cost to the OWNER.
- D. The CONSTRUCTION MANAGEMENT ENGINEER may inspect and test any component of the aggregate placement at any time. Unless otherwise indicated, testing shall be performed by the Geotechnical Testing Laboratory with materials furnished by the CONTRACTOR at the expense of the CONTRACTOR.

1.7.4 Quality Control (QC) Laboratory

A. The Geotechnical Testing Laboratory shall serve as the QC Laboratory and shall meet the qualifications in Specification Section 01 40 00, Quality Control.

1.8 **Product Delivery, Handling, and Storage**

A. Not used.

1.9 Schedule

A. Not used.

2. MATERIALS

2.1 Granular Fill

- A. Granular Fill shall conform to the requirements for coarse aggregate No. 57 stone in accordance with Section 901 of the most recent edition of the Maryland Department of Transportation (MDOT) State Highway Administration (SHA) Standard Specifications for Construction and Materials.
- B. Material shall have less than fifteen (15) percent weight loss by test method JLT-S-105-89.

2.2 Crusher Run Aggregate / Graded Aggregate

A. Crusher Run Aggregate and Graded Aggregate material shall conform to the requirements for Crusher Run Aggregate (CR-6) in accordance with Section 901 of the most recent edition of the Maryland Department of Transportation (MDOT) State Highway Administration (SHA) Standard Specifications for Construction and Materials.

2.3 No. 2 Stone

A. No. 2 Stone shall meet the gradations of No. 2 stone in accordance with AASHTO M43-05 and the physical property requirement for Coarse Aggregate in accordance with Section 901 of the most recent edition of the MDOT SHA Standard Specifications for Construction and Materials.

2.4 Riprap

A. Riprap shall be in accordance with Section 901 of the most recent edition of the MDOT SHA Standard Specifications for Construction and Materials.

2.5 Gabion Stone

A. Gabion stone shall be in accordance with Section 901 of the most recent edition of the MDOT SHA Standard Specifications for Construction and Materials.

2.6 Pea Gravel / 3/8" Rounded Pea Gravel

A. Pea Gravel and 3/8" Rounded Pea Gravel material shall be rounded, naturally occurring stone meeting the following gradation.

TABLE 31 05 16-2 Pea Gravel Gradation

U.S. Standard	Percent Finer
Sieve Opening	
1/2 inch	100
3/8 inch	95-100
No. 4	75
No. 40	0-3
No. 200	0-1

3. <u>EXECUTION</u>

3.1 <u>Installation of Aggregate</u>

- A. Installation and type of aggregate shall be in accordance with Contract Drawings.
- B. Installation of crusher run for roadways shall be in accordance with the Contract Drawings and Specification Section 32 15 00, Aggregate Surfacing.
- C. The CONTRACTOR shall measure placement thickness periodically throughout each day of construction to verify that the design thickness required on the Contract Drawings is met. The CONTRACTOR shall maintain a written log of these field measurements and their locations and provide them to the CONSTRUCTION MANAGEMENT ENGINEER on a daily basis and to the OWNER at project close-out. The CONSTRUCTION MANAGEMENT ENGINEER may make independent measurements of thicknesses, as necessary

3.2 <u>As-Built Survey</u>

A. Survey shall be in accordance with Specification Section 01 70 00, Execution and Closeout Requirements.

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SECTION 31 05 19.13 GEOTEXTILES

1. **GENERAL**

1.1 <u>Description</u>

1.1.1 Scope of Work

A. The Work includes the manufacture, supply, delivery, storage, and installation of geotextile fabrics. Materials specified in this Specification Section shall be installed as shown on the Contract Drawings and as noted in Table 31 05 19.13-1 below.

TABLE 31 05 19.13-1 Location of Specified Materials

Specified Material	Location
Separation Non-woven Geotextile (8 oz.)	Closure Cap
Stabilization Geotextile	As needed for Subgrade Stabilization
Erosion and Sediment Control Geotextiles	As shown on Contract Drawings

1.1.2 Related Work Specified Elsewhere

- A. Section 01 33 00, Submittals.
- B. Section 01 40 00, Quality Control.
- C. Section 31 05 15, Earthwork.
- D. Section 31 05 19.16, Geomembrane.
- E. Section 31 05 19.26, Geocomposite.

1.2 References

A. Not used.

1.3 Definitions

A. Not used.

1.4 Qualifications

A. The geotextile manufacturer(s) shall be a specialist(s) in the manufacture of polyester and/or polypropylene geotextile, and have produced and manufactured a minimum of

- five (5) million square feet of said geotextile fabric that was used in successful installations.
- B. The geotextile shall be installed by a Geosynthetics Installer meeting the qualifications in Specification Section 01 40 00, Quality Control.

1.5 **Submittals**

- A. A Statement of Qualifications for the Geosynthetics Installer meeting the requirements of Geosynthetic Installer qualifications noted in Specification Section 01 40 00, Quality Control, shall be submitted to the CONSTRUCTION MANAGEMENT ENGINEER for approval at least twenty (20) calendar days prior to installation. No geotextile installation shall begin until the CONSTRUCTION MANAGEMENT ENGINEER has received and approved the items as identified.
- B. A Statement of Qualifications for the geotextile Manufacturer shall be submitted to the CONSTRUCTION MANAGEMENT ENGINEER for approval. The following information regarding the manufacturer's geosynthetics shall be submitted by the CONTRACTOR to the CONSTRUCTION MANAGEMENT ENGINEER for approval at least twenty (20) calendar days prior to installation. No geotextile installation shall begin until the CONSTRUCTION MANAGEMENT ENGINEER has received and approved the items as identified in this submittal.

1.5.1 Certified Test Reports

A. The CONTRACTOR shall submit in writing to the CONSTRUCTION MANAGEMENT ENGINEER for approval the manufacturers' names and the materials intended for use for each geotextile. Certified test reports for the material that is to be delivered to the Site conforming to the requirements of standards and testing methods specified herein shall be submitted to the CONSTRUCTION MANAGEMENT ENGINEER for approval prior to delivery of geotextile. The material manufacturer and the CONTRACTOR must satisfy the CONSTRUCTION MANAGEMENT ENGINEER that the material will meet the requirements listed in Tables 31 05 19.13-2 and 31 05 19.13-3. The CONTRACTOR shall transmit to the CONSTRUCTION MANAGEMENT ENGINEER all information provided by the manufacturers or suppliers, prior to approval for furnishing and installing any such materials.

1.5.2 Installation and Repair Procedures

A. The CONTRACTOR shall submit to the CONSTRUCTION MANAGEMENT ENGINEER for approval twenty (20) calendar days prior to installation, the geotextile manufacturer's recommended installation procedures, including placement and joining, and the manufacturers recommended procedures for repairing or replacing damaged or defective geotextile material.

B. The CONTRACTOR shall also submit Geosynthetic Installer's Installation Plan for geotextile in accordance with Specification Section 01 40 00, Quality Control.

1.6 Safety

A. Safety shall be in accordance with Specification Section 01 45 00, Health and Safety.

1.7 **Quality Assurance**

1.7.1 Material Testing

1.7.1.1 Material Testing by Manufacturer

- A. Geotextiles shall be tested by the respective manufacturer(s) prior to shipment to ensure that the physical and mechanical properties of the finished products are in accordance with this Specification. The required material properties, test methods, values, and units are presented in Table 31 05 19.13-2 and Table 31 05 19.13-3. Test frequencies shall be in accordance with Manufacturer's Quality Control frequencies from ASTM D4354.
- B. Compatibility testing shall be performed to verify the chemical and physical resistance of the nonwoven, needle-punched geotextile. Manufacturer(s) shall submit test data based on EPA's Method 9090, Compatibility Test for Wastes and Membrane Liners, for the geotextile material to be furnished and typical solid municipal waste sanitary landfill leachate. Existing test results from the same formulation of geotextile may be provided.

1.7.1.2 Material Testing by Contractor

A. Samples of the Separation Geotextile and Stabilization Geotextile (if required) shall be obtained by the CONTRACTOR (for testing at a Geosynthetics Testing Laboratory) at a frequency of one (1) sample (at least four [4] feet by four [4] feet) for every two (2) acres of material installed. The geotextiles shall be tested for the properties listed in Tables 31 05 19.13-2 and 31 05 19.13-3. Each sample collected shall have the roll, lot, and manufacturer clearly marked on or attached to the sample. Sample shipping and testing shall be the responsibility of the CONTRACTOR. All samples not submitted for testing shall be properly stored onsite during construction and submitted to the CONSTRUCTION MANAGEMENT ENGINEER at the completion of the project.

TABLE 31 05 19.13-2

Physical Properties of Nonwoven Needle-Punched Separation Geotextile

Minimum Average

		Minimum Average	
Property	Test Method	Roll Values (MARV)	Unit
Mass Per Unit Area	ASTM D5261	8	oz/yd ²
Grab Tensile Strength	ASTM D4632	205	lb
Grab Tensile Elongation	ASTM D4632	50	%
Trapezoidal Tear Strength	ASTM D4533	95	lb
Puncture (CBR) Strength	ASTM D6241	600	1b
AOS ¹	ASTM D4751	80	Sieve no.
UV Resistance ²	ASTM D7238	70	%

AOS is a maximum average roll value.

TABLE 31 05 19.13-3
Physical Properties of Woven Stabilization Geotextile

Property	Test Method	Minimum Average Roll Values (MARV)	Unit
Grab Tensile Strength	ASTM D4632	315	lb
Grab Tensile Elongation	ASTM D4632	15	%
Mullen Burst	ASTM D3786	600	psi
Puncture (CBR) Strength	ASTM D6241	900	1b
Trapezoid Tear Strength	ASTM D4533	120	lb
AOS^1	ASTM D4751	40	Sieve no.

AOS is a maximum average roll value.

Notes:	%	= Percent.	$oz/yd^2 = Ounce(s)$ per square yard.
	AOS	Apparent Opening Size.	psi = Pound(s) per square inch.
	lb	= Pound(s)	sec = Second.

UV resistance is a minimum value. Evaluation to be on 2.0-inch strip tensile specimens per ASTM D5035 after 500 hours of exposure.

1.7.2 Daily Quality Control (QC) Log

- A. The Geosynthetic Installer's field superintendent shall maintain a daily QC log during all phases of geotextile installation. This log shall document the daily progression of the geotextile installation from delivery of the material to final acceptance. The daily log shall designate those construction activities that influence the integrity of the geotextile material during installation. The log, at a minimum, shall include entries and detailed documentation of the following:
 - 1. Weather, i.e., temperature, winds, precipitation.
 - 2. Site preparation activities, including removal of water, sediment, and any cleaning, smoothing and/or repair to materials underlying the geotextile.
 - 3. Roll and panel number of each sheet that is deployed on a daily basis.
 - 4. Repairs and replacements.
 - 5. Inspection of geotextile material delivered to the Site.
 - 6. Photo documentation to accompany the log with reference to the date, location, and a general description of the photo.
- B. The Geosynthetic Installer's field superintendent shall submit the required daily QC logs to the CONSTRUCTION MANAGEMENT ENGINEER for review within two (2) calendar days of the activities documented. At any point during the Work, if the daily QC log has not been submitted, the CONSTRUCTION MANAGEMENT ENGINEER has the right to stop the geotextile installation activities at no cost to the OWNER. Upon receiving the required daily QC logs, Work may resume.

1.7.3 Visual Inspection

A. During deployment of the various geotextiles, the Geosynthetic Installer and CONSTRUCTION MANAGEMENT ENGINEER shall carry out visual inspections of the material surfaces. Any faulty areas relating to fabric integrity, uniformity, rips or tears, sewing completeness, or seam overlap shall be repaired by the Geosynthetic Installer using techniques pre-approved by the CONSTRUCTION MANAGEMENT ENGINEER. Such repairs shall be reported by means of the daily QC log.

1.7.4 QC Laboratory

A. The Geosynthetics Testing Laboratory shall serve as the QC Laboratory for geotextile testing, and shall meet the qualifications in Specification Section 01 40 00, Quality Control.

1.8 Delivery, Storage, and Handling

- A. Materials shall be delivered to the Site only after the required submittals have been approved in writing by the CONSTRUCTION MANAGEMENT ENGINEER. Storage and handling of the materials shall conform to the manufacturer's recommendations, including the maximum storage duration, and shall be done in such a manner as to prevent damage to any part of the Work or the material itself. Materials shall be labeled for easy identification and comparison to bills of lading and QC test results.
- B. The CONTRACTOR shall provide sufficient labor and equipment to properly unload material upon delivery to the Site. The Geosynthetics Installer's field superintendent shall be present during the delivery and unloading of the geotextile and shall ensure the geotextile material has not been damaged during shipping, storage, or handling. The material shall be stored in a reasonably level area, well-drained, away from oils/fuels, brush, poison oak or ivy, in an accessible area for inspection, and on a smooth surface so that the material is well supported and not resting on sharp objects that could damage it. Individual pieces or bundles shall be stored with safe walking space and clearance between them to allow full view for inspection purposes. To prevent ultraviolet degradation of the materials, the protective wrapper on each geotextile roll shall not be removed until the material is ready for deployment.
- C. Each roll shall be labeled with the manufacturer's name, product identification, lot number, roll number, and roll dimensions. Identification tags attached to the rolls of geotextiles delivered to the Site shall not be removed until the material is installed. Any roll not properly identified prior to deployment activities may be deemed unacceptable for use by the CONSTRUCTION MANAGEMENT ENGINEER and replaced at the expense of the CONTRACTOR.
- D. Any damage to the geotextile material caused by transportation, unloading, storage, or placement of the material shall be repaired according to the manufacturer's recommendations as approved by the CONSTRUCTION MANAGEMENT ENGINEER, at no additional cost to the OWNER. CONTRACTOR shall be responsible for replacing all unacceptable or damaged material at no additional cost to the OWNER. Improper storage resulting in damage should be resolved as directed by the CONSTRUCTION MANAGEMENT ENGINEER.

1.9 Schedule

A. Not used.

2. <u>MATERIALS</u>

2.1 General

- A. Nonwoven and woven geotextile fabrics shall be manufactured from polypropylene resin and polymeric yarn or fiber, respectively, and provide the minimum physical properties outlined in Tables 31 05 19.13-2 and 31 05 19.13-3.
- B. End uses for the Separation Geotextile and Stabilization Geotextile fabrics to be installed for the project are shown on the Contract Drawings.
- C. Specifications for Erosion and Sediment Control geotextiles shall be in accordance with Contract Drawings.

3. <u>EXECUTION</u>

3.1 Geotextile Placement

- A. Nonwoven, needle-punched Separation Geotextile shall be placed by the Geosynthetic Installer at the locations shown on the Contract Drawings. All geotextile panels shall have their seams overlapped a minimum of four (4) inches and securely fastened according to seaming procedures as approved by the CONSTRUCTION MANAGEMENT ENGINEER. On the slopes, seams shall be sewn securely using polymeric thread with a "prayer" stitch and shall be oriented up and down the slope. In wet weather geotextile must be sewn.
- B. Geotextile that has soil or stone placed upon it shall have eighteen (18) inches (minimum) of the material placed onto the fabric in advance of either tracked or rubber-tired construction equipment, expect as allowed by Paragraph 3.3. The material shall be placed in the same direction as the fabric seam. Extreme care is required by the CONTRACTOR so that the equipment operator does not cause damage to the geotextiles. At no time will construction equipment be permitted to track directly on fabric. Any damage to the geotextile fabrics or underlying materials shall be repaired by the Geosynthetic Installer (using approved methods) at no additional expense to the OWNER.
- C. Erosion and Sediment Control Geotextile shall be placed in accordance with Contract Drawings.

3.2 Subgrade Stabilization

A. Where determined by the CONSTRUCTION MANAGEMENT ENGINEER as noted in Specification Section 31 05 15, Earthwork, reinforcement shall be performed by deploying the woven, slit-film Stabilization Geotextile to at least ten (10) feet beyond the CONSTRUCTION MANAGEMENT ENGINEER-delineated limits of the unstable area in all directions. Panel overlaps shall be a minimum of six (6) feet for

both panel edges and end-of-roll edges where required. The CONTRACTOR shall provide any and all measures necessary to anchor the geotextile against wind uplift or drag until Vegetative Support Soil is placed atop the geotextile, in accordance with Specification Section 31 05 15, Earthwork. Under no circumstances shall construction equipment traverse directly on the geotextile.

3.3 Geosynthetic Deployment

- A. All-terrain vehicles (ATVs) may be used in the deployment of geosynthetic materials provided the following conditions are adhered to:
 - 1. ATVs shall not be permitted to operate directly on the geosynthetic material unless written approval is given by the CONSTRUCTION MANAGEMENT ENGINEER.
 - 2. The use of ATVs is considered to be at the CONTRACTOR's risk.
 - 3. Any damage resulting from the use of ATVs, as determined by the CONSTRUCTION MANAGEMENT ENGINEER, will be repaired to the satisfaction of the CONSTRUCTION MANAGEMENT ENGINEER at no additional cost to the OWNER. After three (3) repairs are required as a result of using ATVs, the CONTRACTOR must provide an alternate procedure or create a field test pad to demonstrate that further use of ATVs will not continue to damage the geosynthetics. If alternate procedures and demonstrations are not acceptable to the CONSTRUCTION MANAGEMENT ENGINEER, use of ATVs for geosynthetic deployment will be prohibited.
 - 4. ATVs shall be inspected by the CONSTRUCTION MANAGEMENT ENGINEER prior to use for leakage or other potential risks to the geosynthetics.
 - 5. ATVs that leak fuel and/or oil shall not be permitted to operate over the geosynthetics.
 - 6. Any fuel which leaks onto the geosynthetic shall be thoroughly removed (cleaned) by the CONTRACTOR or have the geosynthetic material replaced at the discretion of the CONSTRUCTION MANAGEMENT ENGINEER at no additional cost to the OWNER.
 - 7. ATVs shall not be refueled on the geosynthetic.
 - 8. ATVs shall have tires with low ground pressure, less than five (5) pounds per square inch, and shall have shallow treads.
 - 9. ATVs shall be operated by a single operator at speeds less than five (5) miles per hour.

- 10. Quick starts, stops, and sharp turns shall not be permitted.
- 11. Pulling material up slopes greater than five (5) percent shall not be permitted.

3.4 <u>Temporary Securement of Geotextiles</u>

A. CONTRACTOR shall secure any exposed geotextiles in place from wind uplift or drag. The amount of ballast or extent of other methods approved by the manufacturer needed to secure geotextiles shall be determined by and at the expense of the CONTRACTOR.

3.5 Placement of Cover Materials

- A. All geotextile fabrics shall be covered with overlying materials as specified in the Contract Documents, within fourteen (14) calendar days following removal of their protective wrapping and their placement in the field, in order to protect them from ultraviolet light degradation, unless a longer period is documented by the manufacturer and approved by the CONSTRUCTION MANAGEMENT ENGINEER. The CONTRACTOR shall stage his activities to accomplish this requirement and maintain the construction schedule. Any geotextiles left exposed longer than the fourteen (14) calendar days shall, at the CONSTRUCTION MANAGEMENT ENGINEER'S direction, be removed for suitable disposal and replaced with new material by the Geosynthetic Installer at no cost to the OWNER.
- B. CONTRACTOR shall place all cover materials in such a manner to ensure geotextiles are not damaged, slippage of underlying materials is minimized, and no excessive wrinkling or tensile stresses in the geotextiles develop.

3.6 <u>As-Built Survey</u>

A. Not used.

-- End of Section --

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SECTION 31 05 19.16 GEOMEMBRANE

1. **GENERAL**

1.1 Description

1.1.1 Scope of Work

- A. The Work includes the manufacture, supply, delivery, storage, installation, and testing of textured linear-low-density polyethylene (LLDPE) geomembrane materials. Materials specified in this Specification Section shall be installed as shown on the Contract Drawings.
- B. The CONTRACTOR shall furnish all labor, materials, supplies, supervision, equipment, construction machinery, and incidentals that may be necessary to construct the project as described in these Specifications and as shown on the Contract Drawings.
- C. The CONTRACTOR is responsible for inspecting the site conditions and existing tiein requirements prior to bidding.

1.1.2 Related Work Specified Elsewhere

- A. Section 01 33 00, Submittals.
- B. Section 01 40 00, Quality Control.
- C. Section 01 70 00, Execution and Closeout Requirements.
- D. Section 31 05 15, Earthwork.
- E. Section 31 05 19.13, Geotextiles.
- F. Section 31 05 19.26, Geocomposite.

1.2 References

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

1.2.1 Geosynthetic Research Institute (GRI)

- A. (2019) Test Methods, Test Properties and Testing Frequency for LLDPE Smooth and Textured Geomembranes. GRI GM17.
- B. (2017) Seam Strength and Related Properties of Thermally Bonded Polyolefin Geomembrane. GRI GM19a.
- C. (2013) Cold Weather Seaming of Geomembranes. GRI GM9.

1.2.2 U.S. Environmental Protection Agency (USEPA)

A. (1991) Inspection Techniques for the Fabrication of Geomembrane Field Seams. EPA-530-SW-91-051.

1.3 Definitions

A. Not used.

1.4 Qualifications

- A. Each Geomembrane manufacturer shall be a specialist in the manufacture of the same type of geomembrane to be installed and have at least five (5) years' experience in the manufacture of and have manufactured at least an annual production of thirty (30) million square feet during the last five (5) years that were used in successful similar installations.
- B. Geomembrane shall be installed by a Geosynthetics Installer meeting the qualifications in Specification Section 01 40 00, Quality Control.

1.5 **Submittals**

- A. A Statement of Qualifications for the Geosynthetics Installer meeting the requirements of Geosynthetic Installer qualifications and submittal requirements noted in Specification Section 01 40 00, Quality Control, shall be submitted to the CONSTRUCTION MANAGEMENT ENGINEER for approval twenty (20) calendar days prior to installation. No geomembrane installation shall begin until the CONSTRUCTION MANAGEMENT ENGINEER has received and approved in writing the items as identified.
- B. Geosynthetics Installer's Installation Plan in accordance with Specification Section 01 40 00, Quality Control, Paragraph 1.5.C.
- C. A Statement of Qualifications for the Geomembrane Manufacturer shall be submitted to the CONSTRUCTION MANAGEMENT ENGINEER for approval. The following information regarding the manufacturer's geomembrane shall be submitted by the

CONTRACTOR to the CONSTRUCTION MANAGEMENT ENGINEER for approval twenty (20) calendar days prior to installation. No geomembrane installation shall begin until the CONSTRUCTION MANAGEMENT ENGINEER has received and approved in writing the items as identified in this submittal.

- 1. Manufacturer's quality control program and/or manual that outlines the factory and field quality control procedures to be utilized for both the manufacturing process and installation of the geomembrane system. This shall address, at a minimum, delivery and use of raw materials, geomembrane roll production, installation (including cold weather installation), and quality assurance (QA)/quality control (QC) of these activities.
- 2. Manufacturer's certificate of compliance to this Specification. Certificate of compliance shall be notarized certifying that each type of geomembrane material furnished for this project (reference project title and number) complies with all requirements specified in the Contract Documents prior to delivery of geomembrane materials. No geomembrane shall be shipped until the manufacturer's certificate of compliance has been received by the CONTRACTOR and approved in writing by the CONSTRUCTION MANAGEMENT ENGINEER.
- 3. Manufacturer's warranty for the geomembrane to be installed, including pipe penetration seals and field seams as applicable, prior to delivery of material.
- 4. Name and location of manufacturer's QA/QC facility where laboratory testing will be conducted for the CONTRACTOR.
- 5. Manufacturer's proposed product defect repair procedures.

1.5.1 Installation

A. Geosynthetic Installer's daily QC log, in accordance with Paragraph 1.7.2 of this Section.

1.5.2 Post-Installation

- A. At the completion of the geomembrane installation activities, the Geosynthetic Installer shall submit to the CONSTRUCTION MANAGEMENT ENGINEER:
 - 1. Post-construction As-Built Drawing of the geomembrane showing all numbered geomembrane panels with their associated roll numbers, location and types of all welded seams, destructive coupon test locations, location and reason for construction repairs and patches, repaired factory defects, surveyed location of anchor trench, and pipe penetrations, surveyed location of landfill gas well penetrations, and limit of closure cap liner. The As-Built Drawings shall identify the panel and roll numbers from which the archive coupons were taken for future

- physical and chemical characteristics testing, if required. As-Built Drawing shall be submitted in AutoCAD version 2013 or newer and in PDF format.
- 2. Reports with field quality test reports, daily acceptance certificates, daily seaming reports, daily QC logs, Geosynthetic Installer's completion report, and written certification from the Geosynthetic Installer that the geomembrane has been installed in accordance with the installation and testing requirements established by both the manufacturer and the Geosynthetic Installer, and these Specifications.
- 3. Geosynthetic Installer's warranty within ten (10) days of final completion.

1.6 Safety

A. Safety shall be in accordance with Specification Section 01 45 00, Health and Safety.

1.7 Quality Assurance

1.7.1 Single Source

A. All material must be obtained from a single material supplier and shall be manufactured by a single manufacturer. If a second supplier for the geomembrane is proposed, separate Pre-Installation submittals shall be submitted to CONSTRUCTION MANAGEMENT ENGINEER for approval. Additionally, it must be certified that the new material is compatible and will effectively interface with existing material and meet all pertinent Contract Specifications. The CONTRACTOR shall be solely responsible for additional testing costs associated with the acceptance of the new supplier or manufacturer.

1.7.2 Daily QC Log

- A. The Geosynthetic Installer's field superintendent shall maintain a daily QC log during all phases of the complete geomembrane installation. This log shall document the daily progression of the geomembrane installation from delivery of the geomembrane to final acceptance. The daily log shall designate those construction activities that influence the integrity of the geomembrane during installation. The log, at a minimum, shall include entries and detailed documentation of the following:
 - 1. Weather, i.e., temperature, winds, precipitation.
 - 2. Required calculations of geomembrane expansion/contraction.
 - 3. Written acceptance of the prepared subgrade surface by the CONSTRUCTION MANAGEMENT ENGINEER and Geosynthetic Installer.
 - 4. Record the roll and panel number of each sheet that is deployed on a daily basis.

- 5. Repairs and replacements.
- 6. Document seaming activities, including name of welder(s) for each seam and any failures resulting from testing of the seams.
- 7. Results and locations of destructive and nondestructive testing performed as part of geomembrane installation, including corrective action taken.
- 8. Inspection of geosynthetic material delivered to the site.
- 9. Calibration dates of each piece of seaming equipment and seam test equipment.
- 10. Photo documentation to accompany the log with reference to the date, location, and a general description of the photo.
- B. The Geosynthetic Installer's field superintendent shall submit the required daily QC logs to the CONSTRUCTION MANAGEMENT ENGINEER for review within two (2) calendar days of the activities documented. At any point during the Work, if the daily QC log has not been submitted, the CONSTRUCTION MANAGEMENT ENGINEER has the right to stop the geomembrane system installation activities at no cost to the OWNER. Upon receiving the required daily QC logs, Work will resume.

1.7.3 Material Testing by Manufacturer

- A. The Manufacturer shall test materials as set forth in the applicable referenced Specifications and as required herein. Requirements for inspection and testing for each type of the geomembrane to be installed are:
 - 1. Plant Testing of Raw Materials—Compounded resin to be used for production shall be tested by the geomembrane manufacturer. At a minimum, one (1) sample shall be obtained from each shipping container (typically a railcar) compartment. Two (2) tests for each of the listed properties in Table 31 05 19.16-1 shall be performed on each textured LLDPE compartment sample. The material will be accepted for production use if all test results conform to the material requirements and results between the various shipment compartments are comparable. Variations are indicative of poor quality and/or inconsistent materials and may be cause for rejection by the CONSTRUCTION MANAGEMENT ENGINEER. ASTM standard test numbers and the range of acceptable results are shown in Tables 31 05 19.16-2a/b and 31 05 19.16-3 are from Geosynthetic Research Institutes Test Methods GRI GM17 for LLDPE. In the event of a conflict, the latest edition of GRI GM17 for LLDPE shall govern.

TABLE 31 05 19.16-1
Physical Properties of Compounded Resin for LLDPE Geomembrane Liner and Extrudate
Welding Rod

TO COMMENT OF THE PROPERTY OF				
Property	Test Method	Required Value	Unit	Sample Frequency*
Specific Gravity	ASTM D792 or ASTM D1505	≤0.939 max. avg.	g/mL	1/200,000 pounds
Melt Index	ASTM D1238 (190°/2.16 kg)	<1.0	g/10 min	One (1) per shipping container

^{*} In addition, the CONSTRUCTION MANAGEMENT ENGINEER at his discretion may select up to ten (10) samples of extrudate welding rod delivered to the site to be tested for these properties.

2. Plant Testing of Geomembrane—The textured LLDPE geomembranes shall be tested by the manufacturer(s) prior to shipment to ensure that the physical and chemical properties of the finished product(s) are in conformance with the Specifications. The required conformance and testing frequencies of geomembranes as well as required values are presented in Table 31 05 19.16-2a/b. Required values listed are minimum average roll values unless otherwise stated. The manufacturer shall provide individual roll test results to prove statistically that the geomembrane maximum meets the minimum average roll values required in Table 31 05 19.16-2a/b and the Test Methods GRI GM 17 for LLDPE. In the event of conflict, the Test Methods in the latest edition of GRI GM 17 shall be the ruling documents.

1.7.4 Material Testing by CONTRACTOR

- A. The CONTRACTOR shall test materials as set forth in the applicable referenced Specifications and as required herein. Requirements for inspection and testing of the textured LLDPE geomembrane are:
 - 1. Archive Field Samples—Five (5) samples of each type of geomembrane installed one (1)-square-foot (minimum) coupon produced and installed shall be retained intact by the field crew foreman as an archive sample. These coupons shall be labeled by the field crew foreman with the appropriate roll numbers and panel numbers of the geomembrane material from which they are obtained and shall be properly stored onsite for the duration of construction and delivered to CONSTRUCTION MANAGEMENT ENGINEER at the end of construction.
 - 2. Destructive and Nondestructive Weld Testing—Geomembrane seam welding and random destructive and nondestructive testing shall be in accordance with procedures outlined in Paragraphs 3.5 and 3.6 of this Section. The CONTRACTOR shall provide test results to prove that the field seam tests meets the minimum values required in Table 31 05 19.16-2a/b or GRI Test Method-GM 19. In the event of conflict between the tables and the GRI Test Method, GRI-GM 19 shall be the ruling document.
 - 3. Conformance Testing of Geomembrane—Upon delivery of the material to the project site, samples of the geomembrane to be installed shall be collected by the

CONTRACTOR CONSTRUCTION locations selected by the MANAGEMENT ENGINEER and submitted to the Geosynthetics Testing Laboratory to ensure that the physical and chemical properties of the product are in conformance with the Specifications. Conformance Testing shall be conducted prior to the installation of the geomembrane. The required Conformance Testing and required values are presented in Table 31 05 19.16-2a/b. Test frequencies shall be eight (8) samples minimum. Additional samples may be required, as directed by the CONSTRUCTION MANAGEMENT ENGINEER, if failing results are reported. Conformance testing shall be coordinated by and conducted at the expense of the CONTRACTOR. Results of the conformance testing shall be submitted to the CONSTRUCTION MANAGEMENT ENGINEER for approval prior to material installation

- 4. Interface Friction Angle Testing—A minimum of thirty (30) days prior to the placement of the cap geosynthetics, the CONTRACTOR shall provide lab test results verifying the shear strength of the interfaces listed in Table 31 05 19.16-3. Lab tests shall be performed with actual geosynthetics and soils to be used in the project. Materials shall meet the minimum interface friction angles specified in Table 31 05 19.16-3. Test results demonstrating adherence to minimum shear strength with differing friction angles and/or adhesion values may be submitted to the CONSTRUCTION MANAGEMENT ENGINEER for approval. Materials with unacceptable results shall be retested at no additional cost to the OWNER. Tests shall be performed with the following parameters:
 - a. Shear rate: one (1) millimeter per minute.
 - b. Seating time: twenty-four (24) hours in fully hydrated condition.
 - c. Normal stress: one hundred (100)/two hundred (200)/four hundred (400) pounds per square foot.

1.7.5 QC Laboratory

A. The Geosynthetics Testing Laboratory shall serve as the QC Laboratory for geomembrane testing, and shall meet the qualifications in Specification Section 01 40 00, Quality Control.

1.8 Delivery, Storage, and Handling

A. Materials shall be delivered to the site only after the required submittals have been furnished by the CONTRACTOR and approved in writing by the CONSTRUCTION MANAGEMENT ENGINEER. Storage and handling of the materials shall conform to the manufacturer's recommendations, including the maximum storage duration, and shall be done in such a manner as to prevent damage to any part of the Work or the material itself. Materials shall be labeled for easy identification and comparison to bills of lading and QC test results.

- B. The CONTRACTOR shall provide labor and equipment to properly unload material upon arrival at the Site. The Geosynthetics Installer's field superintendent shall be present during the delivery and unloading of the geomembrane and shall ensure the geomembrane material has not been damaged during shipping, storage, or handling. The material shall be stored in a reasonably level area, well-drained, away from oils/fuels, brush, poison oak or ivy, in an accessible area for inspection, and on a smooth surface so that the material is well supported and not resting on sharp objects that could damage it. Individual rolls shall be stored with safe walking space and clearance between them to allow full view for inspection purposes. If the geomembrane material is delivered with protective roll covers, these covers shall not be removed until immediately before the material is to be installed. Rolls of geomembrane shall not be stacked more than two (2) rolls high. In addition, the CONTRACTOR shall cover the stored geomembrane materials onsite with plastic so as to protect the geomembrane from the elements for the entire time the geomembrane is stored onsite.
- C. Each roll shall be labeled with the manufacturer's name, product identification, lot number, roll number, and roll dimensions. Identification tags attached to the rolls of geomembrane delivered to the site shall not be removed until the material is installed. Any roll not properly identified prior to deployment activities may be deemed unacceptable for use by the CONSTRUCTION MANAGEMENT ENGINEER and replaced at the expense of the CONTRACTOR.
- D. Any damage (i.e., tears, creases, or punctures) to the geomembrane material caused by transportation, unloading, storage, or placement of the material shall be repaired according to the manufacturer's recommendations, as approved by the CONSTRUCTION MANAGEMENT ENGINEER, at no additional cost to the OWNER. CONTRACTOR shall be responsible for replacing all unacceptable or damaged material at no additional cost to the OWNER. Improper storage resulting in damage should be resolved as directed by the CONSTRUCTION MANAGEMENT ENGINEER.
- E. The geomembrane shall be stored under the responsibility of the CONTRACTOR.

1.9 Schedule

A. Not used.

2. MATERIALS

2.1 Compounded Resin

A. The geomembrane shall be manufactured of new, first-quality low-density polyethylene (compounded) resin conforming to the material properties listed in

Table 31 05 19.16-2a/b for LLDPE. No post-consumer resin of any type shall be added to the formulation.

2.2 **Geomembrane**

- A. A 40-mil textured LLDPE geomembrane is proposed, with an alternate 50-mil textured LLDPE structured geomembrane (Agru MicroDrain, or approved equal).
- B. The minimum acceptable physical, mechanical, and hydraulic properties are outlined in Table 31 05 19.16-2a, Textured 40-Mil LLDPE Geomembrane, and b, Textured 50-Mil LLDPE structured geomembrane (if alternate is approved by the OWNER).
- C. All geomembrane material used for construction shall be textured material. Textured geomembrane shall generally have uniform texturing appearance. It shall be free from such defects that would affect the specified properties and hydraulic integrity of the geomembrane.

2.3 Extrudate Welding Rod

A. Resin used for extrudate welding rod shall have the same material properties as those in the compounded resin used in the manufacture of the geomembrane. These properties are outlined in Table 31 05 19.16-2a/b.

TABLE 31 05 19.16-2a

Physical Properties of Geomembrane Liner – Textured 40-Mil LLDPE

(Minimum Average Roll Values)

	(1711111111111111111111111111111111111			Commis
D 4	TO A DATA ALL I	Required	TT *4	Sample
Property	Test Method	Value	Unit	Frequency
Thickness mils (min. avg.)		100/	0.4	
• Lowest 8 of 10 (and per	ASTM D5994	-10%	%	Per roll
GRI-17)				
Asperity Height mils (min. avg.) ⁽¹⁾	ASTM D7466	16	mil	Every 2 nd roll ⁽²⁾
Density (min. avg.)	ASTM D1505	0.939	g/cc	200,000 lb
	ASTM D792	0.535	g/cc	200,000 10
Tensile Properties (min. avg.) ⁽³⁾				
 Tensile Strength to Yield 	A CTM D ((02	126	lb/inch width	
Tensile Strength to Break	ASTM D6693	60	lb/inch width	20,000 lb
Elongation at Yield	Type IV	12	%	
Elongation at Break		250	%	
2% Modulus (max)	ASTM D5323	2400	lb/in.	Per Formulation
Tear Resistance (min. avg.)	ASTM D1004	22	lb	45,000 lb
Puncture Resistance	ASTM D4833	44	lb	45,000 lb
Axi-Symmetric Break Resistance			10	
Strain	ASTM D5617	30	min	Per Formulation
Carbon Black Content (range)	ASTM D4218 ⁽⁴⁾	2-3	%	45,000 lb
Carbon Black Dispersion	ASTM D5596	Note (5)		45,000 lb
Oxidative Induction Time (OIT)	ASTM D3370	11010 (3)		13,000 10
(a) Standard OIT	ASTM D3895	100	min	
or	ASTM D3093	100	111111	200,000 lb
(b) High Pressure OIT	ASTM D5885	400	min	200,000 10
Oven Aging at 85°C ⁽⁶⁾⁽⁷⁾	ASTM D5885 ASTM D5721	400	111111	
(a) Standard OIT (min. avg.)	ASTW D3721			
% retained after 90 days	ASTM D3895			
or	ASTM D3893	35	%	Per Formulation
(b) High Pressure OIT (min. avg.)				
% retained after 90 days	ASTM D5885	60	%	
UV Resistance ⁽⁸⁾	ASTW D3883			
High Pressure OIT (min. avg.)	ASTM D7238			Per Formulation
% retained after 1600 hrs ⁽⁹⁾	ASTM D5885	35	%	1 ci l'orniulation
Hot Wedge Seams ⁽¹⁰⁾				
		60	11. /*	
• Shear Strength ⁽¹¹⁾	GRI GM19	60	lb/in.	-
• Peel Strength (11)		50	lb/in.	
Peel Separation Peel Separation		25	lb/in.	
Extrusion Fillet Seams				
• Shear Strength ⁽¹¹⁾	GRI GM19	60	lb/in.	_
Peel Strength (11)	Old Olli1)	44	lb/in.	
Peel Separation		25	lb/in.	

- (1) Of 10 readings; 8 out of 10 must be \geq 7 mils, and lowest individual reading must be \geq 5 mils.
- (2) Alternate the measurement side for double sided textured sheet.
- (3) Machine direction (MD) and cross machine direction (XMD) average values should be on the basis of 5 test specimens each direction. Yield elongation is calculated using a gage length of 1.3 inches. Break elongation is calculated using a gage length of 2.0 inches.
- (4) Other methods such as D1603 (tube furnace) or D6370 (TGA) are acceptable if an appropriate correlation to D4218 (muffle furnace) can be established.
- (5) Carbon black dispersion (only near spherical agglomerates) for 10 different views: 9 in Categories 1 or 2 and 1 in Category 3
- (6) The manufacturer has the option to select either one of the OIT methods listed to evaluate the antioxidant content in the geomembrane.
- (7) It is also recommended to evaluate samples at 30 and 60 days to compare with the 90 day response.
- (8) The condition of the test should be 20 hr. UV cycle at 75°C followed by 4 hr. condensation at 60°C.
- (9) UV resistance is based on percent retained value regardless of the original HP-OIT value.
- (10) Value listed for shear and peal strengths are for 4 out of 5 test specimens; the 5th specimen can be as low as 80% of the listed values.
- (11) Also for hot air and ultrasonic seaming methods.

TABLE 31 05 19.16-2b Physical Properties of Structured Geomembrane Liner - Textured 50-Mil LLDPE (Minimum Average Roll Values)

Duonouty	Test Method	Required Value	Unit	Sample
Property Test Method Value Unit Frequency All physical properties are the same as Table 31 05 19.16-2a with the exceptions below.				
Tensile Properties (min. avg.) ⁽¹⁾ • Tensile Strength to Break	ASTM D6693 Type IV	75	lb/inch width	20,000 lb
2% Modulus (max)	ASTM D5323	3000	lb/in.	Per Formulation
Tear Resistance (min. avg.)	ASTM D1004	27	lb	45,000 lb
Puncture Resistance	ASTM D4833	55	lb	45,000 lb
Axi-Symmetric Break Resistance Strain	ASTM D5617	30	min	Per Formulation
Drainage Stud Height (min. avg.)	ASTM D7466	130	mil	Every 2 nd Roll
Spike Asperity Height (min. avg.)	ASTM D7466	20	mil	Every 2 nd Roll
Hot Wedge Seams ⁽²⁾ • Shear Strength ⁽³⁾ • Peel Strength ⁽³⁾ • Peel Separation	GRI GM19	75 63 25	lb/in. lb/in. %	-
Extrusion Fillet Seams • Shear Strength ⁽³⁾ • Peel Strength ⁽³⁾ • Peel Separation	GRI GM19	75 57 25	lb/in. lb/in. %	-

Machine direction (MD) and cross machine direction (XMD) average values should be on the basis of 5 test specimens each direction. Yield elongation is calculated using a gage length of 1.3 inches. Break elongation is calculated using a gage length of 2.0 inches.

TABLE 31 05 19.16-3 Interface Friction Angles¹

Interface 1	Interface 2	Minimum Interface Friction Angle (degrees) ²
Vegetative Support Soil	Geocomposite	26
Geocomposite	Textured LLDPE	26
Textured LLDPE	Geotextile	26
Geotextile	Closure Cap Subgrade	26

Additional interface friction testing requirements are listed in Paragraph 1.7.4.A.4.

 ⁽²⁾ Value listed for shear and peal strengths are for 4
 (3) Also for hot air and ultrasonic seaming methods. Value listed for shear and peal strengths are for 4 out of 5 test specimens; the 5th specimen can be as low as 80% of the listed values.

Required interface shear strength may be met through adhesion and the interface friction angle as described in Paragraph 1.7.4.A.4.

3. <u>EXECUTION</u>

3.1 <u>Inspection of Sheet Liner at Job Site</u>

- A. The Geosynthetic Installer and CONSTRUCTION MANAGEMENT ENGINEER shall be responsible for the inspection of the rolls of geomembrane material upon delivery to the job site. CONTRACTOR shall provide all labor and equipment required to assist CONSTRUCTION MANAGEMENT ENGINEER and Geosynthetic Installer in inspection of geomembrane materials upon delivery to the site. Should rolls show damage from transit, they will be so identified and set aside for return to manufacturer at no additional cost to the OWNER.
- B. During deployment of the geomembrane material, the Geosynthetic Installer and the CONSTRUCTION MANAGEMENT ENGINEER will carry out a visual inspection of the geomembrane sheet surface. Any detected flaws or damage shall be repaired by the Geosynthetic Installer using the pre-approved techniques. Such repairs shall be recorded on the As-Built Drawings and documented on the field superintendent's daily QC log.

3.2 <u>Geomembrane Liner Termination</u>

A. Cell Cap

1. The textured LLDPE Geomembrane shall extend to the limit of liner as shown on the Contract Drawings.

3.3 Installation

3.3.1 General

- A. The geomembrane shall be laid out and installed by trained technicians in accordance with the applicable CONSTRUCTION MANAGEMENT ENGINEER-approved proposed panel layout drawing. The geomembrane shall be installed by the Geosynthetic Installer. The CONSTRUCTION MANAGEMENT ENGINEER'S approval of a proposed panel layout drawing does not relieve the manufacturer or approved Geosynthetic Installer of the responsibility to properly deploy and weld the geomembrane material to best accommodate prepared site conditions.
- B. After the panels of geomembrane are deployed and properly positioned, the preapproved welding technicians shall then weld the geomembrane using the approved welding methods. No geomembrane installation activity shall begin until the CONSTRUCTION MANAGEMENT ENGINEER has received, reviewed, and approved in writing the required qualifications for the manufacturer's or Geosynthetic Installer's field superintendent, field crew foreman, and welding technicians.

- C. Power supply equipment required for seaming of the geomembrane panels shall be in good working order and be able to continuously supply power. Each generator shall be placed on a scrub sheet consisting of two (2) layers of geomembrane material if located within the limits of the Work previously covered with geomembrane. Oil and gas to power the generators shall not be stored within the active limits of Work. The CONTRACTOR shall mobilize and position power supply equipment in a manner that prevents damage to installed geomembrane material. Any geomembrane material repairs required due to damage by the CONTRACTOR shall be performed by the CONTRACTOR at no cost to the OWNER. Such action will not be grounds for a contract extension.
- D. The CONTRACTOR shall maintain temporary anchorage of the geomembrane panels against wind uplift damage throughout the entire geomembrane installation process. Geomembrane materials damaged by wind uplift shall be repaired according to the manufacturer's recommended repair procedures by the manufacturer or Geosynthetic Installer at no additional cost to the OWNER. If damage incurred to any geomembrane material is deemed irreparable by the CONSTRUCTION MANAGEMENT ENGINEER, the geomembrane materials shall be removed and properly disposed of by the CONTRACTOR at no additional cost to the OWNER.
- E. All personnel working directly on the geomembrane material shall wear rubber-soled shoes so as not to damage the material. Any damage incurred to the geomembrane material resulting from adverse activities of the manufacturer's or Geosynthetic Installer's personnel shall be repaired according to the recommended repair procedures by the CONTRACTOR at the expense of the CONTRACTOR.
- F. Hand-held or hand-operated equipment (e.g., shovels) used to remove sediment, debris, etc. from the geomembrane shall be plastic or be manufactured from a material which will not cause damage to the geomembrane surface. Damage incurred to the geomembrane material caused by equipment not approved for its intended use as specified herein as witnessed by the CONSTRUCTION MANAGEMENT ENGINEER, OWNER, Northeast Maryland Waste Disposal Authority, or regulator will be repaired by the CONTRACTOR at the expense of the CONTRACTOR.
- G. The manufacturer's or Geosynthetic Installer's field superintendent shall be present during all activities related to the installation, welding, and repair of the geomembrane material.

3.3.2 Field Panel Placement

A. As specified in Paragraph 1.5, prior to commencement of geomembrane installation activities, the CONTRACTOR shall provide the CONSTRUCTION MANAGEMENT ENGINEER with a proposed panel layout drawing, which details the placement of geomembrane panels throughout the entire limits of the Work area. The proposed panel layout drawings are tentative and may be modified with the CONSTRUCTION MANAGEMENT ENGINEER'S written approval to

- accommodate site conditions. Any approved variation shall be noted on the As-Built Drawings.
- B. The field panel layout shall minimize the length of field seaming required to locate seams where applied stresses will be minimal. Sheet panel layout shall take into consideration any expansion and contraction anticipated due to ambient temperature variations.
- C. The geomembrane panels shall be oriented parallel to the line of maximum slope, i.e., up and down, not across, the slope. Panels shall be shingled to promote positive drainage. In corners and odd-shaped locations, the number of extrusion welded seams shall be minimized. Extrusion welded seams shall not be permitted within five (5) feet of the toe of the slope, the top of the berm, or areas of stress concentration (e.g., cell corners) within the entire limits of the Work area.
- D. The CONTRACTOR shall avoid the use of horizontal seams. Horizontal seams shall be considered as any seam having an alignment exceeding 20 degrees from being perpendicular to the slope contour lines. In the event that horizontal seams are necessary and approved in writing by the CONSTRUCTION MANAGEMENT ENGINEER, no two (2) adjacent panels/sheets shall be placed such that their horizontal seams are continuous. All panel/sheets that require horizontal seams must be staggered a minimum distance of fifteen (15) feet above or below the location of the horizontal seam of the adjacent panel/sheet.
- E. Placement of panels/sheets shall result in a good fit in all corners and grade changes. No bridging of the geomembrane at any change in grade or at penetrations will be accepted. Excessive slack shall be avoided to minimize rippling of the geomembrane during placement geocomposite and vegetative support soil.
- F. Placement of geomembrane shall not proceed under interfering conditions including, but not limited to, wind in excess of twenty (20) miles per hour, precipitation, ambient temperatures below thirty-two (32) degrees Fahrenheit or above one hundred four (104) degrees Fahrenheit, high humidity, fog, dew, ponded water, and blowing dust or snow. CONTRACTOR shall be responsible for monitoring working conditions and suspend geomembrane installation as conditions warrant. The CONTRACTOR may propose methods for placement and seaming of geomembrane below thirty-two (32) degrees Fahrenheit in accordance with GRI GM9 and manufacturer's requirements for review and written approval by the CONSTRUCTION MANAGEMENT ENGINEER. For cold weather, additional trial seams and destructive tests are to be taken at the discretion of the CONSTRUCTION MANAGEMENT ENGINEER as recommended in GRI GM9.
- G. The amount of material unrolled and placed daily, shall be limited to the amount of material that can be properly seamed during a one (1)-day operation. Tack or spot welding does not constitute a completed seam.

- H. Damage to the approved subgrade surface during geomembrane placement shall be repaired to its approved condition by the CONTRACTOR at the expense of the CONTRACTOR. Furthermore, any damage incurred to the geomembrane panels during deployment activities (e.g., creases, crimping, scratches, etc.) shall be repaired by the Geosynthetic Installer according to the approved repair procedures at the expense of the CONTRACTOR.
- I. Adjacent geomembrane panels shall be properly positioned in order to provide a sufficient overlap, as indicated in the approved manufacturer's or Geosynthetic Installer's installation plan, of the panels to facilitate welding of the seams. The Geosynthetic Installer shall label each panel of geomembrane immediately upon its deployment with a panel number and corresponding roll number. All panel numbers and corresponding roll numbers of the installed geomembrane material shall be labeled and accurately represented on the As-Built Drawings upon completion of all geomembrane installation activities.
- J. All-terrain vehicles may be used in the deployment of geosynthetic materials provided conditions listed in Specification Section 31 05 19.13, Geotextiles, are adhered to.
- K. Slip sheet shall be used in the deployment of textured geomembrane. CONTRACTOR may submit to the CONSTRUCTION MANAGEMENT ENGINEER for approval in the Pre-Installation submittal, or a proposed alternative method for textured geomembrane deployment.

3.3.3 Seam Preparation

- A. Prior to seaming operations, the seam area shall be kept thoroughly dry and clean. All seam interfaces shall be visually examined by the Geosynthetic Installer for scratches, blemishes, flaws, and texture. All geomembrane panel/sheet surfaces to be seamed shall be free of dust, dirt, and moisture. Water shall be prevented from ponding on the liner material. Any detected damage to the area prepared for seaming operations shall be repaired at no additional cost to the OWNER, including any repairs necessary to the existing geomembrane.
- B. Seams shall be aligned to create the fewest possible number of wrinkles and fishmouths. If panel overlap exceeds what is noted in the installation plan, it shall be removed by trimming the lower sheet. Trimming of excessive panel overlap shall be accomplished using a shielded blade or hook knife. Whenever possible, the cutting of the geomembrane should be from the underside of the geomembrane in an upward motion. All trimming of excessive panel overlap should be completed at least fifty (50) feet ahead of seaming operations. Any damage caused to the geomembrane during this trimming operation shall be repaired at no additional cost to the OWNER.
- C. For extrusion-welded seams, a small hand-held electric rotary grinder with circular disc grit grinding paper shall be used to remove oxidation from the surface of the

geomembrane material for the entire length of the prepared seam. The grinding plate shall be approximately four (4) inches in diameter and No. 80 or 100 grit paper shall be used. The depth of the grinding shall be less than ten (10) percent of the sheet thickness, but generally be only five (5) percent of the sheet thickness. Prior to tacking the overlapped geomembrane panels together, the leading edge of the upper panel shall be ground to a forty-five (45)-degree bevel with the electric rotary grinder while this panel is lifted up off of the lower panel. Grinding should proceed welding by approximately five (5) minutes and the grinding operation shall be oriented perpendicular to the seam direction, and extend approximately one-quarter (0.25) inch beyond the limit of extrudate after it is placed.

3.3.4 Seaming

- A. The approved seaming techniques for this project are the dual-tract hot-wedge and extrusion fillet welding. The hot-wedge technique should be used for panel seams in open areas that can effectively accommodate the seaming equipment. The use of extrusion welding techniques shall only be used on panel seams in limited work space areas, for welding of geomembrane materials to geomembrane appurtenances, for the patching of liner coupons removed for destructive testing purposes, and minor repair procedures (e.g., patching small holes, tears, etc.).
- B. Field seaming operations are prohibited when the ambient air temperature approximately two (2) feet above the geomembrane surface is below thirty-two (32) degrees Fahrenheit or above one hundred four (104) degrees Fahrenheit, during precipitation, or when winds are in excess of twenty (20) miles per hour.

C. Dual-Tract Hot-Wedge Welding

- 1. Techniques for dual-tract hot-wedge seaming differ. Prior to initial production welding, the temperature of the wedge and speed of the nip rollers required for adequate seaming shall be determined from trial seam test strips performed throughout the daily welding operations.
- 2. A slight amount of "squeeze-out" or "flashing" is a good indicator that proper welds are achieved. Also, the depth of the nip rollers marks should be just barely evident to the touch.
- 3. The operator shall keep constant visual contact with the seam, occasionally adjusting the temperature or speed as necessary to maintain a consistent weld.
- 4. Damage caused to the geomembrane during the welding operations as detected by the Geosynthetic Installer's field superintendent or the CONSTRUCTION MANAGEMENT ENGINEER shall be patched according to the Specifications herein at no additional cost to the OWNER. Such action will not be grounds for a contract time extension.

5. Adjustment of the hot-wedge device shall be made regularly as needed, and the device shall be cleaned at least daily.

D. Extrusion Welding

- 1. For the preparation of extrusion fillet seams, a hot-air gun shall be used to leister-weld the overlapped geomembrane panels together to hold them in proper position for extrusion welding once the leading edge of the upper panel is properly beveled.
- 2. The extrusion welder is to be purged of all heat-degraded extrudate in its barrel prior to welding operations. This must be done every time the extrusion welder is restarted after a one (1)-minute or longer downtime. The purged extrudate shall not be discharged onto the surface of the low permeability soil where it would eventually form a hard object under the geomembrane.
- 3. Extrudate in the form of a molten, viscous bead shall be deposited over the overlapped seam upon the conclusion of the grinding operation. The center of the extrudate shall be directly over the leading edge of the upper geomembrane. The extrudate should cover the grind marks on each side of the upper geomembrane to within one-quarter (0.25)-inch of the perimeter of these marks.
- 4. Liner sheet edges to be seemed shall lay flat against each other during seaming until the seam has reached specified strength.
- 5. The thickness of the applied extrudate should be approximately two (2) times the specified sheet thickness as measured from the top of the bottom sheet to the top or crown of the applied extrudate bead.
- 6. Following completion of the seaming operations, visual inspection of the applied extrudate bead shall be made by the field superintendent and CONSTRUCTION MANAGEMENT ENGINEER, particularly for straight line alignment, height, and uniformity of surface texture. There should be no bubbles or pock marks in the extrudate weld.
- 7. Seam welding operations shall gradually terminate at the end of a panel, rather than abruptly terminate with a large mass of solidified extrudate. Where extrusion fillet welds are temporarily terminated during a seaming operation and the seams have had sufficient time to cool, the applied extrudate shall be ground prior to applying new extrudate over the existing seam.
- E. All "T" or "Y" seams created during the installation of the geomembrane (i.e., where more than two [2] panels form a seam) shall be patched with an extrusion welded patch according to these Specifications.

3.4 **Production Trial Seams**

- A. Trial seams shall be made on surplus pieces of geomembrane material to verify that seam welding conditions and equipment operation are adequate. These seams shall be completed for both extrusion fillet and dual-tract hot-wedge seam welding operations for textured LLDPE. Trial seams shall be made under the same conditions as the actual production seam welding conditions.
- B. Trial field testing results as detailed in these Specifications shall be accurately documented by the Geosynthetic Installer's field superintendent on the required daily QC logs (Paragraph 1.7.2). The date and time along with the ambient temperature, welding apparatus identification number, and name of welding technician shall be documented on said logs for each constructed trial field seam. Peel and shear test results of each trial field seam, along with subsequent coupon specimen testing required for failing post-weld trial seams, shall be recorded on the daily QC logs.

3.4.1 Pre-Weld Trial Seams

A. Pre-weld trial seams shall be made for each welding apparatus (operated by an approved welding technician) at the beginning of each production seam welding period (i.e., at the start of the day and the start of the afternoon seam welding session) and at any time that a machine is turned off for more than five (5) minutes or following repair of a broken machine. The pre-weld trial seam sample shall be at least three (3) feet long by two (2) feet wide with the seam centered lengthwise. Four (4) adjoining coupon specimens, each one (1) inch wide, shall be cut from the pre-weld trial seam sample and tested in peel (two [2]) and shear (two [2]) using a Columbine International, Ltd. portable electronic tensile tester (tensiometer), or an approved equivalent set to a strain rate of two (2) inches per minute. The coupon specimen shall sustain sufficient tensile loading before subsequently failing outside of the seam area (i.e., Film Tear Bond [FTB] failure required at a minimum tensile loading as specified for peel and shear in Table 31 05 19.16-2a/b for LLDPE. The coupon specimen shall not fail in the welded seam. If FTB occurs when a coupon specimen is tested in shear or peel at a tensile loading less than that specified, the pre-weld trial seam is considered a failure. If one (1) coupon specimen fails, the entire pre-weld trial seam operation shall be repeated. If any additional coupon specimen fails from the second pre-weld trial seam, the welding apparatus and welding technician shall not be used for seam welding operations until the deficiencies of the welding apparatus are corrected by the field superintendent and two (2) consecutive successful pre-weld trial seams are achieved.

3.5 Nondestructive Seam Continuity Testing

A. The Geosynthetic Installer shall nondestructively test all welded seams over their full length using a vacuum test unit, air pressure testing, or other method approved by the CONSTRUCTION MANAGEMENT ENGINEER. The purpose of the nondestructive test is to check the continuity of the welded seams. Nondestructive

tests shall be performed by experienced personnel thoroughly familiar with the specified test methods and equipment to be used. Nondestructive testing procedures cannot be correlated to the shear and peel strength of the welded seam. Nondestructive seam continuity testing shall be carried out as the seam welding operations progress, not at the completion of all field seam welding operations.

3.5.1 Vacuum Box Testing

- A. Extrusion fillet-welded seams shall be nondestructively tested with a pressurized vacuum box. For vacuum testing, the equipment shall be comprised of the following:
 - 1. A vacuum box assembly consisting of a rigid housing, a clean transparent viewing window, a soft leak-proof neoprene gasket, which is not cracked or otherwise deteriorated in any way, attached to the bottom, port hole of valve assembly, and a gauge to indicate chamber vacuum. Vacuum box assemblies shall be adequately sized to properly test welded seams surrounding and adjoining designed appurtenances.
 - 2. A vacuum tank and pump assembly equipped with a pressure controller and pipe connections.
 - 3. A rubber pressure/vacuum hose with fittings and connections.
 - 4. A bucket and wide brush or spray assembly.
 - 5. A soapy water solution.
 - 6. Testing equipment which is not properly maintained will be rejected in writing at the discretion of the CONSTRUCTION MANAGEMENT ENGINEER. Unusable equipment shall be promptly repaired or replaced at no expense to the OWNER with no delay to the Contract Schedule.

3.5.2 Testing fillet welded seams

- A. The following procedures shall be followed when nondestructively testing extrusion fillet welded seams:
 - 1. Energize the vacuum pump and reduce the tank pressure to a minimum five (5) pounds per square inch (ten [10] inches of mercury) gauge.
 - 2. Adequately wet a section of welded seam with the soapy water solution.
 - 3. Place the vacuum box over the wetted area.
 - 4. Close the bleed valve and open the vacuum valve.

- 5. Ensure that a leak tight seal is created.
- 6. For a period of approximately ten (10) seconds, examine the extrusion fillet-welded seam through the viewing window for the presence of soap bubbles along the edges of the welded seam or within the extrusion fillet bead.
- 7. If no bubble appears after ten (10) seconds, close the vacuum valve and open the bleed valve, move the vacuum box over the next adjoining welded seam area with a minimum three (3)-inch (seventy-five [75]-millimeter) overlap from the previously tested area, and repeat the process.
- 8. All areas where soap bubbles appear shall be adequately marked and repaired according to the recommended repair procedures.
- 9. Vacuum-tested, extrusion fillet-welded seam results shall be recorded on the Geosynthetic Installer's daily QC log.

3.5.3 Air-Pressure Testing Welded Seams

- A. Dual-tract hot-wedge welded seams shall be nondestructively tested with an approved air-pressure device. Equipment for air-pressure testing welded seams shall be comprised of the following:
 - 1. An air pump (manual or motor driven) equipped with pressure gauge capable of generating and sustaining a pressure of between twenty-five (25) and thirty-five (35) pounds per square inch (one hundred sixty [160] and two hundred [200] kilo-Pascals). The Geosynthetic Installer shall not use freon gas to pressurize the welded seam.
 - 2. A rubber hose with appropriate fittings and connections.
 - 3. A sharp, hollow needle, or other approved pressure feed device.
- B. The following procedures shall be followed when nondestructively testing dual-tract, hot-wedge welded seams:
 - 1. Adequately seal both ends of the welded seam to be tested with vice grip clamps or by heating and melting the air channel shut so as to prevent air from leaking from either end of the welded seam.
 - 2. Insert needle or other approved pressure feed device into the air channel created by the dual-tract, hot-wedge at one (1) end of the welded seam.
 - 3. Energize the air pump to a minimum pressure of thirty (30) pounds per square inch (two hundred [200] kilo-Pascals), close valve, and sustain pressure for a minimum of five (5) minutes.

- 4. Once the air pressure is maintained for the five (5)-minute test period, the Geosynthetic Installer shall then cut the air channel at the opposite end of the tested span from where the pressure feed device is inserted. The entire seam length shall be accepted upon the CONSTRUCTION MANAGEMENT ENGINEER'S visual and audible observation of air pressure being released from this cut. The cut in the air channel shall subsequently be repaired with an extrusion bead and nondestructively tested by the Geosynthetic Installer.
- 5. If loss of pressure exceeds three (3) pounds per square inch or pressure does not stabilize, or failure of alternate seam test approved in the installation plan, the dual-tract weld shall be considered failed, and the faulty area of the welded seam shall be located as follows:
 - a. The entire welded seam length shall be divided in half and both halves shall be retested (i.e., the air channel shall be sealed, by appropriate means, at the location of half its original length, and both halves shall be tested as separate seams). The air channel of the welded seam shall be repeatedly divided in this manner until the faulty portion of the welded seam is isolated for repair according to the above Specifications or until the CONSTRUCTION MANAGEMENT ENGINEER directs the Geosynthetic Installer to cap strip the entire faulty length of welded seam with an extrusion-welded patch at no additional cost to the OWNER. All punctures within the air channel made by either the pressure feed device, air-pressure release cut, or melting of the air channel itself shall be properly repaired by an extrudate bead and nondestructively tested at the expense of the CONTRACTOR. Such corrective action will not constitute grounds for a Contract time extension.

3.6 Random Weld Destructive Samples

A. In the event of a conflict, GRI-GM19 shall govern testing parameters. Random weld destructive samples shall be cut by the Geosynthetic Installer from the installed welded geomembrane at a minimum frequency of one (1) sample for every five hundred (500) feet of welded seam. Additional locations shall be determined during the seam welding operations at the CONSTRUCTION MANAGEMENT ENGINEER'S discretion. In order to obtain destructive sample test results prior to completion of geomembrane installation activities, destructive samples shall be cut by the Geosynthetic Installer's field superintendent as the seam welding operations progress. Sampling locations shall be determined by the CONSTRUCTION MANAGEMENT ENGINEER based upon visual observation and experience. The CONSTRUCTION MANAGEMENT ENGINEER must witness the cutting of all destructive samples and the Geosynthetic Installer shall promptly mark all samples obtained with their welded seam number and welding technician. The field superintendent shall also record on the daily QC logs the date and time the welding operation occurred, ambient temperature, and field test results for both peel and shear.

All holes in the geomembrane resulting from obtaining the seam samples shall be immediately repaired in accordance with Paragraph 3.8.

3.6.1 Field Testing of Random Weld Destructive Samples

- A. The Geosynthetic Installer shall cut a twelve (12)-inch-wide by forty (40)-inch-long destructive sample, or as required by Geosynthetics Testing Laboratory, with the welded seam centered lengthwise for each destructive sample. Two (2) one (1)-inch-wide specimens shall be cut from each end of the destructive sample. With the field tensiometer, the Geosynthetic Installer shall test the two (2) specimens from each end (total of four [4]) for shear strength and for peel adhesion using a two (2)-inch strain rate. For the destructive sample to be acceptable, all four (4) test specimens must pass in FTB at a minimum tensile value for peel and shear as specified in Table 31 05 19.16-2a/b. Any specimen that fails either through the weld, or in FTB at a tensile value less than the minimum specified values, is considered a failure.
- B. Should the destructive sample fail the field testing requirements, the Geosynthetic Installer shall remediate the deficient welded seam(s) from which the destructive sample was obtained as detailed in the subsequent Paragraph 3.6.2. Should the destructive sample pass the field testing requirements and be deemed acceptable to the CONSTRUCTION MANAGEMENT ENGINEER, the Geosynthetic Installer shall prepare and submit the remaining portion of the destructive sample for laboratory testing as discussed below.

3.6.2 Laboratory Testing of Random Weld Destructive Samples

- A. The remaining portion of the destructive sample shall be cut into two (2) parts, each a twelve (12)-inch by twelve (12)-inch "coupon," and distributed by the Geosynthetic Installer and at the expense of the CONTRACTOR as follows:
 - 1. One (1) coupon to an approved independent Geosynthetics Testing Laboratory.
 - 2. One (1) coupon to the CONSTRUCTION MANAGEMENT ENGINEER for archive storage.
- B. The CONTRACTOR, or the Geosynthetic Installer, shall package and ship the destructive samples to the approved Geosynthetics Testing Laboratory for determination of both shear and peel strengths. The test method and procedures to be used by the Geosynthetics Testing Laboratory shall be the same as used in field testing, where welded seam specimens are one (1) inch wide, and the strain rate is two (2) inches per minute. Four (4) of the five (5) specimens per twelve (12)-inch by twelve (12)-inch coupon shall pass both shear strength and peel adhesion tests by exhibiting FTB failure at or above the specified minimum tensile values. Lab results shall be submitted to the CONSTRUCTION MANAGEMENT ENGINEER as soon as they become available for evaluation and possible remedial actions. Electronic lab testing results will be accepted by the CONSTRUCTION MANAGEMENT

ENGINEER so as not to impede subsequent construction activities. Hard copy lab testing results shall be submitted to the CONSTRUCTION MANAGEMENT ENGINEER within twelve (12) calendar days of the sampling date.

- C. The following investigation and repair procedure will apply whenever a destructive sample fails the field or laboratory testing requirements:
 - 1. The Geosynthetic Installer shall retrace the seam welding path in both directions from the failed destructive sample test location (ten [10]-foot distance minimum) and take two (2) twelve (12)-inch by twelve (12)-inch coupons for additional shear strength and peel strength field testing according to the procedure specified in Paragraph 3.6. If both coupons are acceptable according to the previously discussed testing requirements, then the faulty welded seam shall be cap-stripped according to the Specifications herein between the locations of the two (2) acceptable twelve (12)-inch by twelve (12)-inch coupons so as to cover the failed destructive sample test location. If either or both of the coupons are considered unacceptable, then the investigation process is repeated until the failed coupons are bounded by two (2) passing coupon test locations. The extrusion-welded cap strip shall extend to at least six (6) inches beyond the entire length of faulty welded seam on all sides and be nondestructively tested according to the procedures specified herein at no additional cost to the OWNER.

3.6.3 Laboratory Procedures for Testing Welded Seams

- A. Laboratory testing of requirements for field-welded seam coupon specimens are listed below:
 - 1. Thickness (ASTM D5994).
 - 2. Field Seam Peel Strength (hot wedge and extrusion fillet) (ASTM D6392).
 - 3. Field Seam Shear Strength (ASTM D6392).
- B. Acceptable values for the thickness test are one hundred (100) percent or more of the values for the parent material. Acceptable peel and shear test results will be FTB at a minimum tensile value as specified in Table 31 05 19.16-2a/b. Any specimens which fail in the weld during either peel or shear tests or result in FTB but at tensile values lower than the specified minimum values will be considered failures. At least four (4) of five (5) specimens tested in shear and peel shall exhibit an FTB value not in the seam area.

3.7 <u>Liner Penetration</u>

A. CONTRACTOR may elect to use manufactured or field fabricated liner boots. CONTRACTOR shall submit construction and installation procedure for field fabricated liner penetration boots to the CONSTRUCTION MANAGEMENT ENGINEER for written approval. Boots attached to landfill gas extraction wells and leachate cleanouts penetrating the cap shall be attached per geomembrane

- manufacturer's specifications. Shop fabricated liner penetration boots shall be submitted to the CONSTRUCTION MANAGEMENT ENGINEER for approval.
- B. Provide booted geomembrane penetration as shown on the Contract Drawings, manufacturer's specifications and specified herein. Include item penetrating cap, neoprene sponge, steel band clamp, and other miscellaneous items as required.
- C. Liner penetration shall be constructed with liner material of the same type and thickness as the Closure cap (forty [40]-mil textured LLDPE).
- D. Seal booted penetration of textured LLDPE using an extrusion welder. Clamp liner boot to well casing using neoprene sponge and stainless-steel band clamps, as shown on the Contract Drawings.
- E. Upon installation of booted liner penetration, CONTRACTOR shall Vacuum Box test extrusion fillet-welded seams as outlined in Paragraphs 3.5.1 and 3.5.2.
- F. CONTRACTOR shall not weld textured LLDPE liner directly to pipe penetrations.

3.8 Defects and Repairs

3.8.1 Identification

A. All welded seams and non-seam areas of the geomembrane shall be evaluated by the Geosynthetic Installer's field superintendent and the CONSTRUCTION MANAGEMENT ENGINEER for identification of defects, holes, blisters, undispersed raw materials, and any sign of contamination by foreign matter. Because light reflected by the geomembrane aids in the detection of defects, the surface of the geomembrane shall be kept clean at the time of inspection. The geomembrane surface shall be broomed or washed as necessary by the Geosynthetic Installer if the amount of dust or mud inhibits inspection.

3.8.2 Evaluation

- A. Each suspect location as noted by either the Geosynthetic Installer's field superintendent or CONSTRUCTION MANAGEMENT ENGINEER, both in seam and non-seam areas, shall be nondestructively tested using the methods described in these Specifications. Each location that fails the nondestructive testing will be marked by the CONSTRUCTION MANAGEMENT ENGINEER and repaired by the Geosynthetic Installer.
- B. Upon inspecting the wrinkles within the geomembrane material during the installation of overlying materials, the CONSTRUCTION MANAGEMENT ENGINEER will decide which wrinkles shall be repaired by the Geosynthetic Installer at the expense of the CONTRACTOR. Any wrinkle which could potentially disrupt the flow of leachate or water along the floor of the containment cell or closure cap will be

evaluated by the CONSTRUCTION MANAGEMENT ENGINEER for potential repair.

3.8.3 Repair Procedures

- A. Repair procedures shall be agreed upon between the CONSTRUCTION MANAGEMENT ENGINEER and Geosynthetic Installer prior to geomembrane installation. Unless otherwise agreed upon the required repair procedures shall be as follows:
 - 1. Faulty Extrusion Fillet-Welded Seams—Minor defects detected during the nondestructive vacuum box testing procedures shall be adequately covered with an extrusion fillet bead which shall cover the entire length of faulty weld. If, based on the CONSTRUCTION MANAGEMENT ENGINEER'S evaluation, the number of welded seam defects or an individual defect is extensive, the entire length of welded seam shall be cap stripped with a patch extrusion-welded completely around its perimeter at no additional cost to the OWNER. The patch shall extend a minimum of six (6) inches beyond the centerline of the faulty weld in all directions for its entire length and be nondestructively tested according to the procedures specified herein.
 - 2. Faulty Dual-Tract, Hot-Wedge Welded Seams—Defects detected on the outer tract (i.e., that tract weld which is visible) during the air pressure testing procedures shall be adequately covered with an extrusion fillet bead for the entire length of faulty weld. If the leak cannot be detected along the outer tract, therefore concluding that the failed weld exists along the inner tract (i.e., that tract weld which is not visible from the upper surface of the welded geomembrane), the Geosynthetic Installer shall cover the entire width of the failed dual-tract weld along its entire length with an extrusion-welded cap strip. The extrusion cap strip shall be placed to at least six (6) inches beyond the edges of the dual-tract weld and nondestructively tested at no additional cost to the OWNER.
 - 3. Wrinkles and Fishmouths—Wrinkles or fishmouths created within the textured LLDPE geomembrane shall be repaired by cutting their entire length along their maximum height. A "stress-relief" circle (approximately six (6) inches in diameter) shall be cut at the end of a fish mouth or at both ends of a wrinkle. The resulting excess geomembrane shall then be overlapped in the downgradient direction and extrusion fillet welded for its entire length. An extrusion welded patch shall then be placed over each "stress-relief" circle and the entire welded repair shall be nondestructively testing by the Geosynthetic Installer.
 - 4. Geomembrane Defects—Pinholes detected within the geomembrane material shall be covered with an extrusion fillet bead. Blisters, larger holes, undispersed raw materials, tears, and contamination by foreign matter shall be capped with an extrusion welded patch. Each welded patch shall have its corners rounded and shall extend a minimum of six (6) inches beyond the extent of the underlying

defect in all directions. All welded repairs shall be nondestructively tested by the Geosynthetic Installer.

- 5. Wind Damage—Textured LLDPE geomembrane panels that suffer wind-blown or wind uplift damage (e.g., severe creases, crimping, tears) either during deployment activities or while temporarily anchored shall be replaced and properly disposed of by the Geosynthetic Installer at the expense of the CONTRACTOR. If damage incurred to the geomembrane is deemed repairable by the CONSTRUCTION MANAGEMENT ENGINEER, the entire limits of damaged material shall be cap stripped with an extrusion welded patch and nondestructively tested accordingly at the expense of the CONTRACTOR.
- 6. The time incurred repairing defects which occur as a result of faulty material, repair equipment, or workmanship will not be considered for a contract time extension.

3.8.4 Verification of Repairs

- A. Each repair will be nondestructively tested using the methods described in this Section, as appropriate. Repairs which pass the nondestructive test will be considered an adequate repair. Repairs which fail will be repeated and retested by the Geosynthetic Installer at the expense of the CONTRACTOR until a passing test results. The CONSTRUCTION MANAGEMENT ENGINEER will observe all nondestructive testing of repairs.
- B. The location and associated repair work of each patch installed on the geomembrane must be documented in the Geosynthetic Installer's daily QC log.

3.9 **As-Built Survey**

A. As-Built Survey shall be completed after geomembrane installation shall designate locations of all field welded seams, repair patches, extrusion fillet beads, and geomembrane panel numbers with associated roll numbers, location of each random weld destructive sample, and those samples obtained for plant physical property testing as required in these Specifications. Survey shall be in accordance with Specification Section 01 70 00, Execution and Closeout Requirements.

3.10 Warranty

A. The CONTRACTOR shall warranty the geomembrane material free from defects for ten (10) years from the date of final acceptance and provide a one (1)-year warranty on workmanship from the date of final acceptance.

-- End of Section -

SECTION 31 05 19.26 GEOCOMPOSITE

1. **GENERAL**

1.1 <u>Description</u>

1.1.1 Scope of Work

A. The Work covers the manufacture, supply, delivery, storage, and installation of the geocomposite drainage net. Materials specified in this Specification Section shall be installed as shown on the Contract Drawings.

1.1.2 Related Work Specified Elsewhere

- A. Section 01 33 00, Submittals.
- B. Section 01 40 00, Quality Control.
- C. Section 31 05 19.13, Geotextiles.
- D. Section 31 05 19.16, Geomembrane.

1.2 References

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

1.2.1 ASTM International (ASTM)

- A. ASTM D1505 (2010) Density of Plastics by the Density-Gradient technique.
- B. ASTM D1603 (2011) Carbon Black Content in Olefin Plastics.
- C. ASTM D4218 (1996; R 2008) Determination of Carbon Black Content in Polyethylene Compounds by the Muffle-Furnace Technique.
- D. ASTM D4355 (2007) Deterioration of Geotextiles from Exposure to Light, Moisture and Heat in a Xenon-Arc Type Apparatus.
- E. ASTM D4491 (1999a; R 2009) Water Permeability of Geotextiles by Permittivity.
- F. ASTM D4533 (2011) Trapezoid Tearing Strength of Geotextiles.

- G. ASTM D4632 (2008) Grab Breaking Load and Elongation of Geotextiles.
- H. ASTM D4716 (2008) Determining the (In-Plane) Flow Rate Per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using Constant Head.
- I. ASTM D4751 (2004) Determining Apparent Opening Size of a Geotextile.
- J. ASTM D4833 (2007) Index Puncture Resistance of Geotextiles, Geomembrane, and Related Products.
- K. ASTM D5035 (2011) Breaking Force and Elongation of Textile Fabrics (Strip Method).
- L. ASTM D5199 (2012) Measuring Nominal Thickness of Geosynthetics.
- M. ASTM D5261 (2010) Measuring Mass Per Unit Area of Geotextiles.
- N. ASTM D5321 (2012) Standard Test Method for Determining the Shear Strength of Soil-Geosynthetic and Geosynthetic-Geosynthetic Interfaces by Direct Shear.
- O. ASTM D7005 (2003; R 2008) Standard Test Method for Determining the Bond Strength (Ply Adhesion) of Geocomposites.

1.3 Definitions

A. Not used.

1.4 Qualifications

- A. The Geocomposite Manufacturer shall be a specialist in the manufacture of geocomposite and shall have produced and manufactured a minimum of five (5) million square feet (ft²) of geocomposite that has been used in successful installations.
- B. The geocomposite shall be installed by a Geosynthetics Installer meeting the qualifications in Specification Section 01 40 00, Quality Control.

1.5 **Submittals**

A. A Statement of Qualifications for the Geosynthetics Installer meeting the requirements of Geosynthetic Installer qualifications noted in Specification Section 01 40 00, Quality Control, shall be submitted to the CONSTRUCTION MANAGEMENT ENGINEER for approval twenty (20) calendar days prior to installation. No geocomposite installation shall begin until the CONSTRUCTION MANAGEMENT ENGINEER has received and approved in writing the items as identified.

B. A Statement of Qualifications for the geocomposite Manufacturer shall be submitted to the CONSTRUCTION MANAGEMENT ENGINEER for approval. The following information regarding the geocomposite shall be submitted by the CONTRACTOR to the CONSTRUCTION MANAGEMENT ENGINEER for approval twenty (20) calendar days prior to installation. No geocomposite installation shall begin until the CONSTRUCTION MANAGEMENT ENGINEER has received and approved the items as identified in this submittal.

1.5.1 Certified Test Reports

- A. The Geosynthetics Installer shall submit in writing to the CONSTRUCTION MANAGEMENT ENGINEER for approval within two (2) weeks after award of Contract the manufacturer's name along with the product name and certification of the material intended for use as geocomposite for the closure cap. Certified test reports conforming to the requirements of standards and testing methods specified herein shall be submitted to the CONSTRUCTION MANAGEMENT ENGINEER for approval prior to delivery of geocomposite. The material manufacturer and CONTRACTOR must satisfy the CONSTRUCTION MANAGEMENT ENGINEER that the material to be furnished and installed will meet in every aspect the requirements set forth in this Specification. The CONTRACTOR shall transmit to the CONSTRUCTION MANAGEMENT ENGINEER all information provided by the manufacturer or supplier prior to obtaining approval for furnishing and installing any such material.
- B. The CONTRACTOR shall obtain samples of the geocomposite material from the geocomposite manufacturer and submit these samples to the CONSTRUCTION MANAGEMENT ENGINEER for approval prior to geocomposite manufacturer's delivery.

1.5.2 Installation and Repair Procedures

- A. The CONTRACTOR shall submit to the CONSTRUCTION MANAGEMENT ENGINEER for approval twenty (20) calendar days prior to installation, the geocomposite manufacturer's recommended installation procedures, including placement and joining, and the manufacturers recommended procedures for repairing or replacing damaged or defective geocomposite material.
- B. The CONTRACTOR shall also submit Geosynthetic Installer's Installation Plan for geocomposite in accordance with Specification Section 01 40 00, Quality Control.

1.6 Safety

A. Safety shall be in accordance with Specification Section 01 45 00, Health and Safety.

1.7 Quality Assurance

1.7.1 Single Source

A. All geocomposite must be obtained from a single material supplier and all geocomposite rolls used in construction shall be manufactured by a single manufacturer.

1.7.2 Material Testing

1.7.2.1 Material Testing by Manufacturer

- A. Geocomposite shall be tested by the manufacturer(s) prior to delivery to the project site to ensure that the physical and hydraulic properties of the finished products are in accordance with this Specification. Required physical properties, test methods, and values are presented in Table 31 05 19.26-1. With exception of transmissivity, test frequency shall be one (1) of each test in Table 31 05 19.26-1 for every fifty thousand (50,000) ft² of net produced. In addition, one (1) three (3)-foot (ft) × roll width coupon of net produced for this installation shall be retained by the manufacturer until construction of the cells closure cap has been completed. Regarding planar transmissivity, a test shall be conducted on a sample of the following geosynthetic system for every two hundred thousand (200,000) ft² of net produced:
 - 1. Steel plate (top).
 - 2. Proposed Vegetative Support Soil (three [3]-inch minimum thickness).
 - 3. Proposed eight (8)-ounce (oz), three hundred (300) mil double-sided Geocomposite.
 - 4. Proposed forty (40)-mil textured linear low-density polyethylene (LLDPE) geomembrane or alternate fifty (50)-mil textured LLDPE structured geomembrane.
 - 5. Proposed eight (8)-oz non-woven needle-punched geotextile.
 - 6. Steel plate (bottom).
- B. In addition to the results of testing required in Table 31 05 19.26-1, the manufacturer of the geocomposite shall submit a written certification stating that all geocomposite produced for the project meets or exceeds the minimum values of the respective physical properties and transmissivity listed in Table 31 05 19.26-1.
- C. The CONTRACTOR shall be solely responsible for the quality of the material provided. Should any of the tests performed on the material yield unsatisfactory results, the CONTRACTOR will be responsible for replacing the material with

satisfactory material without delaying the total project time and without any additional cost to the OWNER.

1.7.2.2 Material Testing by Contractor

- A. The CONTRACTOR shall test geocomposite for physical and hydraulic properties as set forth herein:
 - 1. Interface Friction Angle Testing—The CONTRACTOR shall test geocomposite for adherence to minimum acceptable interface friction angles as listed in Specification Section 31 05 19.16, Geomembrane, in accordance with direct shear testing as specified in ASTM D5321.
 - 2. Field Sampling—Four (4) samples of geocomposite shall be obtained by the CONTRACTOR for possible testing (at least four [4] ft by four [4] ft). Each sample shall be tagged with the numbers of the panel and roll from which it was collected. All collected samples shall be stored onsite at a location approved by the CONSTRUCTION MANAGEMENT ENGINEER. If testing is deemed necessary by the CONSTRUCTION MANAGEMENT ENGINEER, the collected geocomposite samples shall be tested by the Geosynthetics Testing Laboratory to determine density, carbon content, thickness, and/or transmissivity according to the methods listed in Table 31 05 19.26-1. Sample shipping and testing shall be the responsibility of the CONTRACTOR and at the expense of the CONTRACTOR. All samples not submitted for testing shall be properly stored onsite during construction and submitted to the CONSTRUCTION MANAGEMENT ENGINEER upon conclusion of the project.

1.7.3 Daily Quality Control (QC) Log

- A. The Geosynthetics Installer's field superintendent shall maintain a daily QC log during all phases of the geocomposite installation. This log shall document the daily progression of the geocomposite installation from delivery of material to final acceptance of the complete cap system. The daily log shall designate those construction activities that influence the integrity of the geocomposite during installation. The log, at a minimum, shall include entries and detailed documentation of the following:
 - 1. Weather, i.e., temperature, winds, precipitation.
 - 2. Site preparation activities, including removal of water, sediment, or geomembrane liner cleaning.
 - 3. Roll and panel number of each sheet that is deployed on a daily basis.
 - 4. Repairs and replacements.

- 5. Seaming activities.
- 6. Inspection of geocomposite material delivered to the site.
- 7. Calibration dates of each piece of seaming equipment and seam test equipment.
- 8. Photo documentation to accompany the log with reference to the date, location, and a general description of the photo.
- B. The Geosynthetics Installer's field superintendent shall submit the required daily QC logs to the CONSTRUCTION MANAGEMENT ENGINEER for review within two (2) calendar days of the activities documented. At any point during the Work, if the daily QC log has not been submitted, the CONSTRUCTION MANAGEMENT ENGINEER has the right to stop the geocomposite installation activities at no cost to the OWNER. Upon receiving the required daily QC logs, Work may resume.

1.7.4 Visual Inspection

A. During deployment of the geocomposite, the Geosynthetics Installer and the CONSTRUCTION MANAGEMENT ENGINEER shall carry out daily visual inspections of the material surface. Any faulty areas identified relating to drainage net integrity (e.g., flattening of geocomposite ribs) shall be repaired by the Geosynthetics Installer using approved repair procedures and shall be reported in the daily QC log.

1.7.5 QC Laboratory

A. The Geosynthetics Testing Laboratory shall serve as the QC Laboratory for geocomposite testing, and shall meet the qualifications in Specification Section 01 40 00, Quality Control.

1.8 **Product Delivery, Storage, and Handling**

- A. Materials shall be delivered to the site only after the required submittals have been approved in writing by the CONSTRUCTION MANAGEMENT ENGINEER. Storage and handling of the materials shall conform to the manufacturer's recommendations, including the maximum storage duration, and shall be done in such a manner as to prevent damage to any part of the Work or the material itself. Materials shall be labeled for easy identification and comparison to bills of lading and QC test results.
- B. The CONTRACTOR shall provide necessary labor and equipment to properly unload material upon arrival at the Site. The Geosynthetics Installer's field superintendent shall be present during the delivery and unloading of the geocomposite and shall ensure the geocomposite material has not been damaged during shipping, storage, or handling. The material shall be stored in a reasonably level area, well-drained, away from oils/fuels, brush, poison oak or ivy, in an accessible area for inspection, and on a

smooth surface so that the material is well supported and not resting on sharp objects that could damage it. Individual pieces or bundles shall be stored with safe walking space and clearance between them to allow full view for inspection purposes. To prevent ultraviolet degradation, the protective wrapper on each geocomposite roll shall not be removed until the material is ready for use. Additionally, tarping may also be used to protect geocomposite during storage.

- C. Each roll shall be labeled with the manufacturer's name, product identification, lot number, roll number, and roll dimensions. Identification tags attached to the rolls of geocomposite delivered to the site shall not be removed until the material is installed. Any roll not properly identified immediately prior to deployment activities may be deemed unacceptable for use by the CONSTRUCTION MANAGEMENT ENGINEER at the expense of the CONTRACTOR.
- D. Any damage to the geocomposite material caused by transportation, unloading, storage, or placement of the material shall be repaired according to the manufacturer's recommendations as approved by the CONSTRUCTION MANAGEMENT ENGINEER, at no additional cost to the OWNER. CONTRACTOR shall be responsible for replacing all unacceptable or damaged material at no additional cost to the OWNER. Improper storage resulting in damage should be resolved as directed by the CONSTRUCTION MANAGEMENT ENGINEER.

1.9 Schedule

A. Not used.

2. MATERIALS

2.1 Geocomposite

A. The geocomposite drainage net shall be high density polyethylene. The geocomposite shall be manufactured from three (3) sets of parallel, extruded polymer strands. Strands of one (1) set shall lie on top of strands of the other set, and the two (2) sets shall be bonded at the intersection. Strands shall be heat bonded on both sides to eight (8) oz per square yard nonwoven needle-punched geotextile. The material shall have the minimum physical properties specified in Table 31 05 19.26-1.

2.2 **Geocomposite Ties**

A. The geocomposite ties shall be heavy-duty, high-strength polymer braid ties. Ties shall be brightly-colored for easy inspection.

TABLE 31 05 19.26-1
Physical Properties of Geocomposite

			Minimum
Tested Property	Test Method	Frequency	Average Roll Value ^(c)
Geocomposite			
Transmissivity ^(a) , gal/min/ft (m ² /sec)	ASTM D4716	1/200,000 ft ²	3.5
			(7.5×10^{-4})
Ply Adhesion, lb/in	ASTM D7005	1/50,000 ft ²	1.0
Drainage net(b)	•		
Transmissivity ^(a) , gal/min/ft (m ² /sec)	ASTM D4716		38.6 (8×10 ⁻³)
Thickness, mil	ASTM D5199	1/50,000 ft ²	300
Density, g/cm ³	ASTM D1505	1/50,000 ft ²	0.94
Tensile Strength (MD), lb/in	ASTM D5035	1/50,000 ft ²	75
Carbon Black Content, %	Modified ASTM D1603	1/50,000 ft ²	2.0
	ASTM D4218		
Geotextile ^(b)			
Mass per Unit Area, oz/yd ²	ASTM D5261	1/90,000 ft ²	8
Grab Tensile Strength, lb	ASTM D4632	1/90,000 ft ²	205
Puncture (CBR) Strength, lb	ASTM D6241	1/90,000 ft ²	600
AOS, US Sieve (mm) ^(d)	ASTM D4751	1/540,000 ft ²	80 (0.180)
Permittivity, sec ⁻¹	ASTM D4491	1/540,000 ft ²	1.25
Flow Rate, gpm/ft ²	ASTM D4491	1/540,000 ft ²	95
UV Resistance, % Retained	ASTM D4355	Once per formulation	70
	(after 500 hours)		

⁽a) Gradient of 0.3, normal load of 1,000 pounds per square foot, water at 70 degrees Fahrenheit between stainless steel plates for 15 minutes.

- (b) Component properties prior to lamination.
- (c) These are minimum average roll values (MARV) and are based on the cumulative results of specimens tested.
- (d) AOS is a maximum average roll value.

3. <u>EXECUTION</u>

3.1 Installation

- A. The geocomposite shall be laid out and installed by the Geosynthetics Installer in accordance with the applicable CONSTRUCTION MANAGEMENT ENGINEER-approved installation procedures. The CONSTRUCTION MANAGEMENT ENGINEER'S approval of the installation procedures does not relieve the CONTRACTOR of his responsibility to properly install the geocomposite. The geocomposite shall be installed only after the underlying linear low-density polyethylene geomembrane liner has been tested and accepted by the CONSTRUCTION MANAGEMENT ENGINEER. The geocomposite shall be rolled down (machine direction parallel to slope) the side slope, keeping the geocomposite flat against the liner to minimize wrinkles and folds. Rolling and joining of geocomposite across slopes is not permitted. Place adequate ballast (e.g., sandbags) to prevent uplift by wind prior to covering.
- B. Care shall be taken not to entrap small stones when unrolling a geocomposite from the top of a geomembrane lined slope.

3.2 Seams and Overlaps

- A. Geocomposite side seams shall be overlapped a minimum of six (6) inches. Plastic fastener spacing along side seams shall be a maximum of five (5) ft.
- B. Overlap geocomposite end seams a minimum of one (1) ft and offset geocomposite end seams a minimum of five (5) ft between adjacent roll ends. End seam plastic fastener spacing shall be a maximum of one (1) ft. The overlaps shall be in the direction of flow.
- C. Tie geocomposite rolls together with plastic fasteners. The fasteners shall be a contrasting color from the geonet and attached geotextiles. Metallic fasteners will not be allowed. The geotextile component of the geocomposite shall be eight (8)-oz nonwoven needle-punched geotextile and shall be overlapped in the direction of flow and shall have seams sewn using approved methods.
- D. Place geotextile cap strips over any exposed edges of geocomposite. Cap strips shall be a minimum of two (2) ft in width and shall be thermally bonded to the geotextile component of the geocomposite.

3.3 **Penetrations**

A. Submit penetration details to the CONSTRUCTION MANAGEMENT ENGINEER for approval. No penetrations are to be completed until the CONSTRUCTION MANAGEMENT ENGINEER has received and approved in writing the details submitted. Mechanically attach a geotextile apron to the pipes and other appurtenances penetrating through the closure cap so that soil is prevented from getting into the geocomposite. The apron of the attached geotextile shall extend out from the pipe or appurtenance a minimum of two (2) ft. The apron geotextile shall be thermally bonded to the geotextile component of the geocomposite.

3.4 Repairs

3.4.1 Drainage Net Damage

A. Make repairs by placing a patch of the geocomposite over the damaged area. Extend the patch a minimum of two (2) ft beyond the edge of the damage. Use approved fasteners, spaced every six (6) inches around the patch, to hold the patch in place. If more than twenty-five (25) percent of the roll width is damaged, written approval must be obtained from the CONSTRUCTION MANAGEMENT ENGINEER to repair or replace the damaged roll.

3.4.2 Geotextile Damage

A. Repair damaged geotextile by placing a patch of eight (8)-oz geotextile over the damaged area with a minimum of twelve (12) inches of overlap in all directions. The geotextile patch shall be thermally bonded in place.

3.4.3 Protection and Backfilling

A. Cover the geocomposite with the specified materials within fourteen (14) days of acceptance. Vegetative Support Soil shall be placed from the bottom of the slope upward and shall not be dropped directly onto the geocomposite from a height greater than three (3) ft. The Vegetative Support Soil shall be pushed out over the geocomposite in an upward tumbling motion so that the wrinkles in the geocomposite do not fold over. No equipment shall be operated on the top surface of the geocomposite without permission from the CONSTRUCTION MANAGEMENT ENGINEER. The initial loose soil lift thickness shall be twelve (12) inches. Use equipment with ground pressures no greater than five (5) pounds per square inch to place the first lift of soil.

3.5 <u>As-Built Surveys</u>

A. Not used.

-- End of Section --

SECTION 31 09 13 SETTLEMENT PLATES

1. **GENERAL**

1.1 <u>Description</u>

1.1.1 Scope of Work

- A. The Work covered by this Section consists of the fabrication, furnishing, installation, protection, maintenance, and surveying of settlement plates and includes the furnishing of all labor, materials and equipment required.
- B. The CONTRACTOR shall monitor the settlement plates and provide the data to the CONSTRUCTION MANAGEMENT ENGINEER.

1.1.2 Related Work Specified Elsewhere

A. Not used.

1.2 References

- 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.
- B. Unless otherwise indicated the most recent edition of the publication, including any revisions, shall be used.

1.2.1 ASTM International (ASTM)

- A. ASTM A36: Standard Specification for Carbon Structural Steel.
- B. ASTM A53: Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

1.3 Definitions

A. Instrument – Settlement plates are instruments.

1.4 **Qualifications**

A. Not used.

1.5 **Submittals**

- A. Product data cut sheets.
- B. Example layout indicating size and information to be included on plate labels.

1.6 Safety

A. Not used.

1.7 **Quality Assurance**

A. Not used.

1.8 **Product Delivery, Handling, and Storage**

A. Not used.

1.9 Schedule

A. Not used.

1.10 Instrument Protection, Maintenance and Replacement

- A. The CONTRACTOR shall protect all instruments from damage due to construction operations, weather, traffic, and vandalism.
- B. If an instrument is damaged or becomes inoperative due to inadequate protection by the CONTRACTOR, or due to CONTRACTOR's operations, the CONTRACTOR shall replace the damaged instrument within seventy-two (72) hours at no additional cost to the OWNER.
- C. Extreme care shall be exercised by the CONTRACTOR when filling near and around the settlement plates and risers.

2. <u>MATERIALS</u>

2.1 General

A. All settlement plates materials shall be new.

2.2 **Monitoring Instruments**

2.2.1 Instruments

A. Settlement Plates:

- 1. Provide settlement plate and complete assembly in accordance with the standard details shown on the Contract Drawings.
- 2. Steel plate shall conform to ASTM A36.
- 3. Steel pipe shall be Schedule 40 ASTM A53 Grade A.
- 4. All PVC pipe and fittings shall be Schedule 40.
- 5. Plate labels and band clamps shall be stainless steel.

3. <u>EXECUTION</u>

3.1 <u>Pre-Installation Activities</u>

- A. When settlement plates are received at the site, the CONTRACTOR shall perform the following tests:
 - 1. Check, by comparing with procurement document that dimensions and materials are correct.
 - 2. Verify that all components fit together in the correct configuration.
 - 3. Check all components for signs of damage in transit.
 - 4. Check that quantities received correspond to quantities ordered.

3.2 General

- A. The CONTRACTOR shall install instruments that remain fully functional for a minimum of ten (10) years.
- B. The CONTRACTOR shall notify the CONSTRUCTION MANAGEMENT ENGINEER at least twenty-four (24) hours prior to installing each settlement plate.
- C. As each settlement plate is installed, an installation record sheet shall be prepared, including appropriate items from the following list:
 - 1. Project name.

- 2. Planned location in horizontal position and elevation.
- 3. Personnel responsible for installation.
- 4. Date and time of start and completion.
- 5. Type of backfill used.
- 6. As-built location in horizontal position and elevation.
- 7. Weather conditions at the time of installation.
- 8. A space on record sheet for notes, including problems encountered, delays, unusual features of the installation, and details of any events that may have a bearing on instrument behavior.

3.3 Installation of Settlement Plates

- A. The settlement plates shall be installed in pits, one (1) foot above the geosynthetic cap components in the Vegetative Support Soil at the locations shown on the Contract Drawings. The bottom of plate shall be level and the plate shall be installed with a section of marker pipe plumb before proceeding with stem assembly.
- B. The elevation of the top of the plate shall be surveyed. With plate and marker pipe and casing centered with respect to each other and maintained in a vertical position, the pit shall be backfilled in layers by hand and thoroughly compacted with a jumping jack, plate compactor, or similar equipment.
- C. When the installation of the settlement plate is complete, the CONTRACTOR shall notify the CONSTRUCTION MANAGEMENT ENGINEER so that the elevation of the top of the marker pipe at that time can be determined; and no fill shall be placed until this elevation has been determined.
- D. The settlement plate stem shall be flagged and protected from construction equipment and vehicles. If the settlement plate assembly is disturbed such that is more than ten (10) degrees from vertical, it shall be reset within seven (7) calendar days, unless otherwise directed in writing by the CONSTRUCTION MANAGEMENT ENGINEER. If the settlement plate is damaged, it shall be replaced completely, including reconstruction of the settlement plate, base, and risers. The CONTRACTOR shall resurvey the new settlement plate immediately upon completing the installation. All settlement plate replacement activity will be performed by the CONTRACTOR at no additional cost to the OWNER.
- E. During filling activities, the fill placed within five (5) ft of the settlement plates shall be placed extremely carefully to avoid moving or damaging the plates and pipes. Fill placement could be performed with small equipment or by hand.

- F. Affix stainless steel plate labels to the top of the pipe for each settlement plate with stainless steel band clamps. Labels shall be engraved with the settlement plate identifier and the date of installation.
- G. Settlement plate assemblies shall remain in place at the end of construction and become the property of the OWNER.
- H. The CONTRACTOR shall obtain and record all measurements and elevations necessary for accurate determination of settlement data during construction.

3.4 Data Monitoring, Recording, and Submission

- A. The CONTRACTOR shall monitor the settlement plates until Final Acceptance of the project.
- B. The elevations must be established based on a fixed datum or benchmark located outside the limit of work.
- C. Extreme events such as rainstorms, flooding, or seismic activity shall be recorded. Any damage, repair, or relocation of the settlement plates shall be recorded.
- D. Monitoring data from settlement plates shall be recorded on the CONTRACTOR'S daily reports and tabulated in a tracking spreadsheet that shall be maintained over the entire project. At a minimum, data shall include the date and time of each elevation measurement, weather conditions, the elevation, physical condition of the settlement plate, and any issues encountered. The tracking spreadsheet shall be organized by settlement plate and dates/times. The tracking spreadsheet shall be submitted to the CONSTRUCTION MANAGEMENT ENGINEER every two (2) weeks or when requested.
- E. At a minimum, monitoring shall include the data listed in Table 31 09 13-1 at the frequencies specified.

TABLE 31 09 13-1
Geotechnical Monitoring Requirements

Data to be Monitored	Monitoring Timing/Frequency
Settlement plate elevation	At time of initial installation
Settlement plate top of rod elevation	At time of initial installation
and elevation of ground surface	• Every 2 weeks for the first two months
adjacent to settlement plate	Every month after that until Final Acceptance

-- End of Section --

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SECTION 31 11 00 CLEARING AND GRUBBING

1. **GENERAL**

1.1 Description

1.1.1 Scope of Work

- A. This Section includes requirements for the clearing and grubbing of all areas of Work for the construction of the closure cap, and other areas indicated, including work designated in permits and other agreements, in accordance with the Contract Documents.
- B. Clearing and grubbing shall be limited to only those areas required to perform the work associated with this project. Limits of actual clearing and grubbing shall be coordinated with the CONSTRUCTION MANAGEMENT ENGINEER. CONTRACTOR shall not clear and grub beyond perimeter erosion and sediment control devices.

1.1.2 Related Work Specified Elsewhere

- A. Section 01 70 00, Execution and Closeout Requirements.
- B. Section 31 25 00, Erosion and Sediment Control.

1.2 References

A. Not used.

1.3 Definitions

- A. Clearing is the removal from the ground surface and disposal of trees, brush, shrubs, down timber, decayed wood, other vegetation, concrete, rubbish, and debris, as well as the removal of fences, stockpiled materials, and incidental structures.
- B. Grubbing is the removal and disposal of all stumps, buried logs, roots, matted roots, and organic materials.

1.4 **Qualifications**

A. Not used.

1.5 **Submittals**

A. At least twenty (20) calendar days prior to initiating clearing and grubbing activities, CONTRACTOR shall submit a site plan with the specific areas within the Limit of Disturbance that will require Clearing and Grubbing to execute the work for review and written approval by the CONSTRUCTION MANAGEMENT ENGINEER.

1.6 Safety

A. Not used.

1.7 **Quality Assurance**

A. Not used.

1.8 **Product Delivery, Handling, and Storage**

A. Not used.

1.9 Schedule

A. Not used.

2. MATERIALS

A. Not used.

3. <u>EXECUTION</u>

3.1 Disposition of Trees

- A. Trees and shrubs within the limits of Work shall be removed unless otherwise indicated in the Contract Documents. Do not cut or damage trees outside the limits of Work unless so indicated or unless written permission has been obtained from the OWNER. Written permission shall be furnished to the CONSTRUCTION MANAGEMENT ENGINEER before removal operations commence.
- B. CONTRACTOR shall remove from the site and satisfactorily dispose of all trees, shrubs, stumps, roots, brush, masonry, rubbish, scrap, debris, pavement, curbs, fences and miscellaneous other structures not covered under other sections as shown, specified, or otherwise required to permit construction of the Work.
- C. Unless otherwise directed by OWNER, trees, stumps and other cleared and grubbed material shall be transported offsite by the CONTRACTOR. No cleared or grubbed material may be used in backfill or structural embankments.

- D. Cleared and grubbed material may be ground or chipped onsite to ease in transportation to offsite locations. CONTRACTOR may reuse material onsite as approved in writing by the CONSTRUCTION MANAGEMENT ENGINEER and OWNER.
- E. Burning onsite is prohibited.
- F. Trees and shrubs intended to remain, which are damaged beyond repair or removed, shall be replaced by CONTRACTOR at no additional cost to the OWNER.

3.2 Clearing and Grubbing

- A. CONTRACTOR shall clear and grub items indicated on the Contract Drawings and remove cleared and grubbed material from the site. The CONTRACTOR shall mow existing grass to a height of one (1) inch or less. Vegetative debris must be disposed offsite.
- B. Earthwork operations shall not be started in areas where clearing and grubbing is not complete, with the exception that stumps and large roots may be removed concurrent with excavation and grading. Comply with erosion and sediment control measures in accordance with Specification Section 31 25 00, Erosion and Sediment Control.
- C. Clear and grub areas to be excavated, areas to receive fill, and areas upon which structures are to be constructed. Depressions made by the removal of stumps or roots shall be filled with suitable fill, as determined by the CONSTRUCTION MANAGEMENT ENGINEER. Care is to be taken while grubbing over areas of known waste, not to spread waste beyond the existing limit of waste.
- D. The CONTRACTOR shall clear, grub, and strip the site area as shown on the Contract Drawings. Clearing and grubbing shall be performed in accordance with the sequence of construction as defined on the Contract Drawings.
- E. Contractor shall take care to protect existing landfill gas extraction wells, utilities, and other items marked to remain.

3.3 Surveying

A. Surveying shall be in accordance with Specification Section 01 70 00, Execution and Closeout Requirements.

-- End of Section --

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SECTION 31 25 00 EROSION AND SEDIMENT CONTROL

1. **GENERAL**

1.1 <u>Description</u>

1.1.1 Scope of Work

A. This Section includes requirements related to the CONTRACTOR'S responsibility to furnish all labor, equipment, and materials associated with erosion and sediment control required to complete the Work as shown on the Contract Drawings and specified herein.

1.1.2 Related Work Specified Elsewhere

- A. Section 01 70 00, Execution and Closeout Requirements.
- B. Section 31 05 16, Aggregates.
- C. Section 32 92 19, Upland Meadow Establishment.

1.2 References

- A. Maryland Department of the Environment (MDE). Maryland Standards and Specifications for Soil Erosion and Sediment Control (2011).
- B. Maryland Department of Transportation (MDOT). State Highway Administration (SHA) Standard Specifications for Construction and Materials (2019).

1.3 Definitions

A. Not used.

1.4 Qualifications

A. Not used.

1.5 **Submittals**

A. Product data, source information, and manufacturer's instructions for all materials to be used.

- B. Certificate of training for responsible personnel who will perform inspections required by the General Permit for Discharges of Stormwater Associated with Construction Activity.
- C. Inspection logs as required by the General Permit for Discharges of Stormwater Associated with Construction Activity.
- D. Notice of Termination for the General Permit for Discharges of Stormwater Associated with Construction Activity.

1.6 Safety

A. Safety shall be in accordance with Specification Section 01 45 00, Health and Safety.

1.7 Quality Assurance

- A. All erosion and sediment control work shall comply with applicable requirements of governing authorities having jurisdiction. The Specifications and Contract Drawings are not comprehensive, but rather convey the intent to provide complete erosion and sediment control for the project.
- B. Erosion and sediment control measures shall be established at the beginning of construction and maintained during the entire period of construction. Onsite areas that are subject to severe erosion, and offsite areas that are especially vulnerable to damage from erosion and/or sedimentation, shall be identified and receive special attention.
- C. All land-disturbing activities shall be planned and conducted to minimize the size of the area to be exposed at any one time and the length of the time of exposure.
- D. Surface water runoff originating upgrade of exposed areas shall be controlled to reduce erosion and sediment loss during the period of exposure.
- E. All land-disturbing activities shall be planned and conducted so as to minimize offsite sedimentation.

1.8 Product Delivery, Handling, and Storage

A. Not used.

1.9 **Schedule**

A. Not used.

2. <u>MATERIALS</u>

2.1 General

A. All erosion and sediment control materials shall conform to the requirements of the MDE Water Management Administration, 2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control and subsequent updates, the MDOT SHA Standard Specifications for Construction and Materials, and the Contract Drawings.

2.2 Gabion

- A. Gabion wire shall be galvanized and PVC coated and comply with the requirements of Section 906 of the latest version of the MDOT SHA Standard Specifications for Construction and Materials.
- B. Stone Fill for gabions shall comply with requirements of the project Specifications, Section 31 05 16, Aggregates, Paragraph 2.5, Gabion Stone.

3. EXECUTION

3.1 <u>General Permit for Discharges of Stormwater Associated with Construction Activity</u>

- A. The OWNER has obtained coverage under the Maryland Department of the Environment's General Permit for Discharges of Stormwater Associated with Construction Activity, State Discharge Permit Number 20-CP.
- B. Upon award of this contract, the permit will be transferred to the CONTRACTOR and the CONTRACTOR will be solely responsible for meeting the requirements of the permit.
- C. The CONTRACTOR must submit a copy of all inspection reports to the CONSTRUCTION MANAGEMENT ENGINEER on a weekly basis.
- D. The permit is included in Attachment B.
- E. Submit a Notice of Termination to the CONSTRUCTION MANAGEMENT ENGINEER for approval once construction is complete and final stabilization has been achieved on all portions of the site for which the CONTRACTOR is responsible. Once approved, submit the Notice of Termination to the Maryland Department of the Environment.

3.2 Extent of Work

A. CONTRACTOR shall implement additional erosion and sediment controls as required by the sediment control inspector, Montgomery County Department of Permitting Services, or CONSTRUCTION MANAGEMENT ENGINEER to remain in compliance with applicable local and state regulations. Field changes and minor adjustments from the Contract Drawings are permissible as long as the installation functions and conforms to the Contract Documents.

3.3 General

- A. The CONTRACTOR shall install new erosion and sediment control measures in accordance with the manufacturer's recommendations, the Contract Drawings, the MDE Water Management Administration, 2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control and subsequent updates, and the MDOT SHA Standard Specifications for Construction and Materials.
- B. Sediment removed from erosion and sediment controls may be used in the Work if it meets the specifications. The CONTRACTOR is responsible for proper disposal of sediment if it is not used in the Work.

3.3.1 Stabilized Construction Entrances (SCE)

A. Install stabilized construction entrances in accordance with the details shown on the Contract Drawings. Other perimeter erosion and sediment controls that extend to the SCE shall tie into the mountable berm portion of the SCE as appropriate. SCEs shall be replenished as necessary throughout construction to maintain their required function and when required by the sediment control inspector or CONSTRUCTION MANAGEMENT ENGINEER.

3.3.2 Earth Dikes

A. Install earth dikes as indicated on the Contract Drawings. Accumulated sediment and debris shall be removed to maintain positive drainage as needed.

3.3.3 Soil Stabilization Matting

- A. Install soil stabilization matting as indicated on the Contract Drawings. Material should not be installed if surface condition is unsuitable due to frost, excessive moisture or other condition.
- B. Install turf reinforcement matting at locations shown and/or noted on the Contract Drawings. Installation of the material shall follow the manufacturer recommendations. Enkamat 7010 or approved equal.

3.3.4 Pipe Slope Drains

A. Install pipe slope drains as indicated on the Contract Drawings. Points of inflow and outflow shall be maintained free of erosion. Accumulated sediment and debris shall be removed to maintain positive drainage as needed.

3.3.5 Clear Water Diversions

A. Install clear water diversions as indicated on the Contract Drawings. Points of inflow and outflow shall be maintained free of erosion. Accumulated sediment and debris shall be removed to maintain positive drainage as needed.

3.3.6 Super Silt Fence

A. Install super silt fence as indicated on the Contract Drawings. Any repairs to fencing material shall be made promptly for any super silt fence that is damaged, decomposed, or ineffective. Sediment deposits along fencing shall be removed before deposits reach one-third (1/3) of the height of the barrier. The immediate area occupied by the fence and any sediment deposits shall be shaped to an acceptable grade.

3.3.7 Filter Logs

A. Install filter logs as indicated on the Contract Drawings. Any repairs to filter logs shall be made promptly for any filter logs that are damaged, decomposed, or ineffective. Sediment deposits along filter logs shall be removed before deposits reach one-half (1/2) of the height of the barrier. The immediate area occupied by the filter logs and any sediment deposits shall be shaped to an acceptable grade.

3.3.8 Inlet Protection

A. Install inlet protection as indicated on the Contract Drawings. Accumulated sediment and debris shall be removed to maintain positive drainage as needed.

3.3.9 Temporary Stone Outlet Structure

A. Install temporary stone outlet structures as indicated on the Contract Drawings. Accumulated sediment and debris shall be removed before deposits reach within six (6) inches of the weir crest to maintain positive drainage as needed.

3.3.10 Temporary Gabion Outlet Structure

A. Install temporary gabion outlet structures as indicated on the Contract Drawings. Accumulated sediment and debris shall be removed before deposits reach within twelve (12) inches of the weir crest to maintain positive drainage as needed.

3.3.11 Sump Pit

A. Install and maintain sump pits as indicated on the Contract Drawings.

3.3.12 Filter Bag

A. Install filter bags as indicated on the Contract Drawings. Replace as needed when the bag clogs, rips, tears, or punctures.

3.3.13 Sediment Basin No. 1

- A. Prior to construction of Sediment Basin No. 1, CONTRACTOR shall block and divert all stormwater inlets and pipes that enter existing Pond 3 as indicated on the Contract Drawings. CONTRACTOR shall monitor Pond 3 during the first rain event after mobilization to ensure that the storm drainage conveyance systems have been blocked, that an unknown conveyance into Pond 3 does not exist, and that stable nonerosive conveyance is being provided with the installed diversion controls. Existing flow into Pond 3 identified during the monitoring that could cause life safety, soil stability, constructability, and/or that is beyond the capability of pumping operations using a sump pit or filter bag to convey and/or property filter sediment shall be brought to the attention of the CONSTRUCTION MANAGEMENT ENGINEER. Construction of Sediment Basin No. 1 shall not commence prior to approval of the Montgomery County Department of Permitting Service's Sediment Control Inspector.
- B. CONTRACTOR shall regularly clean the surface of the filter fabric on the dewatering device and replace as necessary to maintain flow.
- C. CONTRACTOR shall remove and replace or otherwise clean the stone cone around the dewatering device as necessary to maintain flow.
- D. CONTRACTOR shall remove accumulated sediment within the sediment basin when the Contract Drawing specified elevation has been reached.
- E. CONTRACTOR shall install temporary chain link construction safety fence around the perimeter of Sediment Basin No. 1 as indicated on the Contract Drawing. CONTRACTOR if responsible for providing security locks and limited access into the fencing throughout construction.
- F. CONTRACTOR shall install, inspect and maintain the baffle board within Sediment Basin No. 1 for the duration of construction. Section of the installed baffle board and/or the supporting posts shall be removed and replaced if damaged or degraded permitting the shortcutting of sediment laden water through the baffle.

3.3.14 Vegetative Stabilization

- A. All areas of disturbance related to construction shall be temporarily or permanently stabilized in accordance with the Contract Drawings and Specification Section 32 92 19, Upland Meadow Establishment.
- B. Same day vegetative stabilization shall be provided in identified areas of the northwest slope and benches within Phases S-I, S-II, S-III, F-I, and F-II, initial infill area of Phases S-IV, S-V, F-III, and F-IV, Sediment Basin No. 1 in Phases S-IV and F-VI, and any other area identified within the Contract Drawings but not explicitly stated in this item.

3.3.1 Temporary Culvert Access

A. Install temporary culvert accesses on the Contract Drawings. Points of inflow and outflow shall be maintained free of erosion. Accumulated sediment and debris shall be removed to maintain positive drainage as needed.

3.4 Erosion and Sediment Control Inspections

A. The CONTRACTOR is responsible for inspecting the erosion and sediment control measures on a regular basis in order to maintain them in good working order and to comply with local, state and federal requirements. The inspection frequency shall be at least weekly and no less than the more restrictive of the requirements of the National Pollutant Discharge Elimination System General Permit for Stormwater Discharge Associated with Construction Activities or the requirements of the local sediment control inspector.

3.5 Removal of Erosion and Sediment Controls

A. Erosion and sediment controls may not be removed until the site is adequately stabilized, written approval is received by the sediment control inspector, and written approval is received from the CONSTRUCTION MANAGEMENT ENGINEER. Upon receiving the necessary written approvals, all erosion and sediment control measures are to be removed and any areas of redisturbance are to be permanently stabilized, unless otherwise noted on Contract Drawings.

-- End of Section --

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SECTION 32 15 00 AGGREGATE SURFACING

1. **GENERAL**

1.1 Description

A. The Work covered by this Section consists of the furnishing, installation, protection, maintenance, and surveying of access roads and includes the furnishing of all labor, materials and equipment required.

1.1.1 Related Work Specified Elsewhere

- A. Section 31 05 16, Aggregates.
- B. Section 31 05 19.13, Geotextiles.

1.2 References

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

1.2.1 ASTM International (ASTM)

A. ASTM D1557 (2012; E 2015) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3) (2700 kN-m/m3).

1.3 Definitions

A. Not used.

1.4 Qualifications

A. Not used.

1.5 **Submittals**

A. Material submittals shall be as required in Specification Section 31 05 16, Aggregates.

1.6 Safety

A. Not used.

1.7 **Quality Assurance**

A. Sampling and testing shall meet the requirements of Specification Section 31 05 16, Aggregates.

1.8 **Product Delivery, Handling, and Storage**

A. Not used.

1.9 Schedule

A. Not used.

2. MATERIALS

2.1 Crusher Run Aggregate

A. Crusher run aggregate shall meet the requirements of Specification Section 31 05 16, Aggregates.

2.2 **Geotextile**

A. Geotextile shall meet the requirements of Specification Section 31 05 19.13, Geotextiles.

3. <u>EXECUTION</u>

3.1 General

- A. Perform construction when the atmospheric temperature is above 35 degrees Fahrenheit.
- B. It is the responsibility of the CONTRACTOR to protect, by approved method or methods, all areas of surfacing that have not been accepted by the CONSTRUCTION MANAGEMENT ENGINEER. Bring surfaces damaged by freeze, rainfall, or other weather conditions to a satisfactory condition.

3.2 **Subgrade Preparation**

- A. Where the access roads are constructed in fill, place and compact the fill soils to their full depth to match surrounding grade, then excavate to place geotextile and crusher run aggregate.
- B. Do not place, spread, or compact acceptable fill material while it is frozen or thawing, or place upon muddy, frozen or thawing ground, while the soil underneath is frozen or thawing, or during unfavorable weather conditions. A compacted layer that has

been frozen shall be reworked, recompacted, and approved in accordance with the requirements specified herein, after thawing before the next lift is placed thereon.

3.3 Layer Thickness

A. Place the aggregate material in two (2) layers of equal thickness. Compact the completed aggregate surface course to the thickness indicated. No individual layer may be thicker than six (6) inches nor be thinner than three (3) inches in compacted thickness. Compact the aggregate surface course to a total thickness that is within one-half (1/2) inch of the thickness indicated. Where the measured thickness is more than one-half (1/2) inch deficient, correct such areas by scarifying, adding new material of proper gradation, reblading, and recompacting as directed. Where the measured thickness is more than one-half (1/2) inch thicker than indicated, the course will be considered as conforming to the specified thickness requirements. Measure the total thickness of the aggregate surface course at intervals of one measurement for each five hundred (500) square yards of surface course. Measure total thickness using three (3)-inch diameter test holes penetrating the aggregate surface course.

3.4 Compaction

A. Degree of compaction is a percentage of the maximum density obtained by the test procedure presented in ASTM D698 abbreviated herein as percent laboratory maximum density. Compact each layer of the aggregate surface course with approved compaction equipment, as required in the following paragraphs. Maintain the water content during the compaction procedure at optimum. Compact the mixture with mechanical tampers in locations not accessible to rollers. Continue compaction until each layer through the full depth is compacted to at least ninety (90) percent of laboratory maximum density. Remove any materials that are found to be unsatisfactory and replace them with satisfactory material or rework them to produce a satisfactory material.

3.5 Grade Control

A. During construction, maintain the lines and grades including crown and cross slope indicated on the Contract Drawings.

3.6 Smoothness Test

A. Construct each layer so that the surface shows no deviations in excess of three-eighths (3/8) inch when tested with a ten (10)-foot straightedge applied both parallel with and at right angles to the centerline of the area to be paved. Correct deviations exceeding this amount by removing material, replacing with new material, or reworking existing material and compacting, as directed.

3.7 Quality Control

- A. Perform each of the following tests on samples taken from the placed and compacted aggregate surface course. Take samples and test at the rates indicated.
 - 1. Perform density tests on every lift of material placed and at a frequency of one (1) set of tests for every two hundred fifty (250) square yards, or portion thereof, of completed area.
 - 2. Measure the thickness of the aggregate surface course at intervals providing at least one (1) measurement for each five hundred (500) square yards of base course or part thereof. Measure the thickness using test holes, at least three (3) inches in diameter through the aggregate surface course.

3.8 Maintenance

A. Maintain the aggregate surface course in a condition that will meet all specification requirements until accepted.

-- End of Section --

SECTION 32 31 13.16 DOG PLAY AREA CHAIN-LINK FENCE ENCLOSURE

1. **GENERAL**

1.1 Related Documents

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

1.2 **Summary**

- A. Section includes:
 - 1. Chain-link fence enclosure.
- B. Related Requirements:
 - 1. Section 03 30 53, Miscellaneous Cast-in-Place Concrete, for cast-in-place concrete footings.
 - 2. Section 06 10 63, Exterior Rough Carpentry, for posts.

1.3 Action Submittals

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
 - a. Fence and gate posts, rails, and fittings.
 - b. Chain-link fabric, reinforcements, and attachments.
 - c. Gates and hardware.
- B. Shop Drawings: For each type of fence and gate assembly.
 - 1. Include plans, elevations, sections, and details.
 - 2. Include hardware and operational clearances.

1.4 Informational Submittals

A. Product Certificates: For each type of chain-link fence and gate.

B. Product Test Reports: For framework strength according to ASTM F1043, for tests performed by manufacturer and witnessed by a qualified testing agency or a qualified testing agency.

1.5 **Quality Assurance**

- A. Testing Agency Qualifications: For testing fence grounding; member company of International Electrical Testing Agency (NETA) or a National Recognized Testing Laboratory (NRTL).
 - 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

1.6 Field Conditions

A. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

1.7 Warranty

- A. Special Warranty: Installer agrees to repair or replace components of chain-link fences and gates that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure to comply with performance requirements.
 - b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
- B. Warranty Period: Two years from date of Substantial Completion.

2. <u>MATERIALS</u>

2.1 Performance Requirements

- A. Structural Performance: Chain-link fence and gate frameworks shall withstand the design wind loads and stresses for fence height(s) and under exposure conditions indicated according to ASCE/SEI 7.
 - 1. Design Wind Load: 139.62 lb.

- a. Minimum Post Size: Determine according to ASTM F1043 for post spacing not to exceed 10 feet (3 m) for Material Group IA, ASTM F1043, Schedule 40 steel pipe.
- b. Minimum Post Size and Maximum Spacing: Determine according to Chain Link Fence Manufacturer's Institute (CLFMI) Wind Load Guide (WLG) 2445, based on mesh size and pattern specified.
- B. Lightning Protection System: Maximum resistance-to-ground value of 25 ohms at each grounding location along fence under normal dry conditions.

2.2 Chain-Link Fence Fabric

- A. General: Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage knuckle or twist according to "CLFMI Product Manual" and requirements indicated below:
 - 1. Fabric Height: As indicated on drawings.
 - 2. Steel Wire for Fabric: Wire diameter of 0.148 inch (3.76 mm)].
 - a. Mesh Size: 2 inches (50 mm).
 - b. Polymer-Coated Fabric: ASTM F668, Class 2a over zinc coated steel wire.
 - 1) Color: Black, according to ASTM F934.
 - c. Coat selvage ends of metallic-coated fabric before the weaving process with manufacturer's standard clear protective coating.
 - 3. Selvage: Knuckled at both selvages.

2.3 Fence Framework

- A. Posts and Rails: ASTM F1043 for framework, including rails, braces, and line; terminal; and corner posts. Provide members with minimum dimensions and wall thickness according to ASTM F1043 based on the following:
 - 1. Fence Height: As indicated on Drawings.
 - 2. Light-Industrial-Strength Material: Group IC-L, round steel pipe, electric-resistance-welded pipe.
 - a. End, Corner, and Pull Posts: 2.375 inches (60 mm).
 - 3. Horizontal Framework Members: Top and bottom rails according to ASTM F1043.

- 4. Top Rail: 1.66 inches (42 mm) in diameter.
- 5. Brace Rails: ASTM F1043.
- 6. Metallic Coating for Steel Framework:
 - a. Type A: Not less than minimum 2.0-oz./sq. ft. (0.61-kg/sq. m) average zinc coating according to ASTM A123/A123M or 4.0-oz./sq. ft. (1.22-kg/sq. m) zinc coating according to ASTM A653/A653M.
- 7. Polymer coating over metallic coating.
 - a. Color: Black, according to ASTM F934.

2.4 Tension Wire

- A. Polymer-Coated Steel Wire: 0.148-inch- (3.8-mm-) diameter, tension wire according to ASTM F1664, Class 2a over zinc-coated steel wire.
 - 1. Color: Black, according to ASTM F934.

2.5 **Swing Gates**

- A. General: ASTM F900 for gate posts and single swing gate types.
 - 1. Gate Leaf Width: 60 inches (1524 mm).
 - 2. Framework Member Sizes and Strength: Based on gate fabric height of 72 inches (1830 mm) or less.
- B. Pipe and Tubing:
 - 1. Zinc-Coated Steel: ASTM F1043 and ASTM F1083; protective coating and finish to match fence framework.
 - 2. Gate Posts: Round tubular steel.
 - 3. Gate Frames and Bracing: Round tubular steel.
- C. Frame Corner Construction: Assembled with corner fittings.
- D. Hardware:
 - 1. Hinges: 180-degree inward swing.
 - 2. Latch: Permitting operation from both sides of gate.
 - 3. Closer: Manufacturer's standard.

2.6 <u>Fittings</u>

- A. Provide fittings according to ASTM F626.
- B. Post Caps: Provide for each post.
 - 1. Provide line post caps with loop to receive tension wire or top rail.
- C. Rail and Brace Ends: For each gate, corner, pull, and end post.
- D. Rail Fittings: Provide the following:
 - 1. Top and Bottom Rail Sleeves: Pressed-steel or round-steel tubing not less than 6 inches (152 mm) long.
- E. Tension and Brace Bands: Pressed steel.
- F. Tension Bars: Steel, length not less than 2 inches (50 mm) shorter than full height of chain-link fabric. Provide one bar for each gate and end post, and two for each corner and pull post, unless fabric is integrally woven into post.
- G. Tie Wires, Clips, and Fasteners: According to ASTM F626.
 - 1. Standard Round Wire Ties: For attaching chain-link fabric to posts, rails, and frames, according to the following:
 - a. Hot-Dip Galvanized Steel: 0.148-inch- (3.76-mm-) diameter wire; galvanized coating thickness matching coating thickness of chain-link fence fabric.

H. Finish:

- 1. Metallic Coating for Pressed Steel or Cast Iron: Not less than 1.2 oz./sq. ft. (366 g/sq. m) of zinc.
 - a. Polymer coating over metallic coating.

2.7 **Grout and Anchoring Cement**

- A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout, recommended in writing by manufacturer, for exterior applications.
- B. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to

erosion from water exposure without needing protection by a sealer or waterproof coating, and that is recommended in writing by manufacturer for exterior applications.

3. <u>EXECUTION</u>

3.1 <u>Examination</u>

- A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.
 - 1. Do not begin installation before final grading is completed unless otherwise permitted in writing by CONSTRUCTION MANAGEMENT ENGINEER.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 Preparation

A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet (152 m) or line of sight between stakes. Indicate locations of utilities, landfill gas extraction wells or other surface and underground infrastructure, underground structures, and benchmarks. Stakes cannot be driven into the ground more than 12 inches. CONTRACTOR to measure and mark a line on the stake indicating 12-inch depth for visual inspection of compliance by the CONSTRUCTION MANAGEMENT ENGINEER.

3.3 Chain-Link Fence Installation

- A. Install chain-link fencing according to ASTM F567 and more stringent requirements specified.
 - 1. Install fencing per contract documents.
- B. Footer Excavation: Excavate for concrete footers to dimensions and spacings indicated on contract documents.
- C. Post Setting: Set wooden posts, predrilled as required, in concrete footers per contract documents at indicated spacing into firm, undisturbed soil.
 - 1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
 - 2. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.

- a. Exposed Concrete: Extend 2 inches (50 mm) above grade; shape and smooth to shed water.
- b. Posts Set into Sleeves in Concrete: Use MPBZ post base sleeves preset and anchored into concrete for installing posts as called for in the Contract Documents. Finish anchorage joint to slope away from post to drain water.
- D. Top and Bottom Rails: Secure to posts with fittings.
- E. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Leave 3-inch (76-mm) bottom clearance between finish grade or surface and bottom selvage unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension bars. Anchor to framework so fabric remains under tension after pulling force is released.
- F. Tension Bars: Thread through fabric and secure to end, corner, pull, and gate posts, with tension bands spaced not more than 15 inches (380 mm) on-center spacing.
- G. Tie Wires: Use wire of proper length to firmly secure fabric to rails. Attach wire at one end to chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach other end to chain-link fabric according to ASTM F626. Bend ends of wire to minimize hazard to individuals and clothing.
 - 1. Maximum Spacing: Tie fabric to posts at 12 inches (300 mm) on-center spacing.
- H. Fasteners: Install nuts for tension bands and carriage bolts on the side of fence opposite the fabric side.

3.4 **Gate Installation**

A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation.

3.5 Adjusting

- A. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches engage accurately and securely without forcing or binding.
- B. Lubricate hardware and other moving parts.

-- End of Section –

32 31 13.16-7

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SECTION 32 33 00 SITE FURNISHINGS

1. **GENERAL**

1.1 Related Documents

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

1.2 **Summary**

A. Section Includes:

- 1. Sloped chaise lounge chair.
- 2. Park bench.
- 3. Trash receptacles.
- 4. Butterfly box.
- 5. Magnifying lens post.
- 6. Stump climb.
- 7. Balance star.
- 8. Tic tac toe.
- 9. Boulder.
- 10. Tunnel.
- 11. Teeter Totter.
- 12. Boulder terrace.
- 13. Owl nesting box.
- 14. Disc golf basket target.
- 15. Disc golf tee post.
- 16. Disc golf tee box.
- 17. Shade structure.
- 18. Weather Station.
- 19. Art Installation.

B. Related Requirements:

- 1. Section 03 30 00 "Cast-in-Place Concrete" for concrete footings.
- 2. Section 31 05 15 "Earthwork" for excavation for installing concrete footings.
- 3. Section 01 33 00 "Submittals" for product approval.

1.3 **Submittals**

A. Product Data: For each type of product submit manufacturer's product data.

- B. Shop Drawings: For custom site furnishings, submit shop drawings including plans and elevations indicating dimensions, details of reinforcement, anchorages, and indication of exposed finished surfaces.
- C. Samples: For each exposed product and for each color and texture specified.
- D. Product Schedule: For site furnishings. Use same designations indicated on Contract Drawings.
- E. Maintenance Data: For site furnishings to include in maintenance manuals.

2. MATERIALS

2.1 Sloped Chaise Lounge Chair

- A. Subject to compliance with requirements, provide the following product or approved equivalent:
 - 1. Basis of design product: Streetlife, Rough & Ready Lounger (R&R-LNG-230).
 - 2. Comparable products submitted and approved in accordance with requirements of Section 01 33 00 "Submittals".
- B. Construction:
 - 1. Materials:
 - a. Seat: Untreated FSC 100% certified Louro Gamela hardwood
 - b. Support and mounting comb: Hot dip galvanized steel.
 - 2. Dimensions:
 - a. Overall Seat: 91" x 35" x 18"/46" (1 x w x h1/h2)
 - b. Wood Slats: 35" x 6" x 3" (1 x w x depth)
 - c. Support: 24" x 8" x 10" (1 x w x depth)
 - 3. Mounting: Surface mount to concrete footer.

2.2 Park Bench

- A. Custom construction as detailed in contract documents.
- B. Construction:
 - 1. Materials:

- a. Seat: Untreated Northern white cedar.
- b. Support: Hardwood trunk section.

2. Dimensions:

- a. Seat: 90" x 12" x 3" (1 x w x h)
- b. Support: 33" x 18" (ht x dia.)
- 3. Mounting: Secure seat to support using 6" hex washerhead stainless steel screw, 2 each side of support, countersink ½" below surface of support.

2.3 Trash Receptacle

- A. Subject to compliance with requirements, provide the following product or approved equivalent:
 - 1. Basis of design product: Victor Stanley, Model SD-42.
 - 2. Comparable products submitted and approved in accordance with requirements of Section 01 33 00 "Submittals".

B. Construction:

- 1. Materials:
 - a. Exterior: 3/8" vertical solid steel bars; ½" x 2½" horizontal solid steel bands; ½" x 2" upper steel support bars, 3/8" x 3" lower steel support bars; 5/8" solid steel top ring; leveling feet with a 3/8" diameter threaded steel shaft. Stainless steel pivot pins for door movement, 3/16" solid steel latch assembly.
 - b. Liner: 36-gallon capacity high density plastic.
- 2. Mounting: Surface mount to concrete footer with manufacturer supplied mounting plate.
- 3. Options: Rain bonnet lid.
- 4. Color: Gray
- 5. Finish: Polyester powder-coated.

2.4 Butterfly Box

A. Subject to compliance with requirements, provide the following product or approved equivalent:

- 1. Basis of design product: Gardener's Supply Company, Butterfly Townhouse Shelter.
- 2. Comparable products submitted and approved in accordance with requirements of Section 01 33 00 "Submittals".

B. Construction:

- 1. Materials: Mango wood, painted.
- 2. Dimensions: 6 3/4" x 25" x 5 3/4" (w x height x depth).
- 3. Mounting: Galvanized steel post 1 ½" dia., ¼" thick and galvanized steel mounting bracket 8" x 16"; surface mount to concrete footer.

2.5 Magnifying Lens Post

- A. Custom construction as detailed in contract documents.
- B. Construction:
 - 1. Materials: Western red cedar post.
 - 2. Dimensions: 6" x 6" x 36" (1 x w x height)
 - 3. Mounting: Surface mount to concrete footer with 6" x 6" x 3/8" (1 x w x depth) galvanized steel mounting bracket.
 - 4. Finish: Untreated.
 - 5. Lens: 4" x 4" magnifying lens, 5 x magnification, inset in 6" x 6" stainless steel plate/post cap.

2.6 Stump Climb

- A. Custom construction as detailed in contract documents.
- B. Construction:
 - 1. Materials: Hardwood trunk section; 9 stumps per grouping.
 - 2. Dimension range:
 - a. Min. 18" x 18" (h x dia.)
 - b. Max. 36" x 36" (h x dia.)

2.7 Balance Star

- A. Custom construction as detailed in contract documents.
- B. Construction:
 - 1. Materials:
 - a. Beams: Untreated Northern white cedar.
 - b. Support: Hardwood trunk section.
 - 2. Dimensions:
 - a. Beams: 3" x 6" x 120" (1 x w x h)
 - b. Support: 33" x 24" (h x dia.)
 - 3. Mounting: Secure beams to support using 6" hex washerhead stainless steel screw, drilled from top surface of support; 2 each support, countersink ½" below surface of support.

2.8 <u>Tic Tac Toe</u>

- A. Custom construction as detailed in contract documents.
- B. Construction:
 - 1. Materials: Hardwood trunk section.
 - 2. Dimension:
 - a. Min. 30" x 18" (h x dia.)

2.9 Boulder

- A. Locally sourced landscape boulder.
- B. Construction:
 - 1. Dimension Range:
 - a. Height: Min. 30", Max. 48"
 - b. Length/Width: Min. 36", Max. 60"
 - 2. File as needed to remove all sharp exposed edges.

2.10 Tunnel

- A. Reinforced concrete cylinder pipe.
- B. Construction:
 - 1. Dimension:
 - a. 48" x 144" (dia. x 1)

2.11 <u>Teeter Totter</u>

- A. Custom construction as detailed in contract documents.
- B. Construction:
 - 1. Materials: Untreated Northern white cedar.
 - 2. Dimensions: Varies, see contract documents.
 - 3. Mounting: Surface mount to concrete footer with 8" x 8" x 3/8" (1 x w x d) galvanized steel mounting bracket.

2.12 **Boulder Terrace**

- A. Locally sourced landscape boulder. Refer to Contract Documents for overall dimensions of each Boulder Terrace installation.
- B. Construction:
 - 1. Dimension range for each boulder:
 - a. Height: 20" Min. 28" Max.
 - b. Length/Width: Min. 72", Max. 90"
 - 2. File as needed to remove all sharp exposed edges.
 - 3. Minimal height variation in slope of exposed surface.

2.13 Owl Nesting Box

- A. Subject to compliance with requirements, provide the following product or approved equivalent:
 - 1. Basis of design product: Barn Owl Box Company, Barn owl box.
 - 2. Comparable products submitted and approved in accordance with requirements of Section 01 60 00 "Product Requirements".

B. Construction:

- 1. Materials: molded plastic, double box
- 2. Dimensions: 17 ½" x 17 ½" x 27" (w x h x d)
- 3. Mounting: Galvanized steel post 3" dia. ¼" thick and galvanized steel mounting bracket 8" x 16"; surface mount to concrete footer.
- 4. Finish: White outer box, brown inner box.

2.14 <u>Disc Golf Basket Target</u>

- A. Subject to compliance with requirements, provide the following product or approved equivalent:
 - 1. Basis of design product: DGA Mach 7 permanent disc golf basket.
 - 2. Comparable products submitted and approved in accordance with requirements of Section 01 60 00 "Product Requirements".

B. Construction:

- 1. Materials: Hot dip galvanized steel 2" dia. pole, 28 sting chain assembly, and trapper basket.
- 2. Dimensions: 23" dia. x 48 2 ½" (w x height)
- 3. Mounting: Surface mount to concrete footer with 8" x 8" x 3/8" (1 x w x d) mounting bracket.
- 4. Finish: Galvanized steel.
- 5. Options: High visibility vinyl ring.

2.15 <u>Disc Golf Tee Post</u>

- A. Custom construction as detailed in contract documents.
- B. Construction:
 - 1. Materials: Western red cedar post.
 - 2. Dimensions: 6" x 6" x 36" (l x w x height)
 - 3. Mounting: Surface mount to concrete footer with 6" x 6" x 3/8" (1 x w x d) galvanized steel mounting bracket.
 - 4. Finish: Untreated.

2.16 <u>Disc Golf Tee Box</u>

- A. Custom construction as detailed in contract documents.
- B. Construction:
 - 1. Materials: Untreated northern white cedar.
 - 2. Dimensions: 144"/60" x 6" x 6" (1 x w x d)
 - 3. Mounting: Secure with #3 rebar, countersink ½" below surface.
 - 4. Finish: Ground contact pressure treated.
 - 5. Weed Barrier: Polypropylene landscape fabric.

2.17 **Shade Structure**

- A. Custom construction as detailed in contract documents.
- B. Construction:
 - 1. Materials: Western red cedar.
 - 2. Dimensions:
 - a. Posts 6" x 6" x 103"
 - b. Beam 2" x 8", cut to length and dimensions as shown in Contract Documents.
 - c. Slats 1" x 4" x 12"
 - 3. Mounting: Surface mount to concrete footer with 6" x 6" x 3/8" (1 x w x depth) galvanized steel mounting bracket.
 - 4. Finish: Untreated.

2.18 Weather Station

- A. Prior to beginning construction, the CONSTRUCTION MANAGEMENT ENGINEER will relocate the existing weather station to an area within or near Phase S-VI to remain operational during construction. The CONTRACTOR shall communicate with the CONSTRUCTION MANAGEMENT ENGINEER when the proposed final location for the weather station is at grade and ready for relocation by others.
- B. CONTRACTOR shall provide a small concrete footer for the weather station. The final location and size will be determined during construction and will be paid at Contract unit prices.

2.19 Art Installation

A. Custom construction as detailed in contract documents.

B. Construction:

- 1. Materials: Galvanized steel.
- 2. Dimensions:
 - a. Posts: 10'- 0" Ht.; 4" Dia.; 1/4" Depth.
 - b. Panel: ½" Depth; Laser cut to dimensions shown in contract documents and welded smooth; All over ¼" Dia. Perforations.
- 3. Mounting: Surface mount to concrete footer with 10" x 10" x ½" (1 x w x depth) galvanized steel mounting bracket.
- 4. Finish: Powder coat red.

2.20 <u>Materials</u>

- A. Steel and Iron: Free of surface blemishes and complying with the following:
 - 1. Plates, Shapes, and Bars: ASTM A36/A36M.
 - 2. Steel Pipe: Standard-weight steel pipe complying with ASTM A53/A53M, or electric-resistance-welded pipe complying with ASTM A135/A135M.
 - 3. Tubing: Cold-formed steel tubing complying with ASTM A500/A500M.
 - 4. Sheet: Commercial steel sheet complying with ASTM A1011/A1011M.
- B. Wood: Surfaced smooth on four sides with eased edges; kiln dried, free of knots, solid stock of species indicated.
 - 1. Wood Species:
 - a. FSC 100% certified Louro Gamela hardwood.
 - b. Western Red Cedar.
 - c. Northern White Cedar.
 - d. Mango.
 - e. Hardwoods: Oak, Walnut, Maple, Beech.
- C. Plastic: Color impregnated, color and UV-light stabilized, and mold resistant.
- D. Polyethylene: Fabricated from virgin plastic HDPE resin.
- E. Anchors, Fasteners, Fittings, and Hardware: Manufacturer's standard, corrosion-resistant-coated or noncorrodible materials; commercial quality.

- F. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M; recommended in writing by manufacturer, for exterior applications.
- G. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound; resistant to erosion from water exposure without needing protection by a sealer or waterproof coating; recommended in writing by manufacturer, for exterior applications.
- H. Galvanizing: Where indicated for steel and iron components, provide the following protective zinc coating applied to components after fabrication:
 - 1. Zinc-Coated Tubing: External, zinc with organic overcoat, consisting of a minimum of 0.9 oz./sq. ft. (0.27 kg/sq. m) of zinc after welding, a chromate conversion coating, and a clear, polymer film. Internal, same as external or consisting of 81 percent zinc pigmented coating, not less than 0.3 mil (0.0076 mm) thick.
 - 2. Hot-Dip Galvanizing: According to ASTM A123/A123M, ASTM A153/A153M, or ASTM A924/A924M.

2.21 Fabrication

- A. Metal Components: Form to required shapes and sizes with true, consistent curves, lines, and angles. Separate metals from dissimilar materials to prevent electrolytic action.
- B. Welded Connections: Weld connections continuously. Weld solid members with full-length, full-penetration welds and hollow members with full-circumference welds. At exposed connections, finish surfaces smooth and blended, so no roughness or unevenness shows after finishing and welded surface matches contours of adjoining surfaces.
- C. Pipes and Tubes: Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.
- D. Exposed Surfaces: Polished, sanded, or otherwise finished; all surfaces smooth, free of burrs, barbs, splinters, and sharpness; all edges and ends chamfered or capped as indicated in contract documents.
- E. Factory Assembly: Factory assemble components to greatest extent possible to minimize field assembly. Clearly mark units for assembly in the field.

2.22 General Finish Requirements

A. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.23 **Steel and Galvanized-Steel Finishes**

- A. Powder-Coat Finish: Manufacturer's standard polyester, powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.
- B. PVC Finish: Manufacturer's standard, UV-light stabilized, mold-resistant, slip-resistant, matte-textured, dipped or sprayed-on, PVC-plastisol finish, with flame retardant added; complying with coating manufacturer's written instructions for pretreatment, application, and minimum dry film thickness.

3. EXECUTION

3.1 Examination

- A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance of the Work.
- B. Locate and mark subsurface utilities in the area of work before installation to avoid conflicts. Landfill gas piping is the only known subsurface utility that will be present. Notify CONSTRUCTION MANAGEMENT ENGINEER of any conflicts and obtain written approval from the CONSTRUCTION MANAGEMENT ENGINEER for any changes before proceeding with the installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 Installation

- A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.
- B. Unless otherwise indicated, install site furnishings after landscaping and installation of gravel access roads have been completed.
- C. Install site furnishings level, plumb, true, and securely anchored at locations indicated on Drawings. Install in accordance with the details as shown on the CONTRACT DRAWINGS.
- D. Post Setting: Refer to contract drawings for additional information on size of mounting brackets.

E. Boulder Terrace: Install boulder terrace in locations shown on the Contract Drawings. Increase soil depth to ensure positive drainage away from and around the boulder terrace. A minimum of 12-inch separation between the lowest point of the boulder terrace installation and geosynthetics is required. Soil shall be a consistent depth under the entire boulder terrace to provide for a uniform load. The entire bottom surface of the boulder is to be in contact with the soil.

-- End of Section -

SECTION 32 92 19 UPLAND MEADOW ESTABLISHMENT

1. **GENERAL**

1.1 Description

A. This Section includes requirements for seeding and mulching to the limits shown and as required for restoration and stabilization of all disturbed areas, and as specified in the Contract Documents and directed by the CONSTRUCTION MANAGEMENT ENGINEER.

1.2 Related Work Specified Elsewhere

- A. Section 01 33 00, Submittals.
- B. Section 01 40 00, Quality Control.
- C. Section 01 70 00, Execution and Closeout.
- D. Section 31 25 00, Erosion and Sediment Control.

1.3 References

- A. Maryland Department of the Environment. Maryland Standards and Specifications for Soil Erosion and Sediment Control (2011).
- B. Maryland Department of Transportation (MDOT) State Highway Administration (SHA). Standard Specifications for Construction and Materials (2018).
- C. Montgomery County Department of Permitting Services, Sediment Control Permit.

1.4 Quality Assurance

- A. The Geotechnical Testing Laboratory shall serve as the Quality Control Laboratory and shall meet the qualifications in Specification Section 01 40 00, Quality Control. The CONTRACTOR shall submit soil samples to the Geotechnical Testing Laboratory to confirm acceptable soil conditions exist, as shown in the Contract Documents.
- B. Obtain a certification of compliance from seed supplier to assure sufficient seed species percentages in the mixture, purity, germination rate, and maximum weed seed content of the grass seed mixture.

- C. Regulatory Requirements: Comply with the Agricultural Article of the Annotated Code of Maryland, Section 15.08.01, Maryland Seed Law; seed shall be certified by the Maryland Department of Agriculture.
- D. Source Quality Control: Each seed species shall be tested by the grower or distributor for purity, germination, and weed seed; and carry tags provided by the grower or distributor that indicate test results.
- E. Herbicide Application: All herbicides shall be applied by or under the direct supervision of a Maryland Certified Pesticide Applicator.

1.5 **Submittals**

- A. Submit, in accordance with Specification Section 01 33 00, Submittals, certificates of compliance before delivery of materials for the following items:
 - 1. Seed.
 - 2. Sod.
 - 3. Fertilizer.
 - 4. Lime.
 - 5. Mulch.
- B. Manufacturer's and/or source data for topsoil.
- C. Certified chemical and mechanical analysis of samples of topsoil, soil mixes, soil amendments and organic compost materials used in making of soil mixes.
- D. Landscaper's Qualifications: Company name and individual performing meadow establishment, and a list with references of three (3) projects of similar magnitude completed within the last eight (8) years. Company name and individual performing pesticide applications, including current MD Department of Agriculture Certified Pesticide Applicator Number.
- E. Topsoil: Certificate of compliance from a laboratory approved by the CONSTRUCTION MANAGEMENT ENGINEER, stating pH, texture, and percent of organic content.
- F. Soil Test Results: Provide soil testing of existing soil identifying pH, fertility, and soil structure.
- G. Certificate of compliance from the seed supplier stating percentages of the mixture, purity, germination rate, and maximum weed seed content of the grass seed mixture.
- H. Seeding Schedule: Develop a Schedule that provides dates for completing major operations of the Contract, including herbicide application, mowing, tilling / scarifying, and seeding. Submit the written Schedule to the CONSTRUCTION

- MANAGEMENT ENGINEER at least twenty (20) calendar days before beginning operations for approval.
- I. Provide samples and technical data for all other products listed in Part 2 of this Specification section for testing and visual inspection.
- J. Integrated Pest Management (IPM) Program: Develop an IPM Program that includes methods of pest monitoring for noxious weed and invasive species control, pesticide selection, application rates, and scheduling. IPM Program shall include monthly inspections to identify and spot spray noxious weed and invasive species. The inspector shall have knowledge and be able to identify 90% of species on the following lists.
 - 1. List of Invasive Species of Concern established by the Maryland Invasive Species Council.
 - 2. List of Maryland Noxious Weeds regulated by the Maryland Department of Agriculture.

Submit the IPM Program prior to commencing seeding operations to the CONSTRUCTION MANAGEMENT ENGINEER for review and approval.

- K. Establishment Schedule: The Establishment Schedule shall include dates for Upland Meadow Establishment maintenance operations such as mowing. Submit the Establishment Schedule when seeding operations are completed to the CONSTRUCTION MANAGEMENT ENGINEER for review and approval.
- L. Management Plan: Provide a plan for management of the meadow throughout the establishment phase until final acceptance. Plan should include plans and schedule for watering, annual mowing, and invasive management.

1.6 Delivery, Storage, Handling, Protection

- A. Deliver the material in packages of uniform weight that do not exceed 75 pounds (lb) (34 kilograms) net weight and bear the name of the manufacturer, the net weight, and supplemental statement of the net weight content.
- B. Store seed in a cool, dry place. Do not allow seed to get wet or freeze.
- C. Meadow Seed Mixes shall be mixed by the grower or distributer in advance of delivery.

2. <u>MATERIALS</u>

- A. Topsoil may be sourced from onsite stockpiled material or brought from offsite and shall meet the requirements of MDOT SHA Section 920.01.02. Topsoil shall only be provided for the permanent improved areas and shall be placed in a 4-inch layer.
- B. Topsoil shall be free from foreign material such as hard pan, stones larger than 1-inch diameter, concrete, cinders, brick asphalt, or other undesirable materials. It shall also be reasonably free from weeds and objectionable plant material.
- C. Meadow Mix #1: Upland Deer Tolerant Meadow Seed Mix:
 - 1. Basis of Design: Custom Seed Mix by Ernst Conservation Seeds. www.ernstseed.com, or approved equal.

% of			Cultivar/
Mix	Latin Name	Common Name	Ecotype
1.3	Asclepias tuberosa	Butterfly Milkweed	Any
1.3	Aster oblongifolius	Aromatic Aster	PA
1.3	Aster prenanthoides	Zig Zag Aster	PA
0.3	Baptisia tinctoria	Wild Indigo	PA
4.0	Chamaecrista fasciculata	Partridge Pea	PA
4.0	Coreopsis lanceolata	Lance Leaf Coreopsis	Any
8.6	Echinacea purpurea	Purple Coneflower	Any
20.0		Virginia Wildrye	PA
0.3	Eragrostis spectabilis	Purple Lovegrass	PA
0.7	Eupatorium coelestinum	Mistflower	VA
0.2	Geum canadense	White Avens	PA
2.6	Heliopsis helianthoides	Ox-Eye Sunflower	PA
0.5	Liatris spicata	Spiked Gayfeather	PA or any
1.0	Liatris squarrosa	Scaly Blazing Star	VA
0.4	Monarda fistulosa	Wild Bergamot	FIG (PA)
0.3	Monarda punctata	Dotted Mint	MD or APB
0.3	Oenothera fruticosa	Sundrops	PA
19.0	Panicum anceps	Beaked Panicgrass	MD
3.0	Panicum sphaerocarpon	Roundseeded Panicgrass	PA
0.4	Penstemon canescens	Grayhairy Beardtongue	WV
0.7	Penstemon digitalis	Tall White Beardtongue	PA
0.4	Penstemon hirsutus	Hairy Beardtongue	PA
0.9	Pycnanthemum tenuifolium	Narrow Leaved Mountain Mint	PA
0.7	Rudbeckia fulgida	Orange Coneflower	VA
4.0	Rudbeckia hirta	Black Eyed Susan	PA or any
20.0	Schizachyrium scoparium	Little Bluestem	PA or
			Camper

% of			Cultivar/
Mix	Latin Name	Common Name	Ecotype
1.0	Senna hebecarpa	Wild Senna	WV
0.6	Solidago nemoralis	Gray Goldenrod	PA
0.2	Solidago odora	Licorice Scented Goldenrod	PA
1.5	Tradescantia ohiensis	Ohio Spiderwort	PA
0.5	Zizia aurea	Golden Alexanders	PA
100	Total		

- 2. By seed count this mix has approximately 357,000 seeds/lb and is 28.1% grasses and 71.9% wildflowers.
- 3. If an item in this mix is not available, add its percentage to a member of the same genera in the mix or to Schizachyrium scoparium. Mix shall include no less than 25 individual species.

4. Seeding Rates:

- a. On sites with slope less than 3:1, apply this mix at 10 lb PLS or 15 bulk lb/acre along with a cover crop.
- b. If slope is 3:1, this mix may be applied at 14 lb PLS or 20 bulk lb/acre along with a cover crop and possibly an erosion control blanket.

D. Meadow Mix #2: Active Areas: Three-Way Tall Fescue Mix

- 1. Basis of Design: Three-Way Tall Fescue Mix by Ernst Conservation Seeds. www.ernstseed.com, or approved equal.
- 2. Mix Composition ERNMX-136
 - a. 34.0% Festuca arundinacea, "Firecracker SLS" turf type Tall Fescue
 - b. 33.0% Festuca arundinacea, "Ninja III" Tall Fescue
 - c. 33.0% Festuca arundinacea, "Valkyrie LS" turf type Tall Fescue
- 3. Seeding Rate: 7=10 lb/1,000 square feet.
- E. Meadow Mix #3: Upland Deer Tolerant Meadow Seed Mix:
 - 1. To be used where slopes are steeper than 3:1 and as indicated on the plans.
 - 2. Basis of Design: Custom Seed Mix by Ernst Conservation Seeds. www.ernstseed.com, or approved equal.

% of			Cultivar/
Mix	Latin Name	Common Name	Ecotype
0.2	Asclepias tuberosa	Butterfly Milkweed	Any
0.2	Aster oblongifolius	Aromatic Aster	PA
0.2	Aster prenanthoides	Zig Zag Aster	PA
1.6	Chamaecrista fasciculata	Partridge Pea	PA
1.3	Coreopsis lanceolata	Lance Leaf Coreopsis Any	
2.8	Echinacea purpurea	Purple Coneflower	Any
22.2	Elymus virginicus	Virginia Wildrye	PA
0.1	Eragrostis spectabilis	Purple Lovegrass	PA
0.1	Eupatorium coelestinum	Mistflower	VA
0.1	Geum canadense	White Avens	PA
0.9	Heliopsis helianthoides	Ox-Eye Sunflower	PA
0.1	Liatris spicata	Spiked Gayfeather	PA or any
0.1	Liatris squarrosa	Scaly Blazing Star	VA
0.2	Monarda fistulosa	Wild Bergamot	FIG (PA)
0.2	Monarda punctata	Dotted Mint	MD or APB
0.1	Oenothera fruticosa	Sundrops	PA
31.1	Panicum anceps	Beaked Panicgrass	MD
	Panicum sphaerocarpon	Roundseeded Panicgrass	PA
0.1	Penstemon canescens	Grayhairy Beardtongue	WV
0.2	Penstemon digitalis	Tall White Beardtongue	PA
0.1	Penstemon hirsutus	Hairy Beardtongue	PA
0.2	Pycnanthemum tenuifolium	Narrow Leaved Mountain Mint	PA
0.1	Rudbeckia fulgida	Orange Coneflower	VA
1.3	Rudbeckia hirta	Black Eyed Susan	PA or any
31.1	Schizachyrium scoparium	Little Bluestem	PA or
			Camper
0.4	Senna hebecarpa	Wild Senna	WV
	Solidago nemoralis	Gray Goldenrod	PA
	Solidago odora	Licorice Scented Goldenrod	PA
0.3	Tradescantia ohiensis	Ohio Spiderwort	PA
0.1	Zizia aurea	Golden Alexanders	PA
100	Total		

- 3. By seed count this mix has approximately 234,000 seeds/lb and is 63.7% grasses and 36.3% wildflowers.
- 4. If an item in this mix is not available, add its percentage to a member of the same genera in the mix or to Schizachyrium scoparium. Mix shall include no less than twenty-five (25) individual species.

5. If an item in this mix is not available, add its percentage to a member of the same genera in the mix or to Schizachyrium scoparium. Mix shall include no less than twenty-five (25) individual species.

6. Seeding Rates:

a. On sites with slope that are slightly greater than 3H:1V, apply this mix at 45 bulk lb/acre along with a cover crop and an erosion control blanket.

F. Cover Crops:

- 1. Seed a cover crop of grain crops, at the time of seeding, based on the following recommendations:
 - a. Grain oats (1 Jan to 30 Apr; 30 lb/acre)
 - b. Brown top millet (1 May to 31 Aug; 10 lb/acre)
 - c. Grain rye (1 Sept to 31 Dec; 30 lb/acre)

G. Mulch:

- 1. Mulch and mulch anchoring for protection of temporary and permanent seeding shall be in accordance with Contract Documents.
- 2. Mulch application rates shall be in accordance with Contract Documents.
- 3. In locations where soil stabilization matting is used, no mulch is required to protect temporary or permanent seeding. Refer to Specification Section 31 25 00, Erosion and Sediment Control.
- 4. Straw Mulch: For areas where erosion control blankets are not used, provide straw mulch that consists of thoroughly threshed cereal grains that is free of mold, foreign substances, or noxious weeds and weed seeds.
- 5. Erosion Control Blankets: For Meadow Mix #3 provide a 100% biodegradable woven bristle coir stabilization matting with 48% open area.

H. Fertilizer:

- 1. The CONTRACTOR shall submit soil samples to the Geotechnical Testing Laboratory or an approved soils testing laboratory for recommended adjustments to fertilizer and lime application rates shown on Contract Drawings. Recommendations shall be submitted to and approved by the CONSTRUCTION MANAGEMENT ENGINEER before implementation.
- 2. Fertilizer shall be uniform in composition, free-flowing, and delivered to the site fully labeled according to applicable state fertilizer laws and shall bear the name,

trade name or trademark, and warranty of the producer. Fertilizer shall be in accordance with Contract Documents.

I. Water: Use only potable water from fresh water sources, free of injurious chemicals and other toxic substances harmful to plant life.

3. EXECUTION

3.1 <u>Temporary and Permanent Seeding</u>

A. Temporary and permanent seeding shall be installed as shown on the Contract Drawings.

3.2 <u>Time Restrictions</u>

- A. When permanent seeding is specified or directed but seeding is not allowed because of specified time restrictions, utilize one or more of the following methods to prevent erosion and sedimentation until such time as permanent seeding or sodding is allowed:
 - 1. Place and anchor straw mulch or wood chips.
 - 2. Prepare soil as for permanent seeding and then mulch as specified; overseed during the next seasonal seeding period.
 - 3. Provide other erosion control measures acceptable to the CONSTRUCTION MANAGEMENT ENGINEER.
- B. Perform seeding when the temperature is above 32° F and the soil is not frozen. Spring planting shall be between the dates of February 15th through June 15th; fall planting shall be between the dates of September 1st through November 30th.

3.3 Preparation

- A. Mark areas to be seeded and obtain approval from the CONSTRUCTION MANAGEMENT ENGINEER before applying herbicide, mowing, or beginning seeding operations.
- B. Treatment of Invasives: After a period of approximately 3 months of the growing season, during which time growth is approximately 6 inches in height, apply a non-selective herbicide to eliminate undesirable vegetation.
 - 1. Treatments shall occur when air temperatures are above 65 °F and on a windless day. Ensure herbicides are nontoxic for aquatic environments, spraying shall not occur within 25 feet of any waterway. Use caution to avoid off-target drift when applying herbicides adjacent to vegetation to remain.

2. Apply a glyphosate product @ 2% with wetting agent and dye in conformance with the IPM Program a minimum of ten (10) days before seeding as follows:

MATERIAL	RATE PER ACRE
Glyphosate Herbicide	5 lb. of active ingredient
Marking Dye	6 to 15 oz.
Water	To 50 gallon

Follow with a second application one month later to address skips or persistent species.

C. Debris Removal: Any and all debris encountered shall be removed, including rocks greater than 1-inch diameter and residual plant biomass, and hauled away by the CONTRACTOR.

3.4 Application

- A. Broadcast Seeding: In areas where Upland Meadow Establishment and Forest Plantings areas overlap, use a broadcast seed method. Mix the cover crop seeds and upland meadow seeds, at the rates specified. Spread seed mixture evenly over the prepared site using a broadcast spreader.
- B. Drill Seeding: In areas where Upland Meadow Establishment is located in an open field, use a drill seed method. Mix the cover crop seeds and upland meadow seeds, at the rates specified. Spread seed mixture evenly over the prepared site using a Seed Drill with Rake.
- C. Seeding on Steep Slopes: Run machinery perpendicular to the slope.
- D. Firm the Soil: In order to achieve a good seed-to-soil contact, firm the soil using a roller to press seeds into the soil. Seeds shall be planted no deeper than ¼ inch. Perform seed establishment to the lines, grades, and limits shown on the contract documents.
- E. Mulch: Spread a ½ inch layer of straw mulch over the area of meadow immediately after seeding. If using a mulch blower, ensure material is in an air-dry condition. Mulch shall be secured using a tackifier.
- F. Erosion Control Blanket: Where specified install an erosion control blanket immediately after seeding.
 - 1. Unroll in the direction of the flow of water. Lay matting smoothly in firm, uniform contact with the soil surface, without stretching or tenting. Overlap with the upslope portion on top. Overlap at least 2 inches and ends at least 6 inches.

- 2. Secure matting with a U-shaped staple, 8-inches in length, driven perpendicular to the soil grade and flush with the surface of the matting.
- 3. Placement of staples per the follow table:

Area of Matting	Maximum Distance Between
	Fasteners
Uppermost or Leading Edge of Matting	6-inch
Overlapping Edges of Matting	18-inch
Lowermost or Toe-Edge of Matting	18-inch

- G. Stabilization: Same day stabilization is required including seed application and straw mulch for all scarified areas.
- H. Watering: Gently apply water over the surface of erosion control blanket or straw mulch to wet the soil at least 2-inch depth. Apply water weekly for the first 2 months.

3.5 Acceptance

A. Seed Phase Acceptance: Submit a request for Seeding Phase Acceptance when operations are completed and provide the Establishment Phase Schedule. The CONSTRUCTION MANAGEMENT ENGINEER shall perform an inspection to verify completion and provide Seeding Phase Acceptance if all requirements have been met.

3.6 Maintenance

A. Establishment Phase: The Establishment Phase begins upon Seed Phase Acceptance. Areas of seeding shall be maintained for a period of 36 months after Seed Phase Acceptance and accepted in writing by the CONTRACT MANAGEMENT ENGINEER. Seed Phase Acceptance will be issued for each Final Phase defined on the Drawings.

B. Mowing:

- 1. During the first growing season, when the meadow vegetation reaches a height of 18 inches 24 inches, approximately every 6 weeks, use a mower to trim the meadow to a height of 8 inches. Mowing shall cease by mid-September.
- 2. Annually, prior to new spring growth, trim any material standing from the previous year to approximately 2 inches.
- 3. During the second growing season, if the meadow has a heavy presence of Ragweed or Foxtail, trim the meadow to a height of 8 inches. Mowing shall cease by mid-September.

C. Weed Control: Implement weed control in accordance with the IPM Program.

D. Inspections:

- 1. Conduct inspections for invasive species with the CONSTRUCTION MANAGEMENT ENGINEER on or about July 15.
- 2. CONTRACTOR shall inspect seeded areas for failures in need of repairs due to poor vegetative growth, traffic or equipment damage, weather damage, or erosion.
- E. Watering: Water weekly the first two months and throughout the first growing season during droughts when rain has not occurred over a 10-day period, or as necessary to maintain adequate moisture in the upper 4 inches of soil.

F. Repairs and Reseeding:

- 1. Provide repairs or reseeding during specified planting seasons for areas where they are deemed necessary by the CONSTRUCTION MANAGEMENT ENGINEER at no additional cost to the OWNER.
- 2. Reseed using the broadcast seeding method.
- 3. If a stand of turf is inadequate as determined by the CONSTRUCTION MANAGEMENT ENGINEER, overseed and fertilize using half of the rates originally applied. If the stand is over 60% damaged, as determined by the CONSTRUCTION MANAGEMENT ENGINEER, perform seed bed preparation and follow installation seeding recommendations. This shall continue until a satisfactory stand of vegetation has been established and accepted by the CONSTRUCTION MANAGEMENT ENGINEER.
- G. Final Acceptance: At completion of the maintenance period, the CONSTRUCTION MANAGEMENT ENGINEER will conduct an inspection to determine if satisfactory coverage has been achieved. Satisfactory coverage is defined as follows:
 - 1. For Meadow Mix #1 and #3: at least 95% total vegetation cover shall be achieved. Meadow will only be accepted when there are less than 15% coverage by invasive species.
 - 2. For Meadow Mix #2: At least 95% vegetation cover shall be achieved. No bare spots larger than 3 square feet. Not more than 10% of total area with bare spots larger than 1 square foot.

H. As-Built Survey:

1. Survey as specified in Specification Section 01 70 00, Execution and Closeout Requirements.

-- End of Section --

SECTION 32 93 00 PLANTS

1. **GENERAL**

1.1 Related Documents

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
 - 1. Section 31 05 15, Earthwork.

1.2 **Summary**

- A. Section includes:
 - 1. Plants.
 - 2. Tree stabilization.
 - 3. Tree-watering devices.

1.3 <u>References</u>

- A. Standards: Comply with applicable recommendations of the following:
 - 1. "Standardized Plant Names", American Joint Committee on Horticultural Nomenclature.
 - 2. American Standard for Nursery Stock", American Association of Nurserymen (ANSI 260.1)

1.4 Definitions

- A. Backfill: The earth used to replace or the act of replacing earth in an excavation.
- B. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with a ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.
- C. Balled and Potted Stock: Plants dug with firm, natural balls of earth in which they are grown and placed, unbroken, in a container. Ball size is not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required.

- D. Bare-Root Stock: Plants with a well-branched, fibrous-root system developed by transplanting or root pruning, with soil or growing medium removed, and with not less than the minimum root spread according to ANSI Z60.1 for type and size of plant required.
- E. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.
- F. Fabric Bag-Grown Stock: Healthy, vigorous, well-rooted plants established and grown in-ground in a porous fabric bag with well-established root system reaching sides of fabric bag. Fabric bag size is not less than diameter, depth, and volume required by ANSI Z60.1 for type and size of plant.
- G. Finish Grade: Elevation of finished surface of planting soil.
- H. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant. Some sources classify herbicides separately from pesticides.
- I. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- J. Planting Area: Areas to be planted.
- K. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See Section 31 05 15, Earthwork, for topsoil.
- L. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.
- M. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.
- N. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.

O. Subsoil: The surface or elevation of soil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

1.5 **Coordination**

- A. Coordination with Turf and Meadow Areas: Plant trees, shrubs, and other plants after finish grades are established and before planting turf or meadow areas unless otherwise indicated.
 - 1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

1.6 Preinstallation Meetings

A. Preinstallation Conference: Conduct conference at Project site. Schedules for planting, requested substitutions, planting methods and site inspections will be reviewed.

1.7 Submittals

- A. Product Data: For each type of product.
 - 1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.
 - 2. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.
 - 3. Slow-Release, Tree Watering Device: Manufacturer and product information.
 - 4. Deer Protection Fence: Manufacturer and product information.
- B. Samples for Verification: For each of the following:
 - 1. Mulch: 1-quart (1-L) volume of each organic mulch required; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.
- C. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:
 - 1. Manufacturer's certified analysis of standard products.
 - 2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.

- D. Planting Schedule: Submit schedule for installation of planting material, maintenance, and invasive management.
- E. Maintenance Data: Recommended procedures to be established by OWNER for maintenance of plants during a calendar year. Submit before expiration of required maintenance periods.

1.8 Quality Assurance

- A. Installer Qualifications: A qualified landscape installer with no less than 5 years documented experience for installation resulting in successful establishment of work similar to requirements of this project.
 - 1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
 - 2. Pesticide Applicator: State licensed, commercial.
- B. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.
- C. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.
 - 1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container-grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches (150 mm) above the root flare for trees up to 4-inch (100-mm) caliper size, and 12 inches (300 mm) above the root flare for larger sizes.
- D. Plant Material Observation: CONSTRUCTION MANAGEMENT ENGINEER may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. CONSTRUCTION MANAGEMENT ENGINEER may also observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and may reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.
 - 1. Notify CONSTRUCTION MANAGEMENT ENGINEER of sources of planting materials seven days in advance of delivery to site.
 - 2. CONSTRUCTION MANAGEMENT ENGINEER or his representative may view plants at their place of growth or upon delivery.

1.9 Delivery, Storage, and Handling

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws if applicable.

B. Bulk Materials:

- 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
- 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
- 3. Accompany each delivery of bulk materials with appropriate certificates.
- C. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.
- D. Handle planting stock by root ball.
- E. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F (16 to 18 deg C) until planting.
- F. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.
 - 1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.
- G. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.
- H. Deliver plants after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.
 - 1. Set balled stock on ground and cover ball with soil, or other acceptable material.

- 2. Do not remove container-grown stock from containers before time of planting.
- 3. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly wet condition.
- I. Plants damaged in transit, storage or handling may be rejected at the sole discretion of the CONSTRUCTION MANAGEMENT ENGINEER. CONTRACTOR shall note that consideration for plant material damage may not be life threatening, but rather cosmetic such as broken branches or scratched trunks, to qualify plant for rejection.

1.10 Field Conditions

- A. Field Measurements: Verify actual grade elevations, service and utility locations, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.
- B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

1.11 Plant Seasons

- A. Balled and Burlapped (B&B), deciduous trees and shrub materials:
 - 1. May be installed between September 15 until April 15.
 - 2. Lowest Risk:
 - a. Deciduous plants dug and planted while dormant in spring or fall except those listed below.
 - b. Deciduous plants dug during dormancy and planted after producing leaves providing they have been properly stored.
 - c. Deciduous plants dug after leaves have fully expanded and harden off.
 - 3. Highest Risk:
 - a. Deciduous plants dug in the spring during newly expanding leaf production.

B. Evergreen B&B material:

1. Freshly dug evergreen material should not be moved without proper conditioning during active growth.

C. Excluded Material:

1. The following trees may not be installed between November 15 and March 1: White oak (*Quercus alba*), Scarlet Oak (*Quercus coccinea*), Red Oak (*Quercus rubra*), Willow Oak (*Quercus phellos*), Flowering Dogwood Varieties (*Cornus florida*), Sweet Gum (*Liquidambar styraciflua*) and all conifers with the exception of White Pines (*Pinus strobus*).

D. Out of season plant installation:

- 1. Planting outside of the planting time stated in this Article shall be considered to be out of season plant installation.
- 2. Generally, out of season plant installation shall not be allowed.
- 3. Variance in planting seasons will only be permitted when authorized in advance by the OWNER and CONSTRUCTION MANAGEMENT ENGINEER in response to CONTRACTOR's request. The CONTRACTOR shall not permit any out of season plant installation without this authorization.
- 4. If out of season plant installation is requested, the CONTRACTOR shall provide in writing a list of plant species to the CONSTRUCTION MANAGEMENT ENGINEER or OWNER.
 - a. No plants shall be stored on site or installed outside of established plant seasons without the written consent of the CONSTRUCTION MANAGEMENT ENGINEER.
- 5. The warranty for out of season plant installation shall be extended one calendar year to compensate for the variance.

1.12 Warranty

- A. Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.
- B. Any delay in completion of planting operations which extends the planting into more than one planting season shall extend the Warranty period correspondingly.
- C. CONTRACTOR shall provide written warranty certificates to the CONSTRUCTION MANAGEMENT ENGINEER.

D. Warranty Provisions:

- 1. Failures include, but are not limited to, the following:
 - a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by OWNER.
 - b. Structural failures including plantings falling or blowing over.
 - c. Faulty performance of tree stabilization.
- 2. Warranty Periods: From date of Installation Acceptance.
 - a. Trees and Shrubs: 12 months.
- 3. Include the following remedial actions as a minimum:
 - a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
 - b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
 - c. A limit of one replacement of each plant is required except for losses or replacements due to failure to comply with requirements.
 - d. Provide extended warranty for period equal to original warranty period, for replaced plant material.

2. <u>MATERIALS</u>

2.1 Plant Material

- A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant List, Plant Schedule, or Plant Legend indicated on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
 - 1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch (19 mm) in diameter; or with stem girdling roots are unacceptable.

- 2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.
- B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to CONSTRUCTION MANAGEMENT ENGINEER, with a proportionate increase in size of roots or balls.
- C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which begins at root flare according to ANSI Z60.1. Root flare shall be visible before planting.
- D. Labeling: Label at least one plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant.
- E. If formal arrangements or consecutive order of plants is indicated on Drawings, select stock for uniform height and spread, and number the labels to assure symmetry in planting.

2.2 Fertilizers

- A. Planting Tablets: Tightly compressed chip-type, long-lasting, slow-release, commercial-grade planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a form that can be absorbed by plant roots.
 - 1. Size: 5-gram tablets.
 - 2. Nutrient Composition: 20 percent nitrogen, 10 percent phosphorous, and 5 percent potassium, by weight plus micronutrients.

2.3 Mulches

- A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees, shrubs, and planting beds consisting of one of the following:
 - 1. Type: Shredded hardwood.
 - 2. Size Range: 3 inches (76 mm) maximum, 1/2 inch (13 mm) minimum.
 - 3. Color: Natural.

4. Depth: Apply 3-inch average thickness of organic mulch, and finish level with adjacent finish grades. Do not place mulch against plant stems or trunk.

2.4 <u>Pesticides</u>

- A. General: Pesticide registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.
- B. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
- C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

2.5 <u>Tree-Stabilization Materials</u>

- A. No tree staking to occur in areas covered by the geosynthetic liner landfill cap.
- B. Trunk-Stabilization Materials:
 - 1. Upright and Guy Stakes: Rough-sawn, sound, new hardwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal (38-by-38-mm actual) by length indicated, pointed at one end. Use a minimum of 2 stakes of length required to penetrate at least 18 inches below bottom of backfilled excavation and to extend at least 72 inches above grade. Set vertical stakes and space to avoid penetrating root balls or root masses. Use the number of stakes as follows:
 - a. Use two stakes for trees up to 12 feet high and 2-1/2 inches or less in caliper. Space stakes equally around trees.
 - b. All trees greater than 3" caliper and all trees in the planters should be guyed to supports mounted into the rock curb.
 - c. Attach flags to each guy wire, 30 inches above finish grade.
 - 2. Guys and Tie Wires: ASTM A641/A641M, Class 1, galvanized-steel wire, two-strand, twisted, 0.106 inch (2.7 mm) in diameter.
 - 3. Guy Cable: 5-strand, 3/16-inch-diameter, galvanized-steel cable, with zinc-coated turnbuckles, a minimum of 3 inches long, with two 3/8-inch galvanized eyebolts.
 - 4. Hose Chafing Guard: Reinforced rubber or plastic hose at least 1/2 inch in diameter, black, cut to lengths required to protect tree trunks from damage.

5. Flags: Standard surveyor's plastic flagging tape, white, 6-inches long.

2.6 Tree-Watering Devices

- A. Slow-Release Watering Device: Standard product manufactured for drip irrigation of plants and emptying its water contents over an extended time period; manufactured from UV-light-stabilized nylon-reinforced polyethylene sheet, PVC, or HDPE plastic.
 - 1. Color: dark chocolate green or tan.

2.7 <u>Miscellaneous Products</u>

- A. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.
- B. Burlap: Non-synthetic, biodegradable.

2.8 Planting Soil

A. Meet the requirements of topsoil in 32 05 15 – Earthwork.

3. EXECUTION

3.1 <u>Examination</u>

- A. Examine areas to receive plants, with Installer present, for compliance with requirements and conditions affecting installation and performance of the Work.
 - 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
 - 2. Verify that plants and vehicles loaded with plants can travel to planting locations with adequate overhead clearance.
 - 3. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
 - 4. Uniformly moisten excessively dry soil that is not workable or which is dusty.
- B. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by CONSTRUCTION MANAGEMENT ENGINEER and replace with new planting soil.

- C. Proceed with installation only after unsatisfactory conditions have been corrected.
- D. Contact 'MISS UTILITY' at 800-257-7777 (72) hours prior to digging. CONTRACTOR shall take sole responsibility for any cost incurred due to damage due to these utilities.
- E. Do not willfully proceed with planting as designed when it is obvious that conditions and/or obstructions exist due to changes in site conditions. Such conditions shall be brought to the immediate attention of the CONSTRUCTION MANAGEMENT ENGINEER. The CONTRACTOR will be held responsible for all necessary revisions due to failure to give such notification so that material can be relocated or conditions corrected prior to plant installations.
- F. Remove any existing plant material necessary for the installation and the completion of the planting designed and contracted as part of this project.

3.2 Preparation

- A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf and meadow areas and existing plants from damage caused by planting operations.
- B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake or flag locations, outline areas, adjust locations when requested, and obtain CONSTRUCTION MANAGEMENT ENGINEER's written acceptance of layout before excavating or planting. Make minor adjustments as required.
- D. Lay out plants at locations directed by the CONSTRUCTION MANAGEMENT ENGINEER. Stake or flag locations of individual trees and shrubs and outline areas for multiple plantings. Do not install plants until the CONSTRUCTION MANAGEMENT ENGINEER has approved the locations.
- E. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks, branches, stems, twigs, and foliage to protect during digging, handling, and transportation.
 - 1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting

3.3 Excavation for Trees and Shrubs

A. Planting Pits and Trenches: Excavate circular planting pits.

- 1. Excavate planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are unacceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.
- 2. Excavate approximately three times as wide as ball diameter for plant stock.
- 3. Excavate at least 12 inches (300 mm) wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
- 4. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
- 5. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
- 6. Maintain angles of repose of adjacent materials to ensure stability. Do not excavate subsoils of adjacent paving, structures, hardscapes, or other new or existing improvements.
- 7. Maintain supervision of excavations during working hours.
- 8. Keep excavations covered or otherwise protected overnight and when unattended by Installer's personnel.
- B. Obstructions: Notify CONSTRUCTION MANAGEMENT ENGINEER if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.
- C. Drainage: Notify CONSTRUCTION MANAGEMENT ENGINEER if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.
- D. Fill excavations with water and allow to percolate away before positioning trees and shrubs.

3.4 Tree and Shrub Planting

A. Inspection: At time of planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.

- B. Roots: Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.
- C. Balled and Burlapped Stock: Set each plant plumb and in center of planting pit or trench with root flare 1 inch (25 mm) above adjacent finish grades.
 - 1. Backfill: Vegetative support soil according to Section 31 05 15, Earthwork. For trees, use excavated soil for backfill.
 - 2. After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
 - 3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
 - 4. Place planting tablets equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside the root ball about 1 inch (25 mm) from root tips; do not place tablets in bottom of the hole.
 - a. Quantity: Two per plant.
 - 5. Continue backfilling process. Water again after placing and tamping final layer of soil.
- D. Balled and Potted and Container-Grown Stock: Set each plant plumb and in center of planting pit or trench with root flare 1 inch (25 mm) above adjacent finish grades.
 - 1. Backfill: Vegetative support soil according to Section 31 05 15, Earthwork. For trees, use excavated soil for backfill.
 - 2. Carefully remove root ball from container without damaging root ball or plant.
 - 3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
 - 4. Place planting tablets equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside the root ball about 1 inch (25 mm) from root tips; do not place tablets in bottom of the hole.
 - a. Quantity: Two per plant.

- 5. Continue backfilling process. Water again after placing and tamping final layer of soil.
- E. Fabric Bag-Grown Stock: Set each plant plumb and in center of planting pit or trench with root flare 1 inch (25 mm) above adjacent finish grades.
 - 1. Backfill: Vegetative support soil according to Section 31 05 15, Earthwork. For trees, use excavated soil for backfill.
 - 2. Carefully remove root ball from fabric bag without damaging root ball or plant. Do not use planting stock if root ball is cracked or broken before or during planting operation.
 - 3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
 - 4. Place planting tablets equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside the root ball about 1 inch (25 mm) from root tips; do not place tablets in bottom of the hole.
 - a. Quantity: Two per plant.
 - 5. Continue backfilling process. Water again after placing and tamping final layer of soil.
- F. Slopes: When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

3.5 Tree and Shrub Pruning

- A. Remove only dead, dying, or broken branches. Do not prune for shape.
- B. Prune, thin, and shape trees and shrubs as directed by CONSTRUCTION MANAGEMENT ENGINEER.
- C. Prune, thin, and shape trees and shrubs according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by CONSTRUCTION MANAGEMENT ENGINEER, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.
- D. Do not apply pruning paint to wounds.

3.6 Tree Stabilization

- A. Trunk Stabilization by Upright Staking and Tying: Install trunk stabilization as follows unless otherwise indicated:
 - 1. Upright Staking and Tying: Stake trees of 2- through 5-inch (50- through 125-mm) caliper. Stake trees of less than 2-inch (50-mm) caliper only as required to prevent wind tip out. Use a minimum of two stakes of length required to penetrate at least 18 inches (450 mm) below bottom of backfilled excavation and to extend at least 72 inches (1830 mm) above grade. Set vertical stakes and space to avoid penetrating root balls or root masses.
 - 2. Upright Staking and Tying: Stake trees with two stakes for trees up to 12 feet (3.6 m) high and 2-1/2 inches (63 mm) or less in caliper; three stakes for trees less than 14 feet (4.2 m) high and up to 4 inches (100 mm) in caliper. Space stakes equally around trees.
 - 3. Support trees with bands of flexible ties at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.
 - 4. Support trees with two strands of tie wire, connected to the brass grommets of tree-tie webbing at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.

3.7 Planting Area Mulching

- A. Mulch backfilled surfaces of planting areas and other areas indicated.
 - 1. Trees in Turf or Meadow Areas: Apply organic mulch ring of 3-inch (75-mm) average thickness, with 36-inch (900-mm) radius around trunks or stems. Do not place mulch within 3 inches (75 mm) of trunks or stems.
 - 2. Organic Mulch in Planting Areas: Apply 3-inch (75-mm) average thickness of organic mulch extending 12 inches (300 mm) beyond edge of individual planting pit or trench and over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 3 inches (75 mm) of trunks or stems.

3.8 Edging Installation

A. Shovel-Cut Edging: Separate mulched areas from turf areas, curbs, and paving with a 45-degree, 4- to 6-inch- (100- to 150-mm-) deep, shovel-cut edge.

3.9 <u>Installing Slow-Release Watering Device</u>

A. Provide one device for each tree.

B. Place device on top of the mulch at base of tree stem and fill with water according to manufacturer's written instructions.

3.10 <u>Installing Deer Protection Fence</u>

- A. Provide one device for each tree and shrub.
- B. Install device according to manufacturer's written instructions.

3.11 Plant Maintenance

- A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings.
- B. Fill in, as necessary, soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.
- C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices when possible to minimize use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

3.12 <u>Pesticide Application</u>

- A. Apply pesticides and other chemical products and biological control agents according to authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with OWNER's operations and others in proximity to the Work. Notify OWNER before each application is performed.
- B. Pre-Emergent Herbicides (Selective and Nonselective): Apply to tree, shrub, and ground-cover areas according to manufacturer's written recommendations. Do not apply to seeded areas.
- C. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

3.13 Repair and Replacement

A. General: Repair or replace existing or new trees and other plants that are damaged by construction operations, in a manner approved by CONSTRUCTION MANAGEMENT ENGINEER.

- 1. Submit details of proposed pruning and repairs.
- 2. Perform repairs of damaged trunks, branches, and roots within 24 hours, if approved.
- 3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by CONSTRUCTION MANAGEMENT ENGINEER.
- B. Remove and replace trees that are more than 25 percent dead or in an unhealthy condition before the end of the corrections period or are damaged during construction operations that CONSTRUCTION MANAGEMENT ENGINEER determines are incapable of restoring to normal growth pattern.
 - 1. Provide new trees of same size as those being replaced for each tree.
 - 2. Species of Replacement Trees: Species selected by CONSTRUCTION MANAGEMENT ENGINEER.
- C. The CONTRACTOR shall request an inspection by the CONSTRUCTION MANAGEMENT ENGINEER for tree and shrub plantings at the end of the 1 year maintenance period. For any replacement plants required, a re-inspection will occur at the end of the growing season following replanting. If additional corrections are required an additional maintenance period and subsequent inspection will be required.

3.14 Cleaning and Protection

- A. During planting, keep adjacent paving and construction clean and work area in an orderly condition. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off OWNER's property.
- C. Protect plants from damage due to landscape operations and operations of other CONTRACTORs and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.
- D. After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.
- E. At time of Installation Acceptance, verify that tree-watering devices are in good working order and leave them in place. Replace improperly functioning devices.

3.15 Establishment Phase

- A. Maintenance Service for Trees and Shrubs: Provide maintenance by skilled employees of landscape Installer. Maintain as required in "Plant Maintenance" Article. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established, but for not less than maintenance period below:
 - 1. Maintenance Period: 12 months from date of Installation Acceptance.
- B. Final Acceptance: At completion of the maintenance period, the CONSTRUCTION MANAGEMENT ENGINEER will conduct an inspection to determine if the plants are acceptably healthy and well established in accordance with the requirements in Paragraph 1.12.

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SECTION 33 31 00 STORMWATER PIPING AND APPURTENANCES

1. **GENERAL**

1.1 <u>Description</u>

1.1.1 Scope of Work

A. This Section includes requirements for supply, delivery, installation and testing of stormwater piping materials, manholes, inlets, box culverts, and appurtenances as specified in the Contract Documents. Materials noted in this Section shall be installed as shown on the Contract Drawings and as noted in Table 33 31 00-1 below.

TABLE 33 31 00-1 Location of Specified Materials

Specified Material	Location/Description
6-inch HDPE Piping	Northwest Slope Discharge Facility
Concrete Pipe	Storm Drains
Manholes	Storm Drains
Inlets	Storm Drains
Concrete Barrel	Sediment Basin No. 1
Box Culverts	Swales at Road Crossings

B. The Work includes furnishing all materials, supplies, supervision, equipment, and construction machinery that may be necessary to construct the project as described in these Specifications.

1.1.2 Related Work Specified Elsewhere

- A. Section 01 33 00, Submittals.
- B. Section 01 70 00, Execution and Closeout Requirements.
- C. Section 31 05 15, Earthwork.
- D. Section 31 05 16, Aggregates.
- E. Section 31 05 19.16, Geomembrane.

1.2 References

1.2.1 American Association of State Highway and Transportation Officials (AASHTO)

A. AASHTO M154 (2012) Standard Specification for Air-Entraining Admixtures for Concrete.

B. AASHTO M198 (2010) Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.

1.2.2 ASTM International

- A. ASTM C443 (2020) Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
- B. ASTM C76 (2019b) Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
- C. ASTM C857 (2019) Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures
- D. ASTM C890 (2019) Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures
- E. ASTM C361 (2019) Standard Specification for Reinforced Concrete Low-Head Pressure Pipe

1.3 <u>Definitions</u>

A. Not used.

1.4 Qualifications

A. All manufacturers of precast concrete utility structures shall possess a current certification from the National Precast Concrete Association (NPCA).

1.5 **Submittals**

1.5.1 Certificate of Compliance

- A. The CONTRACTOR shall submit to the CONSTRUCTION MANAGEMENT ENGINEER Certificates of Compliance before delivery of materials covered under this Section. Certificates shall include a copy of the manufacturer's certified test reports; job location; the CONTRACTOR'S name; types, classes, and strengths of pipe; and the pipe manufacturer's name.
- B. Materials shall not be delivered to the site until approved in writing by the CONSTRUCTION MANAGEMENT ENGINEER.
- C. Precast concrete manufacturer's current certification from NPCA.

1.5.2 Certified Test Reports

A. Certified test reports within the requirements of standards and testing methods specified herein shall be submitted to the CONSTRUCTION MANAGEMENT ENGINEER for approval prior to material delivery. The pipe manufacturer and CONTRACTOR must satisfy the CONSTRUCTION MANAGEMENT ENGINEER that the material offered to be furnished and installed will meet the requirements set forth in these Specifications. The CONTRACTOR shall transmit to the CONSTRUCTION MANAGEMENT ENGINEER all information provided by the manufacturer or supplier prior to approval for delivery of any such material.

1.5.3 Packing List

A. A packing list or invoice shall accompany every shipment and shall contain the following information: CONTRACTOR'S name, kind and class of pipe, length, and other pertinent information.

1.5.4 Installation and Repair Recommendations

A. The CONTRACTOR shall submit to the CONSTRUCTION MANAGEMENT ENGINEER the manufacturer's recommended installation and repair procedures for pipe, pipe connections, and structures.

1.6 Safety

A. Safety shall be in accordance with Specification Section 01 45 00, Health and Safety.

1.7 Quality Assurance

- A. HDPE pipe—HDPE pipe shall be tested prior to shipment to ensure that the physical properties are in accordance with this Specification. Copies of the manufacturer's quality assurance testing shall be submitted to the CONSTRUCTION MANAGEMENT ENGINEER.
- B. Concrete pipe—Concrete pipe shall be tested prior to shipment to ensure that the physical properties are in accordance with this Specification. Copies of the manufacturer's quality assurance testing shall be submitted to the CONSTRUCTION MANAGEMENT ENGINEER.
- C. Precast concrete structure—Any precast concrete sections which are not in compliance with the required dimensions; which are not true, square, plumb, symmetrical; which have honeycombing; cracks; chips; which do not have smooth surfaces; or otherwise have visible material defects shall be rejected and removed from the project site. Rejected materials may not be repaired but shall be replaced with new products. Cosmetic defects, if in the opinion of the CONSTRUCTION MANAGEMENT

ENGINEER, will not affect the integrity, longevity, and water tightness of the structure, may be allowed if approved in writing.

1.8 <u>Delivery, Handling, and Storage</u>

- A. Delivery of pipe and related materials shall be coordinated with installation of the materials. Materials shall be unloaded with proper equipment and shall be properly wedged secure. They shall be stored outside of traffic and work areas in a reasonably level, well-drained area away from brush and poison oak or ivy. Individual pieces or bundles shall be stored with safe walking space and clearance between them to allow full view for inspection. Other materials shall not be placed over or against the stored pipe. Pipe shall be stored on a flat surface so that the barrel of the pipe is evenly supported and not piled more than 4 feet high. Bundles and containers shall not be stacked on one another.
- B. Pipe, fittings, and appurtenances shall be unloaded and handled with crane, backhoe, or other equipment of adequate capacity with an appropriate sling to protect the materials from damage. Materials shall be handled in a manner that ensures delivery to installation location in sound, undamaged conditions. Pipe shall be carried to placement location, not dragged.
- C. If damage occurs and is deemed repairable, it shall be repaired as directed by the CONSTRUCTION MANAGEMENT ENGINEER in accordance with approved manufacturer's recommendations. If damage is not repairable in the opinion of the CONSTRUCTION MANAGEMENT ENGINEER, such items will be rejected and shall be removed and replaced at the CONTRACTOR'S expense.
- D. No precast unit shall be shipped less than 7 days from the date of manufacture, unless the unit has been tested and is shown to be in full compliance with the Contract Documents. Date of manufacture shall be stamped on each concrete unit.
- E. Precast sections shall be transported and handled with proper equipment to protect the elements from damage. Sections shall be handled by means of lifting inserts embedded in the concrete. Damaged sections shall be replaced new unused materials.

1.9 Schedule

A. Not used.

2. <u>MATERIALS</u>

2.1 **Pipe and Fittings**

A. Pipe between structures or between structure and terminus shall be of the same size and material and shall be furnished by the same manufacturer. Each pipe length and fitting

shall be clearly marked with the manufacturer's name or trademark, specification designation, and pipe class.

2.2 **Smooth HDPE Piping**

- A. HDPE pipe for the Northwest Slope Discharge Facility shall be the diameter size(s) shown on the Contract Drawings. Wall thickness classification SDR-17 HDPE pipe material shall, at a minimum, conform to the requirements of ASTM 3350, PE 3408, AWWA 906, Cell Classification, 345464C. Pipe shall be DriscoPipe 4100 or approved equal.
- B. If required, HDPE pipe shall be butt-welded to provide a watertight joint. All welding will be performed by a trained individual according to the pipe manufacturer's recommendations.

2.3 Concrete Pipe

- A. Concrete pipe for storm drainage shall be of the sizes indicated on the Contract Drawings.
- B. Concrete pipe shall be manufactured in accordance with and conforming to ASTM C76, Class IV.
 - Flexible watertight joints shall be made with plastic or rubber-type gaskets for concrete pipe. The design of joints and the physical requirements for plastic gaskets shall conform to AASHTO M198, and rubber-type gaskets shall conform to ASTM C443. Gaskets shall have not more than one factory-fabricated splice.
- C. Watertight joints shall be tested and shall meet test requirements of Paragraph 3.4 of this Specification. Rubber gaskets shall comply with the oil resistant gasket requirements of ASTM C443. Certified copies of test results shall be delivered to the OWNER before gaskets or jointing materials are installed. Alternate types of watertight joint may be furnished, if specifically approved.

2.4 Precast Concrete Structures

- A. Structural design for precast units shall be prepared by a Maryland-Registered Professional Engineer for the precast concrete manufacturer. Units shall be designed for HS 20 load designation or 300 pounds per square foot live load, whichever is more critical for determining the concrete and steel stresses. Distribution of earth loading and live load shall be in accordance with ASTM C857 or ASTM C890.
- B. Walls shall be designed using an equivalent fluid pressure of 83 pounds per cubic foot and a 2--foot surcharge. The units shall also be designed to resist all stresses encountered during casting, handling, and erection.

- C. The precast units shall be factory cast. Job site casting will not be permitted. Concrete in the precast elements shall be continuously placed to prevent formation of seams. The finished units shall be free of voids and cracks. Exposed corners and edges shall be beveled. All inserts shall be securely attached or embedded in their proper location.
- D. Concrete strength of all precast units at 28 days shall be 4,000 psi minimum, unless otherwise specified. It shall be the precast unit manufacturer's responsibility to ensure that the specified concrete strength is maintained throughout production of the units. Mix design shall be those previously used by the manufacturer which has proven satisfactory for casting units similar to those specified and producing required strength. All precast concrete shall be air entrained in accordance with AASHTO M154. Admixtures containing calcium chloride shall not be used.
- E. Vault wall sleeves or gaskets for piping, sumps, steps, access hatches, and other inserts as shown on the Contract Documents shall be cast into the structure or inserted at the place of manufacturer.
- F. Precast concrete utility vault bases, risers, and top slabs shall met the material and manufacturing requirements of ASTM C857 and C85, except the minimum 28-day compressive strength of the concrete shall be 4,000 psi. Joints shall meet the requirements of ASTM C443, shall be self-centering, and shall form a tight joint free from water leakage and seepage.
- G. Each section of the vault shall be clearly marked on the inside with the following:
 - 1. ASTM designation.
 - 2. Vault Size.
 - 3. Date of Manufacturer.
 - 4. Name or Trademark of Manufacturer.
- H. Joints shall be sealed with manufacturer-supplied gaskets or mastic sealing compound which meets the recommendation of the manufacturer. Joints shall provide a waterproof joint free from water leakage or seepage.
- I. Steps shall be in accordance with Montgomery County DOT Standard Detail MC-520.01.
- J. Pipe bedding shall be Granular Fill in accordance with Specification Section 31 05 16, Aggregates, except as noted on the Drawings.
- K. Pipe penetrations for pipe openings shall be cast into the precast sections.
 - 1. A banded-boot type rubber gasket shall be provided for a vertical pipeline alignments greater than 18% slope.

- 2. A compression type rubber gasket shall be provided for a vertical pipeline alignment less than 18% slope.
- 3. A mechanically compressed rubberized gasket shall be used for cored openings.4

2.5 **Concrete Barrel Pipe**

- A. Concrete Barrel Pipe for outfalling of Sediment Basin No. 1 shall be 48 in. diameter as indicated on the Contract Drawings.
- B. Concrete Barrel Pipe shall be manufactured in accordance with and conforming to ASTM C76, Class IV.
- C. Flexible watertight joints shall be made with rubber-type gaskets for concrete pipe. The design of joints and the physical requirements for rubber-type gaskets shall conform to ASTM C361.
- D. Watertight joints shall be tested and shall meet test requirements of Paragraph 3.4 of this Specification. Rubber gaskets shall comply with the oil resistant gasket requirements of ASTM C361. Certified copies of test results shall be delivered to the OWNER before gaskets or jointing materials are installed. Alternate types of watertight joint may be furnished, if specifically approved.

3. <u>EXECUTION</u>

3.1 <u>Installation of Pipe</u>

3.1.1 Excavation

- A. Excavate trenches to the width and depth dimensions as indicated on the Contract Drawings. Provide uniform, continuous support for pipe or structure on required pipe bedding. In general, the trench bottom shall be excavated to conform with the shape and dimensions of the proposed pipe or structure. If the shape of the trench cannot be preserved or the trench varies from the shape of the structure, the space between the desired trench dimensions and the bottom of the excavation, as made, shall be filled with Granular Fill. Allowance shall be made for the placement of pipe bedding, where specified. Damage caused to existing facilities by the CONTRACTOR'S operations shall be repaired or replaced at no additional expense to the OWNER.
- B. Unless otherwise authorized by the CONSTRUCTION MANAGEMENT ENGINEER, trench excavation shall proceed no more than 50 feet in advance of the placement and compaction of backfill materials. The CONSTRUCTION MANAGEMENT ENGINEER may require backfilling and subsequent re-excavation on trenches left open for an unreasonable amount of time in advance of pipe installation at no additional expense to the OWNER. Trenches left open overnight, or during

- periods when the CONTRACTOR'S forces are not present, shall be so protected or enclosed and marked so as to cause no danger to the public or others.
- C. Sides of trenches adjacent to other utilities or structures shall be practically plumb. Where permitted by the CONSTRUCTION MANAGEMENT ENGINEER, sides of trenches in other areas may be sloped from a point 1 foot above the top of the pipe to grade. Such slopes shall be at no additional cost to the OWNER. Slopes shall be cut so as not to allow displacement of material or present a danger to personnel. Sides of trenches from a point 1 foot above the top of the pipe to the bottom of the trench shall be practically plumb. Pipe bell holes shall be excavated in the bottom of the trench wherever necessary to permit the proper assembling of joints.
- D. Before pipe installation, excavate sufficient trench in advance so that reasonable changes in line and grade can be made where the location of existing structures vary from that shown on Contract Drawings, and to assure that no unforeseeable obstructions exist. Work required by failure to take such precautions shall be performed at no additional cost to the OWNER.
- E. Sheeting and bracing, where required, shall be placed within the trench width as specified, without any overexcavation. Where trench widths are exceeded, redesign with a resultant increase in pipe strength or special installation procedures will be necessary. Cost of this redesign and increased cost of pipe or installation shall be borne by the CONTRACTOR without additional cost to the OWNER.
- F. The pipeline trench excavation shall be dewatered sufficiently to allow pipe joints to be made under dry conditions. No joint shall be made under water.
- G. No pipe shall be laid upon a foundation into which frost has penetrated, or at any time when there is danger of ice formation or frost penetration at the bottom of the excavation. In freezing weather, open trench length shall be kept to a minimum and the excavation promptly backfilled after the pipe has been installed.
- H. Where wet or otherwise unstable soil incapable of properly supporting the pipe, as determined by the CONSTRUCTION MANAGEMENT ENGINEER, is unexpectedly encountered in the bottom of a trench, such material shall be removed to the depth required and replaced to the proper grade with Granular Fill, in accordance with Specification Section 31 05 16, Aggregates. When removal of unstable material is due to the fault or neglect of the CONTRACTOR while performing shoring and sheeting, water removal, or other specified requirements, such removal and replacement shall be performed at no additional cost to the OWNER.

3.1.2 Bedding

A. Pipe bedding shall be Granular Fill except as noted on the Contract Drawings. Provide bell holes at each joint to permit proper joint assembly and firm bedding for the entire length of the pipe barrel. Each pipe shall be bedded on a solid foundation acceptable to

the CONSTRUCTION MANAGEMENT ENGINEER and in accordance with the Contract Documents.

3.1.3 Placement

- A. Prior to pipe installation, bring bedding material to grade along the entire length of pipe trench to be installed. Excavate bell hole as required. Install pipe to a true uniform line and grade as indicated with continuous bearing of the barrel on the bedding material. Install pipe upgrade with the bell or groove pointing upstream. Place each section of pipe in such a manner as to form a close concentric joint with the adjoining section and to prevent sudden offsets in the flow line.
- B. Foreign matter shall be removed from each pipe, fitting, and appurtenance before placement in the trench. Should foreign matter be observed in previously installed pipe, fittings, or appurtenances, work shall cease until foreign matter is removed.
- C. Pipe shall be carefully handled and lowered into the trench. Pipe shall be installed with special care to ensure that each joint is watertight, has met the required manufacturer's insertion depth, and has no shoulder or unevenness of any kind along the inside of the pipeline. No wedging or blocking will be permitted in installing any pipe unless directed by written order or permission in writing from the CONSTRUCTION MANAGEMENT ENGINEER.
- D. The pipes shall be thoroughly cleaned before being installed and shall be kept clean until acceptance of the completed work. Open ends of pipes and fittings shall be closed with a watertight cap or plug when work is not proceeding.
- E. Place sufficient backfill on each section of installed pipe to hold it firmly in place.
- F. No pipe shall be brought into position until the preceding length has been thoroughly bedded and secured in place. Care shall be used to assure water tightness and prevent damage to, or disturbing of, the joints during the backfilling process. After pipes have been installed and joints have been made, there shall be no walking on or working over the pipe, except as may be necessary in tamping the backfill material, until the backfill is at least 2 feet over the top of the pipe.
- G. Whenever a pipe requires cutting, to fit into the line or bring it to the required location, the work shall be performed by an approved method that leaves a smooth, square end. Field spigots shall be stop-marked with a felt-tip marker or wax crayon for proper length of assembly insertion.
- H. A calibrated, precise sewer pipe laser shall be used to align pipe to the proper grade. The CONTRACTOR is responsible to continuously monitor the line and grade in each pipe run between structures. It is the CONTRACTOR's responsibility to maintain proper calibration of the equipment throughout the duration of the project.

I. Unless otherwise specified by the CONSTRUCTION MANAGEMENT ENGINEER, the elevation of all drainage structures shall be within ± 0.1 foot of those shown on the Contract Drawings.

3.1.4 Backfill

- A. After the pipe has been properly bedded, and placed, backfill shall be placed in accordance with Contract Drawings and Specification Section 31 05 15, Earthwork. Material tests for density shall be made as necessary to ensure conformance to this Specification.
- B. When compacting by rolling or operating heavy equipment parallel with the pipe, displacement of or injury to the pipe shall be avoided. Movement of construction machinery over a culvert or storm drain at any stage of construction shall be at the CONTRACTOR'S risk. Any damaged pipe shall be repaired or replaced.

3.2 Jointing

A. Before any joints are made in the trench, the CONTRACTOR shall demonstrate to the CONSTRUCTION MANAGEMENT ENGINEER by making a sample joint that methods he/she will employ conform with the Contract Specifications, will secure a watertight joint, and that the workmen whom he intends to use for this work are familiar with the requirements for making proper joints.

3.2.1 HDPE Pipe

- A. Sections of HDPE shall be joined into continuous lengths on the job site following the guidelines of ASTM F2620, using simultaneous butt fusion as the method of joining the dual contained polyethylene piping system.
- B. System supplier shall approve all fusion equipment used for the containment system. The butt fusion equipment used to join the pipe shall be capable of meeting all normal butt fusion requirements: alignment, heating, trimming, and fusion pressure.
- C. System supplier shall provide written butt fusion pressure procedure as part of the submittal package.
- D. Fused segments of pipe shall be moved to avoid damage to the pipe. Handle dual contained pipe with care. Limit bending of the pipe. Nylon slings are preferred.
- E. For HDPE pipe, clean joint surfaces immediately before joining, square (face) end of each pipe to be fused, then butt weld the pipe together according to the manufacturer's recommendations. Allow welds sufficient time to cool before working with the pipe.

3.2.2 Concrete Pipe

- A. Bell and Spigot—The first pipe shall be bedded to the established grade line, with the bell end placed upstream. The interior surface of the bell shall be thoroughly cleaned with a wet brush and the lower portion of the bell filled with mortar as required to bring inner surfaces of abutting pipes flush and even. The spigot end of each subsequent pipe shall be cleaned with a wet brush and uniformly matched into a bell so that sections are closely fitted. After each section is laid, the remainder of the joint shall be filled with mortar, and a bead shall be formed around the outside of the joint with sufficient additional mortar. If mortar is not sufficiently stiff to prevent appreciable slump before setting, the outside of the joint shall be wrapped or bandaged with cheesecloth to hold mortar in place.
- B. Tongue and Groove—The first pipe shall be bedded carefully to the established grade line with the groove upstream. A shallow excavation shall be made underneath the pipe at the joint and filled with mortar to provide a bed for the pipe. The grooved end of the first pipe shall be thoroughly cleaned with a wet brush, and a layer of soft mortar applied to the lower half of the groove. The tongue of the second pipe shall be cleaned with a wet brush; while in horizontal position, a layer of soft mortar shall be applied to the upper half of the tongue. The tongue end of the second pipe shall be inserted in the grooved end of the first pipe until mortar is squeezed out on interior and exterior surfaces. Sufficient mortar shall be used to fill the joint completely and to form a bead on the outside.
- C. Gaskets and jointing materials shall be as recommended by the particular manufacturer in regard to use of lubricants, cements, adhesives, and other special installation requirements. Surfaces to receive lubricants, cements, or adhesives shall be clean and dry. Gaskets and jointing materials shall be affixed to the pipe not more than 24 hours prior to the installation of the pipe, and shall be protected from the sun, blowing dust, and other deleterious agents at all times. Gaskets and jointing materials shall be inspected before installing the pipe; any loose or improperly affixed gaskets and jointing materials shall be removed and replaced. The pipe shall be aligned with the previously installed pipe, and the joint pushed home. If, while the joint is being made the gasket becomes visibly dislocated the pipe shall be removed and the joint remade.

3.3 Precast Concrete Structures

- A. Precast concrete structures include inlets, manholes, box culverts, and other miscellaneous structures noted on the Contract Drawings.
- B. Precast sections shall be transported and handled with proper equipment to protect the units from damage. Sections shall be handled by means of lifting inserts embedded in the concrete. All precast concrete unit construction shall consist of new and un-used products, free from defects. Repairs to precast concrete units shall be strictly prohibited, before, and after shipment. Precast concrete units damaged as a result of installations shall be removed and disposed of by the CONTRACTOR at no additional cost to the

OWNER and not returned to the project site. Damaged precast units shall be replaced with new, un-used precast units from the same manufacture. Injection of grout sealant in the surrounding soils to correct joint leakage is prohibited.

- C. Precast units shall be installed where shown on the Contract Drawings.
- D. Mating surfaces shall be cleaned of all foreign materials such as dirt, mud, stones, etc., and where appropriate, joint sealing materials applied prior to assembly of the units. If mastic is used as a joint sealant, it shall be re-applied with new material every time precast units are re-set or re-positioned.

3.4 Field Testing

3.4.1 Hydrostatic Test on Watertight Joints

A. A hydrostatic test shall be made on the watertight joint types as proposed. Only one sample joint of each type needs testing; however, if the sample joint fails because of faulty design or workmanship, an additional sample joint may be tested. During the test period, gaskets or other jointing material shall be protected from extreme temperatures which might adversely affect the performance of such materials. Performance requirements for joints in reinforced and nonreinforced concrete pipe shall conform to AASHTO M198 or ASTM C443M (ASTM C443) and PE plastic pipe shall conform to ASTM D3212.

3.5 Repair/Retest

A. Should test results show displacement, damage, or leakage in excess of the allowable amount, the CONTRACTOR shall repair the displacement and damage and eliminate the leakage. Testing shall be continued until specified conditions are met to the satisfaction of the CONSTRUCTION MANAGEMENT ENGINEER, at no additional cost to the OWNER.

3.6 Work Affecting Existing Piping

A. The CONTRACTOR is responsible for field verifying the location of existing piping or structures to which connections are to be made, and location of other facilities which could be destroyed during earth moving activities.

3.7 <u>As-Built Survey</u>

A. Survey shall in accordance with Specification Section 01 70 00, Execution and Closeout Requirements.

-- End of Section -

SECTION 33 51 10 LANDFILL GAS COLLECTION AND CONVEYANCE SYSTEM

1. **GENERAL**

1.1 Description

1.1.1 Scope of Work

- A. The CONTRACTOR shall supply all materials, equipment, and labor needed to install, complete and make ready for use all pipe, pipe fittings, and valves for landfill gas collection and conveyance as specified herein and as indicated on the Contract Drawings.
- B. The CONTRACTOR shall provide qualified personnel and/or a subcontractor for the installation and construction of modifications to the landfill gas collection and conveyance system.
- C. The CONTRACTOR shall prepare a gas collection and conveyance system work plan as indicated on the Contract Drawings.

1.1.2 Related Work Specified Elsewhere

- A. Section 01 33 00, Submittals.
- B. Section 01 45 00, Health and Safety.
- C. Section 01 70 00, Execution and Closeout Requirements.
- D. Section 02 41 00, Demolition.
- E. Section 33 51 11, Landfill Gas Extraction Well and Condensate Drain System.

1.2 <u>References</u>

A. The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by basic designation only. Use of the most recent version is required.

1.2.1 ASTM International (ASTM)

A. ASTM D1248, Specification for Polyethylene Plastics Molding and Extrusion Materials.

- B. ASTM D1598, Test for Time-to-Failure of Plastic Pipe Under Constant Internal Pressure.
- C. ASTM D1599, Test for Short-Time Rupture Strength of Plastic Pipe, Tubing and Fittings.
- D. ASTM D2122, Determining Dimensions of Thermoplastic Pipe and Fittings.
- E. ASTM D2513, Specification for Thermoplastic Gas Pressure Pipe Tubing and Fittings.
- F. ASTM D2774, Practice for Underground Installation of Thermoplastic Pressure Piping.
- G. ASTM D2321, Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
- H. ASTM D3035, Polyethylene Plastic Pipe (SDR-PR) Based on Controlled Outside Diameter.
- I. ASTM D3350, Specification for Polyethylene Plastics Pipe and Fittings Materials.
- J. ASTM F714, Standard Specifications for 3-Inch to 36-Inch Polyethylene Pipe.
- K. ASTM F1417, Test Method for Installation Acceptance of Plastic Gravity Sewer Lines using Low-Pressure Air.
- L. ASTM D638-03, Standard Test Method for Tensile Properties of Plastics.
- M. ASTM D790-07, Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
- N. ASTM D1505-03, Standard Test Method for Density of Plastics by the Density-Gradient Technique.
- O. ASTM D1693-07a, Standard Test Method for Environmental Stress-Cracking of Ethylene Plastics.

1.2.2 American National Standard Institute (ANSI)/American Society of Mechanical Engineers (ASME)

A. ASME B31.8, Gas Transmission and Distribution Piping Systems, Appendix N.

1.2.3 Plastics Piping Institute (PPI)

A. PE Pipe Handbook. Installation guidance is in Chapter 7 and hydrostatic testing procedures are in Chapter 2.

1.3 <u>Definitions</u>

A. Not used.

1.4 Qualifications

A. The OWNER will provide a Landfill Gas Operations and Maintenance Contractor to assist in maintaining the operation of the landfill gas collection and conveyance system. The CONTRACTOR is to provide qualified personnel and/or a subcontractor for the installation and construction of modifications to the landfill gas collection and conveyance system. The qualified personnel and/or subcontractor shall have five (5) or more years of experience providing similar services, including installation of landfill gas management piping, welding, and associated infrastructure.

1.5 **Submittals**

- A. The CONTRACTOR shall prepare and submit to the CONSTRUCTION MANAGEMENT ENGINEER for review and approval in accordance with Specification Section 01 33 00, Submittals, certificates of compliance on materials furnished and manufacturer's brochures containing complete information and instructions pertaining to the storage, handling, installation, inspection, maintenance, and repair of each type of pipe, pipe fitting, and valve furnished.
- B. The CONTRACTOR shall prepare and submit a gas collection and conveyance system work plan to the CONSTRUCTION MANAGEMENT ENGINEER and OWNER for review and approval for all phases of the project as defined on G-002 of the Contract Drawings.
- C. The CONTRACTOR will provide a list of all personnel who will be involved in the project and their corresponding qualifications and experience for review and approval by the CONSTRUCTION MANAGEMENT ENGINEER prior to commencing work.
- D. The CONTRACTOR shall prepare and submit Shop Drawings to the CONSTRUCTION MANAGEMENT ENGINEER for review and approval. The Shop Drawings shall show the following:
 - 1. Dimensions, slopes, and invert elevations at connections.
 - 2. Tie-ins to the existing system.

- 3. Detailed procedures to be used in joining and installing piping system, including manufacturer's recommendations.
- 4. Interfacing of piping system to equipment and appurtenances.
- 5. Detailed requirements for burial, supports, anchors, guides, expansion joints, and accessories required for a satisfactory piping system.
- 6. Bill of materials, indicating material composition of pipe, pressure rating, nominal size with wall dimensions, and its installation drawing.
- 7. Valve Operation and Maintenance Data: Submit detailed operation and maintenance data for valves and appurtenances provided under this Section. As a minimum, include the following:
 - a. Technical information required to replace any piece of equipment
 - b. A list of manufacturers and suppliers, including addresses and phone numbers
 - c. Manufacturer's design and sizing criteria and calculations
 - d. A list of recommended spare parts.
- 8. Tests: Submit description of proposed testing methods, procedures, and apparatus. Prepare and submit report for each test.
- E. The CONTRACTOR shall provide photographic documentation of the installation of isolation valves, tie-in to the existing header pipe at the blower flare station, and any other installation as identified while performing the work as directed by the CONSTRUCTION MANAGEMENT ENGINEER.

1.6 Safety

A. Safety shall be in accordance with Specification Section 01 45 00, Health and Safety.

1.7 Quality Assurance

- A. Piping manufacturer shall maintain a continuous quality control program. Plastic molding materials used to manufacture pipe and fittings under this Section shall be tested for conformance to ASTM D3035, ASTM D3350, or ASTM D1248.
- B. Valves and appurtenances provided under this Section shall be the standard product in regular production by manufacturers whose products have proven reliable in similar service for at least two (2) years.
- C. Insofar as possible, valves shall be the product of one (1) manufacturer.

1.8 Delivery, Storage, and Handling

- A. Pipe shall be stored or stacked to prevent damage by marring, crushing, or piercing. Maximum stacking height shall be limited to six (6) feet. Pipe shall be stored in accordance with the manufacturer's recommendations.
- B. Pipe and pipe fittings shall be handled carefully in loading and unloading. They shall be lifted by hoists and lowered on skidways in such a manner as to avoid shock. Derricks, ropes, or other suitable equipment shall be used for lowering the pipe into the extraction well borings. Pipe and pipe fittings shall not be dropped or dumped.
- C. Unload pipe, fittings, and appurtenances opposite to or as close to the place where they are to be installed as is practical to avoid unnecessary handling. Keep pipe interiors completely free from dirt and foreign material.
- D. Handle valves and appurtenances very carefully. Valves that are cracked, dented, or otherwise damaged or dropped will not be acceptable.
- E. Store valves and appurtenances in approved enclosed shelter and off the ground, unless otherwise acceptable to CONSTRUCTION MANAGEMENT ENGINEER.

1.9 Schedule

A. Not used.

2. <u>MATERIALS</u>

2.1 <u>High Density Polyethylene (HDPE) Pipe</u>

A. General

- 1. HDPE pipe and fittings greater than three (3)-inch-diameter as indicated on the Contract Drawings shall be Standard Dimension Rating (SDR) 17 HDPE pipe using a 3408 type resin or approved equal. HDPE pipe and fittings that are three (3)-inch-diameter and less shall be SDR 11.
- 2. Pipe shall be extruded from a Type III, Class C, Category 5, Grade P34 compound as described in ASTM D1248. It shall be classified as cell 345434C according to ASTM D3350 and have the material designation of PE 3408. The pipe shall be manufactured to meet the requirements of ASTM D2513. Manufacturer's literature shall be adhered to when "manufacturer's recommendations" are specified. Pipe and fittings shall be provided by one (1) manufacturer. Acceptable manufacturers include Plexco, Driscopipe, or approved equal.

3. The HDPE pipe shall have the typical physical properties as determined by the appropriate test method, as listed in Table 33 51 10-1.

TABLE 33 51 10 Material Physical Properties

Physical Property	Test Method	Nominal Value
Density	ASTM D1505	0.955 gram per cubic centimeter
Tensile Yield Strength	ASTM D638	3,200 pounds per square inch
Tensile Modulus of Elast.	ASTM D638	130,000 pounds per square inch
Flexural Modulus	ASTM D790	135,000 pounds per square inch
Environmental Stress	ASTM D1693	>5,000 hours
Condition A, B, C		
Compression	ASTM D1248	>3,500 hours
Melt Index	ASTM D1238	< 0.15

- a. HDPE Fittings—Fittings shall be ASTM D2513-latest edition, butt fusion molded. Fittings shall be pressure rated to match the system piping to which they are fused. Fittings shall conform to all applicable reference standards listed herein.
- b. Flexible Mechanical Couplings—Flexible mechanical couplings for buried and exposed service pipe connections shall be the stainless-steel type suitable for use with polyethylene pipe.
- c. HDPE Pipe shall be joined by heat fusion to provide a homogeneous, sealed and leak proof joint. Pipe shall be joined following manufacturer's recommendation. Polyethylene pipe shall not be joined by solvents.

2.2 Flanges for HDPE Pipe

- A. Flanges for HDPE pipe shall be convoluted ductile iron back-up rings with a minimum thickness of one (1) inch, as manufactured by Improved Piping Products (925-254-0962), Inc., of Orinda, California or approved equal. Backup rings shall be finished with red oxide primer.
- B. Studs and bolts, nuts, and washers for flanges shall be 316 stainless steel.

2.3 Wellheads

A. Refer to Specification Section 33 51 11, Landfill Gas Extraction Well and Condensate Drain System.

2.4 Valves

A. General

- 1. Valves shall be complete with necessary operators, actuators, handwheels, chain wheels, extension stems, floor stands, worm and gear operators, operating nuts, chains, wrenches, and other accessories or appurtenances which are required for the proper completion of the work. Operators, actuators, and other accessories shall be sized and furnished by the valve supplier and factory mounted.
- 2. Manual valve operators shall turn right to close unless otherwise specified. Valves shall indicate the direction of operation.
- 3. Valves and operators shall be suitable for the exposure they are to be subjected to, e.g., buried and landfill gas. Valves shall have safety features required by the Occupational Safety and Health Administration.
- 4. Unless otherwise shown, valves shall be the same size as the adjoining pipe.
- 5. Valves shall have manufacturer's name and working pressure cast in raised letters on valve body. Valves shall be Type 57 provided by Asahi/America, Inc. of Malden, Massachusetts, or approved equal. Landfill gas Type 57 collection system valves should be polyvinyl chloride (PVC) body with polypropylene discs, and nitrile or ethylene-propylene-diene-monomer (EPDM) seat and seals. Manufacturer must be ISO-9001 certified.
- 6. All valves shall have a permanent (not painted on) open/close position indicator.

B. Butterfly Valves

1. The header isolation valves shall be corrosion-resistant Type 1, Grade 1, butterfly bubble tight, wafer design, with a PVC body, nitrile seat, and compatible with a flat face flange, as manufactured by Asahi/America or equal. Butterfly valves shall be resistant to landfill gas and methane gas. The valves shall be rated for one hundred (100) pounds per square inch at thirty (30) to one hundred twenty (120) degrees Fahrenheit. If called for, the valve shall be supplied from the manufacturer with a two (2)-piece stem and housing for buried applications. The housing shall be carbon steel with a baked powder epoxy coat. The valve and where called for, the valve stem, shall be Type 57 for landfill gas collection system valves. If required, stem extensions shall be stainless steel in an epoxy coated steel outer housing with a gear box assembly mounted on top and equipped with a removable manual operating wheel. Monitoring ports at the butterfly valves shall be quick connects. If required, quick connects shall be attached to the pipeline via flexible metal hose connector, Swagelok Part No. SS-4HO-6-L4, or equal.

C. Labcock Valves

1. Quick connects used for monitoring ports may be replaced by labcock valves at all monitoring ports in the system, subject to written approval by the CONSTRUCTION MANAGEMENT ENGINEER. Labcock valves shall be one-quarter (1/4)-inch PVC with EPDM seats and seals. Valves shall have one-quarter (1/4)-inch male pipe thread on one (1) end and hose connection on the other end.

2.5 Pipeline Locator/Warning Tape

A. Tape shall be a metallic locator/warning tape imprinted with the words "Caution Gas Line Buried Below," as supplied by Terra Tape (800-231-2417) or equal.

2.6 **Detailed Requirements**

- A. Workmanship—The pipe shall be homogeneous throughout and free from visible cracks, holes, foreign inclusions, or other defects. The pipe shall be uniform in color, opacity, density, and other physical properties.
- B. Dimensions and Tolerances—Dimensions and tolerances shall be measured in accordance with ASTM D3035 (HDPE). The eccentricity of the inside and outside circumferences of the pipe walls shall not exceed twelve (12) percent.
- C. Sustained Pressure—The pipe shall not fail, balloon, burst, or weep as defined in ASTM D1598.
- D. Burst Pressure—The minimum burst pressure shall be as given, when determined in accordance with ASTM D1599.

2.7 <u>Identification</u>

- A. Marking on the pipe shall include the following, spaced at intervals of not more than five (5) feet.
 - 1. Pipe nominal size.
 - 2. Pipe schedule.
 - 3. Specification of plastic material.
 - 4. Type and grade of plastic.
 - 5. Provide butt welded joints, except joints at equipment and valves shall be flanged and gasketed.

3. EXECUTION

3.1 HDPE Pipe Handling

A. HDPE pipe shall not be bent more than the minimum radius recommended by the manufacturer for type, grade, and SDR. Care shall be taken to avoid imposing strains that will overstress or buckle the HDPE piping or impose excessive stress on the joints. Where bending of pipe is not feasible, fittings may be utilized to change the direction of HDPE pipe.

B. Joining HDPE Pipe

- 1. Only two (2) methods shall be utilized for joining HDPE pipe: heat fusion and mechanical joining.
 - a. Mechanical Joining shall be accomplished with HDPE flange adapters, neoprene gaskets, and ductile iron back-up flanges, and shall be used only where shown on the Contract Drawings. Refer also to Paragraph 3.2 of this Section.
 - b. Heat Fusion joints shall be made in accordance with manufacturer's step by step procedures and recommendations. Fusion equipment and a trained operator shall be provided by the CONTRACTOR. Pipe fusion equipment shall be of the size and nature to adequately weld all pipe sizes and fittings necessary to complete the project. Branch saddle fusions shall be made in accordance with manufacturer's recommendations and step-by-step procedures. Branch saddle fusion equipment will be of the size to facilitate saddle fusion within the pipe trench. Heat fusion shall be performed outside of the trench whenever practical. Before heat fusing pipe, each length shall be inspected for the presence of dirt, sand, mud, shavings, and other debris. Any foreign material shall be completely removed. At the end of each day, all open ends of fused pipe shall be capped or otherwise covered to prevent entry by animals or debris.
 - c. As per the manufacturer's instructions, no fusion shall be performed in precipitation unless a shelter is provided.

3.2 HDPE Pipe Installation

- A. Pipe installation shall comply with the requirements of ASTM D2321, PPI PE Pipe Handbook Chapter 7, and the manufacturer's recommendations.
- B. Lengths of fused pipe to be handled as one (1) segment shall not exceed four hundred (400) feet.

C. Temporary Pipe Installation

- 1. Temporary pipe will be installed above grade and will be utilized for permanent installation per the Contract Drawings and the approved gas collection and conveyance system work plan.
- 2. Installation of temporary pipe is to be approved and coordinated with the Landfill Gas Operations and Maintenance Contractor by the CONSTRUCTION MANAGEMENT ENGINEER prior to bringing into operation.
- D. The CONSTRUCTION MANAGEMENT ENGINEER shall be notified prior to any pipe being installed in the trench in order for the inspector to have an opportunity to inspect the following items:
 - 1. Butt and saddle fusions.
 - 2. Pipe integrity.
 - 3. Trench excavation for rocks and foreign material.
 - 4. Proper trench slope.
 - 5. Trench contour to ensure the pipe will have uniform and continuous support.
- E. Any irregularities found by the CONSTRUCTION MANAGEMENT ENGINEER during this inspection must be corrected before lowering the pipe into the trench. Pipe shall be allowed sufficient time to adjust to trench temperature prior to any testing, segment tie-ins, and/or backfilling.
- F. Tie-ins shall be made outside of the trench whenever possible. When tie-ins are to be made only in the trench, a bell hole shall be excavated large enough to ensure an adequate and safe work area.
- G. Below grade piping shall be marked with metallic locator/warning tape to be buried in the trench above the pipe as indicated on the Contract Drawings.

H. Plugs:

- 1. Temporarily plug installed pipe at the end of each day's work or other interruption to the installation of any pipeline. Plugging shall be adequate to prevent the entry of animals or liquids into the pipe or the entrance, or insertion of deleterious materials.
- 2. Where plugging is required for phasing of the Work for later connection, install watertight, permanent-type plugs.

3.3 Flanged Connections

A. Flanged connections for polyethylene (PE) pipe shall be installed per manufacturer's recommendations.

- B. The CONTRACTOR shall use an anti-seize compound on all stainless steel nuts and bolts.
- C. The CONTRACTOR shall wrap and tape the flanges and bolts in five (5)-mil polyethylene sheeting prior to backfilling to help protect the assembly from corrosion.

3.4 **Segment Testing**

- A. The HDPE pipeline shall be subjected to an air test per ASTM F1417 and as described herein to detect any leaks in the piping. Testing shall be performed below grade (inside the trench). The CONTRACTOR shall accept the responsibility for locating, uncovering (if previously backfilled), and repairing any leaks detected during testing.
- B. Like sizes of HDPE piping shall be butt welded together into testing segment not to exceed one thousand (1,000) feet. Segments shall be connected to a testing apparatus on one (1) end and fitted with fusion-welded caps on all openings.
- C. The segment to be tested should be allowed time to reach constant and/or ambient temperature before initiating the test.
- D. The test should be performed during a period when the pipe segment will be out of direct sunlight when possible; i.e., early morning, late evening, or cloudy days.
- E. This will minimize the pressure changes which will occur during temperature fluctuations.
- F. The test pressure shall be four (4) pounds per square inch gauge.
- G. Pressure drop during the test shall not exceed one (1) percent of the testing gauge pressure over a period of one (1) hour. (See Paragraph 3.5 in this Section for test failures.) The CONSTRUCTION MANAGEMENT ENGINEER shall sign off on a test form to indicate test compliance. The test form shall include:
 - 1. Contract Number.
 - 2. Date
 - 3. Location of test/pipe segment.
 - 4. Length of pipe segment.
 - 5. Size and pipe material.
 - 6. PSI and time test is started and stopped.
 - 7. Change in PSI.
 - 8. If the test passed or failed.
 - 9. Technician performing the test.
 - 10. CONSTRUCTION MANAGEMENT ENGINEER'S signature confirming oversight.

- H. The CONSTRUCTION MANAGEMENT ENGINEER shall be notified prior to commencement of the testing procedure and shall be present during the test.
- I. Equipment for this testing procedure will be furnished by the CONTRACTOR. The testing apparatus will attach to pipeline being tested and include an appropriate low-range pressure gauge and temperature gauge, and valves and fittings to introduce pressurized air to perform the test. The testing apparatus and gauges are to be inspected and approved by the CONSTRUCTION MANAGEMENT ENGINEER.

3.5 Test Failure

- A. The following steps shall be performed when a pipe segment fails the one (1) percentone (1) hour test described in this Section.
 - 1. The pipe and all fusions shall be inspected for cracks, pinholes, or perforations.
 - 2. Blocked risers and capped ends shall be inspected for leaks.
 - 3. Leaks shall be located and/or verified by applying a soapy water solution and observing soap bubble formation.
- B. Pipe and fused joint leaks shall be repaired by cutting out the leaking area and refusing the pipe.
- C. After all leaks are repaired, a retest shall be performed in accordance with this Section.

3.6 Valve Installation

- A. Install valves and appurtenances in accordance with manufacturer's recommendations.
- B. Butterfly valves shall be installed between two (2) flanged connections with stainless-steel nuts and bolts coated with anti-seize compound prior to assembly. Stud lengths shall accommodate the required distance between flanges and spacers.
- C. Spacers may be required for full operation of flanged butterfly valves. Install spacers with approval of CONSTRUCTION MANAGEMENT ENGINEER.
- D. Valve flanges, bolts and nuts shall be wrapped and taped in five (5)-mil polyethylene sheeting prior to backfilling.
- E. Unless otherwise approved, install valves plumb and level. Valves shall be installed free from distortion and strain caused by misaligned piping, equipment, or other causes.
- F. Install valves in horizontal pipes with shafts vertical unless otherwise indicated.

3.7 Valve Field Tests and Adjustments

- A. Adjust parts and components as required to provide correct operation.
- B. Conduct functional field test of each valve in presence of CONSTRUCTION MANAGEMENT ENGINEER to demonstrate that each part and components together function correctly. Testing equipment required shall be provided.
- C. CONTRACTOR shall provide manufacturer's recommended maximum torque data for bolted connections and furnish his intended installation method to ensure that bolts are not over-torqued. Hand wrenching of plastic pipe connections without torque monitoring shall not be permitted. Cracking of pipe/appurtenances shall be repaired by CONTRACTOR at no additional cost to the OWNER.

3.8 As-Built Surveys

A. The CONTRACTOR shall survey the landfill gas pipe as it is placed to confirm alignment and that minimum slope is achieved. The CONTRACTOR shall survey the top of all landfill gas valves, condensate drains, extraction wells (ground and top of wellhead), and appurtenances associated with the landfill gas system. Survey shall be in accordance with Specification Section 01 70 00, Execution and Closeout Requirements.

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SECTION 33 51 11 LANDFILL GAS EXTRACTION WELL AND CONDENSATE DRAIN SYSTEM

1. **GENERAL**

1.1 <u>Description</u>

1.1.1 Scope of Work

A. The work covered under this Section includes the furnishing of all labor, equipment, and materials, and performing all operations in connection with the installation and testing of the vertical landfill gas (LFG) extraction wells and condensate systems.

1.1.2 Related Work Specified Elsewhere

- A. Section 01 33 00, Submittals.
- B. Section 01 45 00, Health and Safety.
- C. Section 01 70 00, Execution and Closeout Requirements.
- D. Section 02 41 00, Demolition.
- E. Section 31 05 16, Aggregates.
- F. Section 33 51 10, Landfill Gas Collection and Conveyance System.

1.2 <u>References</u>

1.2.1 ASTM International

- A. ASTM D2513, Standard Specification for Polyethylene (PE) Gas Pressure Pipe, Tubing, and Fittings.
- B. ASTM D3350, Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.
- C. ASTM D1784, Standard Classification System and Basis for Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.
- D. ASTM D2467, Standard Specification for Socket-Type Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.

1.3 Definitions

A. Not used.

1.4 **Qualifications**

- A. The CONTRACTOR responsible for constructing the gas extraction wells shall be licensed as a driller employing only competent workers for the execution of this Work. All such Work shall be performed under the direct supervision of an experienced driller satisfactory to the CONSTRUCTION MANAGEMENT ENGINEER. The driller shall have a minimum of five (5) years of demonstrated experience installing LFG collection wells in municipal landfill refuse.
- B. In accordance with Specification Section 33 51 10, the CONTRACTOR shall employ qualified personnel and/or subcontractor shall have five (5) or more years of experience providing similar services, including installation of landfill gas management piping, welding, and associated infrastructure.

1.5 **Submittals**

- A. The CONTRACTOR will provide a list of all personnel who will be involved in the project and their corresponding qualifications and experience for review and approval by the CONSTRUCTION MANAGEMENT ENGINEER prior to commencing work.
- B. The CONTRACTOR shall supply to the CONSTRUCTION MANAGEMENT ENGINEER, in writing at least twenty (20) calendar days before the start of work, the proposed work schedule including the following:
 - 1. The starting date of construction.
 - 2. The dates and order of gas extraction well and condensate drain drilling.
 - 3. The completion date of gas extraction well and condensate drain drilling.
 - 4. Any anticipated work stoppage of duration greater than twenty-four (24) hours with exception of weekends and holidays.
- C. The CONTRACTOR shall submit shop drawings and/or product data for approval to the CONSTRUCTION MANAGEMENT ENGINEER for the following items:
 - 1. Piping and fittings, for high-density polyethylene (HDPE) hoses, gauges, and test parts.
 - 2. All dimensions and components of the wellhead and adapters shall be drawn to scale. A complete shop drawing showing all components shall be provided as a single submittal.

- 3. Ductile iron flange adaptors.
- 4. Construction diagrams for each well.
- 5. Well and condensate drain identification tags.
- 6. Manufacturer's installation instructions.
- 7. Shop drawings showing the dimensions and all components of the well fittings and adapters.
- 8. Manufacturer's Operation and Maintenance Manual.
- 9. Manufacturer's warranty information.
- 10. Prior to construction, the CONTRACTOR shall provide the CONSTRUCTION MANAGEMENT ENGINEER coordinates and surface elevation of proposed well and condensate drain locations. Notify CONSTRUCTION MANAGEMENT ENGINEER if surface elevation at drilling location differs more than one (1) foot from plan elevation.
- D. During all gas extraction well and condensate drain drilling, a detailed driller's report shall be maintained and submitted in duplicate to the CONSTRUCTION MANAGEMENT ENGINEER. The report shall give a complete description of all subsurface material encountered, number of feet drilled, number of hours on the job, shutdown due to breakdown, and other pertinent data requested by the CONSTRUCTION MANAGEMENT ENGINEER.
- E. During drilling of each borehole within the refuse disposal area, the CONTRACTOR shall maintain a log of the reference points of depth measurements and the depth of each borehole.
- F. Upon completion of each gas extraction well and condensate drain, the CONTRACTOR shall also submit to the CONSTRUCTION MANAGEMENT ENGINEER a report to include the following:
 - 1. The name and location of the job.
 - 2. The date and time of the borehole drilling (start and finish), with borehole identification labeling.
 - 3. Gas extraction well and condensate drain number and coordinates.
 - 4. Surface elevation.

- 5. Depth to water.
- 6. The depth or location of any lost drilling materials or tools.
- 7. Names of drilling/installation crew staff, firm, and supervisor.
- 8. Size and materials of pipe used in wells and drains.
- 9. Type of drilling rig used for boreholes.
- 10. Depth of completed gas extraction well and condensate drain, including depths to beginning and end of perforated sections, to the bottom of the well cap and height above ground of wellhead.
- 11. The nominal hole diameter of the borehole.
- 12. Description of extraordinary events encountered, including weather description.
- 13. Photoionization detector and combustible gas indicator lower explosive limit readings.
- 14. Amount, size, and description of crushed stone used and vertical limits.
- 15. Amount, description, quantity, and vertical limits of bentonite plugs installed.
- 16. Amount, description, and vertical limits of sand backfill installed.
- 17. Problems encountered in advancing the boreholes including locations of refusal and depth advanced.
- 18. Other pertinent data requested by the CONSTRUCTION MANAGEMENT ENGINEER.

1.6 Safety

A. Safety shall be in accordance with Specification Section 01 45 00, Health and Safety.

1.7 **Quality Assurance**

- A. The CONTRACTOR shall be capable of identifying subsurface conditions and maintaining complete and current logs and daily notes for the gas extraction well completion reports.
- B. The OWNER or CONSTRUCTION MANAGEMENT ENGINEER may make any other investigations regarding qualifications as deemed necessary to determine the ability of the CONTRACTOR to perform the Work, and the CONTRACTOR shall

furnish to the OWNER or CONSTRUCTION MANAGEMENT ENGINEER all such information and data for this purpose as the OWNER or CONSTRUCTION MANAGEMENT ENGINEER may request.

1.8 <u>Delivery, Storage, and Handling</u>

- A. Parts and materials shall be properly protected so that no damage, deterioration, or contamination will occur from time of shipment until installation is completed.
- B. If, in the opinion of the CONSTRUCTION MANAGEMENT ENGINEER, parts and materials are damaged, deteriorated, or contaminated before acceptance of the well, the material and/or the gas extraction well will be rejected. The CONTRACTOR shall replace the labor, parts, and materials at no additional cost to the OWNER.
- C. Materials shall be stored to ensure preservation of their quality and fitness for work. When deemed necessary, they shall be placed on wooden platforms or other hard, clean surfaces and not on the ground. Stored materials shall be located so as to facilitate prompt inspection.

1.9 Schedule

A. Not used.

1.10 Subsurface Conditions

- A. Subsurface investigations have not been made within the landfill area to the depth of the proposed LFG wells. Landfill gas extraction wells shall penetrate through municipal landfill refuse until reaching the depths shown on the Contract Drawings.
- B. The CONTRACTOR shall be aware that unfavorable subsurface conditions may exist at the sites selected for the gas extraction wells and condensate drains. Subsurface conditions at the landfill may include soils of any description, density, or consistency; municipal refuse, boulders, concrete rubble, perched water, or other large objects.
- C. The information concerning the subsurface conditions and problems of which the CONTRACTOR is advised is for the sole purpose of assisting the CONTRACTOR in the bid preparation. The OWNER, CONSTRUCTION MANAGEMENT ENGINEER, and their consultants do not guarantee the accuracy and the conditions and concerns stated above. These conditions and concerns may not be indicative of the conditions at the site.
- D. In the event subsurface conditions, in the opinion of the CONTRACTOR, may be unfavorable for gas extraction well installation, the CONTRACTOR shall promptly notify the CONSTRUCTION MANAGEMENT ENGINEER verbally, and in writing, of such conditions and present an alternative location for approval.

- E. Obstructions may be encountered when drilling in a landfill, many of which can be drilled through. The CONTRACTOR is expected to make reasonable effort to drill through such obstructions.
- F. During construction, it is expected that minor relocations of well installation will be necessary. Such relocations shall be made only by written direction of the CONSTRUCTION MANAGEMENT ENGINEER. If obstructions are encountered during drilling requiring well or drain relocation, the CONTRACTOR shall notify the CONSTRUCTION MANAGEMENT ENGINEER verbally and in writing before continuing with the construction in order that the CONSTRUCTION MANAGEMENT ENGINEER may make such field revisions as are necessary. If the CONTRACTOR fails to notify the CONSTRUCTION MANAGEMENT ENGINEER when an obstruction is encountered, and proceeds with the construction despite this interference, the CONTRACTOR shall do so at his own risk. Holes that are abandoned will be filled with sand to the original grade level. The CONTRACTOR shall receive no payment for any footage drilled for an abandoned borehole. Drilling occurring at a borehole which has been directed for abandonment and/or relocation by the CONSTRUCTION MANAGEMENT ENGINEER will be at the CONTRACTOR'S expense.

1.11 Notification

- A. The CONTRACTOR shall notify the CONSTRUCTION MANAGEMENT ENGINEER, in writing, of the number of drilling rigs and personnel to be used on the project. Any change in the number of rigs and personnel shall require written notification to the CONSTRUCTION MANAGEMENT ENGINEER, forty-eight (48) hours prior to the change.
- B. The CONTRACTOR shall notify the CONSTRUCTION MANAGEMENT ENGINEER, in writing, ten (10) days prior to the commencement of drilling activities.
- C. The CONTRACTOR shall provide written notification to the CONSTRUCTION MANAGEMENT ENGINEER twenty-four (24) hours prior to start of any gas extraction well or condensate drain drilling activities.
- D. The CONTRACTOR shall provide written notification to the CONSTRUCTION MANAGEMENT ENGINEER forty-eight (48) hours prior to requiring support from the OWNER's Landfill Gas O&M Contractor to provide operational support for the existing gas collection and conveyance system.
- E. The CONTRACTOR shall meet weekly with the OWNER's Landfill Gas O&M Contractor to provide an update of upcoming field activities.

1.12 Gas Extraction Well and Condensate Drain Acceptance Criteria

A. Each gas extraction well and drain shall be approved based on the following criteria in the opinion of the CONSTRUCTION MANAGEMENT ENGINEER:

- 1. The well/drain is structurally sound and in conformance with designated standards.
- 2. The borehole is drilled plumb and true to line.
- 3. Provisions are made to keep well and drain piping centered in the borehole.
- B. All piping, crushed stone, bentonite seals, etc. shall be installed as directed by the Contract Drawings.
- C. No payment for the wells or drains shall be due to the CONTRACTOR if all of the above requirements are not met.

1.13 <u>Disposal of Drill Cuttings</u>

A. Waste and waste soil excavated during construction of gas extraction wells and condensate drains shall be placed by the CONTRACTOR below the cap subgrade elevations if construction sequence allows for direct placement or at an approved location.

2. MATERIALS

2.1 Landfill Gas Extraction Wells and Condensate Drains

2.1.1 Pipe

- A. HDPE, ASTM D2513/D3350 (Cell classification PE355434C), SDR-17, Material PE 3408, DriscoPlex 4100 or approved equal.
- B. All HDPE piping shall be butt-fused in strict compliance with the manufacturer's recommendations.

2.1.2 Fittings and Flanges

A. HDPE, ASTM D2513/D3350, SDR-17.

2.1.3 Bolts, Washers, and Nuts

A. Stainless Steel, Type 304.

2.2 <u>Landfill Gas Extraction Wellheads</u>

A. The LFG collection system wellheads shall be a Quick-Change Orifice Plate design, Model ORP215 as manufactured by QED Environmental Systems, Inc. or equal as approved by the CONSTRUCTION MANAGEMENT ENGINEER and shall consist of wellhead piping and fittings, flow control valve, gas temperature gauge port, quick

- connect gas sampling, static and differential pressure ports, reinforced flexible hose connector, dust cap. All wellhead piping and fittings shall be Schedule 80 polyvinyl chloride (PVC). Adapters shall be Elastomeric PVC.
- B. The wellhead shall incorporate an orifice plate system such that the plates can be quickly exchanged without shutting off the control valve.
- C. The wellhead shall incorporate a fine tune control valve.
- D. Each wellhead shall include a minimum of four (4) sample ports.
- E. The equipment shall be capable of withstanding the rigors of LFG recovery application, including internal high vacuum, weathering, gas constituent, and ultraviolet light exposure.
- F. The wellheads shall be tight and leak-free and shall be height adjustable in the field.
- G. The wellhead assemblies shall be capable of being used with a Landtec GEM-2000 or 5000 Gas Analyzer incorporating all monitoring functions.
- H. The wellhead assemblies shall have a nominal size of two (2) inches and a nominal flow capacity range of zero (0) to one hundred twenty-five (125) cubic feet per minute (cfm).
- I. The wellhead shall be designed to withstand a vacuum of one hundred (100) inches of water.

2.2.1 Measurement Tube

- A. The measurement tube shall be of sufficient length to allow gas to achieve a uniform velocity profile before being measured.
- B. The measurement tube assembly shall be pre-assembled and leak tested. The manufacturer shall conduct one hundred (100) percent testing for functionality. All units shall leak not more than ten (10) cubic centimeters per minute at a pressure of ten (10) pounds per square inch.

2.2.2 Orifice Plate

- A. The orifice plates shall be constructed of one-sixteenth (1/16)-inch laser cut stainless steel.
- B. Each plate shall have an easy to read tab with the plate size. The plate size can be read without removing the plate from the housing.

C. Each wellhead will be provided with a set of six (6) orifice plates, ranging in size from four-tenths (0.4) to one and four-tenths (1.4) inches.

2.2.3 Temperature Gauges

A. The temperature gauges shall have a stainless steel probe and all stainless steel fittings, hermetically sealed water-tight dial cover, UV resistant components, heavy-duty shatter-resistant glass dial, and calibration nut. They shall be connected to the wellheads with quick-connect fittings or approved equal and operate from zero (0) to two hundred fifty (250) degrees Fahrenheit. Dial shall be Ashcroft two (2)-inch series EI Grade A or equal.

2.2.4 Quick-Connect Test Ports

A. Test ports shall be positive sealing and shall be constructed of chrome-plated brass compatible for use with the GEM-2000 or 5000 Gas Analyzer. Test Ports shall be Colder Products Company; Plugs#PMC 30; Test Port #MCD10-04 with shutoff. Or approved equal.

2.2.5 Valves

- A. Wellhead Control Valve shall be constructed of Schedule 80 PVC and stainless steel.
- B. The Valve housing shall include an indexed scale for indexing valve settings for easy adjustment and reset.
- C. The Valve shall have a rising stem for easy identification of valve position.
- D. The Valve Stem shall have a three-quarter (3/4)-inch stainless steel shaft with coarse threads for long term durability and linear flow adjustment.
- E. The Valve Handle shall be made of stainless steel for long term durability. No plastic handles are allowed.
- F. All valves shall carry a permanent decal securely fastened to the body which includes the manufacturer and serial number.
- G. The Valve Handle shall include a numeric scale for easy setting adjustment and reset.
- H. Valve be capable of flows up to one hundred twenty-five (125) standard cfm and up to one hundred twenty (120) degrees Fahrenheit temperature.

2.2.6 Molded Well Cap

A. Each wellhead system shall include a high visibility molded well cap, which secures the gas extraction wellhead and provides ports for a downhole dewatering pump and

- liquid level access. Liquid level access will be completed without needing to close control valve, or remove the LFG wellhead.
- B. Well caps shall be manufactured to assure proper fit on standard well casings. Cap sizes shall be available for six (6)-inch standard casing.
- C. Well caps shall include flexible seals for the well casing and for the gas extraction wellhead pipe.
- D. Well caps will have a minimum of five (5) threaded ports for installing pass through style compression fittings. Three (3) fittings can be used with nylon pump tubing, the other two (2) ports can be used for liquid sensing.
- E. Caps will include an integral gas pipe support ring at the cap base. The support ring and flexible coupling will provide two (2) points of stabilization for the gas pipe minimizing stress on the flexible gas hose.

2.2.7 Flex Connectors

- A. Flex connectors shall be used to accommodate landfill settlement.
- B. The flex connectors shall be two (2)-inch-diameter hose and provided by the wellhead manufacturer for this connection. Flexible hose to pipe connections shall be made using stainless steel hose clamps to secure the flexible hose.
- C. Diameter of flexible connector shall be mated with wellhead discharge to ensure airtight connection.
- D. Two (2) extra flex connectors with clamps shall be provided for each wellhead.

2.2.8 Nuts, Bolts, Washers, and Gaskets

- A. Nuts, bolts, and washers shall be Type 304 stainless steel.
- B. Gaskets for flange installation shall be neoprene.

2.2.9 Well and Condensate Drain Identification

- A. Four (4)-inch by six (6)-inch aluminum well/condensate drain identification tags shall be permanently attached to each wellhead or condensate drain with stainless steel clamps. The identification tags shall indicate the well or condensate drain identification number.
- B. Yellow fiberglass flexible marker, six (6) ft long, with well identification number in black three (3)-inch letters, Model PM-301 manufactured by Pro-Mark Utility Supply, Inc., or approved equal.

2.3 Granular Fill

A. Granular Fill, in accordance with Specification Section 31 05 16, Aggregates, shall be placed around the LFG extraction wells and condensate drains as indicated on the Contract Drawings.

3. <u>EXECUTION</u>

3.1 Preparation

A. The CONTRACTOR shall be responsible for the layout and staking of all wells and condensate drains. The location (coordinates and surface elevations) of each well and condensate drain shall be documented.

3.2 LFG Extraction Well and Condensate Drain Installation

- A. Drill hole to diameter and depth as indicated. Wells are not to be vented to the atmosphere without permission from the CONSTRUCTION MANAGEMENT ENGINEER. If the wellhead is not to be installed within forty-eight (48) hours, a blind flange shall be installed on the well after installation to temporarily prevent discharge prior to wellhead installation. The blind flange shall be removed prior to the installation of the wellhead.
- B. Well installation shall be accomplished with a thirty-six (36) inch bucket auger rig. After the auger has reached its lowest elevation, all loose earth and debris shall be removed.
- C. The HDPE extraction well pipe and condensate drain pipe shall be inserted, taking care that it is centered in the hole. The annular space between the casing and the outer wall of the hole shall then be filled with crushed stone, sand, and bentonite as indicated on the Contract Drawings.
- D. Every effort shall be made on the part of the CONTRACTOR to ensure pipe plumbness and centralization. The CONTRACTOR shall use spacers at the perforated section of the well to assure the pipe is maintained within the center of the borehole. The CONSTRUCTION MANAGEMENT ENGINEER shall approve the spacer design method prior to its use.

3.3 Wellhead Installation

- A. The wellheads shall be lifted and handled according to written procedures supplied by the manufacturer.
- B. The wellheads shall be installed within two (2) percent of vertical (plumb).

- C. Where the wellheads connect directly to the collection header, a reducer shall be welded to the lateral for flex hose connection in accordance with accepted methods and standards appropriate for the header material.
- D. The wellheads shall be installed on the well casing in accordance with the manufacturer's written instructions.

3.4 Wellhead Testing

- A. After installing the wellhead, the following minimum test operations shall be performed:
 - 1. Leak test all components and connections of the wellhead to the landfill gas piping system. Apply soapy water to all fittings for visual observation for leaks.
 - 2. Test temperature gauge.
 - 3. Test pressure ports across orifice plate. Provide flow vs. pressure curve for zero (0) to forty (40) cfm range. Test shall be made on actual device installed. All wellheads shall be identical.
 - 4. Test valve for proper closure and seat.
- B. Prior to acceptance, the following verifications shall be made:
 - 1. Verify that the wellhead is installed per the manufacturer's written instructions and these Specifications.
 - 2. Verify that the wellhead has passed the tests as specified.
 - 3. Verify that all submittal requirements have been met.

3.5 Well Field Operations

- A. The operation of the well field will be coordinated with the CONSTRUCTION MANAGEMENT ENGINEER and the Landfill Gas Operations and Maintenance Contractor. The CONTRACTOR is to perform work in accordance with the Contract Drawings and the approved gas collection and conveyance system work plan.
- B. CONTRACTOR shall coordinate with the CONSTRUCTION MANAGEMENT ENGINEER and the Landfill Gas Operations and Maintenance Contractor to disconnect wells within two hundred (200) feet of an area where excavation is being performed.
- C. The Landfill Gas Operations and Maintenance Contractor is responsible for balancing the well field to demonstrate its stability to the satisfaction of the CONSTRUCTION

MANAGEMENT ENGINEER. Stability will be demonstrated by minimizing oxygen below one (1.0) percent by volume, and maximizing methane recovered for the long term. A vacuum must be observed at each wellhead. In the event an issue is identified, the CONSTRUCTION MANAGEMENT ENGINEER will notify the CONTRACTOR to make any necessary repairs.

3.6 Gas Extraction Well Abandonment

- A. If the CONTRACTOR fails to meet the gas extraction well and condensate drain acceptance criteria as stated in this Section or should the gas extraction well condensate drain be rendered inoperable due to loss of tools, collapse, or other causes related to gas extraction well or drain construction operations, the CONTRACTOR shall abandon the gas extraction well(s) or drain. The abandonment shall entail backfilling the borehole with sand. Under these conditions, the CONTRACTOR shall receive no payment for time, materials, or work for abandonment and shall receive no compensation for the abandoned gas extraction well or drain.
- B. The CONTRACTOR will notify the CONSTRUCTION MANAGEMENT ENGINEER immediately if any obstruction or issue is encountered during drilling. If the CONTRACTOR is directed by the CONSTRUCTION MANAGEMENT ENGINEER to abandon a borehole, the CONTRACTOR will fill the borehole with sand.
- C. If borehole abandonment is directed by the CONSTRUCTION MANAGEMENT ENGINEER, the CONTRACTOR shall be compensated for footage drilled and abandonment.

3.7 Protection and Site Cleanup

- A. At all times during the progress of the site work, the CONTRACTOR shall use all reasonable precautions to prevent either tampering with the gas extraction wells and condensate drains or the entrance of foreign material.
- B. All gas extraction wells and condensate drains shall be protected as indicated during construction by the use of hay bales or other approved means. The CONTRACTOR shall replace any gas extraction well or condensate drain which is damaged by construction operations at the CONTRACTOR'S expense.
- C. Immediately upon completion of site work, the CONTRACTOR shall remove all of his or her equipment, materials, and supplies from the site of the work, remove all surplus materials and debris, fill in all holes or excavations, and restore any disturbed areas to their original condition.
- D. Excavated material will be removed from the site at the end of each work day. The CONTRACTOR shall be responsible for all loading and transportation costs of the

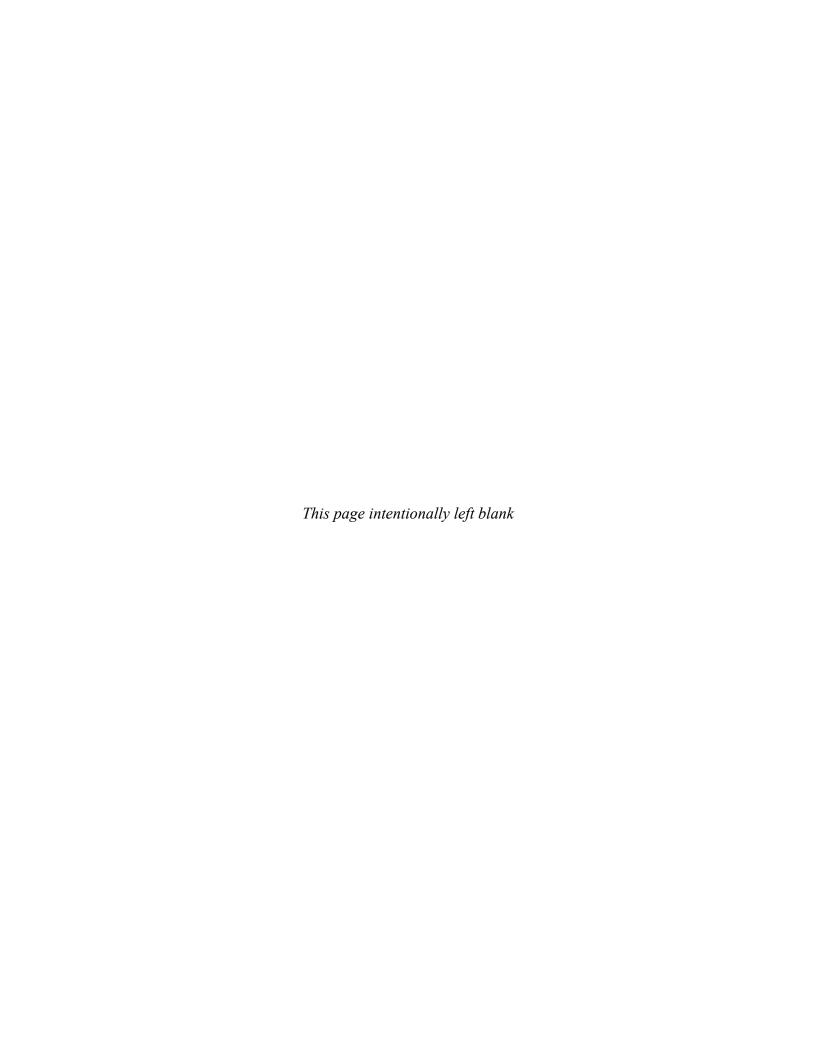
refuse. Refuse shall be handled and controlled such that it does not drift off as litter due to wind, water, or animals.

3.8 <u>As-Built Surveys</u>

A. Survey shall be in accordance with Specification Section 01 70 00, Execution and Closeout Requirements.

-- End of Section --

Attachment A Geotechnical Investigations





THE ROBERT B. BALTER COMPANY®

September 10, 2018

Mr. Mark Gutberlet, PE Project Manager EA Engineering, Science, and Technology, Inc., PBC 225 Schilling Circle, Suite 400 Rockville, MD 20850

RE: Geotechnical Evaluation

Gude Landfill

Rockville, Maryland

RBB Project No. 16943-0

Dear Mr. Gutberlet:

The Robert B. Balter Company is pleased to submit this geotechnical evaluation report for the subject project. The purpose was to assess the existing soil cap condition and provide recommendation regarding soil reuse.

Project information provided to us by various parties helped form the basis for our recommendations. If any of the project information discussed in this report differs from the actual proposed construction, we should be contacted to re-evaluate the recommendations provided herein and provide revisions if necessary.

We have appreciated this opportunity to be of service. If you have any questions regarding this report, or if we can assist you in any way, please do not hesitate to call our office.

Sincerely,

THE ROBERT B. BALTER COMPANY

Professional Certification. I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland. License No. 232 (4), Expiration Date: 06/25/2020

James M. Bailey, E.I.T.

Geotechnical Engineer

Chief Fantages

2018

TABLE OF CONTENTS

1.0	INTRODUCTION	. 1
1.1	GENERAL	1
1.2	AUTHORIZATION	1
1.3	SCOPE	
1.4	SUMMARY OF RECOMMENDATIONS	. 1
2.0	PROJECT DESCRIPTION	. 1
2.1	SITE CONDITIONS	
2.2	Project Information	2
2.3	SITE GEOLOGY	2
3.0	EVALUATION PROGRAM	. 2
3.1	SUBSURFACE EXPLORATIONS	2
3.2	LABORATORY TESTING PROGRAM	3
4.0	SUBSURFACE CONDITIONS	. 3
4.1	GENERAL	
4.2	SUBSURFACE MATERIALS	3
5.0	EVALUATION AND RECOMMENDATIONS	. 7
5.1	TOPSOIL REUSE	7
5.2	CAP FILL SOIL REUSE	
5.3	COMPACTION MOISTURE CONTENTS	8
5.4	WEATHER CONDITIONS	8
6.0	GEOTECHNICAL OBSERVATION AND TESTING	. 9
7.0	GENERAL COMMENTS	. 9

LIST OF TABLES

- Table 1 Existing Cap Fill Soil Depths
- Table 2 Environmental Screening Results
- Table 3 Laboratory Test Results
- Table 4 Baltimore NOAA Station

LIST OF PLATES

- Plate 1 Site Vicinity Map
- Plate 2 Boring Location Plan

APPENDICES

- A Boring Logs
- B Laboratory Soils Test Results



1.0 INTRODUCTION

1.1 General

The proposed project will consist of a new toupee cap for the Gude Landfill, as well as an analysis of the stability of the site as it pertains to future developments, such as potential access roads, parking areas, and new facilities.

1.2 Authorization

The geotechnical evaluation was authorized by EA, based on our September 28, 2017 *Revised Proposal for Geotechnical Evaluation*.

1.3 Scope

The scope of the geotechnical evaluation included the following: site reconnaissance, subsurface sampling and testing, geotechnical laboratory testing, engineering evaluation and report preparation.

1.4 Summary of Recommendations

Cap Fill Soil The existing site cap fill soils are expected to be suitable for reuse.

Reuse However, laboratory testing indicated that site soils are presently in excess

of the optimum moisture content and may require drying before

placement. We would expect the moisture content of the existing fill soils

to change over time.

Topsoil The current site topsoil was only encountered sporadically, with most plant

covering growing in the fill soils rather than a distinct topsoil stratum. It is

unlikely to be cost-effective to salvage for reuse as topsoil

2.0 PROJECT DESCRIPTION

2.1 Site Conditions

The project is located at 600 East Gude Drive, Rockville, Maryland. The site is bordered to the northwest by Gude Trail, followed by a residential development, to the northeast by a heavily forested area, to the southeast by a mixed commercial/retail development, and to the southwest by East Gude Drive followed by mixed commercial/retail development. The site is currently occupied by the closed Gude MSW Landfill including a gas energy production facility and is currently being used as a radio-controlled (RC) model airplane recreational area. A Vicinity Map is shown on Plate 1, attached.



2.2 Project Information

The proposed project will consist of the reconstruction of the landfill cap. The purpose of this investigation was to determine the depth of the existing cap and to determine the potential for reuse of the existing cap soils.

2.3 Site Geology

According to the <u>National Geologic Map Database</u> provided by USGS, the subject site is underlain by the Wissahickon Formation. This formation is known to consist of Muscovite-chlorite-albite schist, muscovite-chlorite schist, chloritoid schist, and quartzite; intensely folded and cleaved.

3.0 EVALUATION PROGRAM

3.1 Subsurface Explorations

The subsurface exploration program for this study included a total of 128 new Test Pits, labeled TP-200 to TP-335, with the exclusions of TP-296, TP-297, TP-300, TP-306, TP-313, TP-316 and TP-328. These test locations were not performed due to time constraints. The locations for the test pits were selected by EA and located in the field by Balter using standard taping procedures and are assumed accurate to within 10-15 feet. Additionally, longitude and latitude coordinates were recorded by cell phone GPS for each test pit location and are assumed accurate to within 10 to 15 feet. Prior to the start of the test pit operations, the test pits were cleared for utilities by Miss Utility. The attached **Plate 2, Boring Location Plan,** indicates the approximate as-dug locations of the test pits.

The test were advanced to depths ranging from 1.5 feet to 8 feet below the existing ground surface using a Case 580 N backhoe. During the test operations, bulk samples of representative soils from the upper regions of the soils were recovered for laboratory evaluation. Following completion, the test pit locations were backfilled with landfill garbage at the bottom and soils on top lightly compacted with the backhoe bucket. After backfill, all test pits were strawed and seeded.

All test pits were screened for oxygen levels and combustible gases as per the site Health and Safety Plan.

The subsurface data obtained from the recent explorations are presented in log form in **Appendix A**.

The depths at which water was observed in the test were recorded upon completion. The method of classification used in preparing the strata descriptions is based on our interpretation of the Unified Soils Classification System (USCS).



Test pit logs show the estimated general soil classifications and the <u>assumed</u> boundaries between soil types. The actual boundaries in the field could vary significantly from those assumed for the logs. It is noted that the subsurface data shown on the figures are an integral portion of this report. Separation of the figures from the remainder of the report may lead to misinterpretation of the data by others.

3.2 Laboratory Testing Program

Selected samples were subjected to laboratory analyses to estimate their classifications according to the Unified Soils Classification System. This testing included moisture content determination, sieve gradation analyses, and Atterberg limits determinations. The bulk samples were subjected to evaluation of their compaction properties by AASHTO T-180 (Modified Proctor).

The results of our laboratory testing are presented in Appendix B and are summarized in **Table** 1 of Section 4.2 Subsurface Materials.

4.0 SUBSURFACE CONDITIONS

4.1 General

This section provides a description of the estimated subsurface conditions encountered at the borings at the time of drilling. Significant variations may occur outside specific test locations.

4.2 Subsurface Materials

4.2.1 Surficial Materials

Topsoil - Topsoil was only encountered in borings TP-201, TP-202, TP-203, TP-254, TP-255, TP-256, TP-257, TP-258, TP-259, and TP-263 to depths ranging between 1 inch and 4.0 inches. The term "topsoil," as used in this report refers to surface soils having an apparently significant organic content, based only on visual estimates in the field. It does not imply that the subject materials meet the requirements or specifications for topsoil set by any particular organization or agency. Plant growth was present across the landfill, however the growth appears to be within the fill soils rather than within a distinct topsoil layer.

4.2.2 Existing Cap Fill Soils

Fill soils associated with the existing landfill cap were found to generally consist of Sand and Silt mixtures (SM, ML) and Sand and Clay mixtures (SC), and Clays (CL) with significant amounts of gravel and significant amounts of cobbles and boulders encountered in some borings. Some borings encountered crushed stone (CR-6) layers within the soil cap. Existing cap fill soils extended to depths ranging between 1.5 feet and 8 feet. Test pits TP-279, TP-293, and TP-298 terminated in the existing cap soils (i.e. they were not fully penetrated). The existing cap fill depths for each test pit are presented on the following page in Table 1.



Table 1 – Existing Cap Fill Soil Depths

Test Pit		Table 1	- EXISU	ıng Cap rın	Sun Du	puis
TP-200	Test Pit		Test Pit		Test Pit	
TP-201 NA TP-244 1.0 TP-287 6.5 TP-202 NA TP-245 1.3 TP-288 2.3 TP-203 NA TP-246 3.8 TP-289 4.3 TP-204 2.0 TP-247 3.3 TP-290 2.7 TP-205 5.0 TP-248 1.5 TP-291 3.5 TP-206 2.0 TP-249 3.0 TP-292 1.5 TP-207 2.0 TP-250 1.8 TP-293 NP TP-208 5.0 TP-251 1.0 TP-294 4.0 TP-209 0.9 TP-251 1.0 TP-294 4.0 TP-209 0.9 TP-252 1.5 TP-295 5.0 TP-210 2.5 TP-253 5.5 TP-298 NP TP-211 1.7 TP-254 3.9 TP-299 2.0 TP-211 1.7 TP-255 3.3 TP-301 5.8 TP-212 1.						
TP-202 NA TP-245 1.3 TP-288 2.3 TP-203 NA TP-246 3.8 TP-289 4.3 TP-204 2.0 TP-247 3.3 TP-290 2.7 TP-205 5.0 TP-248 1.5 TP-291 3.5 TP-206 2.0 TP-249 3.0 TP-292 1.5 TP-207 2.0 TP-250 1.8 TP-293 NP TP-208 5.0 TP-251 1.0 TP-294 4.0 TP-209 0.9 TP-251 1.0 TP-294 4.0 TP-209 0.9 TP-252 1.5 TP-295 5.0 TP-210 2.5 TP-253 5.5 TP-298 NP TP-211 1.7 TP-254 3.9 TP-299 2.0 TP-211 1.7 TP-255 3.3 TP-301 5.8 TP-212 1.7 TP-255 3.3 TP-301 5.8 TP-213 2					_	
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TP-218 4.0 TP-261 6.0 TP-308 3.5 TP-219 4.3 TP-262 2.0 TP-309 3.0 TP-220 3.0 TP-263 6.0 TP-310 1.0 TP-221 1.3 TP-264 3.0 TP-311 1.6 TP-222 1.5 TP-265 3.0 TP-312 3.5 TP-223 0.9 TP-266 2.3 TP-314 3.5 TP-224 2.3 TP-267 2.0 TP-315 1.3 TP-224 2.3 TP-268 3.0 TP-317 3.2 TP-225 0.3 TP-268 3.0 TP-317 3.2 TP-226 1.5 TP-269 2.5 TP-318 2.5 TP-227 2.0 TP-270 3.0 TP-319 1.5 TP-228 3.5 TP-271 2.0 TP-320 3.9 TP-229 5.3 TP-272 3.5 TP-321 1.5 TP-230 <	TP-216	2.3	TP-259	6.0	TP-305	3.3
TP-219 4.3 TP-262 2.0 TP-309 3.0 TP-220 3.0 TP-263 6.0 TP-310 1.0 TP-221 1.3 TP-264 3.0 TP-311 1.6 TP-222 1.5 TP-265 3.0 TP-312 3.5 TP-223 0.9 TP-266 2.3 TP-314 3.5 TP-224 2.3 TP-267 2.0 TP-315 1.3 TP-225 0.3 TP-268 3.0 TP-317 3.2 TP-225 0.3 TP-269 2.5 TP-318 2.5 TP-226 1.5 TP-269 2.5 TP-318 2.5 TP-227 2.0 TP-270 3.0 TP-319 1.5 TP-228 3.5 TP-271 2.0 TP-320 3.9 TP-229 5.3 TP-272 3.5 TP-321 1.5 TP-230 2.7 TP-273 6.5 TP-322 2.3 TP-231 <	TP-217	4.0	TP-260	4.0	TP-307	3.5
TP-220 3.0 TP-263 6.0 TP-310 1.0 TP-221 1.3 TP-264 3.0 TP-311 1.6 TP-222 1.5 TP-265 3.0 TP-312 3.5 TP-223 0.9 TP-266 2.3 TP-314 3.5 TP-224 2.3 TP-267 2.0 TP-315 1.3 TP-225 0.3 TP-268 3.0 TP-317 3.2 TP-226 1.5 TP-269 2.5 TP-318 2.5 TP-227 2.0 TP-270 3.0 TP-319 1.5 TP-228 3.5 TP-271 2.0 TP-320 3.9 TP-229 5.3 TP-272 3.5 TP-321 1.5 TP-230 2.7 TP-273 6.5 TP-322 2.3 TP-231 5.0 TP-274 4.0 TP-323 4.0	TP-218	4.0	TP-261	6.0	TP-308	3.5
TP-221 1.3 TP-264 3.0 TP-311 1.6 TP-222 1.5 TP-265 3.0 TP-312 3.5 TP-223 0.9 TP-266 2.3 TP-314 3.5 TP-224 2.3 TP-267 2.0 TP-315 1.3 TP-225 0.3 TP-268 3.0 TP-317 3.2 TP-226 1.5 TP-269 2.5 TP-318 2.5 TP-227 2.0 TP-270 3.0 TP-319 1.5 TP-228 3.5 TP-271 2.0 TP-320 3.9 TP-229 5.3 TP-272 3.5 TP-321 1.5 TP-230 2.7 TP-273 6.5 TP-322 2.3 TP-231 5.0 TP-274 4.0 TP-323 4.0	TP-219	4.3	TP-262	2.0	TP-309	3.0
TP-222 1.5 TP-265 3.0 TP-312 3.5 TP-223 0.9 TP-266 2.3 TP-314 3.5 TP-224 2.3 TP-267 2.0 TP-315 1.3 TP-225 0.3 TP-268 3.0 TP-317 3.2 TP-226 1.5 TP-269 2.5 TP-318 2.5 TP-227 2.0 TP-270 3.0 TP-319 1.5 TP-228 3.5 TP-271 2.0 TP-320 3.9 TP-229 5.3 TP-272 3.5 TP-321 1.5 TP-230 2.7 TP-273 6.5 TP-322 2.3 TP-231 5.0 TP-274 4.0 TP-323 4.0	TP-220		TP-263	6.0		
TP-223 0.9 TP-266 2.3 TP-314 3.5 TP-224 2.3 TP-267 2.0 TP-315 1.3 TP-225 0.3 TP-268 3.0 TP-317 3.2 TP-226 1.5 TP-269 2.5 TP-318 2.5 TP-227 2.0 TP-270 3.0 TP-319 1.5 TP-228 3.5 TP-271 2.0 TP-320 3.9 TP-229 5.3 TP-272 3.5 TP-321 1.5 TP-230 2.7 TP-273 6.5 TP-322 2.3 TP-231 5.0 TP-274 4.0 TP-323 4.0						
TP-224 2.3 TP-267 2.0 TP-315 1.3 TP-225 0.3 TP-268 3.0 TP-317 3.2 TP-226 1.5 TP-269 2.5 TP-318 2.5 TP-227 2.0 TP-270 3.0 TP-319 1.5 TP-228 3.5 TP-271 2.0 TP-320 3.9 TP-229 5.3 TP-272 3.5 TP-321 1.5 TP-230 2.7 TP-273 6.5 TP-322 2.3 TP-231 5.0 TP-274 4.0 TP-323 4.0	-				_	
TP-225 0.3 TP-268 3.0 TP-317 3.2 TP-226 1.5 TP-269 2.5 TP-318 2.5 TP-227 2.0 TP-270 3.0 TP-319 1.5 TP-228 3.5 TP-271 2.0 TP-320 3.9 TP-229 5.3 TP-272 3.5 TP-321 1.5 TP-230 2.7 TP-273 6.5 TP-322 2.3 TP-231 5.0 TP-274 4.0 TP-323 4.0	-					
TP-226 1.5 TP-269 2.5 TP-318 2.5 TP-227 2.0 TP-270 3.0 TP-319 1.5 TP-228 3.5 TP-271 2.0 TP-320 3.9 TP-229 5.3 TP-272 3.5 TP-321 1.5 TP-230 2.7 TP-273 6.5 TP-322 2.3 TP-231 5.0 TP-274 4.0 TP-323 4.0	TP-224			2.0	TP-315	1.3
TP-227 2.0 TP-270 3.0 TP-319 1.5 TP-228 3.5 TP-271 2.0 TP-320 3.9 TP-229 5.3 TP-272 3.5 TP-321 1.5 TP-230 2.7 TP-273 6.5 TP-322 2.3 TP-231 5.0 TP-274 4.0 TP-323 4.0	TP-225	0.3		3.0	TP-317	3.2
TP-228 3.5 TP-271 2.0 TP-320 3.9 TP-229 5.3 TP-272 3.5 TP-321 1.5 TP-230 2.7 TP-273 6.5 TP-322 2.3 TP-231 5.0 TP-274 4.0 TP-323 4.0	TP-226	1.5	TP-269	2.5	TP-318	2.5
TP-229 5.3 TP-272 3.5 TP-321 1.5 TP-230 2.7 TP-273 6.5 TP-322 2.3 TP-231 5.0 TP-274 4.0 TP-323 4.0	TP-227		TP-270		TP-319	
TP-230 2.7 TP-273 6.5 TP-322 2.3 TP-231 5.0 TP-274 4.0 TP-323 4.0	TP-228		TP-271		TP-320	
TP-231 5.0 TP-274 4.0 TP-323 4.0	TP-229		TP-272		TP-321	1.5
	TP-230	2.7	TP-273	6.5	TP-322	2.3
TP-232 3.0 TP-275 3.5 TP-224 2.2	TP-231		TP-274		TP-323	4.0
11 252 510 11-275 515 11-524 212	TP-232	3.0	TP-275	3.5	TP-324	2.2
TP-233 2.2 TP-276 3.0 TP-325 2.5	TP-233	2.2	TP-276	3.0		2.5
TP-234 3.3 TP-277 1.8 TP-326 3.0						
TP-235 2.0 TP-278 2.8 TP-327 3.3	TP-235	2.0	TP-278	2.8	TP-327	3.3
TP-236 2.7 TP-279 NP TP-329 2.3	TP-236	2.7	TP-279	NP	TP-329	2.3
TP-237 3.5 TP-280 5.5 TP-330 6.0	TP-237	3.5	TP-280	5.5	TP-330	6.0
TP-238 1.7 TP-281 3.5 TP-331 3.5	TP-238	1.7	TP-281	3.5	TP-331	3.5
TP-239 3.8 TP-282 4.0 TP-332 3.5	TP-239	3.8	TP-282	4.0	TP-332	3.5
TP-240 2.3 TP-283 5.5 TP-333 2.0	TP-240	2.3	TP-283	5.5	TP-333	2.0
TP-241 3.0 TP-284 3.8 TP-334 5.5	TP-241	3.0	TP-284	3.8	TP-334	5.5
TP-242 3.0 TP-285 3.5 TP-335 2.3	TP-242	3.0	TP-285	3.5	TP-335	2.3

Notes: NA = Cap penetrated but no trash encountered; NP = Cap not penetrated

4.2.3 Landfill Trash

Landfill Trash was encountered beneath the existing cap soils in all locations with the exception of test pits TP-200, TP-201, TP-202, TP-203, TP-279, TP-293, and TP-298. The landfill trash generally consisted of various types of debris intermixed with varying amounts of soils. The depth to trash for each test pit are presented on the following page in Table 1.

4.2.4 Residual Soils

Residual soils were encountered beneath the existing cap fill soils in Test Pits TP-200 through TP-203. These soils generally consisted of clay and sand mixtures (USCS: CL) with varying amounts of gravel and extended to the depth of termination where encountered. No landfill trash was encountered in these test pits.

4.2.5 Environmental Screenings

No Combustible Gas or Oxygen readings exceeding the requirements in the Health and Safety Plan were noted during the investigation. All oxygen readings were noted as 20.9% with the exception of test pits performed during a period of precipitation in which slightly lower oxygen levels were noted. It is possible that the precipitation was the cause of the lower level of oxygen. The results of the screening for oxygen and LELs are presented below.

LEL (%) Test Pit Test Pit $O_2(\%)$ LEL (%) Test Pit O₂ (%) 02(%) LEL (%) TP-200 20.9 0 TP-243 20.3 0 TP-286 20.9 0 TP-201 TP-244 TP-287 20.9 0 20.6 0 20.9 0 TP-202 TP-245 20.9 0 TP-288 20.9 20.9 0 0 TP-203 20.9 TP-246 TP-289 20.9 0 20.9 0 0 TP-204 20.9 0 TP-247 20.9 0 TP-290 20.9 0 TP-205 TP-248 TP-291 20.9 0 20.9 0 20.9 0 TP-206 20.9 0 TP-249 20.9 0 TP-292 20.9 0 TP-207 20.9 0 TP-250 20.6 0 TP-293 20.9 0 TP-208 0 TP-251 TP-294 20.9 20.9 0 20.9 0 TP-209 TP-295 20.9 0 TP-252 20.9 0 20.9 0

20.9

20.9

20.9

0

0

TP-298

TP-299

TP-301

20.9

20.9

20.9

0

0

0

Table 2 – Environmental Monitoring Results

Notes: $O_2 = Oxygen$; LEL = Lower Explosive limit

0

0

TP-253

TP-254

TP-255

TP-210

TP-211

TP-212

20.9

20.9

20.9

Table 2 – Environmental Monitoring Results (cont.)

-						tesures (
TP-213	20.9	0	TP-256	20.9	0	TP-302	20.9	0
TP-214	20.9	0	TP-257	20.9	0	TP-303	20.9	0
TP-215	20.9	0	TP-258	20.9	0	TP-304	20.9	0
TP-216	20.9	0	TP-259	20.9	0	TP-305	20.9	0
TP-217	20.9	0	TP-260	20.9	0	TP-307	20.9	0
TP-218	20.9	0	TP-261	20.9	0	TP-308	20.9	0
TP-219	20.9	0	TP-262	20.9	0	TP-309	20.9	0
TP-220	20.9	0	TP-263	20.9	0	TP-310	20.9	0
TP-221	20.9	0	TP-264	20.9	0	TP-311	20.9	0
TP-222	20.9	0	TP-265	20.9	0	TP-312	20.9	0
TP-223	20.9	0	TP-266	20.9	0	TP-314	20.9	0
TP-224	20.9	0	TP-267	20.9	0	TP-315	20.9	0
TP-225	20.9	0	TP-268	20.9	0	TP-317	20.9	0
TP-226	20.9	0	TP-269	20.9	0	TP-318	20.9	0
TP-227	20.9	0	TP-270	20.9	0	TP-319	20.9	0
TP-228	20.9	0	TP-271	20.9	0	TP-320	20.9	0
TP-229	20.9	0	TP-272	20.9	0	TP-321	20.9	0
TP-230	20.9	0	TP-273	20.9	0	TP-322	20.9	0
TP-231	20.9	0	TP-274	20.9	0	TP-323	20.9	0
TP-232	20.9	0	TP-275	20.9	0	TP-324	20.9	0
TP-233	20.9	0	TP-276	20.9	0	TP-325	20.9	0
TP-234	20.6	0	TP-277	20.9	0	TP-326	20.9	0
TP-235	20.6	0	TP-278	20.9	0	TP-327	20.9	0
TP-236	20.6	0	TP-279	20.9	0	TP-329	20.9	0
TP-237	20.9	0	TP-280	20.9	0	TP-330	20.9	0
TP-238	20.9	0	TP-281	20.9	0	TP-331	20.9	0
TP-239	20.9	0	TP-282	20.9	0	TP-332	20.9	0
TP-240	20.9	0	TP-283	20.9	0	TP-333	20.9	0
TP-241	20.4	0	TP-284	20.9	0	TP-334	20.9	0
TP-242	20.3	0	TP-285	20.9	0	TP-335	20.9	0

Notes: O_2 = Oxygen; LEL = Lower Explosive limit

4.2.7 Ground Water Conditions

Static groundwater was not observed in any of the test pits. Subsurface water levels will fluctuate with changes in rainfall and runoff, construction and development activities, and other causes. Future groundwater levels across the site should be expected to vary from those noted during the recent exploration program.

4.2.8 Laboratory Test Results

The completed laboratory index tests performed on samples of the existing cap fill soils are summarized on the following Table 1 - Laboratory Test Results. The laboratory results are presented in graphic form in **Appendix B**.

Table	3 - I	aborator	y Test Results	
-------	-------	----------	----------------	--

D. de	Sample	USCS	In-Place		tterberg Limits	g	- #200 Sin	Mod Proc	ified tor ⁽¹⁾
Boring	Depth (ft)	Class.	Moisture (%)	LL	PL	PI	Sieve (%)	MDD (pcf)	OMC (%)
TP-208	0.0 - 2.0	SM	27.6	36	26	10	48	118.7	13.3
TP-215	0.0 - 2.0	ML	29.8	36	25	11	62	115.0	14.4
TP-228	0.0 - 2.0	ML	26.3	40	27	13	71	112.9	15.5
TP-231	0.0 - 2.0	ML	28.9	34	24	10	62	118.2	13.6
TP-241	0.0 - 2.0	ML	29.7	38	31	7	52	121.7	9.0
TP-253	0.0 - 2.0	SM	24.1	35	29	6	41	119.4	12.4
TP-258	0.0 - 2.0	ML	26.0	37	26	11	60	115.8	13.8
TP-259	0.0 - 2.0	ML	31.0	49	37	12	54	108.4	17.8
TP-263	0.0 - 2.0	SM	31.0	36	30	6	41	117.6	10.5
TP-273	0.0 - 2.0	SM	24.3	30	24	6	49	121.7	12.0

Notes: (1) Modified Proctor performed in accordance with AASHTO T-180; MDD = Maximum Dry Density, OMC = Optimum Moisture Content

5.0 EVALUATION AND RECOMMENDATIONS

5.1 Topsoil Reuse

Generally, topsoil was encountered sporadically, with most plant covering growing directly in the existing fill soils with no distinct topsoil stratum. As such, the existing topsoil is not expected to be suitable for reuse as topsoil, since it is likely not cost effective to collect. However, it could be mixed with the existing cap fill soils for reuse with them.

5.2 Cap Fill Soil Reuse

The site soils are suitable for reuse as controlled compacted fills. It should be noted that the fill materials may contain minor amounts of trash debris however these are not expected to affect the reusability of the soils. Fill placed at any location requiring stable support or minimal settlement shall be constructed as controlled compacted fill. Compacted fill should be placed in relatively horizontal 8-inch loose lifts. Each lift should be uniformly and evenly bladed and mixed during spreading to ensure uniformity of the material in each layer. Each layer should be compacted to a minimum of 95 percent of the Modified Proctor maximum dry density as determined by AASHTO T-180. The moisture content of the materials shall be maintained such that the required degree of compaction can be obtained.

If fills are to be placed on slopes, the original ground should be deeply scarified, or where slopes are steeper than 5 horizontal to 1 vertical, the slope should be stepped or benched, when considered necessary by the Geotechnical Engineer, in order that the placement of fill may be accomplished in horizontal lifts.

5.3 Compaction Moisture Contents

It was noted that the measured natural moisture contents were both higher than the optimum moisture values for most efficient compaction. As a result, drying of excessively wet soils by special manipulation (aerating, discing, etc.) will be required in order to achieve the specified degree of compaction. However it should also be noted that the investigation took place during a period of particularly active precipitation, and the moisture contents obtained may not be indicative of more typical site conditions.

Wet weather could exacerbate the potential compaction difficulties. Cement or lime modification, or mixing with drier or more granular soils, or other methods, could also be used to improve wet or unstable soils at the time of compaction. If earthwork operations are performed during the winter months, the contractor must not work with frozen soils.

5.4 Weather Conditions

Weather (rainfall and freezing) has a huge influence on site earthwork, foundations, and concrete placement. Average monthly weather data reported by the nearest National Oceanic and Atmospheric Administration (NOAA) station, located within Baltimore, provide an insight to the local temperature and precipitation conditions.

Table 4 – Baltimore City NOAA station

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
Precipitation ¹ (in.)	2.84	2.32	3.56	2.99	3.89	3.43	3.85	3.74	3.98	3.16	3.02	3.03	39.81
Below Freezing Days	25	21	14	3	*	0	0	0	0	2	11	21	97

Source: National Oceanic and Atmospheric Administration, minimum 30-year reporting period

According to NOAA, the typical monthly precipitation for the reporting station averages from 2.32 inches in February to 3.98 inches in September. The number of days experiencing freezing temperatures varied from 2 days in October to 25 days in January.

¹Adjusted precipitation to reflect rainfall only (excludes frozen precipitation- pellets, sleet and hail).

^{*}Not reported

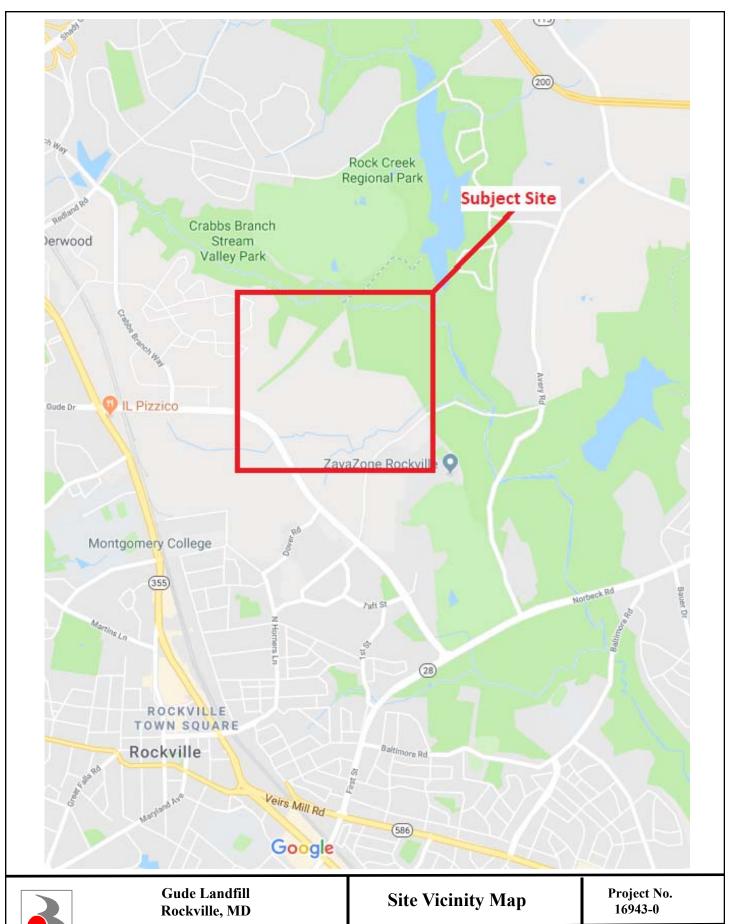
6.0 GEOTECHNICAL OBSERVATION AND TESTING

As variations in soil conditions can be expected to some degree on any project, it is strongly recommended that The Robert B. Balter Company, as project geotechnical engineer, provide full time, on-site observation and testing of all soil related aspects of construction. This is to assure compliance with design concepts and recommendations, and to verify that the subsurface conditions are consistent with those anticipated prior to construction.

7.0 GENERAL COMMENTS

The evaluations and recommendations contained in this report were based upon the finite data obtained from the borings which are presented within this report. Although we have described typical variations which may affect the project, there is the possibility that significant unanticipated conditions may be present outside the specific boring locations. The nature and extent of differing subsurface conditions, as well as their impact on the proposed construction, will most likely not be evident until the time of construction. If significant differences are discovered in the field during construction, it may be necessary for us to re-evaluate and revise the contents of this report.

Also, this report specifically excludes exploration, sampling, testing, evaluation and recommendations relating to the presence of hazardous materials or other environmental concerns which could affect future development of the site. The Robert B. Balter Company performs such services and would be pleased to provide a proposal to address your needs.



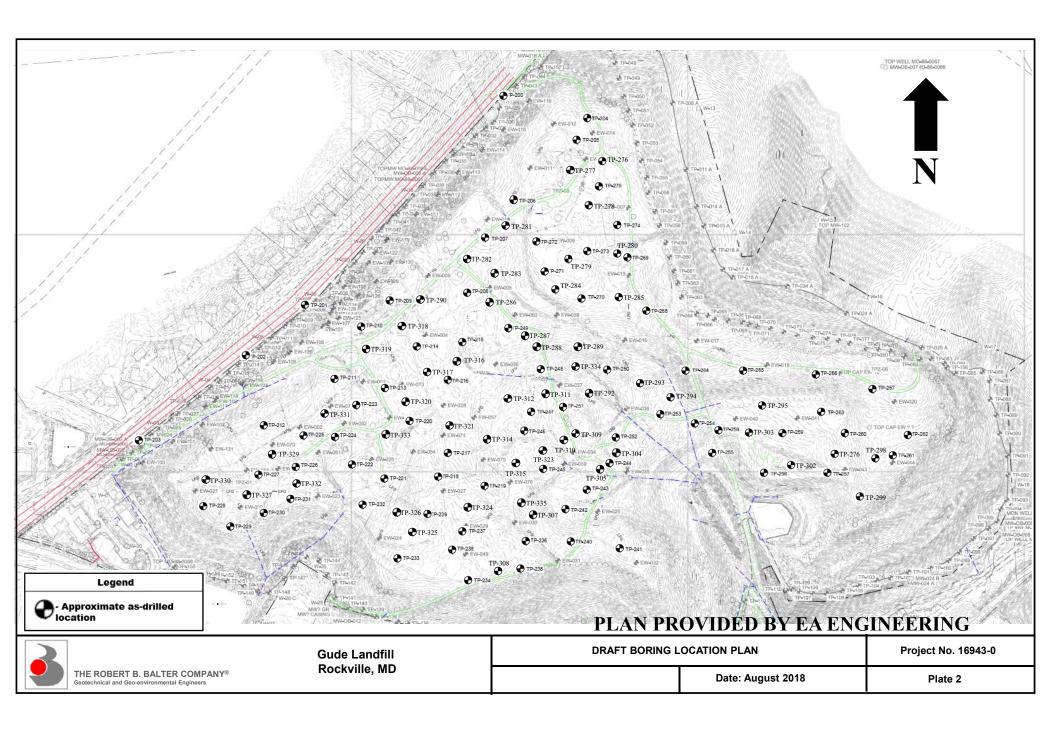


THE ROBERT B. BALTER COMPANY® Geotechnical and Geo-environmental Engineers

Scale: None

Date: Sept. 2018

PLATE 1



APPENDIX A TEST PIT LOGS

THE ROBERT B. BALTER COMPANY IDENTIFICATION OF SOIL SAMPLES

Soils are described in the boring logs according to the following criteria with the principal constituents written in capital letters. Other constituents are preceded by descriptive terminology that is used to denote the percentage of weight of each component. Soil descriptions are determined visually except where laboratory classification test data are available. Classifications are based on The Robert B. Balter Company's interpretation of ASTM D 2487-00.

		0.4. 50/ Finan	Well Graded		GW	GRAVEL
		0 to 5% Fines	Poorly Graded		GP	GRAVEL
Part Part	GRAVEL with Silt					
	FINE GRAINED SOIL	6 to 120/ Finas	Silly Fines	Poorly Graded	GP-GM	GRAVEL with Silt
. 7 9	FINE GRAINED SOIL COARSE GRAINED SOIL > 50% Passing No. 200 Sieve > 50% Retained on No. 200 SILT & SILT & CLAY SAND (LL≥50) (ILL<50)	0 to 12% rines	Clayer Fines	Clavey Fines Well Graded		GRAVEL with Clay
OII Siev	FINE GRAINED SOIL COARSE GRAINED SO > 50% Passing No. 200 Sieve > 50% Retained on No. 200 SILT & SILT & CLAY SAND (LL≥50) (ILL<50)		Poorly Graded		GP-GC	GRAVEL with Clay
D S	_		Silty Fines		GM	Silty GRAVEL
ZE		13 to 50% Fines	Silty Clay Fines	3	GC-GM	Silty, Clayey GRAVEL
AII on \			Clayey Fines		GC	Clayey GRAVEL
GR		0 to 5% Fines	Well Graded		SW	SAND
SE etair		0 to 3/0 Pines	Poorly Graded		SP	SAND
4R % Re			Silty Fines	Well Graded	SW-SM	SAND with Silt
3 0 /	Ω	6 to 12% Fines	Poorly Graded		SP-SM	SAND with Silt
_ ^	A	0 to 12/0 Fines	Clavey Fines	Well Graded	SW-SC	SAND with Clay
	S		Clayey Files	Poorly Graded	SP-SC	SAND with Clay
					SM	Silty SAND
		13 to 50% Fines	Silty, Clayey Fi	nes	SC-SM	Silty, Clayey SAND
			Clayey Fines		SC	Clayey SAND
, e		Low Plastic Fines, PI<4	Plots below "A"	' line	ML	SILT
OII Siev	& X 50)	Low Plastic Fines, 4≤PI≤7	Plots on or above	e "A" line	CL-ML	Silty CLAY
003 000	LT	Plastic Fines, PI>7	Plots on or above	ve "A" line	CL	Lean CLAY
VEI Io. 2		Significant Organics, PI<4	Plots below "A	' line	OL	Organic SILT
AII ng N		Significant Organics, PI≥4	Plots on or above	e "A" line	OL	Organic CLAY
GR assir		Elastic Fines	Plots below "A	' line	MH	Elastic SILT
IE (T & AY ≥50	Plastic Fines	Plots on or above	e "A" line	СН	Fat CLAY
FIN 50%	i di	Significant Organics	Plots below "A	' line	ОН	Organic SILT
, , ,		Significant Organics	Plots on or above	e "A" line	ОН	Organic CLAY
		Dark, highly organic, decomp	posed vegetative t	ssue	PT	PEAT

ADDITIONAL TERMINOLOGY:

Descriptive Components

Descriptive Terms	Proportions
Trace	1 - 5%
Little (Sand, Gravel)	6 - 14%
With (Sand, Gravel)	15 – 30%
With (Silt, Clay)	6 – 12%
Adjective Form (Sandy, Gravelly)	31 - 50%
Adjective Form (Silty, Clayey)	13 - 50%

Density or Consistency

SAND	and GRAVEL	SILT a	nd CLAY
N-Value	Density	N-Value	Consistency
0-4	Very Loose	0-1	Very Soft
5-10	Loose	2-4	Soft
11-30	Medium Dense	5-8	Medium Stiff
31-50	Dense	9-15	Stiff
> 50	Very Dense	16-30	Very Stiff
		> 30	Hard

Fill materials are placed by man, and may be identified by unnatural artifacts, unnatural mixed grain sizes or layering, or trustworthy documentation of fill placement.

Possible Fill materials are difficult to distinguish from natural soils, exhibiting minor distinctions.

Decomposed Rock consists of residual soil with SPT N-values between 50 blows per foot and blows per 4 inches (50/4"). **Highly Weathered Rock** consists of residual soil with SPT N-values between 50/3" and 50/1".

TEST PIT TP-200 PAGE 1 OF 1

CLIENT EAE	ingineering, Inc.					PROJECT	NAME Gu	ıde Landfill				
PROJECT LOC	CATION Montgomer	y Count	y, Mar	yland		PROJECT	NUMBER	16943-0 M	ID			
DATE STARTE	D 7/16/18	_ col	MPLET	ED 7/16/1	3	GROUND E	LEVATION	N	TE	ST PIT SIZ	E	
EXCAVATION	CONTRACTOR The	e Robert	B. Bal	ter Compan	у			WA	TER LEVE	LS	NAVATED I	14/4755
EXCAVATION	METHOD					DATE	TIME	ELAPSED HOURS	CASING DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (f
	J. Bailey			BY K. Cri	st	7/16/18		0 ∑			NE	
NOTES												
O DEPTH O (ft) SAMPLE TYPE NUMBER	REMARKS	U.S.C.S.	GRAPHIC LOG				MATE	RIAL DESC	CRIPTION			
		SM	F	Moi	st, Light Brov	vn, Silty SA	ND (Fill)					
.]				1.5								
				Moi	st, Reddish E	Brown, Sand	ly CLAY					
0.5												
2.5												
-												
.]												
		CL										
5.0		-										
7.5												
	Trash Not			8.0								
7	Encountered						Botto	m of test pit	at 8.0 feet			

TEST PIT TP-201 PAGE 1 OF 1

		ngineering, Inc.				PROJECT	NAME Gu	ide Landfill				
PROJ	ECT LOC	ATION Montgomer	y Coun	ty, Ma	ryland	PROJECT	NUMBER _	16943-0 M	D			
DATE	STARTE	D _7/16/18	_ co	MPLE.	TED <u>7/16/18</u>	GROUND E	LEVATION	·			E	
		CONTRACTOR The			· · · · ·		T184-	ELAPSED	TER LEVEI CASING	HOLE	WATER	WATER
		METHOD				DATE	TIME	HOURS	DEPTH (ft)	DEPTH (ft)	DEPTH (ft)	ELEV (ft)
LOGG	ED BY _	J. Bailey	_ CHI	ECKE	D BY K. Crist	7/16/18		0 ∑			NE	
NOTE	s				T							
O DEPTH (ft)	SAMPLE TYPE NUMBER	REMARKS	U.S.C.S.	GRAPHIC LOG			MATE	RIAL DESC	CRIPTION			
				11/2 1	0.3 Topsoil							
			CL	F	Moist, Red	dish Brown, Sand	ly CLAY (F	ill)				
-						dish Brown, Sand	ly CLAY					
2.5												
-												
-												
-												
5.0			CL									
91/2/8												
ER.												
BAL -												
ERT [
ROBI												
GPJ -												
7.5												
UDE		Trash Not			8.0							
3-0 6		Encountered		<i>V////</i>	0.0		Bottor	n of test pit	at 8.0 feet			
1694												
WELL												
TP //												
GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9 C												
ERAL												
SEN.												

TEST PIT TP-202 PAGE 1 OF 1

CLIENT EAE									ude Landfill				
PROJECT LOC	ATION Montgomer	y Coun	y, Mar	yland			PROJECT	NUMBER	16943-0 M	D			
DATE STARTE	D 7/16/18	_ co	MPLE1	TED _7/	/16/18		GROUND E	LEVATIO	ON		ST PIT SIZ		
EXCAVATION (CONTRACTOR The	Rober	B. Ba	Iter Cor	mpany				WA FLAPSED	TER LEVE	LS HOLE	WATER	WATER
EXCAVATION I	METHOD						DATE	TIME	ELAPSED HOURS	DEPTH (ft)	DEPTH (ft)	DEPTH (ft)	ELEV (ft
LOGGED BY _	J. Bailey	_ CH	ECKE	BY _K	Crist		7/16/18		0 ∑			NE	
NOTES													
O DEPTH O (ft) SAMPLE TYPE NUMBER	REMARKS	U.S.C.S.	GRAPHIC LOG					MAT	ERIAL DESC	CRIPTION			
 		CL	F	0.1 <u></u>		ight Brov	wn, Sandy C						
2.5	Trash Not Encountered	CL		8.0	Moist, I	Red Brow	n, Sandy Cl		om of test pit	at 8.0 feet			

GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9/5/18

TEST PIT TP-203
PAGE 1 OF 1

		ephone No. (410) 363 w.balterco.com	3-1555											
CLIEN	T EA E	ngineering, Inc.						PROJECT N	NAME Gu	ıde Landfill				
PROJ	ECT LOC	ATION Montgomery	/ Count	ty, Mar	yland			PROJECT N	NUMBER	16943-0 M	D			
DATE	STARTE	D _7/16/18	_ co	MPLET	ED _7	/16/18		GROUND E	LEVATION			ST PIT SIZ	E	
EXCA	VATION (CONTRACTOR The	Rober	t B. Ba	Iter Co	mpany				WA ELAPSED	TER LEVEI CASING	-S HOLE	WATER	WATER
EXCA	VATION I	METHOD						DATE	TIME	HOURS	DEPTH (ft)	DEPTH (ft)	DEPTH (ft)	ELEV (ft)
LOGG	ED BY _	J. Bailey	_ CHI	ECKED	BY _	K. Crist		7/16/18		0 ∑			NE	
NOTE	s													
O DEPTH O (ft)	SAMPLE TYPE NUMBER	REMARKS	U.S.C.S.	GRAPHIC		-			MATE	RIAL DESC	CRIPTION			
				F	0.1	Topsoil	addiah E	Brown, Sand	v CLAV (E	:IIV				
			CL	FF	2.0				·	iii <i>)</i>				
2.5		Trash Not	CL		8.0	Moist, Re	eddish E	Brown, Sand						
		Encountered		<i>x</i> //////	<u></u>				Bottor	n of test pit	at 8.0 feet			



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TEST PIT TP-204

CLIENT EA Engineering, Inc. PROJECT NUMBER Golds Landfill PROJECT NUMBER 1694-0 MD DATE STARTED 7/17/18 COMPLETED 7/17/18 EXCAVATION CONTRACTOR The Robert B. Balter Company EXCAVATION METHOD CHECKED BY K. Crist NOTES Lat. 39,11148 Long77,13783 MATERIAL DESCRIPTION Moist, Light Brown, Silty SAND MATERIAL DESCRIPTION MATERIAL	www.bailerco.com		J
DATE STARTED 7/17/18 COMPLETED 7/17/18 GROUND ELEVATION TEST PIT SIZE	CLIENT _EA Engineering, Inc.	PROJECT NAME Gude Landfill	
DATE STARTED 7/17/18 COMPLETED 7/17/18 GROUND ELEVATION TEST PIT SIZE	PROJECT LOCATION Montgomery County, Maryland	PROJECT NUMBER 16943-0 MD	
EXCAVATION CONTRACTOR The Robert B. Balter Company EXCAVATION METHOD LOGGED BY J. Balley CHECKED BY K. Crist NOTES Lat: 39.11148 Long: -77.13783 MATER LEVELS: DATE TIME BLAPSED CASHING DEPTH (ft) DEPTH	DATE STARTED 7/17/18 COMPLETED 7/17/18		
DATE TIME CASING DEPTH (ft) DEPTH		WATER LEVELS	
NOTES Lat: 39.11148 Long: -77.13783 NE NE NOTES Lat: 39.11148 Long: -77.13783 NATERIAL DESCRIPTION NE NE NE NE NE NE NE	EXCAVATION METHOD	DATE TIME ELAPSED CASING HOLE WATER	ATER .EV (ft)
NOTES Lat: 39.11148 Long: -77.13783 Hard Lat: 39.11148 Long: -77.13783 MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION Trash 4.5			
HADO AND AND AND AND AND AND MATERIAL DESCRIPTION Moist, Light Brown, Silty SAND F F AND Trash Trash			ļ
Moist, Light Brown, Silty SAND SM SM F 1 F 2.5 Trash			
Moist, Light Brown, Silty SAND SM F 2.5 TF TF TF Trash A, 5	SAMPLE TYPE NUMBER U.S.C.S. LOG	MATERIAL DESCRIPTION	
	SM F F Moist, Light Brown, Silty SAND SM F F F F F F F F F F F F F F F F F F F	Bottom of test pit at 4.0 feet	



The Robert B. Balter Company
Geotechnical and Environmental Engineers
Materials and Construction Inspection and Testing
Telephone No. (410) 363-1555

TEST PIT TP-205

ww	w.balt	erco.c	om											
CLIENT EAE	nginee	ering, I	nc.				6	PROJECT N	NAME G	ude Landfill				
PROJECT LOC	OITA	M _Mo	ntgomer	y County, M	Maryland			PROJECT N	NUMBER	16943-0 M	D			
DATE STARTE	D _7/1	7/18		COMPI	LETED _	7/17/18		GROUND E	LEVATION	N	TE	ST PIT SIZI		
EXCAVATION	CONTI	RACTO	OR The	Robert B.	Balter Co	ompany				WA	TER LEVE	S	WATER	WATER
EXCAVATION	METH	OD _						DATE	TIME	ELAPSED HOURS	CASING DEPTH (ft)	HOLE DEPTH (ft)		WATER ELEV (ft)
LOGGED BY	J. Bail	ey		_ CHEC	KED BY	K. Crist		7/17/18		0 ∑			NE	
NOTES Lat: 3	9.111 ²	18 Lor	ng: - 77.13	3796										
SAMPLE TYPE	U.S.C.S.	GRAPHIC		Maiak Lieb	A Danson	Cile CANE		MATEF	RIAL DESC	CRIPTION				
2.5	SM		5.0	Trash	it Brown,	Silty SAND	,							
		\bowtie	5.5											
								Bottom	n of test pit	t at 5.5 feet				



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TEST PIT TP-206

WW	w.bait	erco.c	OIII											
CLIENT EAE	ngine	ering, I	lnc.					PROJECT I	NAME G	ude Landfill				
PROJECT LOC	ATIO	N <u>M</u> o	<u>ntgome</u> r	y County, N	<u>Marylan</u> d			PROJECT I	NUMBER	16943-0 M	D			
DATE STARTE										 N		ST PIT SIZI		
EXCAVATION (WA	TER LEVEL	.s		
EXCAVATION I								DATE	TIME	ELAPSED HOURS	CASING DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
LOGGED BY								7/17/18		0 ∑			NE	•
NOTES Lat: 3						Tt. Onot								
	3.110	JJ LUI	ig//. i	3034										
SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG						MATER	RIAL DES	CRIPTION				
	SM	F	2.0	Moist, Ligh	t Brown,	Silty SAN	D							
2.5														
_		\bowtie	3.0											
								Botton	of test pi	t at 3.0 feet				



TEST PIT TP-207 PAGE 1 OF 1

	VVVV															
	T EA E											ude Landfill				
	CT LOC											16943-0 M				
	STARTE									 GROUND E	LEVATIO	N		ST PIT SIZI	E	
	/ATION (DATE	T184F	ELAPSED	TER LEVEL CASING	LS HOLE	WATER	WATER
1	/ATION I									 DATE	TIME	HOURS	DEPTH (ft)	HOLE DEPTH (ft)		ELEV (ft)
LOGGI	ED BY _	J. Bail	еу		c	HECKI	ED BY	Y <u>K. C</u>	Crist	 7/17/18		0 ∑			NE	
NOTES	Lat: 3	9.1100	08 Lon	g: - 77.	13921											
GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ. ROBERT B BALTER.GDT 9/6/18 C DEPTH C DEPTH C (ft) C (ft)	SAMPLE TYPE NUMBER 3		GRAPHIC LOG	2.0 2.5		i, Light	Browl	n, Silty	y SAND			t at 2.5 feet				
GENERAL BH / TP / WELL 16																

GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9/5/18

TEST PIT TP-208 PAGE 1 OF 1

	www.balterco.com											
CLIENT E	A Engineering, Inc.					PROJECT N	NAME Gu	ıde Landfill				
PROJECT L	OCATION Montgomery	/ Count	y, Mar	yland		PROJECT N	NUMBER _	16943-0 M	D			
DATE STAF	TED <u>7/17/18</u>	_ COI	MPLET	ED _7/	17/18	_ GROUND E	LEVATION			ST PIT SIZE	■	
EXCAVATION	ON CONTRACTOR The	Robert	B. Ba	Iter Cor	mpany			WA' FLAPSED	TER LEVEL	_S HOLE	WATER	WATER
EXCAVATION	N METHOD					DATE	TIME	ELAPSED HOURS	DEPTH (ft)	HOLE DEPTH (ft)		ELEV (ft)
LOGGED B	Y _J. Bailey	_ CHE	ECKED	BY K	C. Crist	_		0 ⊼			NE	
NOTES La	t: 39.10939 Long: -77.13	972				_						
O DEPTH O (ft) SAMPLE TYPE	TESTS	U.S.C.S.	GRAPHIC LOG					RIAL DESC	CRIPTION			
2.5		SM			Moist, Light E	Brown, Silty SAN	ND					
5.0			F	5.0	Trash							
				0.0								
			rxxx	6.0			Bottor	n of test pit	at 6.0 feet			



TEST PIT TP-209 PAGE 1 OF 1

CLIENT EA Engineering, Inc.	PROJECT	NAME G	ude Landfill				
PROJECT LOCATION Montgomery County, Maryland			16943-0 M				
DATE STARTED 7/18/18 COMPLETED 7/18/18	GROUND E	LEVATIO	N	TE	ST PIT SIZ	E	
EXCAVATION CONTRACTOR _ The Robert B. Balter Company			WA	TER LEVE	_S	MATER	WATER
EXCAVATION METHOD	DATE	TIME	ELAPSED HOURS	DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
LOGGED BY J. Bailey CHECKED BY K. Crist	7/18/18		0 ⊼			NE	
NOTES Lat: 39.10926 Long: -77.14083							
SAMPLE TYPE NUMBER NUMBER U.S.C.S. GRAPHIC LOG	MATEI	RIAL DES	CRIPTION				
0.0 Moist, Light Brown, Silty SAND							
SM							
1.5	Botton	n of test pi	t at 1.5 feet				
		·					
0							
0							
GENERAL BRITIS / WELL 18845-0 GODE LANDTILL.GF3 ROBERT B BALLER.GD							



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TEST PIT TP-210 PAGE 1 OF 1

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ngine	ering,	Inc.					PROJECT I	NAME G	ude Landfill				
CATIO	N <u>M</u> c	ontgomery	/ County, M	/laryland			PROJECT I	NUMBER	16943-0 M	D			
ED _7/	18/18		COMPL	ETED _	7/18/18						ST PIT SIZ	=	
CONT	RACT	OR The	Robert B.	Balter Co	ompany				WA	TER LEVEL	S		
METH	OD						DATE	TIME	HOURS	CASING DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
							7/18/18		0 ⊻			NE	
				_									
U.S.C.S.	GRAPHIC LOG						MATER	RIAL DES	CRIPTION				
SM	F	2.5		t Brown,	Silty SAN	ND							
		4.0											
							Botton	of test pi	it at 4.0 feet				
	CATION TO THE TOTAL	CATION Mc ED 7/18/18 CONTRACT METHOD J. Bailey 39.10896 Lo	CONTRACTOR The METHOD J. Bailey 39.10896 Long: -77.14	Engineering, Inc. CATION Montgomery County, Methods Completed States of the Robert B. METHOD	Engineering, Inc. CATION Montgomery County, Maryland ED 7/18/18 COMPLETED CONTRACTOR The Robert B. Balter C METHOD J. Bailey CHECKED BY 39.10896 Long: -77.14148 O O O O O O O O O O O O O O O O O O	Engineering, Inc. CATION Montgomery County, Maryland ED 7/18/18 COMPLETED 7/18/18 CONTRACTOR The Robert B. Balter Company METHOD J. Bailey CHECKED BY K. Crist 39.10896 Long: -77.14148 Moist, Light Brown, Silty SAN FF SM FF 2.5 Trash	Engineering, Inc. CATION Montgomery County, Maryland ED 7/18/18 COMPLETED 7/18/18 CONTRACTOR The Robert B. Balter Company METHOD J. Bailey CHECKED BY K. Crist 39.10896 Long: -77.14148 SM FF A SM FF 2.5 Trash	Engineering, Inc. CATION Montgomery County, Maryland ED 7/18/18 COMPLETED 7/18/18 CONTRACTOR The Robert B. Balter Company METHOD J. Bailey CHECKED BY K. Crist 39.10896 Long: -77.14148 MATER MOIST, Light Brown, Silty SAND F SM F At a series of the series of	Engineering, Inc. CATION Montgomery County, Maryland ED 7/18/18 COMPLETED 7/18/18 CONTRACTOR The Robert B. Balter Company METHOD J. Bailey CHECKED BY K. Crist 39.10896 Long: -77.14148 MATERIAL DES MATERIAL DES MOIST, Light Brown, Silty SAND SM F F 2.5 Trash	Engineering, Inc. CATION Montgomery County, Maryland ED 7/18/18 COMPLETED 7/18/18 CONTRACTOR The Robert B. Balter Company METHOD J. Bailey CHECKED BY K. Crist 39.10896 Long: -77.14148 CONTRACTOR The Robert B. Balter September 10 of the Hours of th	Engineering, Inc. CATION Montgomery County, Maryland ED 7/18/18 COMPLETED 7/18/18 CONTRACTOR The Robert B. Balter Company METHOD J. Balley CHECKED BY K. Crist 39.10896 Long: -77.14148 MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION	Engineering, Inc. CATION Montgomery County, Maryland PROJECT NUMBER 16943-0 MD TEST PIT SIZE CONTRACTOR The Robert B. Balter Company METHOD J. Bailey CHECKED BY K. Crist 39.10896 Long: -77.14148 MATERIAL DESCRIPTION MATERIAL DESCRIPTION	PROJECT NAME Gude Landfill PROJECT NUMBER 16943-0 MD TEST PIT SIZE CONTRACTOR The Robert B. Balter Company METHOD J. Bailey CHECKED BY K. Crist 39.10896 Long: -77.14148 MATERIAL DESCRIPTION MOIST, Light Brown, Silty SAND MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION



TEST PIT TP-211 PAGE 1 OF 1

www.															
CLIENT EA E											ude Landfill				
PROJECT LO			_	_							16943-0 M				
DATE STARTI								(GROUND E	LEVATIO	N		ST PIT SIZI	E	
EXCAVATION								— г	DATE	T184-	ELAPSED	TER LEVEI CASING	LS HOLE	WATER	WATER
EXCAVATION									DATE	TIME	HOURS	DEPTH (ft)	HOLE DEPTH (ft)		ELEV (ft)
LOGGED BY	J. Bail	еу		CHI	ECKED	BY <u>K.</u>	Crist		7/18/18		0 ∑			NE	
NOTES Lat: 3	39.1084	11 Long	g: - 77.1	4166											
NOTES Lat::3	39.1084	GRAPHIC LOG		4166			ty SAND		MATER		CRIPTION			NE	
GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9/5/18															



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TEST PIT TP-212

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CLIENT	EA E	ngine	ering, l	Inc.					_ PROJECT	NAME G	ude Landfill				
PROJE	CT LOC	ATIOI	M _Mo	ntgomer	y County	, Maryla	nd		_ PROJECT	NUMBER	16943-0 M	D			
								18			N		ST PIT SIZ	E	
EXCAV	ATION (CONT	RACT	OR The	Robert	B. Balter	r Compa	any			WA	TER LEVEL	S		
									DATE	TIME	ELAPSED HOURS	CASING DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
									7/19/18		0 ⊻			NE	
				ng: -77.1					_						
O DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG						MATE	RIAL DES	CRIPTION				
		SM	F	1.7	Moist, Li Trash	ght Brow	vn, Silty	SAND							
2.5			XXX	2.5											
2.0			XXXX	2.0					Bottor	n of test pi	it at 2.5 feet				



TEST PIT TP-213 PAGE 1 OF 1

VVV	w.bait	erco.c	OIII											
CLIENT EAE	nginee	ering, I	nc.					PROJECT	NAME G	ude Landfill				
PROJECT LOC	OITA	N <u>Mo</u>	ntgomer	y County,	Marylan	d		PROJECT	NUMBER	16943-0 M	D			
DATE STARTE	D _7/1	18/18		COME	PLETED	7/18/18	3			N		ST PIT SIZI	E	
EXCAVATION	CONT	RACT	OR The	Robert B	B. Balter (Company	У			WA	TER LEVEL	.s		
EXCAVATION	METH	OD						DATE	TIME	ELAPSED HOURS	CASING DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
LOGGED BY _							st .	7/18/18		0 ⊻			NE	
NOTES Lat: 3														
O DEPTH O (ft) SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG						MATE	RIAL DES	CRIPTION				
 2.5	SM	FFF	2.3	Moist, Lig	ht Browr	n, Silty S <i>i</i>	AND							
		XXXX	0.2					Bottor	n of test pi	it at 3.2 feet				



TEST PIT TP-214 PAGE 1 OF 1

CLIE	NT EAE	ngine	ering, I	nc.							PROJECT	NAME G	ude Landfill				
PRO	IECT LOC	ATIO	M _Mo	ntgom									16943-0 M				
DATE	STARTE	D _7/	19/18			COMP	LETE	D <u>7/1</u>	9/18		GROUND E	LEVATIO	N	TE	ST PIT SIZ	E	
EXC	VATION	CONT	RACT	OR T	he Rol	oert B.	Balte	r Com	pany				WA'	TER LEVEL	LS HOLE	WATER	WATER
	VATION										DATE	TIME	ELAPSED HOURS	DEPTH (ft)	DEPTH (ft)	DEPTH (ft)	ELEV (ft)
	GED BY _						KED B	BY <u>K.</u>	Crist		7/19/18		0 ⊼			NE	
NOTE	S <u>Lat: 3</u>	9.108	77 Lor	ng: -77.	14042	2											
DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG								MATE	RIAL DES	CRIPTION				
2.5		SM		3.0	Mois		nt Brov	wn, Silt	ty SAN	ID	Botton	n of test pit	t at 3.5 feet				
GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9/5/18																	

GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9/5/18

TEST PIT TP-215

www.baiterco.com											
CLIENT EA Engineering, Inc.	PROJECT NAME Gude Landfill										
PROJECT LOCATION Montgomery County, Maryland	PROJECT NUMBER 16943-0 MD										
DATE STARTED 7/19/18 COMPLETED 7/19/18	GROUND ELEVATION TEST PIT SIZE										
EXCAVATION CONTRACTOR _ The Robert B. Balter Company			WA ⁻	TER LEVEL	-S	WATER	WATER				
EXCAVATION METHOD	DATE	TIME	ELAPSED HOURS	DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)				
LOGGED BY J. Bailey CHECKED BY K. Crist	7/19/18		0 ∑			NE					
NOTES Lat: 39.10899 Long: -77.13973	-										
	-										
SAMPLE TYPE NUMBER NUMBER CRAPHIC LOG	MATERIAL DESCRIPTION										
F Moist, Light Br	own, Sandy Sl	ILT									
'											
2.5											
ML _E											
5.0											
Trash											
-											
6.5		Botto	m of test pit	at 6.5 feet							



TEST PIT TP-216 PAGE 1 OF 1

	NT EAE																	
	IECT LOC							// 0	PROJECT NUMBER 16943-0 MD									
	STARTE								 GROUND ELEVATION TEST PIT SIZE WATER LEVELS									
	VATION								 DATE	TIME	HOLE DEPTH (ft)	WATER WATER						
	VATION								 7/19/18		HOURS 0 ∑	DEPTH (ft)	DEPTH (ft)	DEPTH (ft) NE	ELEV (ft)			
	GED BY					ED BY	<u>K. C</u>	rist	 1710710		0 =							
NOTE	S <u>Lat: 3</u>	9.108	51 Lon	ig: -//	13996													
O DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG						MATE	RIAL DES	SCRIPTION							
		SM		2.3	Moist	Brown	, Silty	SAND										
-	_			3.5					Bottor	n of test p	it at 3.5 feet							
GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9/5/18																		



TEST PIT TP-217 PAGE 1 OF 1

				OIII						_										
	CLIENT _EA Engineering, Inc. PROJECT LOCATION _Montgomery County, Maryland																			
											PROJECT NUMBER 16943-0 MD									
	START									GROUND ELEVATION TEST PIT SIZE WATER LEVELS										
	NOITAVA									— г	DATE	WATER WATER								
	NOITAVA									— F	7/19/18	TIME	ELAPSED HOURS	DEPTH (ft)	HOLE DEPTH (ft)	DEPTH (ft) NE	ELEV (ft)			
	GED BY						D BY _	K. Cri	ist		7713/10		0 -							
NOTE	S Lat:	39.107	'56 Lor	ıg: -77	.13993															
0.0 DEPTH	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG		Moist,	, Light E	Brown,	Silty S	SAND		MATE	RIAL DES	CRIPTION							
2.5		SM	F F F	4.0	Trash															
					Hasii															
			XXXX	4.7							Botton	n of test ni	it at 4.7 feet							
GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9/5/18											Botton	Tortest pr	1 dt 4.7 100t							

GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9/5/18

TEST PIT TP-218 PAGE 1 OF 1

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CLIENT EAL	Engine	ering,	Inc.					PROJECT NAME Gude Landfill									
PROJECT LO	CATIO	N <u>Mo</u>	ntgome	ry County,	Maryland	d		PROJECT NUMBER 16943-0 MD									
DATE START	ED _7/	19/18		COMP	LETED	7/19/18		GROUND E	LEVATION	١	TE	ST PIT SIZI	=				
EXCAVATION	CONT	RACT	OR Th	e Robert B	. Balter 0	Company	1			WA	TER LEVEL	_S					
EXCAVATION	METH	OD						DATE	TIME	ELAPSED HOURS	DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)			
LOGGED BY						K. Crist	t	7/19/18		0 ∑			NE				
NOTES Lat:																	
O DEPTH (ft) (T) (A) (A) (A) (A) (A) (A) (A) (A) (A) (A	U.S.C.S.	GRAPHIC LOG						MATER	RIAL DESC	CRIPTION							
2.5	SM		4.0	Moist, Ligh	ht Brown	, Silty SA	AND	Botton	ı of test pit	at 5.0 feet							



TEST PIT TP-219

VVVV	w.bait	erco.c	JUIII													
CLIENT EAE	nginee	ering, l	Inc.				_ PROJECT N	NAME G	ude Landfill							
PROJECT LOC	ATIO	N <u>Mo</u>	ntgomer	y County, M	aryland		PROJECT NUMBER 16943-0 MD									
DATE STARTE	D _7/1	19/18		COMPL	ETED _7/1	19/18	GROUND ELEVATION TEST PIT SIZE									
EXCAVATION								WATER LEVELS								
EXCAVATION						•	DATE	TIME	ELAPSED HOURS	CASING DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)			
LOGGED BY _						. Crist	7/19/18		0 ∑			NE				
NOTES Lat: 3							_									
I																
O DEPTH O (ft) SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG					MATER	RIAL DES	CRIPTION							
2.5	SM	FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF	4.3	Moist, Light	Brown, Si	Ity SAND										
5.0		\bowtie	5.0													
							Bottom	of test pi	t at 5.0 feet							



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TEST PIT TP-220

CLIENT EA Engineering, Inc.										P	PROJECT NAME Gude Landfill										
PROJECT											PROJECT NUMBER 16943-0 MD										
DATE STA	ARTED	7/1	8/18		c	OMPL	ETED	7/18/	/18	G	GROUND ELEVATION TEST PIT SIZE										
EXCAVAT	ION C	ONTE	RACTO	OR Th	e Rob	ert B. E	Balter (Compa	any		WATER LEVELS DATE TIME ELAPSED HOURS CASING HOLE DEPTH (ft) WATER DEPTH (ft) WATER DEPTH (ft) WATER DEPTH (ft) ELEV (ft)										
EXCAVAT	ION M	ETHO	DD								DATE	TIME	ELAPSED HOURS	DEPTH (ft)	DEPTH (ft)		ELEV (ft)				
LOGGED I	BY J	. Baile	еу		c	HECKI	ED BY	K. C	Crist		7/18/18		0 ∑			NE					
NOTES _L	_at: 39	.1078	39 Lon	ng: - 77.	14055																
ЭĒ			()																		
DEPTH (ft)	NUMBER	U.S.C.S.	GRAPHIC LOG								MATER	RIAL DES	CRIPTION								
0.0 WWS		SM		3.0	Trash		Brown	n, Silty	SAND		Bottom	n of test pit	t at 3.3 feet								



TEST PIT TP-221 PAGE 1 OF 1

		- 100.00															
			_		-												
										GROUND	ELEVA	TION				=	
										DATE	TIM	/E	ELAPSED	TER LEVEI CASING	_S HOLE	WATER	WATER
											_	/15	HOURS	DEPTH (ft)	DEPTH (ft)		ELEV (ft)
						KED B	Y <u>K.</u>	Crist		//10/10			0 4			INE	
S <u>Lat: 3</u>	9.107	26 Lon	g: - 77.	14095													
SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG								MAT	ERIAL [DESC	CRIPTION				
	SM					t Brow	wn, Sil	ty SAN	ID								
		\bowtie	1.7														
										Botte	m of te	st pit	t at 1.7 feet				
 	STARTE VATION (VATION ED BY _ S _Lat: 3	STARTED 7/2 VATION CONTINUATION METHOD BY J. Bail S Lat: 39.1073 S OO: SM	STARTED 7/18/18 VATION CONTRACTO VATION METHOD ED BY _J. Bailey S _Lat: 39.10726 Lon S	STARTED 7/18/18 VATION CONTRACTOR TI VATION METHOD ED BY J. Bailey S Lat: 39.10726 Long: -77. SOUND	STARTED 7/18/18 VATION CONTRACTOR The Rot VATION METHOD ED BY J. Bailey S Lat: 39.10726 Long: -77.14095 SM SM F Mois SM F Tras	STARTED 7/18/18 COMPI VATION CONTRACTOR The Robert B. VATION METHOD ED BY J. Bailey CHECK S Lat: 39.10726 Long: -77.14095 S M J. F Moist, Light	STARTED 7/18/18 COMPLETE VATION CONTRACTOR The Robert B. Balte VATION METHOD ED BY J. Bailey CHECKED E S Lat: 39.10726 Long: -77.14095 SM SM Trash	STARTED 7/18/18 COMPLETED 7/18 VATION CONTRACTOR The Robert B. Balter Comvation METHOD ED BY J. Bailey CHECKED BY K. S Lat: 39.10726 Long: -77.14095 SM Moist, Light Brown, Silent Start Silent Si	STARTED 7/18/18 COMPLETED 7/18/18 VATION CONTRACTOR The Robert B. Balter Company VATION METHOD ED BY J. Bailey CHECKED BY K. Crist S Lat: 39.10726 Long: -77.14095 BLAY OF THE ROBERT B. Balter Company MOIST, Light Brown, Silty SAN Moist, Light Brown, Silty SAN SM F 1.3 Trash	STARTED 7/18/18 COMPLETED 7/18/18 VATION CONTRACTOR The Robert B. Balter Company VATION METHOD ED BY J. Bailey CHECKED BY K. Crist S Lat: 39.10726 Long: -77.14095 Moist, Light Brown, Silty SAND SM F 1.3 Trash	STARTED 7/18/18 COMPLETED 7/18/18 GROUND WATION CONTRACTOR The Robert B. Balter Company WATION METHOD ED BY J. Bailey CHECKED BY K. Crist S Lat: 39.10726 Long: -77.14095 MATION WATION MORE THOO TO THE ROBERT B. Balter Company WATION METHOD TO THE ROBERT B. Balter Company MATION METHOD TO THE ROBERT B. Balter Company WATION METHOD TO THE ROBERT B. Balter Company MATION METHOD TO THE ROBERT B. BALTER B	STARTED 7/18/18 COMPLETED 7/18/18 GROUND ELEVAL VATION CONTRACTOR The Robert B. Balter Company VATION METHOD ED BY J. Bailey CHECKED BY K. Crist S Lat: 39.10726 Long: -77.14095 MATERIAL II MATERIAL II SM IF In II II II II II II II II	STARTED 7/18/18 COMPLETED 7/18/18 GROUND ELEVATION VATION CONTRACTOR The Robert B. Balter Company VATION METHOD ED BY J. Bailey CHECKED BY K. Crist S Lat: 39.10726 Long: -77.14095 MATERIAL DESCRIPTION METHOD SM J. Bailey CHECKED BY SILTY SAND MATERIAL DESCRIPTION MATERIAL DESC	STARTED 7/18/18 COMPLETED 7/18/18 GROUND ELEVATION VATION CONTRACTOR The Robert B. Balter Company VATION METHOD ED BY J. Bailey CHECKED BY K. Crist S. Lat: 39.10726 Long: -77.14095 MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION	STARTED 7/18/18 COMPLETED 7/18/18 WATION CONTRACTOR The Robert B. Balter Company WATION METHOD ED BY J. Bailey CHECKED BY K. Crist S Lat: 39.10726 Long: -77.14095 MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION	STARTED 7/18/18 COMPLETED 7/18/18 STARTED 7/18/18 COMPLETED 7/18/18 VATION CONTRACTOR The Robert B. Balter Company VATION METHOD ED BY J. Bailey CHECKED BY K. Crist S. Lat: 39.10726 Long: -77.14095 MATERIAL DESCRIPTION MATERIAL DESCRIPTION PROJECT NUMBER 16943-0 MD GROUND ELEVATION TEST PIT SIZE WATER LEVELS DATE TIME ELAPSED CASING HOLE HOURS DEPTH (ft) DEPTH (ft) 7/18/18 0 ¥ MATERIAL DESCRIPTION MATERIAL DESCRIPTION SM F MATERIAL DESCRIPTION	STARTED 7/18/18 COMPLETED 7/18/18 VATION CONTRACTOR The Robert B. Balter Company VATION METHOD ED BY J. Bailey CHECKED BY K. Crist S. Lat: 39.10726 Long: -77.14095 MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION PROJECT NUMBER 16943-0 MD GROUND ELEVATION TEST PIT SIZE WATER LEVELS WATER LEVELS WATER LEVELS WATER LEVELS WATER LEVELS MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION



TEST PIT TP-222

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	ECT LOC												NUMBER						
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	VATION										 	ATE	TIME	ELAPS	ED	TER LEVEL	HOLE	WATER	WATER
1	VATION										 _		IIIVIE	HOU	RS	DEPTH (ft)	DEPTH (ft)	DEPTH (ft)	ELEV (ft)
LOGG	SED BY _	J. Bail	ley			CHE	CKED	BY _	K. Cr	rist	 //	18/18		0	⊻			NE	
NOTE	S <u>Lat: 3</u>	9.107	36 Lon	ng: - 77	.1412	29													
		9.107	GRAPHIC GRAPHIC IN The Including Inc	ng: -77	<u>.1412</u>	ist, Liç				SAND			n of test pi						
ERT B																			
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TEST PIT TP-223 PAGE 1 OF 1

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	ECT LOC			_			-							16943-0 M				
DATE	STARTE	D _7/	18/18			COMF	PLETE	D _7/	/18/18	3	G	ROUND E	LEVATIO	N			≣	
	VATION									у		DATE	T18.5-	ELAPSED	TER LEVE	LS HOLE	WATER	WATER
1	VATION										— ⊦	DATE	TIME	HOURS	DEPTH (ft)	HOLE DEPTH (ft)		ELEV (ft)
LOGG	SED BY _	J. Bai	ley			CHEC	KED E	BY K	(. Cris	st		7/18/18		0 ⊼			NE	
NOTE	S <u>Lat: 3</u>	9.107	99 Lor	ng: -77	.1414	2												
O DEPTH	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG		Moi	ist, Lig	ht Bro	own, S	Silty SA	AND		MATEI	RIAL DES	CRIPTION				
		SM		0.9	Tras	sh												
-				2.0								Botton	n of test p	it at 2.0 feet				
GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9/5/18																		



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TEST PIT TP-224

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CLIENT EAE	nginee	ering, I	nc.					PROJECT	NAME G	ude Landfill				
PROJECT LOC	OITA	M _Mo	ntgomer	County, I	Maryland	<u> </u>		PROJECT	NUMBER	16943-0 M	D			
DATE STARTE	D _7/1	8/18		СОМР	LETED	7/18/18		GROUND E	LEVATIO	N	TE	ST PIT SIZI	=	
EXCAVATION	CONTI	RACTO	OR The	Robert B.	Balter C	company				WA	TER LEVEL	-S		
EXCAVATION	METH	OD _						DATE	TIME	ELAPSED HOURS	DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
LOGGED BY _	J. Bail	ey		CHEC	KED BY	K. Crist		7/18/18		0 ⊼			NE	
NOTES Lat: 3	9.1076	32 Lor	ng: - 77.14	1197										
O DEPTH O (ft) SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG						MATE	RIAL DES	CRIPTION				
	SM		2.3	Moist, Ligh	nt Brown,	Silty SA	ND							
2.5				Trash										
		XXXX	2.1					Botton	n of test pi	it at 2.7 feet				



TEST PIT TP-225 PAGE 1 OF 1

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	IT EAE											ıde Landfill				
				_	ery Coun							16943-0 M				
1					co				GROU	ND E	EVATION	N			=	
					ne Rober			•	DA	re	TIME	ELAPSED	TER LEVEL CASING	LS HOLE DEPTH (ft)	WATER	WATER
									— 7/18	-	IIIVIE	HOURS 0 ∑	DEPTH (ft)	DEPTH (ft)		ELEV (ft)
					CH	ECKED E	3Y <u>K</u> . (Crist	''''	/10		0 *			NE	
NOTE	S <u>Lat: 3</u>	9.107	78 Lor	ng: - 77.	14199											
O DEPTH O (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG						M	ATER	IAL DESC	CRIPTION				
		SM	F	0.3	Moist, L	_ight Bro	wn, Silty	y SAND								
				1.7	Trash											
									В	ottom	of test pit	at 1.7 feet				
GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT <i>9/5/</i> 18																
GENERAL Br																



TEST PIT TP-226 PAGE 1 OF 1

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CLIENT EA Eng									ıde Landfill				
PROJECT LOCA									16943-0 M				
DATE STARTED						GR	OUND E	LEVATION	N		ST PIT SIZI	≣	
EXCAVATION CO	ONTRACTO	OR Th	e Robert B.	Balter Co	ompany	— г.			WA' ELAPSED	TER LEVEL CASING	_S HOLE	WATER	WATER
EXCAVATION MI							DATE	TIME	HOURS	DEPTH (ft)	HOLE DEPTH (ft)		ELEV (ft)
LOGGED BY J.	Bailey		CHEC	KED BY _	K. Crist	"	/18/18		0 ∑			NE	
NOTES Lat: 39.	.10732 Lon	ng: -77.	14234										
NOTES Lat: 39. H (#) NOWBER AMPLE TYPE O.0		ng: -77.	14234		Silty SAND		MATER		CRIPTION				
GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9/5/18													



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TEST PIT TP-227

VVVV	w.baile	100.0	OIII											
CLIENT EA Er	nginee	ring, I	nc.					PROJECT I	NAME G	ude Landfill				
PROJECT LOC	ATION	<u> </u>	ntgomer	/ County	, Marylar	nd		PROJECT I	NUMBER	16943-0 M	D			
DATE STARTE	D 7/1	8/18		СОМ	PLETED	7/18/18	3	GROUND E	LEVATIO	N	TE	ST PIT SIZ	E	
EXCAVATION (CONTR	RACTO	OR The	Robert I	B. Balter	Compan	у			WA	TER LEVEL	-S	NAVATED !	WATER
EXCAVATION N	METHO	DD						DATE	TIME	ELAPSED HOURS	DEPTH (ft)	DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
LOGGED BY	J. Baile	ey		CHE	CKED BY	/ K. Cris	st	7/18/18		0 ∑			NE	
NOTES Lat: 39	9.1070	9 Lon	ıg: - 77.14	1275										
SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG						MATER	RIAL DES	CRIPTION				
0.0	SM	F		Moist, Lię	ght Brow	n, Silty S	AND							
		F 	2.0	Trash										
2.5														
2.0		~~~	2.0					Botton	of test pi	it at 2.5 feet				



TEST PIT TP-228 PAGE 1 OF 1

CLIEN	IT EAE	Engineering, Inc.					PROJECT I	NAME G	ude Landfill				
PROJ	ECT LO	CATION Montgomery					PROJECT I	NUMBER	16943-0 M	D			
DATE	STARTE	D 7/18/18	COI	MPLET	ED 7/18/18		GROUND E	LEVATIO	N			E	
EXCA	VATION	CONTRACTOR The	Robert	B. Ba	Iter Company	<u>/</u>			WA'	TER LEVEL	_S HOLE	WATER	WATER
		METHOD					DATE	TIME	ELAPSED HOURS	DEPTH (ft)	HOLE DEPTH (ft)		ELEV (ft)
		J. Bailey		ECKE	BY K. Cris	t	7/18/18		0 ∑			NE	
NOTE	S <u>Lat: 3</u>	39.1069 Long: -77.143	885										
O DEPTH	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG					RIAL DESC	CRIPTION			
				IIIF_	Mois	t, Light Brow	vn, Sandy S	ILT					
			ML	F	3.5 Tras	h							
-				XXXX	4.0			Botto	m of test pit	at 4.0 feet			
GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL,GPJ ROBERT B BALTER.GDT 9/5/18													

GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9/5/18

TEST PIT TP-229

CLIENT EAE											ude Landfill				
PROJECT LOC											16943-0 M				
DATE STARTE	D _7/1	18/18		_ сом	PLETE	7/18/	18	GRO	DUND E	LEVATIO	N			≣	
EXCAVATION	CONT	RACT	OR The	Robert E	B. Balter	r Compa	ny			T	WA ELAPSED	TER LEVEL CASING	LS HOLE	WATER	WATER
EXCAVATION								_ _	DATE	TIME	ELAPSED HOURS	DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	ELEV (ft)
LOGGED BY _	J. Bail	ey		_ CHE	CKED B	Y K. Cı	rist	_							
NOTES Lat: 3	9.106	57 Lor	ng: -77.1	433				_							
SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG							MATER	RIAL DES	CRIPTION				
2.5	SM	FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF	5.3	Moist, Lig	ght Brow	vn, Silty	SAND								
			5.7	Trash											
									Bottom	of test pi	t at 5.7 feet				



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TEST PIT TP-230

ww	w.bait	erco.c	om											
CLIENT EAE	nginee	ering, I	nc.					PROJECT	NAME Gu	ude Landfill				
PROJECT LOC	ATION	M _Mo	ntgomer	y County	, Marylan	ıd		PROJECT	NUMBER	16943-0 MI	D			
DATE STARTE	D _7/1	18/18		_ сом	PLETED	7/18/18	3	GROUND E	LEVATION	N	TE	ST PIT SIZI	E	
EXCAVATION	CONTI	RACT	OR The	Robert E	B. Balter	Compan	у	-		WA ⁻ ELAPSED	TER LEVEL	S HOLE	WATER	WATER
EXCAVATION I	METH	OD _						DATE	TIME	HOURS	DEPTH (ft)	HOLE DEPTH (ft)		ELEV (ft)
LOGGED BY _	J. Bail	еу		_ CHE	CKED BY	K. Cris	st	7/18/18		0 ∑			NE	
NOTES Lat: 3	9.1067	74 Lor	ng: -77.1	4291				.						
	9.1067	GRAPHIC LOG	ng: -77.1					MATER		CRIPTION				



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TEST PIT TP-231

PROJECT NAME Guide Landfill PROJECT NAME Guide Landfil	www.baiterco.com							
DATE STARTED	CLIENT _EA Engineering, Inc.	_ PROJECT N	NAME G	ude Landfill				
EXCAVATION CONTRACTOR	PROJECT LOCATION Montgomery County, Maryland	_ PROJECT N	NUMBER	16943-0 M	D			
CASUAL CONTINUE CASUAL CON	DATE STARTED 7/18/18 COMPLETED 7/18/18	GROUND E	LEVATIO	N	TE	ST PIT SIZ	=	
NOTES Lat: 39.10682 Long: -77.14237	EXCAVATION CONTRACTOR The Robert B. Balter Company			WA	TER LEVEL	S	WATED	WATER
NOTES Lat: 39.10682 Long: -77.14237 A	EXCAVATION METHOD	_	TIME		DEPTH (ft)	DEPTH (ft)	DEPTH (ft)	ELEV (ft)
Trash Tests Te	LOGGED BY J. Bailey CHECKED BY K. Crist	_ 7/18/18		0 ∑			NE	
0.0 Moist, Light Brown, Silty SAND ML F F F T T Trash 5.5	NOTES Lat: 39.10682 Long: -77.14237	_						
	TESTS TE	Brown, Silty SAN	ND					



TEST PIT TP-232 PAGE 1 OF 1

CLIE	NT EAE	nginee	ering, I	Inc.							PROJECT	NAME G	Gude Landfill				
	ECT LOC											NUMBER	16943-0 M	D			
DATE	STARTE	D _7/	18/18			СОМР	LETE	D _7/1	18/18		GROUND	ELEVATIO	ON	TE	ST PIT SIZ	E	
EXCA	VATION	CONT	RACT	OR _T	he Ro	bert B	Balte	er Com	npany			Τ	WA FLADSED	TER LEVE	LS	WATER	WATER
EXCA	VATION	METH	OD _								DATE	TIME	ELAPSED HOURS	DEPTH (ft)	HOLE DEPTH (ft)		ELEV (ft)
LOGG	SED BY _	J. Bail	еу			CHEC	KED E	3Y <u>K</u> .	. Crist		7/18/18		0 ⊼			NE	
NOTE	S <u>Lat: 3</u>	9.1069	91 Lor	ng: -77	.1414												
O DEPTH	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG		Moi	st, Ligh	nt Bro	wn, Sil	Ity SAI	ND	MATE	RIAL DES	SCRIPTION				
2.5		SM	FFFFF	3.0	Tras						Bottoi	m of test p	it at 3.3 feet				
GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9/5/18											DOLLO	ii Oi test p	it at 3.3 leet				



TEST PIT TP-233 PAGE 1 OF 1

CLIEN	NT EAE	ngine	ering, I	nc.						PROJECT I	NAME G	ude Landfill				
	ECT LOC											16943-0 M				
	STARTE								/18			N		ST PIT SIZ	E	
EXCA	VATION	CONT	RACT	OR T	he Robe	ert B. E	Balter (Compa	any			WA'	TER LEVE	_S	WATER	WATER
EXCA	VATION	METH	OD _							 DATE	TIME	ELAPSED HOURS	DEPTH (ft)	HOLE DEPTH (ft)		ELEV (ft)
LOGG	SED BY _	J. Bai	еу		c	HECKE	ED BY	K. C	Crist	 7/18/18		0 ∑			NE	
NOTE	S <u>Lat: 3</u>	9.106	13 Lor	ng: -77.	.14079											
O DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG							MATE	RIAL DES	CRIPTION				
		SM	F	2.2	Moist		Brown	n, Silty	SAND							
סבובראיב מון זון איביב וספיניס ססב באיני ויביסו סואספינו בייסטן פוסוס										Botton	of test pi	it at 3.5 feet				



TEST PIT TP-234 PAGE 1 OF 1

											DDO II	CT N	IAME C	uda Lana	1 £ :11				
	NT <u>EA E</u> JECT LOC												IAME <u>G</u>						
										110			IUMBER				CT DIT CIT		
1	STARTE										 GRUU	IND E	LEVATIO					E	
	AVATION										 DAT	ΤE	TIME	ELAPS HOUR	ED	CASING	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
1	VATION										 7/17	_		0.3		DEPTH (II)	DEPTH (II)	NE NE	ELEV (II)
1	GED BY						CKEL) BY	K. C	rist									
NOTE	ES _Lat: 3	9.105	95 Lon	ıg: -//.	.13961	/													
DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG								M	ATEF	IIAL DES	CRIPTIC	N				
GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9/5/18		SM		4.0	Tras		ght Br	rown,	Silty	SAND	В	ottom	of test pi	it at 4.0 fe	eet				



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TEST PIT TP-235

w	······································	.0.00.0	0111											
CLIENT EA	Engine	ering, l	lnc.					PROJECT	NAME G	ude Landfill				
PROJECT LO	CATIO	N <u>M</u> o	ntgomer	y County,	Maryland	1		PROJECT	NUMBER	16943-0 M	D			
DATE START	ED _7/	17/18		COMP	LETED	7/17/18		GROUND I	LEVATIO	N	TE	ST PIT SIZI	=	
EXCAVATION	CONT	RACT	OR The	Robert B	. Balter C	Company				WA	TER LEVEL	.s		
EXCAVATION								DATE	TIME	ELAPSED HOURS	CASING DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
LOGGED BY								7/17/18		0 ∑			NE	
NOTES Lat:														
SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG						MATE	RIAL DES	CRIPTION				
	SM	F	2.0	Moist, Ligl	ht Brown,	, Silty SA	ND							
								Botton	n of test ni	t at 2.7 feet				



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TEST PIT TP-236

DATE STARTED 7/17/18 COMPLETED 7/17/18 GROUND ELEVATION TEST PIT SIZE		allerco.com								
DATE STARTED	CLIENT EA Enginee	eering, Inc.		PROJECT I	IAME G	ude Landfill				
DATE STARTED	PROJECT LOCATION	ON Montgomer	y County, Maryland	PROJECT	NUMBER	16943-0 M	D			
EXCAVATION CONTRACTOR _The Robert B. Balter Company EXCAVATION METHOD	DATE STARTED 7/1	7/17/18	COMPLETED _7/17/18	GROUND E	LEVATIO	N	TE	ST PIT SIZI	E	
EXCAVATION METHOD LOGGED BY J. Bailey CHECKED BY K. Crist NOTES Lat: 39.10645 Long: -77.13873 MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION SM F F C. Trash 2.5 SM F F C. Trash 3.0 Trash	EXCAVATION CONTR	ITRACTOR The	e Robert B. Balter Company			WA [*]	TER LEVEL	.s		
NOTES Lat: 39.10645 Long: -77.13873				DATE	TIME	HOURS	CASING DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
NOTES _Lat: 39.10645 Long: -77.13873				7/17/18		0 ∑				
THE STATE OF										
Moist, Light Brown, Silty SAND SM F										
SM Light Brown, Silty SAND SM Light Brown, Silty SAND 2.5 2.7 Trash	SAMPLE TYPE NUMBER U.S.C.S.	GRAPHIC LOG		MATEF	RIAL DES	CRIPTION				
	- SM	F F F 2.7		Bottom	of test pi	t at 3.0 feet				



TEST PIT TP-237 PAGE 1 OF 1

CLIENT _													
				ery County,			PROJECT						
				COMP			GROUND E	LEVATIO	N		ST PIT SIZI	E	
				he Robert B			DATE	T13.5-	WA ELAPSED	TER LEVEL CASING	LS HOLE	WATER	WATER
1							DATE	TIME	ELAPSED HOURS	DEPTH (ft)	HOLE DEPTH (ft)		ELEV (ft)
LOGGED	BY <u>J. l</u>	Bailey		CHEC	KED BY K	C. Crist	7/18/18		0 ∑			NE	
NOTES _	Lat: 39.1	0652 Lo	ong: -77	.1396									
NOTES _	Lat: 39.1	O652 TO	ong: -77	.1396	nt Brown, S		MATER		t at 4.1 feet				
GENERAL BH / TP / WELL 169													



TEST PIT TP-238 PAGE 1 OF 1

- 1			erco.c																
	NT EAE											ROJECT							
	ECT LOC											ROJECT							
	STARTE											ROUND	ELEVATI	ION _			ST PIT SIZ	E	
EXCA	VATION	CONT	RACT	OR TI	he Rob	ert B.	Balter	r Com	npany		— г	D.4.T.E.		. EI	WA Lapsed	TER LEVE	LS HOLE	WATER	WATER
	VATION										— ⊦	DATE	TIME	· •	HOURS	DEPTH (ft)	HOLE DEPTH (ft)		ELEV (ft)
LOGG	SED BY _	J. Bail	еу		c	HECK	ED B	Y <u>K</u> .	. Crist			7/18/18			0 ⊼			NE	
NOTE	S <u>Lat: 3</u>	9.106	27 Lon	ıg: - 77.	13977														
O DEPTH	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG		Moist	, Light	t Brow	vn, Sil	Ity SA	ND		MATE	RIAL DE	ESCRI	PTION				
	-	SM	F	1.7	Trash	1													
2.5				2.7									m of test						
GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9/5/18																			



TEST PIT TP-239

ww	w.balt	erco.c	om											
CLIENT EAE	nginee	ering, I	lnc.					PROJECT I	NAME Gu	ıde Landfill				
PROJECT LOC	OITA	M <u>Mo</u>	ntgome	ry County,	Marylan	d		PROJECT I	NUMBER	16943-0 M	D			
DATE STARTE	D _7/1	8/18		_ COMF	LETED	7/18/18		GROUND E	LEVATION	N	TE	ST PIT SIZI	=	
EXCAVATION	CONTI	RACT	OR The	e Robert B	. Balter (Company				WA ELAPSED	TER LEVE	_S HOLE	WATER	WATER
EXCAVATION	METH	OD _						DATE	TIME	HOURS	DEPTH (ft)	DEPTH (ft)	DEPTH (ft)	ELEV (ft)
LOGGED BY _	J. Bail	ey		CHEC	KED BY	K. Crist		7/18/18		0 ∑			NE	
NOTES Lat: 3	9.1065	56 Lor	ng: -77.1	4034										
O DEPTH O (ft) SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG		Moist, Lig	ht Browr	ı, Silty SA	.ND	MATER	RIAL DESC	CRIPTION			,	
2.5	SM		3.8	Trash										
5.0		***	5.0					Bottom	of test pit	at 5.0 feet				



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TEST PIT TP-240

	—— IT <u>EA E</u>		erina I						PROJECT	NAME C	ude Landfill				
	ECT LOC										16943-0 M				
	STARTE				_			17/18			N		ST PIT SIZ	E	
	VATION (TER LEVEL	.S		
	VATION I							ірапу	 DATE	TIME	ELAPSED HOURS	CASING DEPTH (ft)	HOLE	WATER DEPTH (ft)	WATER ELEV (ft)
	ED BY							Criet	 7/17/18		0 ♀	DEI III (II)	DEI III (II)	NE NE	LLL¥ (III)
						LCKLD	DI <u>IX.</u>	CHSL							
NOIE	S Lat: N	/A LOI	1g: IN/ <i>F</i>	4											
O DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG				011		MATER	RIAL DES	CRIPTION				
2.5		SM		2.3	Moist, L	ight Bro	own, Sil	ity SAND							
			XXXX	3.0					Bottom	of test pi	t at 3.0 feet				



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TEST PIT TP-241

CLIEN	—— I T ЕАЕ	ngineering, Inc.					P	ROJECT N	NAME Gu	ide Landfill				
		ATION Montgomery								16943-0 M				
		D 7/17/18								١		ST PIT SIZI	=	
EXCA	VATION	CONTRACTOR The	Robert	B. Ba	Iter C	ompany				WA	TER LEVEL	.S	WATER	WATER
EXCA	VATION	METHOD						DATE	TIME	ELAPSED HOURS	DEPTH (ft)	HOLE DEPTH (ft)		WATER ELEV (ft)
LOGG	ED BY	J. Bailey	CHE	ECKE	BY .	K. Crist		7/17/18		0 ⊼			NE	
NOTE	S <u>Lat: 3</u>	9.10637 Long: -77.13	711											
			711 S.O.S.D ML	GRAPHIC LOG	3.0			n, Sandy Si	ILT	n of test pit				



TEST PIT TP-242 PAGE 1 OF 1

CLIE	NT EAE	nginee	ering, I	lnc.							_ PR	OJECT	NAME G	ude Landfil				
PROJ	ECT LOC	OITA	N <u>Mo</u>	ntgom	ery C	ounty,	Mary	land			_ PR	OJECT	NUMBER	16943-0 N	MD			
DATE	STARTE	D 7/	17/18			COM	PLETE	ED _7	/17/18	3	GR	OUND E	LEVATIO		TE		E	
EXCA	VATION	CONT	RACT	OR _T	he Ro	bert E	. Balt	er Co	mpany	у		DATE	TIME	W/ ELAPSED	ATER LEVE	HOLE	WATER	WATER
	VATION										_	DATE 7/17/18	TIME	ELAPSED HOURS 0 ∑	DEPTH (ft)	DEPTH (ft)	DEPTH (ft) NE	ELEV (ft)
	SED BY _						KED	BY _	<. Cris	st	- '	/1//10		0 =			INE	
NOTE	S Lat: 3	9.106	5 Long	g: - 77.	13825						_							
DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG									MATE	RIAL DES	CRIPTION				
0.0			F		Moi	st, Lig	ht Bro	own, S	Silty SA	AND								
-	_		F															
-	_	SM																
-			F															
2.5																		
-	-		 	3.0	Tra	ch												
				3.3	IIa	311						Botton	n of test pi	t at 3.0 fee	t			
9/5/18																		
ER.G																		
BALT																		
ERTE																		
Z Z																		
ILL.GP																		
ANDF																		
SUDE																		
943-0 (
ILL 169																		
M/																		
. / HB /																		
GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT																		
ಠ∟																		



TEST PIT TP-243 PAGE 1 OF 1

PROJECT LOCATION	CLIENT EA Engineering, Inc.	PROJECT	NAME G	ude Landfill				
EXCAVATION CONTRACTOR The Robert B. Balter Company EXCAVATION METHOD Case 580N Backhoe LOGGED BY J. Bailey CHECKED BY K. Crist NOTES Lat: 39.10665 Long: -77.13783 MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION Bottom of test pit at 2.3 feet								
EXCAVATION METHOD Case 580N Backhoe LOGGED BY J. Bailey CHECKED BY K. Crist NOTES Lat: 39.10865 Long: -77.13783 MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION SM F 1.3		GROUND E	LEVATIO	N	TE	ST PIT SIZ	E	
EXCAVATION METHOD Case 580N Backhoe LOGGED BY J. Bailey CHECKED BY K. Crist NOTES Lat: 39.10665 Long: -77.13783 MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION SM F 1.3 Trash Bottom of test pit at 2.3 feet	EXCAVATION CONTRACTOR The Robert B. Balter Company			WA	TER LEVE	LS	WATER	WATER
NOTES Lat: 39.10665 Long: -77.13783 HE Lat: 39.10665 Long: -77.13783 MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION SM F 1.3 Trash Trash Bottom of test pit at 2.3 feet	EXCAVATION METHOD Case 580N Backhoe		TIME	HOURS	DEPTH (ft)	DEPTH (ft)	DEPTH (ft)	ELEV (ft)
Hat (a) A Hat (b) A Hat (c) A Hat (c	LOGGED BY J. Bailey CHECKED BY K. Crist	7/17/18		0 ⊼			NE	
SM F 1.3 Trash 2.3 Bottom of test pit at 2.3 feet	NOTES Lat: 39.10665 Long: -77.13783							
SM F 1.3 Trash 2.3 Bottom of test pit at 2.3 feet	0.0	MATEI	RIAL DES	CRIPTION				
Bottom of test pit at 2.3 feet	SM F 1.3 Trash							
	2.3	Botton	n of test pi	t at 2.3 feet				
			·					
	0106							
	-							



TEST PIT TP-244 PAGE 1 OF 1

CLIEN	T EAE	ngine	ering, I	nc.							PR	OJECT I	NAME G	ude Landfill				
	ECT LOC													16943-0 M				
	STARTE								7/18		_ GR	OUND E	LEVATIO	N	TE	ST PIT SIZ	E	
EXCA	VATION (CONT	RACTO	OR _T	he Rob	ert B. I	Balter	r Com	pany					WA	TER LEVE	LS HOLE	WATER	WATER
EXCA	VATION I	METH	OD _C	ase 5	BON Ba	ckhoe					_	DATE	TIME	ELAPSED HOURS	DEPTH (ft)	DEPTH (ft)	DEPTH (ft)	ELEV (ft)
LOGG	ED BY _	J. Bail	еу		c	CHECK	ED B	Y <u>K.</u>	Crist		_ 7	/17/18		0 ∑			NE	
NOTE	S <u>Lat: 3</u>	9.107	39 Lon	g: - 77	13747						_							
O DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG									MATER	RIAL DES	CRIPTION				
		SM	F	1.0	Mois Trasl	t, Light	t Brow	vn, Silt	ty SAN	ND								
			///XX	1.0								Botton	of test pi	t at 1.4 feet				
GENERAL BH / IP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9/5/18																		



TEST PIT TP-245 PAGE 1 OF 1

CLIEN	NT EAE	ngine	ering, I	nc.							PROJECT	NAME G	ude Landfill				
PROJ	ECT LOC	ATIO	N _Mo	ntgon							PROJECT	NUMBER	16943-0 M	D			
DATE	STARTE	D _7/	19/18			COMP	LETE	D _7/1	19/18		GROUND E	LEVATIO	N	TE	ST PIT SIZ	E	
EXCA	VATION	CONT	RACT	OR _	The Ro	bert B	. Balte	er Com	npany				WA	TER LEVEL	S HOLE	WATER	WATER
EXCA	VATION	METH	OD _C	Case 5	80N E	ackho	е				DATE	TIME	ELAPSED HOURS	DEPTH (ft)	DEPTH (ft)	DEPTH (ft)	ELEV (ft)
LOGG	SED BY _	J. Bail	еу			CHEC	KED E	3Y <u>K.</u>	. Crist		7/19/18		0 ∑			NE	
NOTE	S <u>Lat: 3</u>	9.107	34 Lor	ng: -77	7.1384	1											
O DEPTH	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG		Moi	st, Ligl	ht Bro	wn, Sil	Ity SAN	ND	MATE	RIAL DES	CRIPTION				
		SM	F	1.3	Tra	sh											
2.5																	
-				3.3													
			××××	0.0							Botton	n of test pi	t at 3.3 feet				
GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9/5/18																	
GENERAL																	

The Robert B. Balter Company Geotechnical and Environmental Engineers Materials and Construction Inspection and Testing Telephone No. (410) 363-1555 www.balterco.com CLIENT EA Engineering, Inc. PROJECT LOCATION Montgomery County Maryland

GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9/5/18

TEST PIT TP-246

CLIENT EA Engineering, Inc.		PROJECT N						
PROJECT LOCATION Montg	gomery County, Maryland	PROJECT N	NUMBER	16943-0 M	D			
DATE STARTED 7/19/18	COMPLETED _7/19/18	GROUND E	LEVATIO	N	TE	ST PIT SIZI	≣	
EXCAVATION CONTRACTOR	The Robert B. Balter Company			WA' ELAPSED	TER LEVEL	S	WATER	WATER
EXCAVATION METHOD Cas	se 580N Backhoe	DATE	TIME	HOURS	DEPTH (ft)	HOLE DEPTH (ft)		ELEV (ft)
LOGGED BY J. Bailey	CHECKED BY K. Crist	7/19/18		0 ⊼			NE	
NOTES _Lat: 39.10779 Long:								
SAMPLE TYPE NUMBER U.S.C.S. GRAPHIC LOG	Moist Light Brown Silty SAND	MATEF	RIAL DES	CRIPTION				
SM F 2.5								
5.0	Trash 2							
		Bottom	ı of test pi	t at 6.2 feet				



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TEST PIT TP-247

CLIEN	IT EA E	nginee	ering, I	nc.						PROJECT	NAME Gu	ude Landfill				
PROJ	ECT LOC	ATION	M _Mo	ntgome	ry Coun	ty, Mar	yland			PROJECT	NUMBER	16943-0 M	D			
DATE	STARTE	D _7/1	19/18		CO	MPLET	ED _7/	/19/18		GROUND E	LEVATION	N	TE	ST PIT SIZI	≣	
EXCA	VATION (CONTI	RACT	OR The	e Rober	t B. Bal	lter Cor	mpany				WA ELAPSED	TER LEVEL	S	WATED	WATER
EXCA	VATION I	METH	OD _C	Case 580	N Back	hoe				DATE	TIME	HOURS	DEPTH (ft)	HOLE DEPTH (ft)		ELEV (ft)
LOGG	ED BY _	J. Bail	ey		СН	ECKED	BY K	Crist		7/19/18		0 ∑			NE	
NOTE	S <u>Lat: 3</u>	9.1080	06 Lor	ng: - 77.1	3856											
	111												I			
DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG							MATE	RIAL DESC	CRIPTION				
0.0			HIIIF		Moist, L	_iaht Br	own. S	iltv SAN	ND							
2.5		SM		3.3	Trash					Botton	n of test pit	t at 3.6 feet				



TEST PIT TP-248

	IT EAE												ude Landfill				
	ECT LOC												16943-0 M				
DATE	STARTE	D <u>7/</u>	17/18		_ coi	MPLET	ED _	7/17/18	8	GR	OUND E	LEVATIO	N		ST PIT SIZ	E	
EXCA	VATION (CONT	RACT	OR The	Robert	t B. Ba	Iter Co	ompan	ıy		1		WA ELAPSED	TER LEVE	_S HOLE	WATER	WATER
EXCA	VATION I	METH	OD _C	Case 580	N Back	hoe					DATE	TIME	HOURS	DEPTH (ft)	DEPTH (ft)		ELEV (ft)
LOGG	SED BY _	J. Bail	ey		_ CH	ECKED	BY	K. Cris	st	_ 7/	/17/18		0 ⊼			NE	
NOTE	S <u>Lat: 3</u>	9.108	56 Lor	ng: - 77.1	384					_							
O DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG								MATEF	RIAL DES	CRIPTION				
0.0	53	SM		1.5	Moist, L	ight Bi	rown,	Silty S	SAND		Bottom	of test pi	it at 2.0 feet				



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TEST PIT TP-249

CLIEN		ngine	ering, I	nc.						PRO	OJECT N	NAME GU	ude Landfill				
	ECT LOC				ery Cou	ınty, Ma	aryland	d					16943-0 M				
DATE	STARTE	D _7/	17/18		с	OMPLE	ETED	7/17/1	18	GR	OUND E	LEVATIO	N	TE	ST PIT SIZ	=	
EXCA	VATION (CONT	RACTO	OR T	ne Rob	ert B. E	Balter C	Compa	ny				WA	TER LEVEL	_S	14/4TED	\4.4.TED
EXCA	VATION I	METH	OD _C	case 58	30N Ba	ckhoe				_	DATE	TIME	ELAPSED HOURS	DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
LOGG	SED BY _	J. Bail	ey		с	HECKE	ED BY	K. Cr	rist	_ 7/	/17/18		0 ⊼			NE	
NOTE	S Lat: 3	9.108	01 Lor	ng: -77.	13895												
DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG								MATER	RIAL DESC	CRIPTION				
0.0 2.5	/S	SM		3.0	Trash	, Light	Brown	, Silty S	SAND		Bottom	of test pit	t at 3.5 feet				



TEST PIT TP-250 PAGE 1 OF 1

CLIEN	IT EA E	ngine	ering, l	lnc.							PROJECT	NAME G	ude Landfill				
	ECT LOC												16943-0 M				
	STARTE								7/18				N		ST PIT SIZ	E	
EXCA	VATION (CONT	RACT	OR _T	he Ro	bert B.	Balter	r Com	pany				WA	TER LEVE	LS	WATER !	14/4755
EXCA	VATION I	METH	OD _C	Case 5	80N B	ackhoe	•				DATE	TIME	ELAPSED HOURS	DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
LOGG	ED BY _	J. Bail	еу			CHECK	KED B	Y <u>K.</u>	Crist		7/17/18		0 ⊼			NE	
NOTES	S _Lat: 3	9.108	53 Lor	ng: -77	7.13708	3											
O DEPTH	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC		Mois	et Ligh	at Brow	wn Silt	by SANF)	MATE	RIAL DES	CRIPTION				
 		SM	F	1.8	Mois Tras		t Brow	vn, Silt	TY SANE)							
-				2.0	ITAS	511					Botton	of test pi	t at 2.0 feet				
GENERAL BH / IP / WELL 10845-U GUDE LANDFILL.GFJ ROBERI B BAL IER.GD \$10718																	



TEST PIT TP-251 PAGE 1 OF 1

EA Engir						PROJECT I	IAME Gu	ıde Landfill				
LOCATI	ON _M		nery County, Ma			PROJECT I						
			COMPLE		18	GROUND E	LEVATIO	N	TE	ST PIT SIZ	E	
LION COI	ITRAC	ror _	Γhe Robert B. Β	alter Compa	ny			WA	TER LEVEL	S	WATER	WATER
TION MET	HOD _	Case 5	80N Backhoe			DATE	TIME	ELAPSED HOURS	DEPTH (ft)	HOLE DEPTH (ft)		WATER ELEV (ft)
BY J. B	ailey		CHECKE	D BY K. Cr	rist	7/17/18		0 ⊼			NE	
Lat: 39.1	0802 Lc	ng: -77	7.13806									
NUMBER IN SO	GRAPHIC		M	2	OANIB.	MATER	RIAL DESC	CRIPTION				
SI	1	1.0	Moist, Light E	Brown, Silty S	SAND							
		3.0				Bottom	of test nit	t at 3.0 feet				
		NUMBER U.S.C.S.	SM	SM F Moist, Light I	SM F Moist, Light Brown, Silty	SM F Moist, Light Brown, Silty SAND 1.0 Trash	SM I I I I I I I I I I I I I I I I I I I	SM F Moist, Light Brown, Silty SAND Trash 3.0	SM S	SM I I F Moist, Light Brown, Silty SAND 1.0 Trash	SM I F Moist, Light Brown, Silty SAND 1.0 Trash	SM I F Moist, Light Brown, Silty SAND 1.0 Trash



TEST PIT TP-252 PAGE 1 OF 1

	VVVV																	
1	IT EAE													ude Landfill				
	ECT LOC													16943-0 M				
1	STARTE					COMF					GI	ROUND E	LEVATIO	N		ST PIT SIZ	E	
	VATION							er Con	npany	/		DATE	T13.4-	WA ELAPSED	TER LEVE	LS HOLE	WATER	WATER
EXCA	VATION	METH	OD _C	ase 5	80N B	Backho	e				— H	DATE	TIME	ELAPSED HOURS	DEPTH (ft)	HOLE DEPTH (ft)		ELEV (ft)
LOGG	ED BY _	J. Bail	еу			CHEC	KED E	BY K	. Cris	t		7/17/18		0 ⊼			NE	
NOTE	S <u>Lat: 3</u>	9.107	69 Lon	ıg: -77	.1372	9												
1		9.1070 9.0070 9.0070 9.0070	GRAPHIC 69 IO	1.5	.1372	g st, Lig						MATE		CRIPTION				
GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9/5/18																		

GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9/5/18

TEST PIT TP-253

CLIENT	— EA Er	ngineering, Inc.					F	PROJECT N	NAME Gu	ıde Landfill				
		ATION Montgo								16943-0 M				
		D 7/17/18				7/17/18				١		ST PIT SIZI	E	
EXCAVA [*]	TION	CONTRACTOR _	The Robert	B. Bal	ter C	Company				WA	TER LEVEL	S	*/ATED	MATER
EXCAVA [*]	TION I	METHOD Case	580N Back	hoe				DATE	TIME	ELAPSED HOURS	DEPTH (ft)	HOLE DEPTH (ft)		WATER ELEV (ft)
LOGGED	BY _	J. Bailey	СНІ	ECKED	BY	K. Crist		7/17/18		0 ∑			NE	
NOTES _	Lat: 39	9.10805 Long: -7	7.1365											
DEPTH (ft)	SAMPLE IYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG			ı		MATE	RIAL DESC	CRIPTION			
0.0	SAN		SM		5.5	Moist, Li	ight Brown	n, Silty SAN	ND					



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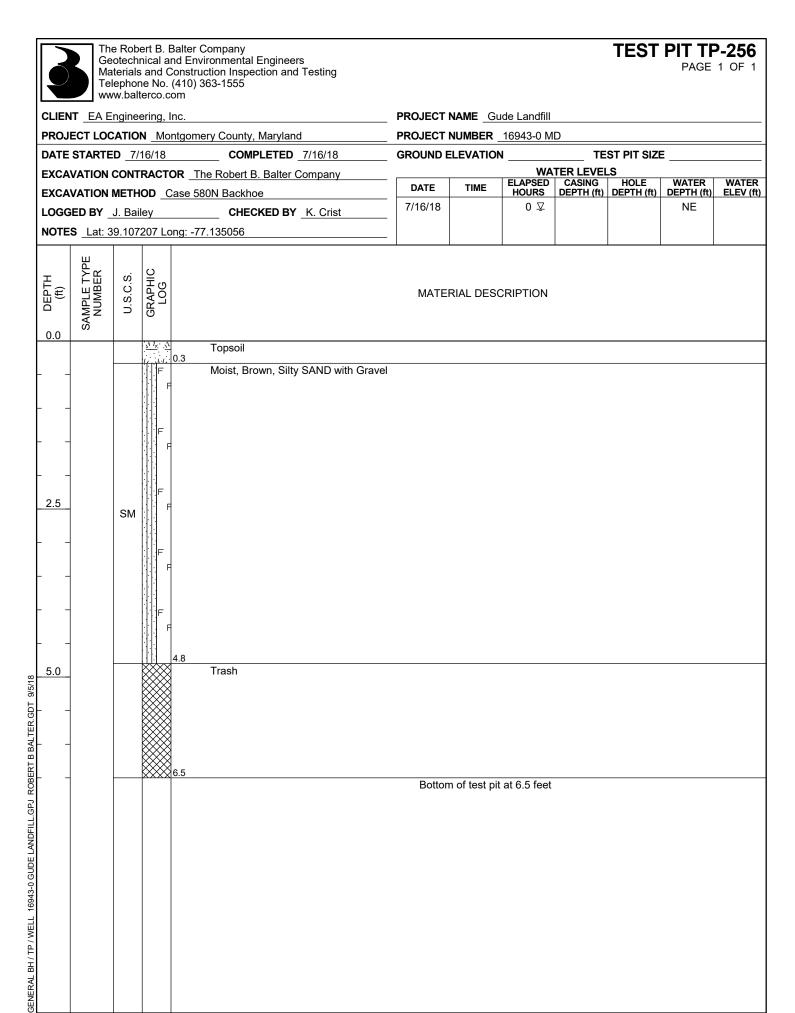
TEST PIT TP-254

	erco.c												
ngine	ering, I	nc.					PROJECT I	NAME G	ude Landfill				
ATIO	N <u>Mo</u>	ntgomer	y County,	Maryland	d		PROJECT I	NUMBER	16943-0 M	D			
											ST PIT SIZ	 E	
									WA	TER LEVEL	_S		
					- , ,		DATE	TIME	ELAPSED HOURS	CASING DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
					K Crist		7/16/18		0 ∑			NE	
													
-													
U.S.C.S.	GRAPHIC LOG						MATE	RIAL DES	CRIPTION				
	71 V	0.3											
SM		3.9		ddish Bro	own, Silty	SAND wit	h Gravel (Fill)					
	\ggg	4.3											
							Botton	n of test pi	t at 4.3 feet				
	SM	SM	D 7/16/18 CONTRACTOR The METHOD Case 580 J. Bailey 9.107852 Long: -77. S. O.	Montgomery County, D 7/16/18 COMI CONTRACTOR The Robert E METHOD Case 580N Backho J. Bailey CHEC 9.107852 Long: -77.13603 SO ON	Montgomery County, Maryland D 7/16/18 COMPLETED CONTRACTOR The Robert B. Balter of METHOD Case 580N Backhoe J. Bailey CHECKED BY 9.107852 Long: -77.13603 S. O.	Montgomery County, Maryland D 7/16/18 COMPLETED 7/16/18 CONTRACTOR The Robert B. Balter Company METHOD Case 580N Backhoe J. Bailey CHECKED BY K. Crist 9.107852 Long: -77.13603 SOUTH DO SOU	ATION Montgomery County, Maryland D 7/16/18 COMPLETED 7/16/18 CONTRACTOR The Robert B. Balter Company METHOD Case 580N Backhoe J. Bailey CHECKED BY K. Crist 9.107852 Long: -77.13603 Signature of the Robert B. Balter Company METHOD Case 580N Backhoe J. Bailey CHECKED BY K. Crist 9.107852 Long: -77.13603 Moist, Reddish Brown, Silty SAND with Moist, Reddish Brown, Sand With Moist, Reddish Brown, Sand With Moist, Reddish Brown, Sand With Mo	ATION Montgomery County, Maryland GROUND ED 7/16/18 COMPLETED 7/16/18 GROUND ED 7/16/18 CONTRACTOR The Robert B. Balter Company METHOD Case 580N Backhoe J. Bailey CHECKED BY K. Crist 9.107852 Long: -77.13603 MATER SO ON	ATION Montgomery County, Maryland PROJECT NUMBER D 7/16/18 COMPLETED 7/16/18 GROUND ELEVATIO CONTRACTOR The Robert B. Balter Company METHOD Case 580N Backhoe J. Bailey CHECKED BY K. Crist 9.107852 Long: -77.13603 MATERIAL DES SM SM Trash 4.3	ATION Montgomery County, Maryland D 7/16/18 COMPLETED 7/16/18 CONTRACTOR The Robert B. Balter Company METHOD Case 580N Backhoe J. Bailey CHECKED BY K. Crist 9.107852 Long: -77.13603 MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION SM A 3.9 Trash 4.3	ATION Montgomery County, Maryland PROJECT NUMBER 16943-0 MD D	ATION Montgomery County, Maryland PROJECT NUMBER 16943-0 MD D 7/16/18 COMPLETED 7/16/18 CONTRACTOR The Robert B. Balter Company METHOD Case 580N Backhoe J. Bailey CHECKED BY K. Crist 9.107852 Long: -77.13603 MATERILE CONTRACTOR Time Robert B. Balter Company MATERILE CONTRACTOR CASSING DEPTH (ft) DATE TIME HAWS DEPTH (ft) 7/16/18 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ATION Montgomery County, Maryland D 7/16/18 COMPLETED 7/16/18 CONTRACTOR The Robert B. Balter Company METHOD Case 580N Backhoe J. Bailey CHECKED BY K. Crist 9,107852 Long: -77.13603 MATERIAL DESCRIPTION MOIst, Reddish Brown, Silty SAND with Gravel (Fill) SM 13.9 Trash 4.3



TEST PIT TP-255

	IT EAE											ude Landfill				
PROJ	ECT LOC	ATIO	M _Mo	ntgome	ery Cou	nty, Ma	ryland			PROJECT	NUMBER	16943-0 M				
DATE	STARTE	D <u>7/</u>	16/18		co	OMPLE	TED _7	7/16/18		GROUND I	ELEVATIO			ST PIT SIZ	≣	
EXCA	VATION (CONT	RACT	OR Th	ne Robe	ert B. Ba	alter Co	ompany			I	WA ELAPSED	TER LEVEL	S	WATER	WATER
EXCA	VATION I	METH	OD _C	case 58	ON Bac	khoe				DATE	TIME	HOURS	DEPTH (ft)	HOLE DEPTH (ft)		ELEV (ft)
LOGG	ED BY	J. Bail	еу		Cł	HECKE	D BY _	K. Crist	:	7/16/18		0 ⊻			NE	
NOTE	S <u>Lat: 3</u>	9.107	514 Lc	ong: -77	7.13577	3										
O DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG		_	.,				MATE	RIAL DES	CRIPTION				
			71 77	0.3	Topso	oil										
2.5		SM	FFFF	3.3			,			And Boulder						
				3.5	Trash					D - #		it at 3.3 feet				





TEST PIT TP-257 PAGE 1 OF 1

1 01 151	. - ^ -										DD0 150		ME 0:					
	NT EAE													ude Landfill				
	ECT LOC								0/40					16943-0 N		OT DIT OIL		
	STARTE										GROUNE	ELE'	VATIO	N	TER LEVE	ST PIT SIZ	E	
	NATION (Comp	pany		DATE	-	TIME	ELAPSED HOURS	CASING	HOLE DEPTH (ft)	WATER	WATER ELEV (#)
	VATION I							.	0		7/16/18	_		0 <u>∑</u>	рерін (π)	рертн (π)	DEPTH (ft) NE	ELEV (ft)
	GED BY						(ED B.	Y <u>K.</u>	Crist									
NOTE	S <u>Lat: 3</u>	9.107	24 Lon	ig: -//	.13408	56												
O DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG								MAT	ERIA	L DES	CRIPTION				
		SM	FFF	0.1 _	Tops Dry,	Brown	i, Silty	SANE	O with C	Gravel								
2.5				3.0														
											Botte	m of	test pi	t at 3.0 feet				
GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9/5/18																		



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TEST PIT TP-258

ww.baiterco.com											
Engineering, Inc.					PROJECT N	NAME G	ude Landfill				
	ry Coun	ty, Mar	yland								
									ST PIT SIZ	 E	
							WA	TER LEVEI	_S		
					DATE	TIME	ELAPSED HOURS	CASING DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
			RV	K Criet	7/16/18		0 ∑			NE	(,/
			, Di _	IX. Olist							
39.107704 Long: -77.	133029										
TESTS	U.S.C.S.		0.5	Topsoil		MATE	ERIAL DESC	CRIPTION			
	ML	F F F			Sandy SILT						
				Trash							
			4.5			Botto	m of test nit	at 4.5 feet			
							in or test pic	at 4.0 loct			
	ED 7/16/18 I CONTRACTOR The METHOD Case 580 J. Bailey 39.107704 Long: -77.	Engineering, Inc. CATION Montgomery Coun ED 7/16/18 CO CONTRACTOR The Rober METHOD Case 580N Back J. Bailey CH 39.107704 Long: -77.135629 TESTS O O O O O O O O O O O O O	Engineering, Inc. CATION Montgomery County, Manual ED 7/16/18 COMPLET CONTRACTOR The Robert B. Ball METHOD Case 580N Backhoe J. Bailey CHECKED 39.107704 Long: -77.135629 TESTS TESTS TESTS ML F F F F F F F F F F F F F F F F F	Engineering, Inc. CATION Montgomery County, Maryland ED 7/16/18 COMPLETED CONTRACTOR The Robert B. Balter County METHOD Case 580N Backhoe J. Bailey CHECKED BY 39.107704 Long: -77.135629 TESTS TESTS OBJECT ML F F F ML F F F F F F F F F F F F	Engineering, Inc. ICATION Montgomery County, Maryland IED 7/16/18 COMPLETED 7/16/18 I CONTRACTOR The Robert B. Balter Company I METHOD Case 580N Backhoe J. Bailey CHECKED BY K. Crist 39.107704 Long: -77.135629 TESTS I D D D D D D D D D D D D D D D D D D	Engineering, Inc. PROJECT N PROJECT	Engineering, Inc. PROJECT NAME GROUND	Engineering, Inc. ICATION Montgomery County, Maryland ED 7/16/18 COMPLETED 7/16/18 I CONTRACTOR The Robert B. Balter Company I METHOD Case 580N Backhoe J. Bailey CHECKED BY K. Crist 39.107704 Long: -77.135629 TESTS IMATERIAL DESCRIPTION MATERIAL DESCRIP	Engineering, Inc. CATION Montgomery County, Maryland ED 7/16/18 COMPLETED 7/16/18 COMPLETED 7/16/18 CONTRACTOR The Robert B. Balter Company I METHOD Case 580N Backhoe J. Bailey CHECKED BY K. Crist 39.107704 Long: -77.135629 TESTS MATERIAL DESCRIPTION Trash 4.0 Trash	Engineering, Inc. ICATION Montgomery County, Maryland PROJECT NUMBER 16943-0 MD RED 7/16/18 COMPLETED 7/16/18 GROUND ELEVATION TEST PIT SIZI ICONTRACTOR The Robert B. Balter Company IMETHOD Case 580N Backhoe J. Bailey CHECKED BY K. Crist 39.107704 Long: -77.135629 TESTS OF TOpsoil MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION	Engineering, Inc. CATION Montgomery County, Maryland PROJECT NUMBER 16943-0 MD TEST PIT SIZE CONTRACTOR The Robert B. Balter Company I METHOD Case 580N Backhoe J. Bailey CHECKED BY K. Crist 39.107704 Long: -77.135629 TESTS TESTS TESTS COMPLETED 7/16/18 GROUND ELEVATION WATER LEVELS DATE TIME ELAPSED CASING HOLE DEPTH (ft) DEPTH (

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GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9/5/18

TEST PIT TP-259
PAGE 1 OF 1

w	ww.balterco.com											
CLIENT EA	Engineering, Inc.					PROJECT N	NAME Gu	de Landfill				
PROJECT LO	CATION Montgomery	Coun	ty, Mar	<u>yland</u>		PROJECT N	NUMBER _	16943-0 M	D			
DATE START	ED 7/16/18	_ co	MPLET	TED _7	7/16/18	GROUND E	LEVATION	I	TE	ST PIT SIZE	.	
EXCAVATION	CONTRACTOR The	Rober	t B. Ba	Iter Co	ompany			WA ⁻	TER LEVEL	-S	VALATED !	\A/ATER
EXCAVATION	METHOD Case 580N	N Back	hoe			DATE	TIME	ELAPSED HOURS	DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
LOGGED BY	J. Bailey	CH	ECKED	BY _	K. Crist	7/16/18		0 ∑			NE	
NOTES Lat:	39.107749 Long: -77.1	34712				_						
LOGGED BY	J. Bailey	CH	GRAPHIC BY THE		Topsoil Moist, Brown, s	Sandy SILT	MATE				I	
				6.9								
							Botton	n of test pit	at 6.8 feet			



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TEST PIT TP-260

CLIENT EAE												ude Landfill				
PROJECT LOC	ATION	Mo	ntgome	ry Coun	nty, Mary	yland			_ PR	ROJECT I	NUMBER	16943-0 M				
DATE STARTE	D _7/1	6/18		_ co	MPLET	ED _7	/16/18		_ GR	ROUND E	LEVATIO	N		ST PIT SIZ	≣	
EXCAVATION	CONTR	RACTO	OR Th	e Rober	rt B. Bal	Iter Co	mpany	1		Г		WA	TER LEVEL	S	WATER	WATER
EXCAVATION	METHO	DD _C	case 58	0N Bacl	khoe				_	DATE	TIME	ELAPSED HOURS	DEPTH (ft)	HOLE DEPTH (ft)		ELEV (ft)
LOGGED BY _	J. Baile	Э У		СН	IECKED	BY k	K. Crist	t	_ 7	7/16/18		0 ⊼			NE	
NOTES Lat: 3	9.1056	6 Lon	ng: - 77.1	13373					_							
LOGGED BY _	J. Baile 9.1056	GRAPHIC 99 Ke	4.0	CH					_	MATER	RIAL DES	HOURS 0 CRIPTION it at 4.6 feet		DEPTH (ft)	NE NE	ELEV (ft)



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TEST PIT TP-261

ngine	ering, l	Inc.				PROJECT N	NAME G	ude Landfill				
ATIO	N <u>Mo</u>	ntgomery	/ County, Ma	aryland		PROJECT N	NUMBER	16943-0 M	D			
D _7/	16/18		COMPLE	TED _7/16	6/18					ST PIT SIZI	=	
						- [WA	TER LEVEL	.s		-
						DATE	TIME	HOURS	CASING DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
				DBY K. (Crist	7/16/18		0 ∑			NE	
		I										
U.S.C.S.	GRAPHIC LOG					MATER	RIAL DES	CRIPTION				
	HF.		Moist, Light E	Brown, Silty	y SAND							
SM		6.0										
	\bowtie	6.5				Dottom	of toot ni	t at C E fact				
						Bolloff	, or test pi	t at 0.0 leet				
	SATIOI D 7/2 CONT METH J. Bail 9.1074	CATION MC ED 7/16/18 CONTRACT METHOD CO J. Bailey 9.10746 Lor ON SON OF F	CONTRACTOR The METHOD Case 5800 J. Bailey 9.10746 Long: -77.13 O O O O O O O O O O O O O O O O O O O	Montgomery County, March 20 7/16/18 COMPLE CONTRACTOR The Robert B. B. B. METHOD Case 580N Backhoe J. Bailey CHECKE 99.10746 Long: -77.133188 SOUTH STANFORM TO S	CATION Montgomery County, Maryland D 7/16/18 COMPLETED 7/16 CONTRACTOR The Robert B. Balter Complete Balter Balter Complete Balter Balter Complete Balter Balter Complete Balter Balter Balter Complete Balter Balter Balter Complete Balter Bal	ATION Montgomery County, Maryland D 7/16/18 COMPLETED 7/16/18 CONTRACTOR The Robert B. Balter Company METHOD Case 580N Backhoe J. Bailey CHECKED BY K. Crist 9.10746 Long: -77.133188 O HADO SO	ATION Montgomery County, Maryland D 7/16/18 COMPLETED 7/16/18 GROUND E CONTRACTOR The Robert B. Balter Company METHOD Case 580N Backhoe J. Bailey CHECKED BY K. Crist 9.10746 Long: -77.133188 MATER Moist, Light Brown, Silty SAND F F F F F F F F F F F F F F F F F F F	ATION Montgomery County, Maryland D 7/16/18 COMPLETED 7/16/18 CONTRACTOR The Robert B. Balter Company METHOD Case 580N Backhoe J. Bailey CHECKED BY K. Crist 9,10746 Long: -77.133188 MATERIAL DES MATERIAL DES MOIST, Light Brown, Silty SAND F F F F F F F F F F F F F F F F F F	### ATION	### PROJECT NUMBER 16943-0 MD 160	### PROJECT NUMBER 16943-0 MD ### PROJECT NUMBER 16943-0 MD	Carrion Montgomery County, Maryland D. 7/16/18 COMPLETED 7/16/18 COMPLETED 7/16/18 GROUND ELEVATION TEST PIT SIZE



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TEST PIT TP-262

VVVV	w.bait	erco.c	OIII											
CLIENT EAE	ngine	ering, l	lnc.				P	ROJECT N	IAME G	ude Landfill				
PROJECT LOC	ATIO	N <u>Mo</u>	ntgomer	y County, M	Maryland		Р	ROJECT N	IUMBER	16943-0 M	D			
DATE STARTE	D _7/	16/18		COMPI	_ETED _	7/16/18		ROUND E				ST PIT SIZI	=	
EXCAVATION										WA	TER LEVEL	_S		
EXCAVATION	METH	OD (Case 580	N Backhoe)			DATE	TIME	ELAPSED HOURS	CASING DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
LOGGED BY						K. Crist		7/16/18		0 ∑			NE	
NOTES Lat: 3					_									
1														
O DEPTH O (ft) SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG						MATEF	RIAL DES	CRIPTION				
	SM	F	2.0	Moist, Brov	vn, Silty S	SAND								
2.5			3.8											
								Bottom	of test pi	t at 3.8 feet				

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TEST PIT TP-263

PAGE 1 OF 1

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		ngineering, Inc.								ude Landfill				
		ATION Montgomer								16943-0 M				
		D _7/16/18				7/16/18		GROUND E	LEVATIO	N		ST PIT SIZI	E	
		CONTRACTOR The			iter Co	mpany		DATE	TIME	ELAPSED HOURS	TER LEVEL	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER
		METHOD Case 580				· · ·		7/16/18		HOURS 0 ∑	DEPTH (ft)	DEPTH (ft)	NE NE	ELEV (ft)
		J. Bailey			DBY _	K. Crist		7710710					''-	
		9.107969 Long: -77.	134034											
O DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG					MATE	ERIAL DESC	CRIPTION			
				71.71	-	Topsoi	il							
				<u> </u>	0.5	Moist	Brown, Sil	Ity SAND						
2.5			SM	FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF		WIO15L,	BIOWII, GII	IY SAND						
BAL -					6.0	Trash								
GENERAL BH / IF / WELL 19945-0 GUDE LANDFILL.GFJ KOBERT B BALLEK.GUT 99718														

Bottom of test pit at 10.0 feet



TEST PIT TP-264

CLIENT EAE								PRO	JECT N	IAME G	ude Landfill				
PROJECT LOC	OITA	N <u>Mo</u>	ntgomer	y County, I	Maryland	d		PRO	JECT N	NUMBER	16943-0 M	D			
DATE STARTE	D _7/1	16/18		_ COMP	LETED	7/16/18	3	GRO	OUND E	LEVATIO			ST PIT SIZ	E	
EXCAVATION	CONT	RACT	OR The	Robert B.	Balter (Company	у				WA	TER LEVEL	S	WATER	WATER
EXCAVATION	METH	OD _C	Case 580	N Backho	е			_ D	ATE	TIME	ELAPSED HOURS	DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	ELEV (ft)
LOGGED BY	J. Bail	ey		_ CHEC	KED BY	K. Cris	st	_ 7/1	16/18		0 ⊼			NE	
NOTES Lat: 3	9.108	534 Lc	ong: -77.	136183											
O DEPTH O (ft) SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG		Moist, Bro	wn, Silty	' SAND v	with Bould		MATER	RIAL DES	CRIPTION				
2.5	SM	FFF	3.0	Trash											
5.0			5.5												
									DOLLOTT	or test pl	t at 5.5 feet				



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TEST PIT TP-265

ww.	w.baile	E100.0	OIII											
CLIENT EAE	nginee	ering, I	nc.					PROJECT	NAME G	ude Landfill				
PROJECT LOC	ATION	M _Mo	ntgomer	y County,	Maryland	<u></u>		PROJECT	NUMBER	16943-0 M	D			
DATE STARTE	D _7/1	16/18		СОМР	LETED	7/16/18		GROUND E	LEVATIO	N	TE	ST PIT SIZI	=	
EXCAVATION (WA	TER LEVEL	_S		
EXCAVATION I	ИЕТНО	OD C	Case 580	N Backho	е			DATE	TIME	ELAPSED HOURS	CASING DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
LOGGED BY						K. Crist		7/16/18		0 ∑			NE	
NOTES Lat: 3														
SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG						MATE	RIAL DES	CRIPTION				
0.0 Ø	SM		3.0	Moist, Red	ddish Bro	own, Silty	SAND	Botton	n of test pi	it at 3.7 feet				



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TEST PIT TP-266

CLIEN.	 Т <u>ЕА Е</u> і	nginee	ering, I	lnc.						PROJ	ECT N	IAME Gu	ude Landfill				
	ECT LOC				ry Cour	nty, Ma	ryland						16943-0 M				
DATE	STARTE	D _7/1	16/18		cc	MPLE.	TED _	7/16/18	3	GROU	IND EI	LEVATION	N	TE	ST PIT SIZI	=	
EXCA\	ATION (CONT	RACT	OR Th	e Robe	rt B. Ba	alter C	ompan	у				WA	TER LEVEL	_S	14/4TED	14/4 T ED
EXCA\	ATION I	METH	OD _C	Case 58	0N Bac	khoe				DAT	ΤE	TIME	ELAPSED HOURS	DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
LOGGI	ED BY _	J. Bail	ey		CH	IECKEI	D BY	K. Cris	st	7/16	/18		0 ⊼			NE	
NOTES	S _Lat: 3	9.108	506 Lc	ong: -77	.134112	2				_							
DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG							М	IATER	IIAL DESC	CRIPTION				
0.0		SM	FF	2.3	Moist,	Brown,	, Silty :	SAND									
			×××	3.2						В	ottom	of test pit	t at 3.2 feet				



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TEST PIT TP-267 PAGE 1 OF 1

NT EAE	ngine	ering, I	nc.								PROJECT	NAME G	ude Landfill				
IECT LOC	ATIO	N Mo	ntgom	ery C	ounty,	Mary	land										
STARTE	D _7/	16/18			COMF	PLETE	ED _7	7/16/1	8		GROUND E	LEVATIO	N	TE	ST PIT SIZ	E	
VATION	CONT	RACTO	OR _T	he Ro	bert B	. Balt	ter Co	mpar	ny				WA	TER LEVE	LS	WATER	WATER
VATION	METH	OD _C	ase 5	80N E	Backho	е						TIME	HOURS	DEPTH (ft)	DEPTH (ft)	DEPTH (ft)	ELEV (ft)
GED BY _	J. Bail	еу			CHEC	KED	BY _	K. Cri	st		7/16/18		0 ₹			NE	
S <u>Lat: 3</u>	9.108	229 Lo	ng: -7	7.133	38												
SAMPLE TYPE NUMBER	U.S.C.S.	1.11		Moi	et Bro	nwn G	Silty S	SAND			MATE	RIAL DES	CRIPTION				
	SM	F	2.0			own, s	Silty S	SAND									
-			3.0								Botton	n of test ni	t at 3.0 feet				
	STARTE AVATION GED BY Lat: 3	STARTED 7/2 AVATION CONT AVATION METH GED BY J. Bail ES Lat: 39.108	STARTED 7/16/18 AVATION CONTRACTO AVATION METHOD CO GED BY J. Bailey ES Lat: 39.108229 Lo ORAPHIC GRAPHIC STARTES SM F F	AVATION CONTRACTOR _TAVATION METHOD _Case 5 GED BY _J. Bailey ES _Lat: 39.108229 Long: -7 BOTO OF F SMF SMF SMF SMF F	STARTED 7/16/18 AVATION CONTRACTOR The RoavATION METHOD Case 580N B GED BY J. Bailey ES Lat: 39.108229 Long: -77.133 BLAY AND CONTRACTOR The RoavATION METHOD Case 580N B GED BY J. Bailey ES Lat: 39.108229 Long: -77.133 BLAY AND CONTRACTOR The RoavATION METHOD Case 580N B GED BY J. Bailey ES Lat: 39.108229 Long: -77.133	STARTED 7/16/18 COME AVATION CONTRACTOR The Robert B AVATION METHOD Case 580N Backho GED BY J. Bailey CHEC ES Lat: 39.108229 Long: -77.13338 WAS BURNEY OF THE ROBERT B AVATION METHOD Case 580N Backho GED BY J. Bailey CHEC S Lat: 39.108229 Long: -77.13338 WAS BURNEY OF THE ROBERT B AVATION METHOD Case 580N Backho GED BY J. Bailey CHEC S Lat: 39.108229 Long: -77.13338 WAS BURNEY OF THE ROBERT B AVATION METHOD Case 580N Backho GED BY J. Bailey CHEC S Lat: 39.108229 Long: -77.13338 WAS BURNEY OF THE ROBERT B AVATION METHOD Case 580N Backho GED BY J. Bailey CHEC S Lat: 39.108229 Long: -77.13338 WAS BURNEY OF THE ROBERT B AVATION METHOD Case 580N Backho GED BY J. Bailey CHEC S Lat: 39.108229 Long: -77.13338 WAS BURNEY OF THE ROBERT B AVATION METHOD Case 580N Backho GED BY J. Bailey CHEC S Lat: 39.108229 Long: -77.13338 WAS BURNEY OF THE ROBERT B AVATION METHOD Case 580N Backho GED BY J. Bailey CHEC S Lat: 39.108229 Long: -77.13338 WAS BURNEY OF THE ROBERT B AVATION METHOD Case 580N Backho GED BY J. Bailey CHEC S Lat: 39.108229 Long: -77.13338 WAS BURNEY OF THE ROBERT B AVATION METHOD Case 580N Backho GED BY J. Bailey CHEC S Lat: 39.108229 Long: -77.13338 WAS BURNEY OF THE ROBERT B AVATION METHOD Case 580N Backho GED BY J. Bailey CHEC S Lat: 39.108229 Long: -77.13338 WAS BURNEY OF THE ROBERT B AVATION METHOD Case 580N Backho GED BY J. Bailey CHEC S Lat: 39.108229 Long: -77.13338 WAS BURNEY OF THE ROBERT B AVATION METHOD Case 580N Backho GED BY J. Bailey CHEC S Lat: 39.108229 Long: -77.13338 WAS BURNEY OF THE ROBERT B AVATION METHOD Case 580N Backho GED BY J. Bailey CHEC S Lat: 39.108229 Long: -77.13338 WAS BURNEY OF THE ROBERT B AVATION METHOD CASE 580N BACKHO GED BY J. BURNEY OF THE ROBERT B AVATION METHOD CASE 580N BACKHO AVATION METHOD CASE 580N BACK	STARTED 7/16/18 COMPLET AVATION CONTRACTOR The Robert B. Ball AVATION METHOD Case 580N Backhoe GED BY J. Bailey CHECKED SES Lat: 39.108229 Long: -77.13338	Montgomery County, Maryland E STARTED 7/16/18 COMPLETED 7/ AVATION CONTRACTOR The Robert B. Balter Control Method Case 580N Backhoe GED BY J. Bailey CHECKED BY CHECK	STARTED 7/16/18 COMPLETED 7/16/18 AVATION CONTRACTOR The Robert B. Balter Compart AVATION METHOD Case 580N Backhoe GED BY J. Bailey CHECKED BY K. Critical States and the second states are second states as a second state of the second states are second states as a second state	STARTED 7/16/18 COMPLETED 7/16/18 AVATION CONTRACTOR The Robert B. Balter Company AVATION METHOD Case 580N Backhoe GED BY J. Bailey CHECKED BY K. Crist ES Lat: 39.108229 Long: -77.13338 BY AUTION METHOD Case 580N Backhoe GED BY J. Bailey CHECKED BY K. Crist SM J. F. Moist, Brown, Silty SAND SM J. F. F. Trash	STARTED 7/16/18 COMPLETED 7/16/18 AVATION CONTRACTOR The Robert B. Balter Company AVATION METHOD Case 580N Backhoe GED BY J. Bailey CHECKED BY K. Crist ES Lat: 39.108229 Long: -77.13338 BY AUTION METHOD Case 580N Backhoe GED BY J. Bailey CHECKED BY K. Crist SM JF Moist, Brown, Silty SAND SM JF F Trash	PROJECT E STARTED 7/16/18 COMPLETED 7/16/18 GROUND E AVATION CONTRACTOR The Robert B. Balter Company AVATION METHOD Case 580N Backhoe GED BY J. Bailey CHECKED BY K. Crist ES Lat: 39.108229 Long: -77.13338 MATE MATE MATE Moist, Brown, Silty SAND Trash	STARTED 7/16/18 COMPLETED 7/16/18 GROUND ELEVATION AVATION CONTRACTOR The Robert B. Balter Company AVATION METHOD Case 580N Backhoe SED BY J. Bailey CHECKED BY K. Crist SS Lat: 39.108229 Long: -77.13338 MATERIAL DES MATERIAL DES MATERIAL DES Trash	STARTED 7/16/18 COMPLETED 7/16/18 WANTION CONTRACTOR The Robert B. Balter Company WANTION METHOD Case 580N Backhoe SED BY J. Bailey CHECKED BY K. Crist SS Lat: 39.108229 Long: -77.13338 MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION SM F F Moist, Brown, Silty SAND	RECT LOCATION Montgomery County, Maryland PROJECT NUMBER 16943-0 MD	SETARTED 7/16/18 COMPLETED 7/16/18 GROUND ELEVATION TEST PIT SIZE AVATION CONTRACTOR The Robert B. Balter Company AVATION METHOD Case 580N Backhoe SED BY J. Bailey CHECKED BY K. Crist S. Lat: 39.108229 Long: -77.13338 WATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION PROJECT NUMBER 16943-0 MD TEST PIT SIZE WATERIAL SET PIT SIZE WATE	PROJECT NUMBER 16943-0 MD STARTED 7/16/18 COMPLETED 7/16/18 WATER LEVELS WATON METHOD Case 580N Backhoe SED BY J. Bailey CHECKED BY K. Crist SS Lat: 39.108229 Long: -77.13338 MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION



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TEST PIT TP-268 PAGE 1 OF 1

CLIENT EA Engineering, Inc.										_ PRO	JECT N	IAME Gu	ıde Landfill				
PROJ	ECT LOC	ATIO	N _Mo	ntgome	ery Cou	inty, M	arylan	d		_ PRO	JECT N	IUMBER _	16943-0 M	D			
DATE	STARTE	D _7/1	17/18		c	OMPLI	ETED	7/17/	18	_ GRO	UND E	LEVATION	N	TE	ST PIT SIZI	≣	
EXCA	VATION (CONT	RACT	OR Th	ne Robe	ert B. E	Balter (Compa	ny				WA	TER LEVEL	-S	WATER	WATER
EXCA	VATION I	METH	OD _C	Case 58	ON Ba	ckhoe				_	ATE	TIME	ELAPSED HOURS	DEPTH (ft)	HOLE DEPTH (ft)		WATER ELEV (ft)
LOGO	SED BY _	J. Bail	еу		c	HECKE	ED BY	K. Cı	rist	_ 7/1	7/18		0 ∑			NE	
NOTE	S <u>Lat: 3</u>	9.1090	09 Lor	ng: - 77.	13675					_							
														l		I.	
DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG							ı	MATER	RIAL DESC	CRIPTION				
0.0			ille F		Moist	, Light	Brown	n, Silty	SAND								
	_																
	_		F														
	-	SM															
	-		¦∰F ∭F														
2.5	-																
			III F	3.0													
			\bowtie		Trash												
	-			3.5							Bottom	of test pit	at 3.5 feet				
											Dottom	or toot pic	. 41 0.0 1001				



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TEST PIT TP-269 PAGE 1 OF 1

	NT EAE											ude Landfill				
	ECT LOC											16943-0 M				
	STARTE						D 7/17		GRO	UND E	LEVATION	N		ST PIT SIZ	E	
	VATION						er Comp	any		ATE	TIME	ELAPSED HOURS	TER LEVEI CASING	LS HOLE DEPTH (ft)	WATER	WATER
	VATION									7/18	IIIVIE	HOURS 0 ∑	DEPTH (ft)	DEPTH (ft)	DEPTH (ft) NE	ELEV (ft)
	SED BY					ECKED I	BY <u>K. C</u>	Crist	'''	7710		0 *			INC	
NOTE	S <u>Lat: 3</u>	9.109	85 Lor	ıg: - 77.	13716											
O DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG						1	MATEF	RIAL DESC	CRIPTION				
		SM	FFF	2.5	Moist, L	ight Bro	wn, Silty	SAND								
				3.5												
										Bottom	of test pit	t at 3.5 feet				
GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9/5/18																



TEST PIT TP-270

CLIENT EAE											ude Landfill				
PROJECT LOC	ATION	Mo_Mo	ntgome	ry County	, Marylaı	nd		PROJE	CT NU	MBER	16943-0 M	D			
DATE STARTE	D _7/1	7/18		COM	IPLETED	7/17/1	8	GROUN	D ELE	VATIO	N		ST PIT SIZ	≣	
EXCAVATION	CONTE	RACTO	OR Th	e Robert	B. Balter	Compa	ny		-		WA	TER LEVEL	S	WATER	WATER
EXCAVATION	METHO	DD _C	case 58	0N Backh	oe			_		TIME	HOURS	DEPTH (ft)	DEPTH (ft)		ELEV (ft)
LOGGED BY	J. Baile	әу		CHE	CKED B	Y K. Cr	ist	7/17/1	8		0 ⊼			NE	
EXCAVATION LOGGED BY NOTES Lat: 3 BAWNIN O.O 2.5	J. Baile 9.1093	GRAPHIC 66 No.		CHE	CKED BY				TERIA	L DES			HOLE DEPTH (ft)	WATER DEPTH (ft) NE	WATER ELEV (ft)



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TEST PIT TP-271 PAGE 1 OF 1

CLIENT EA Engineering, Inc.	PROJECT I	NAME G	ude Landfill				
PROJECT LOCATION Montgomery County, Maryland	PROJECT						
DATE STARTED 7/17/18 COMPLETED 7/17/18	GROUND E				ST PIT SIZ	E	
EXCAVATION CONTRACTOR The Robert B. Balter Company			WA	TER LEVE	S	WATER	WATER
EXCAVATION METHOD Case 580N Backhoe	DATE	TIME	ELAPSED HOURS	DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
LOGGED BY J. Bailey CHECKED BY K. Crist	7/17/18		0 ⊼			NE	
NOTES Lat: 39.10966 Long: -77.13839	_						
O.O SAMPLE TYPE NUMBER NUMBER NUMBER NUMBER NOWBER	MATE	RIAL DES	CRIPTION				
SM F F 2.0 Trash							
KXXXI ²	Botton	n of test pi	t at 2.3 feet				
81.0							
0.01							
GENERAL BH / IF / WELL 18943-0 GUDE LANDFILL.GFU KOBERT B BAL I ER, GDI							
H							



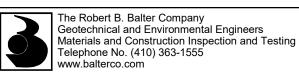
TEST PIT TP-272

VVV	w.bait	erco.c	JUIII											
CLIENT EAE	ngine	ering,	Inc.					PROJECT N	NAME G	ude Landfill				
PROJECT LOC				ry County, M	aryland			PROJECT N	NUMBER	16943-0 M	D			
DATE STARTE					ETED 7	/17/18		GROUND E				ST PIT SIZI		
EXCAVATION											TER LEVEL	.s		
EXCAVATION					<u> </u>	трану		DATE	TIME	ELAPSED HOURS	CASING DEPTH (ff)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
LOGGED BY					ED BV k	Criet		7/17/18		0 ∑	\		NE	\
NOTES Lat: 3						t. Onot								
Lat. 5	3.100	T	ig/ / . i	002										
O DEPTH O (ft) SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG						MATEF	RIAL DES	CRIPTION				
	SM	F		Moist, Light	Brown, S	Silty SAND)							
	GM	o F	1.5	Moist, Gray	·									
2.5	SM	F		Moist, Light	Brown, S	Silty SAND)							
				Trash										
								Bottom	of test pi	t at 4.5 feet				



TEST PIT TP-273 PAGE 1 OF 1

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		Engineering, Inc.	v Ca:	h, M	land	PROJECT						
		CATION Montgomer D 7/17/18			ED _7/17/18	PROJECT				ST PIT SIZI	=	
						GROUND E	LEVATION		TER LEVEL			
					iei Company	DATE	TIME	ELAPSED	CASING	HOLE	WATER DEPTH (ft)	WATER ELEV (ft)
					RY K Crist	7/17/18		0 ∑	22. 711(10)	32(it)	NE NE	* (:1.)
				_0.1.	_							
EXC LOG NOT H1430 0.0	ES Lat: 3 WANTION GEOD BY ES LAT: 3 WANTIE TABLE AND A CONTROL OF THE PROPERTY OF THE PRO	CONTRACTOR The METHOD Case 580 J. Bailey 39.10993 Long: -77.13 TESTS	N Back	BCKEPHIC GRAPHIC BOTTOM CRAPHIC BOTT	Moist, Re More Trash		MATE!	ELAPSED HOURS	CASING DEPTH (ft)	HOLE	DEPTH (ft)	WATER ELEV (ft)
GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9							Botton	n of test pit	at 7.0 feet			



TEST PIT TP-274

CLIENT EAE												ude Landfill				
PROJECT LO	OITA	M _Mo	ntgome	ry Cour	ıty, Mar	yland			PR	OJECT N	NUMBER	16943-0 M				
DATE STARTE	:D _7/1	17/18		cc	MPLET	ED _7/	/17/18		_ GR	OUND E	LEVATIO	N		ST PIT SIZ	E	
EXCAVATION	CONT	RACT	OR Th	e Rober	rt B. Bal	Iter Cor	mpany	<u>, </u>		Т		WA ELAPSED	TER LEVEL	_S	WATED	WATER
EXCAVATION	METH	OD _C	Case 58	0N Bacl	khoe				_	DATE	TIME	HOURS	DEPTH (ft)	HOLE DEPTH (ft)		ELEV (ft)
LOGGED BY	J. Bail	ey		СН	ECKED	BY K	<. Crist	t	_ 7/	/17/18		0 ∑			NE	
NOTES Lat: 3	39.110	31 Lor	ng: - 77.′	13718					_							
LOGGED BY	J. Bail	ey 31 Lor GRAPHIC	ng: -77.	CH					7/			0 ♀			NE	



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TEST PIT TP-275 PAGE 1 OF 1

VVVV	w.bait	erco.c	OIII										
CLIENT EA E	nginee	ering, I	nc.				_ PROJECT N	NAME G	ude Landfill				
PROJECT LOC	ATIO	N _Mo	ntgomer	y County, M	laryland		_ PROJECT N	NUMBER	16943-0 M	D			
DATE STARTE	D _7/	17/18		COMPL	.ETED _7/	17/18	GROUND E	LEVATIO	N	TE	ST PIT SIZI	=	
EXCAVATION (CONT	RACT	OR The	Robert B.	Balter Cor	mpany			WA	TER LEVEL	_S		
EXCAVATION I	METH	OD C	ase 580	N Backhoe			DATE	TIME	ELAPSED HOURS	CASING DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
LOGGED BY						C. Crist	7/17/18		0 ∑			NE	
NOTES Lat: 3							_						
							_						
O DEPTH O (ft) SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG					MATER	RIAL DES	CRIPTION				
2.5	SM	FFF	3.5	Moist, Light	Brown, S	ilty SAND							
		XXXX	4.0				Bottom	of test pi	t at 4.0 feet				



The Robert B. Balter Company Geotechnical and Environmental Engineers Materials and Construction Inspection and Testing Telephone No. (410) 363-1555 www.balterco.com

TEST PIT TP-276

CLIENT EAE											ude Landfill				
PROJECT LOC	OITA	<u> Mo</u>	ntgome	ry County,	Marylan	nd		_ PRO	DJECT N	NUMBER	16943-0 M				
DATE STARTE	D _7/1	19/18		_ COMF	PLETED	7/19/1	8	_ GRO	OUND E	LEVATIO	N		ST PIT SIZ	≣	
EXCAVATION	CONTI	RACT	OR The	e Robert B	B. Balter	Compar	ny				WA ELAPSED	TER LEVEL	S	WATER	WATER
EXCAVATION	METH	OD _C	Case 580	N Backho	е			_	DATE	TIME	HOURS	DEPTH (ft)	HOLE DEPTH (ft)		ELEV (ft)
LOGGED BY	J. Bail	ey		CHEC	KED BY	′ <u>K.</u> Cr	ist	_ 7/	19/18		0 ∑			NE	
NOTES Lat: 3	9.1110	03 Lor	ng: -77.1	3744				_							
LOGGED BY	J. Bail 9.1110	ey CRAPHIC LOG	ng: -77.1	CHEC	KED BY			7/	MATEF	RIAL DES	CRIPTION		DEPTH (ft)	NE NE	ELEV (ff)



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TEST PIT TP-277 PAGE 1 OF 1

CLIE	NT E	A Eng	inee	ring,	Inc.								PF	ROJECT	NAME G	ude Laı	ndfill				
PRO	JECT L	OCA1	ΓΙΟΝ	Mc	ontgor	nery	Count	y, Ma	arylar	nd			PF	ROJECT	NUMBER	16943	-0 M	D			
DAT	E STAF	RTED	7/2	0/18			CO	MPLE	TED	7/2	0/18		GI	ROUND E	LEVATIO	N		TE	ST PIT SIZ	E	
EXC	AVATIO	ON CO	NTF	RACT	OR _	The F	<u>Robert</u>	B. B	alter	Com	pany			D.4.T.F.	T114F	ELAP	WA SED	TER LEVE	HOLE	WATER	WATER
1	AVATIO												– ŀ.	DATE	TIME	HOL	RS	DEPTH (ft)	DEPTH (ft)	DEPTH (ft)	ELEV (ft)
	GED B							ECKE	D BY	Y <u>K.</u>	Crist		_ '	7/20/18			Ā			NE	
NOT	ES La	t: 39.1	1109	7 Loi	ng: -7	<u>7.137</u>	′93						_								
0.0 (#)	\bar{g}^{*}		U.S.C.S.	GRAPHIC										MATE	RIAL DES	CRIPT	ON				
-	_	G	M			C	rushed	d Stoi	ne												
_		S	SM .	F	0.9	M	loist, L	ight E	Brow	n, Silt	ty SAI	ND									
-					1.8	Tı	rash														
2.5				\bowtie																	
			-	x	2.7									Botton	n of test pi	t at 2.7	feet				
GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9/5/18																					
GENER.																					



TEST PIT TP-278 PAGE 1 OF 1

WW	w.bait	erco.c	OIII										
CLIENT EAE	nginee	ering, I	nc.				PROJECT	NAME G	ude Landfill				
PROJECT LOC	OITA	M _Mo	ntgomer	y County, M	laryland		PROJECT	NUMBER	16943-0 M	D			
DATE STARTE	D _7/1	19/18		COMPL	ETED _7/	19/18	GROUND E				ST PIT SIZI	=	
EXCAVATION							_		WA	TER LEVEL	_S		
EXCAVATION	METH	OD C	Case 580	N Backhoe			DATE	TIME	ELAPSED HOURS	CASING DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
LOGGED BY	J. Bail	ey		CHECK	ED BY K	. Crist	7/19/18		0 ∑			NE	
NOTES Lat: 3							_						
SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG					MATE	RIAL DES	CRIPTION				
0.0	SM	FFF	2.8	Moist, Light	Brown, S	ilty SAND	Botton	n of test pi	it at 3.7 feet				

The Robert B. Balter Company Geotechnical and Environmental Engineers Materials and Construction Inspection and Testing Telephone No. (410) 363-1555 www.balterco.com

TEST PIT TP-279

CLIENT EAE									ude Landfill				
	ATION Montgomery								16943-0 MI				
	D 7/19/18				7/19/18		GROUND E	ELEVATIO			ST PIT SIZ	E	
	CONTRACTOR The F			Iter C	company		DATE	TIME	ELAPSED HOURS	TER LEVEL CASING	_S HOLE	WATER	WATER
EXCAVATION	METHOD Case 580N	Back	hoe				DATE	TIME		DEPTH (ft)	HOLE DEPTH (ft)		ELEV (ft)
LOGGED BY	J. Bailey	CH	ECKE	BY	K. Crist		7/19/18		0 ∑			NE	
NOTES Lat: 3	9.10976 Long: -77.138	302											
SAMPLE TYPE NUMBER	REMARKS	U.S.C.S.	GRAPHIC LOG					MATE	ERIAL DESC	CRIPTION			
0.0	Trash Not Encountered	SM		8.0	Moist	, Light Bro	own, Silty SA		m of test pit		oris		

The Robert B. Balter Company **TEST PIT TP-280** Geotechnical and Environmental Engineers PAGE 1 OF 1 Materials and Construction Inspection and Testing Telephone No. (410) 363-1555 www.balterco.com PROJECT NAME Gude Landfill CLIENT EA Engineering, Inc. PROJECT LOCATION Montgomery County, Maryland PROJECT NUMBER 16943-0 MD DATE STARTED 7/19/18 COMPLETED 7/19/18 **GROUND ELEVATION TEST PIT SIZE** WATER LEVELS SED CASING RS DEPTH (ft) D **EXCAVATION CONTRACTOR** The Robert B. Balter Company HOLE DEPTH (ft) WATER ELEV (ft) WATER DEPTH (ft) ELAPSED DATE TIME **EXCAVATION METHOD** Case 580N Backhoe HOURS 7/19/18 0 ∑ ΝE LOGGED BY J. Bailey CHECKED BY K. Crist NOTES Lat: 39.10993 Long: -77.1375 SAMPLE TYPE NUMBER GRAPHIC LOG DEPTH (ft) U.S.C.S. MATERIAL DESCRIPTION 0.0 Asphalt Debris Moist, Light Brown, Silty SAND with variable amounts of garbage 2.5 SM 5.0 GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9/5/18 Trash Bottom of test pit at 6.5 feet



The Robert B. Balter Company Geotechnical and Environmental Engineers Materials and Construction Inspection and Testing Telephone No. (410) 363-1555 www.balterco.com

TEST PIT TP-281

www.baiterco.com							
CLIENT _EA Engineering, Inc.	_ PROJECT N	NAME G	ude Landfill				
PROJECT LOCATION Montgomery County, Maryland	_ PROJECT N	NUMBER	16943-0 M	D			
DATE STARTED 7/20/18 COMPLETED 7/20/18	_ GROUND E				ST PIT SIZI	E	
EXCAVATION CONTRACTOR _ The Robert B. Balter Company			WA ⁻	TER LEVEL	-S		
EXCAVATION METHOD _Case 580N Backhoe	DATE	TIME	ELAPSED HOURS	DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
LOGGED BY _J. Bailey CHECKED BY _K. Crist	7/20/18		0 ∑			NE	
	_						
	MATER						



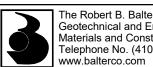
TEST PIT TP-282

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CLIENT EAE	nginee	ering, l	lnc.					PROJECT	NAME Gu	ide Landfill				
PROJECT LOC	OITA	M _Mo	ntgomer	y County,	Marylan	d		PROJECT I	NUMBER _	16943-0 M	D			
DATE STARTE	D _7/2	20/18		_ COM	PLETED	7/20/18		GROUND E	LEVATION			ST PIT SIZE	!	
EXCAVATION	CONTI	RACT	OR The	e Robert E	B. Balter (Company	<u>'</u>			WA'	TER LEVEL	S HOLE	WATER	WATER
EXCAVATION	METH	OD _C	Case 580)N Backho	oe			DATE	TIME	HOURS	DEPTH (ft)	HOLE DEPTH (ft)		ELEV (ft)
LOGGED BY _	J. Bail	ey		_ CHEC	KED BY	K. Crist	t	7/20/18		0 ⊼			NE	
NOTES Lat: 3	9.1099	91 Lor	ng: -77.1	3948										
O DEPTH O (ft) SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG		Moist, Lig	ht Brown	n, Silty SA	AND	MATER	RIAL DESC	CRIPTION				
2.5	SM	FFFF	4.0											
5.0				Trash				Bottom	n of test pit	at 5.3 feet				

The Robert B. Balter Company Geotechnical and Environmental Engineers Materials and Construction Inspection and Testing Telephone No. (410) 363-1555 www.balterco.com

TEST PIT TP-283 PAGE 1 OF 1

www.baiterd								
CLIENT EA Engineerin		PROJECT I						
	Montgomery County, Maryland	PROJECT I						
DATE STARTED 7/20/		GROUND E	LEVATION			ST PIT SIZI	=	
	ACTOR The Robert B. Balter Company	DATE	TIME	ELAPSED HOURS	CASING	HOLE DEPTH (ft)	WATER	WATER
EXCAVATION METHOD		7/20/18		0 <u>∑</u>	рертн (π)	рертн (π)	DEPTH (ft) NE	ELEV (ft)
LOGGED BY J. Bailey		-						
NOTES Lat: 39.10964	Long: -77.13941	_						
1 1 % 1 1	000 P000 P000 P000 P000 P000 P000 P000	MATER	RIAL DESC	CRIPTION				
0.0	Moist, Light Brown, Silty SAND							
2.5 SM	F F F F F F F Trash							
GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL GPJ ROBERT B BALTER.GDT 9/5/18	7.0							
		Bottom	of test pit	at 7.0 feet				
ANDE								
NDE I								
9-0 @								
1694								
2								
· \								
ERAL								
Ö Ö Ö Ö Ö								



The Robert B. Balter Company Geotechnical and Environmental Engineers Materials and Construction Inspection and Testing Telephone No. (410) 363-1555 www.balterco.com

TEST PIT TP-284

CLIENT EA Engineering, Inc. PROJECT NAME Guide Landfill PROJECT LOCATION Montgomery County, Maryland PROJECT LOCATION Montgomery County, Maryland PROJECT NAME Guide Landfill WATER LEVELS WATER LEVELS WATER LEVELS DATE TIME LANGES DEPTH IN DEP	WW	w.bait	- 100.0	OIII											
DATE STARTED 7/19/18 COMPLETED 7/19/18 GROUND ELEVATION TEST PIT SIZE	CLIENT EAE	ngine	ering, l	Inc.					PROJECT	NAME G	ude Landfill				
EXCAVATION CONTRACTOR The Robert B. Balter Company EXCAVATION METHOD Case 580N Backhoe LOGGED BY J. Bailey CHECKED BY K. Crist NOTES Lat: 39.10951 Long: -77.13799 Material Description F. G.	PROJECT LOC	ATIO	M _Mo	ntgomer	y County, I	<u>Maryland</u>	l		PROJECT	NUMBER	16943-0 M	<u>D</u>			
EXCAVATION CONTRACTOR The Robert B. Balter Company EXCAVATION METHOD Case 580N Backhoe LOGGED BY J. Bailey CHECKED BY K. Crist NOTES Lat: 39.10951 Long: -77.13799 Material Description F. G.	DATE STARTE	D _7/	19/18		СОМР	LETED _	7/19/18						ST PIT SIZI	=	
EXCAVATION METHOD Case 580N Backhoe LOGGED BY J. Bailey CHECKED BY K. Crist NOTES Lat: 39 10951 Long: -77.13799 MATERIAL DESCRIPTION MATERIAL DE											WA	TER LEVEL	_S		
CHECKED BY J. Bailey CHECKED BY K. Crist NOTES Lat: 39.10951 Long: -77.13799 NE NE NE NE NE NE NE									DATE	TIME	HOURS	DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
NOTES Lat: 39.10951 Long: -77.13799 Hard Column Lat: 39.10951 Long: -77.13799 MATERIAL DESCRIPTION							K. Crist		7/19/18						
ALL HAND SOLUTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION SM F F															
Moist, Light Brown, Silty SAND SM F															
Moist, Light Brown, Silty SAND SM F 2.5 F 3.8 Trash	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG						MATE	RIAL DES	CRIPTION				
		SM	FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF	3.8		nt Brown,	Silty SA	ND	Botton	n of test pi	t at 4.5 feet				



TEST PIT TP-285

ww	w.balt	erco.c	om											
CLIENT EAE	nginee	ering, l	Inc.					PROJECT I	NAME Gu	ide Landfill				
PROJECT LOC	OITA	M _Mo	ntgomer	y County, N	Maryland			PROJECT I	NUMBER _	16943-0 M	D			_
DATE STARTE	D _7/1	19/18		_ COMPI	LETED _	7/19/18		GROUND E	LEVATION			ST PIT SIZE	≣	
EXCAVATION	CONTI	RACT	OR The	Robert B.	Balter C	ompany		F.=-		WA'	TER LEVEL CASING	S HOLE	WATER	WATER
EXCAVATION	METH	OD _C	Case 580	N Backhoe)			DATE	TIME	ELAPSED HOURS	DEPTH (ft)	HOLE DEPTH (ft)	I	ELEV (ft)
LOGGED BY	J. Bail	еу		_ CHEC	KED BY	K. Crist		7/19/18		0 ⊼			NE	
NOTES Lat: 3	9.109	52 Lor	ng: -77.13	3738										
O DEPTH O (ft) SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG						MATEF	RIAL DESC	CRIPTION				
0.0 2.5 	SM	FFF	3.5	Moist, Ligh	t Brown,	Silty SAN	ND	Bottom	n of test pit	at 4.7 feet				



The Robert B. Balter Company Geotechnical and Environmental Engineers Materials and Construction Inspection and Testing Telephone No. (410) 363-1555 www.balterco.com

TEST PIT TP-286

CLIENT EA Engineering, Inc. PROJECT LOCATIONMorigomery County. Maryland PROJECT NUMBER16943-0 MD TEST PIT SIZE EXCAVATION CONTRACTORThe Robert B_ Balter Company EXCAVATION METHODCase 580N Badishoe LOGGED BY	www.baiterco.com							
DATE STARTED 7/20/18 COMPLETED 7/20/18 GROUND ELEVATION TEST PIT SIZE	CLIENT EA Engineering, Inc.	PROJECT N	NAME G	ude Landfill				
DATE STARTED 7/20/18 COMPLETED 7/20/18 GROUND ELEVATION TEST PIT SIZE	PROJECT LOCATION Montgomery County, Maryland	PROJECT N	NUMBER	16943-0 M	D			
EXCAVATION CONTRACTOR The Robert B. Balter Company EXCAVATION METHOD Case 580N Backhoe Checked by K. Crist Checked by Chec	DATE STARTED 7/20/18 COMPLETED 7/20/18					ST PIT SIZI	=	
EXCAVATION METHOD Case 580N Backhoe LOGGED BY J. Bailey CHECKED BY K. Crist NOTES Lat: 39.10932 Long: -77.13918 MATERIAL DESCRIPTION Trash Trash	EXCAVATION CONTRACTOR The Robert B. Balter Company			WA [*]	TER LEVEL	_S		
CHECKED BY L. Bailey CHECKED BY K. Crist NE NOTES Lat: 39.10932 Long: -77.13918 NE NE NOTES Lat: 39.10932 Long: -77.13918 NE NE NOTES Lat: 39.10932 Long: -77.13918 NE NE NE NE NOTES Lat: 39.10932 Long: -77.13918 NE NE NE NE NE NE NE N		DATE	TIME	HOURS	CASING DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
NOTES Lat: 39.10932 Long: -77.13918 Had a lat: 39.10932 Long: -77.13918 MATERIAL DESCRIPTION MATERIAL DESCRIPTION SM		7/20/18		0 ∑			NE	
MATERIAL DESCRIPTION MATERIAL DESCRIPTION Moist, Light Brown, Silty SAND SM F F 3.0 Trash 3.7								
O.0 Moist, Light Brown, Silty SAND SM F 3.0 Trash 3.7		·						
SM / F	SAMPLE TYPE NUMBER U.S.C.S. LOG	MATEF	RIAL DES	CRIPTION				
	SM SM Silty SAND SM Trash	Bottom	ı of test pi	t at 3.7 feet				



TEST PIT TP-287

WW	w.bait	erco.c	com									
CLIENT EAE	ngine	ering, l	Inc.			PROJECT N	IAME Gu	ude Landfill				
PROJECT LOC	OITA	M _Mo	ntgomery C	ounty, Marylan	nd	PROJECT N	IUMBER	16943-0 MI)			
DATE STARTE	D _7/2	20/18		COMPLETED	7/20/18	GROUND E	LEVATION	N	TE	ST PIT SIZ	E	
EXCAVATION	CONT	RACT	OR The Ro	bert B. Balter	Company			WA ⁻ ELAPSED	CASING	S HOLE	WATER	WATER
EXCAVATION	METH	OD _C	Case 580N E	Backhoe		DATE	TIME	HOURS	DEPTH (ft)	HOLE DEPTH (ft)		ELEV (ft)
LOGGED BY _	J. Bail	еу		CHECKED BY	K. Crist	7/20/18		0 ∑			NE	
NOTES Lat: 3	9.108	9 Long	g: - 77.13878									
NON DEPTH HT CALL HE CALL H	S.D.S.U.S.	GRAPHIC GRAPHIC		st, Light Brown	n, Silty SAND			t at 7.5 feet				



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TEST PIT TP-288

CLIEN	IT EA E	nginee	ering, I	lnc.					PROJECT I	NAME Gu	ıde Landfill				
PROJ	ECT LOC	ATION	N _Mo	ntgomer	y County,	Marylan	d		PROJECT I	NUMBER	16943-0 M	D			
DATE	STARTE	D _7/2	20/18		СОМІ	PLETED	7/20/18	8	GROUND E	LEVATION	١	TE	ST PIT SIZI	≣	
EXCA	VATION (CONTI	RACTO	OR The	e Robert E	B. Balter	Compan	ıy			WA' ELAPSED	TER LEVEL	S	WATED	WATER
EXCA	VATION I	METH	DD _C	Case 580	N Backho	oe			DATE	TIME	HOURS	DEPTH (ft)	HOLE DEPTH (ft)		ELEV (ft)
LOGG	ED BY _	J. Bail	ey		_ CHEC	KED BY	K. Cris	st	7/20/18		0 ∑			NE	
NOTE	S <u>Lat: 3</u>	9.1086	35 Lor	ng: -77.1	3855										
O DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG						MATEF	RIAL DESC	CRIPTION				
		SM		2.3	Moist, Lig	ht Brown	n, Silty S	AND							
2.5				4.0	Trash										
									Bottom	n of test pit	at 4.0 feet				

The Robert B. Balter Company Geotechnical and Environmental Engineers Materials and Construction Inspection and Testing Telephone No. (410) 363-1555 www.balterco.com CLIENT EA Engineering, Inc. PROJECT LOCATION Montgomery County, Maryland DATE STARTED 7/19/18 COMPLETED 7/19/18 EXCAVATION CONTRACTOR The Robert B. Balter Company

GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9/5/18

TEST PIT TP-289

CLIENT _EA Engineering, Inc. PROJECT NAME _Gude Landfill PROJECT LOCATION _Montgomery County, Maryland PROJECT NUMBER16943-0 MD DATE STARTED7/19/18	
FYCAVATION CONTRACTOR The Robert R. Ralter Company WATER LEVELS	
EXCAVATION CONTRACTOR The Robert B. Balter Company WATER LEVELS FI ADSED CASING HOLE WATER	
	14/4755
EXCAVATION METHOD Case 580N Backhoe DATE TIME ELAPSED CASING HOLE WATER HOURS DEPTH (ft) DEPTH (ft) DEPTH (ft) DEPTH (ft)	WATER ELEV (ft)
LOGGED BY J. Bailey CHECKED BY K. Crist 7/19/18 0 \(\text{D}\) NE	
NOTES Lat: 39.10885 Long: -77.13804	
SAMPLE TYPE NUMBER NUMBER TYPE TYPE NUMBER TYPE NUMBER TYPE TYPE NUMBER TYPE TYPE TYPE TYPE TYPE TYPE TYPE TYPE	
Moist, Light Brown, Silty SAND	
2.5 SM	
5.0 6.5 Bottom of test pit at 6.5 feet	



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TEST PIT TP-290 PAGE 1 OF 1

CLIE	 NT <u>E</u> A E	ngine	ering, l	Inc.							PROJECT	NAME G	ude Landfill				
	JECT LOC												16943-0 M				
DATI	E STARTE	D 7/2	20/18			СОМР	LETE	D _7/2	20/18		GROUND E	LEVATIO	N	TE	ST PIT SIZ	E	
EXC	AVATION	CONT	RACT	OR _	he Ro	bert B.	Balte	r Com	npany		-		WA	TER LEVE	LS	WATER	WATER
EXC	AVATION	METH	OD _C	Case 5	80N B	ackhoe	9				DATE	TIME	ELAPSED HOURS	DEPTH (ft)	HOLE DEPTH (ft)		ELEV (ft)
LOG	GED BY _	J. Bail	еу			CHEC	KED B	BY <u>K</u> .	. Crist		7/20/18		0 ⊼			NE	
NOTI	ES <u>Lat: 3</u>	9.109	35 Lor	ng: -77	7.1403	3											
O DEPTH	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG								MATE	RIAL DES	CRIPTION				
GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9/5/18 CONTRACT BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9/5/18		SM	FFF	2.7	Tras	st, Ligh	nt Brov	wn, Sil	Ity SAN	ND	Botton	n of test pi	it at 3.0 feet				
GENERAL BH / T																	



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TEST PIT TP-291

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CLIENT EA En	gineer	ing, I	nc.					PROJECT	NAME G	ude Landfill				
PROJECT LOCA	ATION	Moı	ntgomer	y County,	Maryland	d		PROJECT	NUMBER	16943-0 M	D			
DATE STARTED						7/20/18		GROUND E				ST PIT SIZI	=	
EXCAVATION C										WA	TER LEVEL	.s		
EXCAVATION M								DATE	TIME	ELAPSED HOURS	CASING DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
LOGGED BY _J						K. Crist		7/20/18		0 ∑			NE	
NOTES Lat: 39														
	.1007	/ [011		0020										
SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG						MATE	RIAL DES	CRIPTION				
 	SM	FFFFF	3.5	Moist, Ligh	nt Brown	, Silty SA	ND							
5.0			5.0	ı rasn										
	×	XXX	5.0					Botton	n of test pi	it at 5.0 feet				



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TEST PIT TP-292

VVVV	w.bait	erco.c	OIII											
CLIENT EA Er	nginee	ering, I	nc.					PROJECT I	NAME G	ude Landfill				
PROJECT LOC	ATION	M _ Mo	ntgomer	y County,	Maryland	d		PROJECT I	NUMBER	16943-0 M	D			
DATE STARTE					PLETED			GROUND E				ST PIT SIZ	=	
EXCAVATION (WA	TER LEVEL	_S		
EXCAVATION N								DATE	TIME	ELAPSED HOURS	CASING DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
LOGGED BY						K. Crist		7/19/18		0 ∑			NE	
NOTES Lat: 39														
O DEPTH O (f) SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG						MATE	RIAL DES	CRIPTION				
	SM		1.5	Moist, Lig	ht Brown	, Silty SAI	ND							
		XXX	4.0											
								Botton	of test pi	t at 4.0 feet				

TEST PIT TP-293 PAGE 1 OF 1



The Robert B. Balter Company Geotechnical and Environmental Engineers Materials and Construction Inspection and Testing Telephone No. (410) 363-1555 www.balterco.com

TEST PIT TP-294

www.baiterco.com							
CLIENT EA Engineering, Inc.	PROJECT N	NAME G	ude Landfill				
PROJECT LOCATION Montgomery County, Maryland	PROJECT	NUMBER	16943-0 M	D			
DATE STARTED 7/19/18 COMPLETED 7/19/18	GROUND E				ST PIT SIZI	=	
EXCAVATION CONTRACTOR _ The Robert B. Balter Company			WA ⁻	TER LEVEL	_S		
EXCAVATION METHOD Case 580N Backhoe	DATE	TIME	ELAPSED HOURS	CASING DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
LOGGED BY J. Bailey CHECKED BY K. Crist	7/19/18		0 ∑			NE	
NOTES Lat: 39.10817 Long: -77.13632	_						
SAMPLE TYPE NUMBER U.S.C.S. GRAPHIC LOG	MATEF	RIAL DES	CRIPTION				
O.O. O.O. O.O. O.O. O.O. O.O. O.O. O.O	Bottom	of test pi	t at 4.5 feet				

The Robert B. Balter Company Geotechnical and Environmental Engineers Materials and Construction Inspection and Testing Telephone No. (410) 363-1555 www.balterco.com CLIENT EA Engineering, Inc. PROJECT LOCATION Montgomery County, Maryland DATE STARTED 7/20/18 COMPLETED 7/20/18 EYCAVATION CONTRACTOR. The Pobert B. Balter Company

GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9/5/18

TEST PIT TP-295

CLIEN	—— IT <u>EA E</u>	nginee	ering, l	Inc.					PROJECT	NAME G	ude Landfill				
					County, M						16943-0 M	D			
DATE	STARTE	D 7/2	20/18		COMPL	ETED _7	7/20/18		GROUND E	LEVATIO	N	TE	ST PIT SIZI	=	
EXCA	VATION (CONT	RACT	OR The	Robert B. E	Balter Co	mpany				WA	TER LEVEL	-S	14/4TED	14/4 T ED
EXCA	VATION I	METH	OD _C	Case 580N	l Backhoe				DATE	TIME	ELAPSED HOURS	DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
					CHECKI	ED BY	K. Crist		7/20/18		0 ∑			NE	
				g: -77.134											
O DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG						MATEI	RIAL DES	CRIPTION				
0.0			F	N	loist, Light	Brown, S	Silty SAN	ID							
2.5		SM	FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF	5.0											
					rash										
			XXX	6.0					Dotto:-	of toot := !	t at 6.0 feet				
									סטונטרו	i oi test pi	ı aı u.u ieel				

TEST PIT TP-298 PAGE 1 OF 1

	ww.balterco.com										
	Engineering, Inc.						ude Landfill				
	CATION Montgomer						16943-0 M				
DATE START				TED 7/20/18	GROUND I	ELEVATIO	N		ST PIT SIZ	E	
	CONTRACTOR The			lter Company	DATE	TIME	ELAPSED	TER LEVE	HOLE	WATER	WATER
	METHOD Case 580				7/20/18	IIIVIE	HOURS 0 ∑	DEPTH (ft)	DEPTH (ft)	DEPTH (ft) NE	ELEV (f
	J. Bailey		ECKE	D BY K. Crist			0 ±			INE	
NOTES Lat:	39.1073 Long: -77.13	336									
O DEPTH (ft) SAMPLE TYPE NUMBER	REMARKS	U.S.C.S.	GRAPHIC LOG				ERIAL DESC	CRIPTION			
2.5	Trash Not Encountered	SM		Moist, Ligh	t Brown, Silty SA		m of test pit	at 8.0 feet			



TEST PIT TP-299 PAGE 1 OF 1

CLIEN	NT EAE	ngine	ering, I	nc.							_ PROJ	ECT N	NAME G	ude Land	fill				
PROJ	ECT LOC	ATIO	N <u>Mo</u>	ntgom	ery Co	unty, I	Maryla	and			_ PROJ	ECT N	NUMBER	16943-0	MD				
DATE	STARTE	D _7/2	20/18		(COMP	LETEI	D _7/2	20/18		_ GROU	ND E	LEVATIO	N		TE	ST PIT SIZ	E	
EXCA	VATION	CONT	RACTO	OR _T	he Rol	oert B.	Balte	r Com	npany			. . T	T184E	V ELAPSE	D	ER LEVEL CASING	HOLE	WATER	WATER
1	VATION										- DA 1		TIME	HOURS	\$ C	DEPTH (ft)	DEPTH (ft)	DEPTH (ft)	ELEV (ft)
1	SED BY _						KED B	BY <u>K.</u>	. Crist		- 1/20	10		0 ½	-			NE	
NOTE	S <u>Lat: 3</u>	9.107	01 Lon	g: -77	.13348	3					_								
DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG								М	ATEF	RIAL DES	CRIPTIO	N				
0.0					Mois	t, Ligh	t Brov	wn, Sil	Ity SAI	ND									
		SM	F	2.0	Tras			,											
2.5					IIas	11													
2.5	-			2.7								ottor	of test pi	t at 2.7 f-	ot				
GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL,GPJ ROBERT B BALTER,GDT 9/5/18																			

The Robert B. Balter Company **TEST PIT TP-301** Geotechnical and Environmental Engineers Materials and Construction Inspection and Testing Telephone No. (410) 363-1555 www.balterco.com PROJECT NAME Gude Landfill **CLIENT** EA Engineering, Inc. PROJECT LOCATION Montgomery County, Maryland PROJECT NUMBER 16943-0 MD COMPLETED 7/20/18 **GROUND ELEVATION** DATE STARTED 7/20/18 **TEST PIT SIZE** WATER LEVELS SED CASING RS DEPTH (ft) D **EXCAVATION CONTRACTOR** The Robert B. Balter Company HOLE DEPTH (ft) ELAPSED DATE TIME **EXCAVATION METHOD** Case 580N Backhoe HOURS 7/20/18 0 ∑ LOGGED BY J. Bailey CHECKED BY K. Crist NOTES Lat: 39.10739 Long: -77.13395 SAMPLE TYPE NUMBER GRAPHIC LOG DEPTH (ft) U.S.C.S. MATERIAL DESCRIPTION 0.0 Moist, Light Brown, Silty SAND 2.5

Bottom of test pit at 7.0 feet

SM

Trash

5.0

GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9/5/18

PAGE 1 OF 1

WATER ELEV (ft)

WATER DEPTH (ft)

ΝE



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TEST PIT TP-302

VVVV	···.buit	0.00.0	0111										
CLIENT EA E	ngine	ering, I	lnc.				PROJECT N	NAME G	ude Landfill				
PROJECT LOC	ATIO	N <u>Mo</u>	ntgomer	y County, M	aryland		PROJECT N	NUMBER	16943-0 M	D			
DATE STARTE	D _7/2	20/18		COMPLI	ETED 7/20	0/18	GROUND E				ST PIT SIZI	=	
EXCAVATION (CONT	RACT	OR The	Robert B. E	Balter Comp	pany			WA [*]	TER LEVEL	_S		
EXCAVATION I	METH	OD C	Case 580	N Backhoe		-	DATE	TIME	ELAPSED HOURS	CASING DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
LOGGED BY					ED BY K.	Crist	7/20/18		0 ∑			NE	
NOTES Lat: 3							_						
O DEPTH O (ft) SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG					MATER	RIAL DES	CRIPTION				
	SM	F	2.0	Moist, Light	Brown, Silt	y SAND							
2.5													
		XXXX	3.0				Bottom	of test pi	t at 3.0 feet				

GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9/5/18

TEST PIT TP-303

								_							
CLIENT EAE											ude Landfill				
PROJECT LOC											16943-0 M				
DATE STARTE	D _7/2	20/18		co	MPLETE	D 7/20)/18	G	ROUND E	LEVATIO	N		ST PIT SIZ	■	
EXCAVATION (CONTI	RACT	OR Th	e Robert	B. Balte	er Comp	any		1		WA'	TER LEVEL	_S	WATER	WATER
EXCAVATION I	METHO	DD _C	Case 58	0N Back	hoe				DATE	TIME	ELAPSED HOURS	DEPTH (ft)	HOLE DEPTH (ft)		ELEV (ft)
LOGGED BY _	J. Bail	еу		СНІ	ECKED E	3Y K. (Crist		7/20/18		0 ∑			NE	
NOTES Lat: 3	9.1076	37 Lor	ng: - 77.1	13531											
	J. Bail 9.1076	ey 37 Lor GRAPHIC PROPERTY OF F		CHI							0 ♀			NE NE	
									Botton	i oi test pi	t at 5.0 feet				



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TEST PIT TP-304 PAGE 1 OF 1

CLIENT _	EA En	nginee	ering, I	lnc.					PROJECT I	NAME Gu	ıde Landfill				
PROJEC1	T LOC	OITA	N <u>Mo</u>	ntgomery	County, M	laryland			PROJECT I	NUMBER	16943-0 M	D			
DATE ST	ARTE) _7/1	9/18		COMPL	ETED _	7/19/18		GROUND E	LEVATION	N	TE	ST PIT SIZI	=	
EXCAVA	TION C	ONTI	RACTO	OR The	Robert B.	Balter Co	ompany				WA' ELAPSED	TER LEVEL	S	WATER	WATER
EXCAVAT	TION N	/ETH	DD _C	Case 580N	N Backhoe				DATE	TIME	HOURS	DEPTH (ft)	HOLE DEPTH (ft)		ELEV (ft)
LOGGED	BY _J	l. Bail	еу		CHECK	ED BY _	K. Crist		7/19/18		0 ∑			NE	
NOTES _	Lat: 39	9.1074	19 Lor	ng: -77.13	753										
												I			
DEPTH (ft)	SAMPLE ITPE NUMBER	U.S.C.S.	GRAPHIC LOG						MATER	RIAL DESC	CRIPTION				
0.0]]] _F	N	/loist, Light	Brown,	Silty SAN	ID							
 		SM	F	1.8		. 5. 6	y 07 ii.								
			XXX	Т	rash										
			XX												
2.5															
			XXX	3.0											
			××××						Bottom	of test pit	at 3.0 feet				



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TEST PIT TP-305

	vvvvv.	.Daile	5100.0	OIII											
CLIENT _E	EA Enç	ginee	ring, I	nc.					PROJECT	NAME G	ude Landfill				
PROJECT	LOCA	TION	1 <u>Mo</u>	ntgomer	y County,	Marylan	d		PROJECT	NUMBER	16943-0 M	D			
DATE STAI	RTED	7/2	0/18		СОМІ	PLETED	7/20/18		GROUND E				ST PIT SIZI	=	
EXCAVATION											WA	TER LEVEL	_S		
EXCAVATION									DATE	TIME	ELAPSED HOURS	CASING DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
LOGGED B							K. Crist		7/20/18		0 ∑			NE	
NOTES La								<u> </u>							
1				,											
O DEPTH (ft)	NUMBER	U.S.C.S.	GRAPHIC LOG						MATE	RIAL DES	CRIPTION				
0.0 2.5		SM		3.3	Moist, Lig	ht Brown	i, Silty SA	ND	Botton	n of test pi	t at 4.0 feet				



The Robert B. Balter Company Geotechnical and Environmental Engineers Materials and Construction Inspection and Testing Telephone No. (410) 363-1555 www.balterco.com

TEST PIT TP-307

			0.00.0													
CLIENT	Γ EA E	nginee	ering, I	nc.					F	PROJECT	NAME G	ude Landfill				
PROJE	CT LOC	ATIO	N <u>Mo</u>	ntgome	ry Count	ty, Mary	land			PROJECT	NUMBER	16943-0 M	D			
DATE	STARTE	D 7/2	20/18		co	MPLETE	ED 7/2	0/18	(GROUND E	LEVATIO	N	TE	ST PIT SIZ	E	
EXCAV	ATION (CONT	RACT	OR Th	e Robert	t B. Balt	er Com	pany		1		WA	TER LEVEL	-S	WATER !	WATER
EXCAV	ATION I	ИЕТН	OD _C	ase 58	0N Back	hoe				DATE	TIME	ELAPSED HOURS	DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	ELEV (ft)
LOGGE	ED BY _	J. Bail	еу		CHI	ECKED	BY K.	Crist		7/20/18		0 ⊼			NE	
NOTES	Lat: 3	9.1066	68 Lor	ıg: - 77.1	13871											
0.0 (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC T LOG			_ight Bro	own, Silt	ty SAND		MATE	RIAL DES	CRIPTION				
2.5		SM	FFF	3.5												
				4.0	Trash											
			XXXX	4.0						Botton	of test pi	it at 4.0 feet				



TEST PIT TP-308
PAGE 1 OF 1

CLIEN	IT EA E	nginee	ering, I	nc.					PROJECT I	NAME Gu	ıde Landfill				
PROJ	ECT LOC	OITA	M _Mo	ntgome	ry Coun	ty, Maryl	and		PROJECT I	NUMBER	16943-0 M	D			
DATE	STARTE	D _7/2	20/18		_ co	MPLETE	D <u>7/20/</u>	18	GROUND E	LEVATION			ST PIT SIZI		
EXCA	VATION (CONTI	RACT	OR The	e Rober	t B. Balte	er Compa	any	·		WA ELAPSED	TER LEVEL	S HOLF	WATER	WATER
EXCA	VATION I	METH	OD _C	ase 580	N Back	thoe			DATE	TIME	HOURS	DEPTH (ft)	HOLE DEPTH (ft)		ELEV (ft)
LOGG	ED BY _	J. Bail	еу		CHI	ECKED I	BY <u>K. C</u>	rist	7/20/18		0 ∑			NE	
NOTE	S <u>Lat: 3</u>	9.106	13 Lor	ng: - 77.1	3903										
o DEPTH o (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG						MATER	RIAL DESC	CRIPTION			,	
0.0		SM		3.5	Moist, L	ight Bro	wn, Silty	SAND	Bottom	n of test pit	t at 1.8 feet				



The Robert B. Balter Company Geotechnical and Environmental Engineers Materials and Construction Inspection and Testing Telephone No. (410) 363-1555 www.balterco.com

TEST PIT TP-309

DATE STARTED 7/19/18 COMPLETED 7/19/18 GROUND ELEVATION TEST PIT SIZE EXCAVATION CONTRACTOR The Robert B. Balter Company EXCAVATION METHOD Case 580N Backhoe LOGGED BY J. Bailey CHECKED BY K. Crist NOTES Lat: 39.10789 Long: -77.13805 COMPLETED 7/19/18 GROUND ELEVATION TEST PIT SIZE WATER LEVELS WATER LEVELS TIME HOURS DEPTH (ft) DEP	VVVV	w.baile	5100.0	OIII											
DATE STARTED 7/19/18 COMPLETED 7/19/18 GROUND ELEVATION TEST PIT SIZE	CLIENT EA Er	nginee	ring, I	nc.					PROJECT	NAME G	ude Landfill				
DATE STARTED 7/19/18 COMPLETED 7/19/18 GROUND ELEVATION TEST PIT SIZE	PROJECT LOCA	ATION	I Mo	ntgomer	y County,	Maryland	d		PROJECT	NUMBER	16943-0 M	D			
EXCAVATION METHOD	DATE STARTED	D <u>7/</u> 1	9/18		COMF	LETED	7/19/18						ST PIT SIZE	=	
EXCAVATION METHOD Case 580N Backhoe LOGGED BY J. Bailey CHECKED BY K. Crist NOTES Lat: 39.10789 Long: -77.13805 MATERIAL DESCRIPTION MATERIAL DESCRIPT	EXCAVATION C	CONTR	RACTO	OR The	e Robert B	. Balter C	Company				WA	TER LEVEL	_S		
CHECKED BY S. Bailey CHECKED BY K. Crist N. C	EXCAVATION N	ИЕТНО	DD C	Case 580	N Backho	e	-		DATE	TIME	HOURS	CASING DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
NOTES _Lat: 39.10789 Long: -77.13805							K. Crist		7/19/18		0 ∑			NE	
MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION Moist, Light Brown, Silty SAND SM F 3.0 Trash Trash															
Moist, Light Brown, Silty SAND SM F 2.5 Trash Trash															
SM F Moist, Light Brown, Silty SAND F SM F F SM F F SM F SM F SM F SM F SM SM	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG						MATEI	RIAL DES	CRIPTION				
		SM		3.0		ht Brown	, Silty SAN	ND	Botton	n of test pi	t at 3.8 feet				

The Robert B. Balter Company Geotechnical and Environmental Engineers Materials and Construction Inspection and Testing Telephone No. (410) 363-1555 www.balterco.com CLIENT EA Engineering, Inc. PROJECT LOCATION Montgomery County, Maryland DATE STARTED 7/19/18 COMPLETED 7/19/18

GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9/5/18

TEST PIT TP-310

CLIEN	<u> </u>	nginee	ering, I	lnc.					P	PROJECT I	NAME G	ude Landfill				
	ECT LOC											16943-0 M				
DATE	STARTE	D _7/1	9/18		_ col	MPLETE	D _7/19	9/18		ROUND E	LEVATIO	N	TE	ST PIT SIZI	=	
EXCA\	VATION (CONTI	RACTO	OR The	e Robert	B. Balte	er Comp	oany				WA	TER LEVEL	-S	14/4TED	14/4 T ED
EXCA\	VATION I	METH	OD _C	Case 580)N Back	hoe				DATE	TIME	ELAPSED HOURS	DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
LOGG	ED BY _	J. Bail	ey		CHE	ECKED I	BY K.	Crist		7/19/18		0 ∑			NE	
NOTES	S <u>Lat: 3</u>	9.1076	34 Lon	ng: -77.1	3807											
O DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG							MATER	RIAL DES	CRIPTION				
		SM	F		Moist, L	ight Bro.	wn, Silt	y SAND								
				1.0	Trash											
2.5																
_				4.1												
										Botton	of test pi	t at 4.1 feet				



TEST PIT TP-311 PAGE 1 OF 1

	WW															
	NT EAE											ude Landfill				
	JECT LOC											16943-0 M				
	STARTE					/IPLETE			GRO	DUND E	LEVATION			ST PIT SIZ	E	
	AVATION						er Comp	oany		ATE	TIME	ELAPSED HOURS	TER LEVEL CASING	LS HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER
	AVATION										IIIVIE		DEPTH (ft)	DEPTH (ft)		ELEV (ft)
	GED BY _					CKED E	BY <u>K.</u>	Crist	"	19/18		0 ∑			NE	
NOTI	ES <u>Lat: 3</u>	9.108	14 Lon	ıg: - 77.	13841											
O DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG							MATER	RIAL DESC	CRIPTION				
2.5	-	SM	FFF	1.6	Moist, L	ight Brov	wn, Silt	y SAND								
				3.0						Bottom	of test pit	t at 3.0 feet				
GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9/5/18																



TEST PIT TP-312 PAGE 1 OF 1

	^ F							-	O IEOT I	NAME O					
CLIENT E											ude Landfill				
PROJECT							0/40				16943-0 M		OT DIT OF		
DATE STA								GF	KOUND E	LEVATIO	N		ST PIT SIZI	=	
EXCAVATI						er Comp	oany	— _[DATE	TIME	ELAPSED	TER LEVEL	HOLE	WATER	WATER
EXCAVATI									7/19/18	111112	HOURS 0 ∑	DEPTH (ft)	DEPTH (ft)	DEPTH (ft) NE	ELEV (ft)
LOGGED E					ECKED E	BY <u>K.</u>	Crist	'	/13/10		0 -			INL	
NOTES L	at: 39.108	07 Lon	ıg: - 77.	13892											
O DEPTH O (ft)	NUMBER U.S.C.S.	GRAPHIC LOG		Moist, L	ight Bro	wn, Silt <u>y</u>	y SAND		MATE	RIAL DESC	CRIPTION				
2.5	SM	FFFFF	3.5	Trash	igni bio	wii, Siit	y SAND		Botton	n of test pit	t at 4.0 feet				
GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9/5/18															



TEST PIT TP-314 PAGE 1 OF 1

-		****	w.ban	erco.c	OIII											
CI	LIEN	T EAE	ngine	ering, I	Inc.					PROJECT	NAME _	Gude Landfill				
PI	ROJI	ECT LOC	ATIO	N <u>Mo</u>	ntgome	ery County	y, Maryla	and		PROJECT	NUMBER	16943-0 M	D			
D	ATE	STARTE	D _7/	19/18		CON	/IPLETE	D <u>7/19/</u>	/18	GROUND I	ELEVATIO	ON			≣	
E	XCA	VATION	CONT	RACT	OR T	ne Robert	B. Balte	r Compa	any		T	WA ELAPSED	TER LEVEI CASING	LS HOLE	WATER	WATER
E	XCA	VATION	METH	OD _C	Case 58	30N Backh	noe			DATE	TIME	HOURS	DEPTH (ft)	DEPTH (ft)	DEPTH (ft)	
LC	ogg	ED BY _	J. Bail	ley		CHE	CKED B	Y K. C	rist	7/19/18		0 ∑			NE	
N	OTE	S <u>Lat: N</u>	I/A Lo	ng: N/	A											
NO DEPTH			I/A Lo	GRAPHIC GRAPHIC STATE TO STATE		Moist, Li				MATE		SCRIPTION Dit at 4.5 feet				
SENERAL BH / TP / WELL 169																



TEST PIT TP-315 PAGE 1 OF 1

NT EAE	ngine	ering, I	nc.								PROJECT	NAM	IE Gu	ude Landfill				
ECT LOC	ATIO	N Mo	ntgor	nery	Count	y, Ma	ryland	d			PROJECT	NUN	IBER .	16943-0 N	1D			
STARTE	D _7/	19/18			COI	MPLE	TED	7/19)/18		GROUND	ELEV	/ATIOI	N	TE	ST PIT SIZ	E	
VATION	CONT	RACT	OR _	The F	Robert	B. Ba	alter C	Comp	any		DATE	Τ.		WA ELAPSED	TER LEVE CASING	HOLE	WATER	WATER
												<u>'</u>	IME	l l	DEPTH (ft)	DEPTH (ft)	DEPTH (ft)	ELEV (ft)
						ECKE	D BY	<u>K. C</u>	Crist		7/19/18			0 \$			NE	
S <u>Lat: 3</u>	9.107	42 Lon	ıg: -7	7.139)													
SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG									MATE	ERIAL	DESC	CRIPTION				
	SM	F	1.3			ight E	Brown	, Silty	y SANI	D								
			2.2	11	asn													
		XXXX	3.3								Botto	m of	test pit	t at 3.3 feet	<u> </u>			
	STARTE VATION (VATION I GED BY _ S _Lat: 3	STARTED 7/2 NATION CONT NATION METH SED BY J. Bail S Lat: 39.107	STARTED 7/19/18 NATION CONTRACTO NATION METHOD CO SED BY J. Bailey S. Lat: 39.10742 Lor OBEN S. C. S.	STARTED 7/19/18 NATION CONTRACTOR _ NATION METHOD Case 9 SED BY J. Bailey S Lat: 39.10742 Long: -7 SOUND DO NOT BE SED BY SOUND	STARTED 7/19/18 NATION CONTRACTOR The F NATION METHOD Case 580N GED BY J. Bailey SS Lat: 39.10742 Long: -77.139 WAYN SM F F 1.3	STARTED 7/19/18 COINTACTOR The Robert AVATION METHOD Case 580N Back GED BY J. Bailey CHIES Lat: 39.10742 Long: -77.139 BYOTHER ROBERT CHIES SEED BY J. Bailey CHIES S. Lat: 39.10742 Long: -77.139 BYOTHER ROBERT CHIES SEED BY J. Bailey CHIES S. Lat: 39.10742 Long: -77.139 BYOTHER ROBERT CHIES SEED BY J. Bailey CHIES S. Lat: 39.10742 Long: -77.139 BYOTHER ROBERT CHIES SEED BY J. Bailey CHIES SEED BY J. Bailey CHIES SEED BY J. Bailey CHIES S. Lat: 39.10742 Long: -77.139 BYOTHER ROBERT CHIES SEED BY J. BAILEY CHIES SEED BY J. BA	STARTED 7/19/18 COMPLE IVATION CONTRACTOR The Robert B. Ba IVATION METHOD Case 580N Backhoe GED BY J. Bailey CHECKE IS Lat: 39.10742 Long: -77.139 SM F Moist, Light E F1.3 Trash	STARTED 7/19/18 COMPLETED AVATION CONTRACTOR The Robert B. Balter Control Method Case 580N Backhoe GED BY J. Bailey CHECKED BY S. Lat: 39.10742 Long: -77.139 BY A STARTED 7/19/18 COMPLETED AVATION METHOD Case 580N Backhoe GED BY J. Bailey CHECKED BY G.	STARTED 7/19/18 COMPLETED 7/19 EVATION CONTRACTOR The Robert B. Balter Completed Available Sed By J. Bailey CHECKED BY K. G. S. Lat: 39.10742 Long: -77.139 EXAMPLE 1.3 Moist, Light Brown, Silty Fals. SM SM STARTED 7/19/18 COMPLETED 7/19 WATION CONTRACTOR The Robert B. Balter Complete Sed By J. Bailey CHECKED BY K. G. S. Lat: 39.10742 Long: -77.139 Moist, Light Brown, Silty Fals. Trash	STARTED 7/19/18 COMPLETED 7/19/18 IVATION CONTRACTOR The Robert B. Balter Company IVATION METHOD Case 580N Backhoe GED BY J. Bailey CHECKED BY K. Crist IS Lat: 39.10742 Long: -77.139 Moist, Light Brown, Silty SAN SM F F Trash	ECT LOCATION Montgomery County, Maryland E STARTED 7/19/18 COMPLETED 7/19/18 AVATION CONTRACTOR The Robert B. Balter Company AVATION METHOD Case 580N Backhoe SED BY J. Bailey CHECKED BY K. Crist ES Lat: 39.10742 Long: -77.139 Moist, Light Brown, Silty SAND SM F 1.3 Trash	STARTED 7/19/18 COMPLETED 7/19/18 GROUND WATION CONTRACTOR The Robert B. Balter Company WATION METHOD Case 580N Backhoe SED BY J. Bailey CHECKED BY K. Crist SS Lat: 39.10742 Long: -77.139 MATE MOIST, Light Brown, Silty SAND SM F 1.3 Trash	STARTED 7/19/18 COMPLETED 7/19/18 GROUND ELEXANTION CONTRACTOR The Robert B. Balter Company NATION METHOD Case 580N Backhoe SED BY J. Bailey CHECKED BY K. Crist S Lat: 39.10742 Long: -77.139 MATERIAL MATERIAL MOIST, Light Brown, Silty SAND SM FF1.3 Trash	ECT LOCATION Montgomery County, Maryland STARTED 7/19/18 COMPLETED 7/19/18 GROUND ELEVATION WATION CONTRACTOR The Robert B. Balter Company WATION METHOD Case 580N Backhoe SED BY J. Bailey CHECKED BY K. Crist S Lat: 39.10742 Long: -77.139 MATERIAL DESI MATERIAL DESI MOist, Light Brown, Silty SAND SM F1.3 Trash	STARTED 7/19/18 COMPLETED 7/19/18 GROUND ELEVATION WATION CONTRACTOR The Robert B. Balter Company WATION METHOD Case 580N Backhoe SED BY J. Bailey CHECKED BY K. Crist S. Lat: 39.10742 Long: -77.139 MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION SM F F 1.3 Trash	STARTED 7/19/18 COMPLETED 7/19/18 GROUND ELEVATION	STARTED 7/19/18 COMPLETED 7/19/18 GROUND ELEVATION TEST PIT SIZE INTERPRETATION CONTRACTOR The Robert B. Balter Company INTERPRETATION METHOD Case 580N Backhoe SED BY J. Bailey CHECKED BY K. Crist S. Lat: 39.10742 Long: -77.139 MATERIAL DESCRIPTION MATERIAL DESCRIPTION TEST PIT SIZE INTERPRETATION TEST	RECT LOCATION Montgomery County, Maryland STARTED 7/19/18 COMPLETED 7/19/18 NATION CONTRACTOR The Robert B. Balter Company NATION METHOD Case 580N Backhoe SED BY J. Bailey CHECKED BY K. Crist S. Lat: 39.10742 Long: -77.139 MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION MATERIAL DESCRIPTION TEST PIT SIZE WATER LEVELS DATE TIME HOURS DEPTH (tt) D



TEST PIT TP-317

CLIENT EAE								PR	ROJECT I	NAME G	ude Landfill				
PROJECT LOC	ATION	I _Мо	ntgomei	ry County	, Maryla	and		PR	ROJECT I	NUMBER	16943-0 M	D			
DATE STARTE	D 7/2	0/18		COM	IPLETE	D 7/20/	18	GR	ROUND E	LEVATIO	N	TE	ST PIT SIZ	=	
EXCAVATION	CONTR	RACTO	OR The	e Robert I	B. Balte	r Compa	any		-		WA	TER LEVEL	-S	WATER	WATER
EXCAVATION	METHO	DD _C	ase 580	N Backh	oe				DATE	TIME	ELAPSED HOURS	DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	ELEV (ft)
LOGGED BY _	J. Baile	э у		CHE	CKED B	Y K. C	rist	7	7/20/18		0 ⊼			NE	
NOTES Lat: 3															
LOGGED BY _	J. Baile 9.1084	A GRAPHIC LOG	<u>ıg: -77.1</u>	CHE	CKED B				MATER	RIAL DES	HOURS		DEPTH (ft)		ELEV (ft)



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TEST PIT TP-318

CLIENT												ude Landfill				
PROJEC	T LOC	ATIO	M _Mo	ntgomer	ry County	, Maryla	and		P	ROJECT	NUMBER	16943-0 M	D			
DATE ST	TARTE	D _7/2	20/18		_ CON	IPLETE	D _7/20)/18	0	ROUND E	LEVATIO	N		ST PIT SIZ	≣	
EXCAVA	ATION C	CONT	RACT	OR The	e Robert	B. Balte	r Comp	any	— г	П		WA ELAPSED	TER LEVEL	S	WATER	WATER
EXCAVA	ATION N	/ETH	OD _C	Case 580	N Backh	ioe				DATE	TIME	HOURS	DEPTH (ft)	HOLE DEPTH (ft)		ELEV (ft)
LOGGED	D BY _	J. Bail	ey		CHE	CKED E	3Y K. (Crist		7/20/18		0 ⊻			NE	
NOTES	Lat: 39	9.1090	04 Lor	ng: - 77.1	4062											
0.0 DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG		Moist, Li	aht Brov	wn. Silt	v SAND		MATER	RIAL DES	CRIPTION				
2.5		SM	FFF	2.5	Trash	ght Brov	wn, Silt <u>y</u>	y SAND								
			\ggg	3.8												
										Bottom	of test pi	it at 3.8 feet				



TEST PIT TP-319

	WW	···.bait	C100.0	OIII											
CLIEN	T EA E	ngine	ering, I	nc.					PROJECT I	NAME G	ude Landfill				
PROJE	CT LOC	ATIO	M _Mo	ntgomer	y County	, Marylan	nd		PROJECT I	NUMBER	16943-0 M	D			
DATE S	STARTE	D _7/2	20/18		СОМ	PLETED	7/20/18	3	GROUND E	LEVATIO	N	TE	ST PIT SIZI	=	
EXCAV	ATION (CONT	RACT	OR The	Robert I	B. Balter	Compan	У			WA	TER LEVEL	.S		
EXCAV	ATION I	METH	OD C	ase 580	N Backh	oe			DATE	TIME	ELAPSED HOURS	CASING DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
						CKED BY	′ K. Cris	st	7/20/18		0 ∑			NE	
	Lat: 3														
O DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG						MATER	RIAL DES	CRIPTION				
		SM	FF	1.5	Moist, Lig	ght Brown	n, Silty S	AND							
2.5			\bowtie	2.5					D						
									DOLLOIT	i oi test pi	t at 2.5 feet				



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TEST PIT TP-320 PAGE 1 OF 1

www	/.balterco.	com									
CLIENT EA En	gineering,	Inc.			PROJECT N	IAME Gu	de Landfill				
PROJECT LOCA	ATION M	ontgomery C	ounty, Maryland	db	PROJECT N	NUMBER _	16943-0 M	D			
DATE STARTED	7/20/18		COMPLETED	7/20/18	GROUND E	LEVATION	I	TE	ST PIT SIZI	≣	
EXCAVATION C	ONTRACT	TOR The Ro	obert B. Balter (Company			WA'	TER LEVEL CASING	LS HOLE	WATER	WATER
EXCAVATION M	ETHOD _	Case 580N E	Backhoe		DATE	TIME	HOURS	DEPTH (ft)	DEPTH (ft)	DEPTH (ft)	ELEV (ft)
LOGGED BY _J	. Bailey		CHECKED BY	K. Crist	7/20/18		0 ∑			NE	
NOTES Lat: 39	.10809 Lo	ng: -77.1408	3								
O DEPTH O (ft) SAMPLE TYPE NUMBER	U.S.C.S. GRAPHIC LOG				MATER	RIAL DESC	CRIPTION			,	
	SM	F 3.9 Tra	ist, Light Brown	, Silty SAND	Bottom	of test pit	at 4.8 feet				



TEST PIT TP-321 PAGE 1 OF 1

	CLIEN	T EAE	ngine	ering, I	lnc.							_ PROJEC	T N	AME Gu	ude Landfil	1			
	PROJI	ECT LOC	ATIO	N <u>Mo</u>	ntgom								T N	UMBER	16943-0 N	ИD			_
	DATE	STARTE	D _7/2	20/18			COME	PLETE	D _7/	20/18		GROUNI) EL	EVATIO	N	TE	ST PIT SIZ	E	
	EXCA'	VATION	CONT	RACT	OR _T	he Ro	bert E	. Balte	er Con	npany	1		1	T11.4F	W/ ELAPSED	ATER LEVE CASING	HOLE	WATER	WATER
- 1		VATION										- DATE	+	TIME	HOURS	DEPTH (ft)	DEPTH (ft)	DEPTH (ft)	ELEV (ft)
- 1		ED BY					CHEC	KED	BY K	(. Crist	t	7/20/18	·		0 ⊼			NE	
L	NOTE	S <u>Lat: 3</u>	9.107	99 Lor	ng: -77	'.14						_							
	DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG								MAT	ER	IAL DES	CRIPTION				
ŀ	0.0			F		Мо	ist, Lig	ht Bro	wn, S	ilty SA	AND								
-	2.5		SM	F	1.5	Tra			,										
L					3.2														
				XXXX	3.2							Bott	om	of test pit	t at 3.2 fee	t			
GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9/5/18																			
GENERAL BH / TP / WE																			



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TEST PIT TP-322

CLIEN	IT EA E	nginee	ering, I	Inc.						_ PROJE	ECT N	IAME Gu	ude Landfill				
PROJ	ECT LOC	ATIO	N _Mo	ntgome	ery Cou	nty, Ma	ryland	d		_ PROJE	ECT N	IUMBER _	16943-0 M	D			
DATE	STARTE	D _7/2	20/18		C	OMPLE	TED	7/20/1	18	GROU	ND E	LEVATION	N	TE	ST PIT SIZI	≣	
EXCA	VATION (CONT	RACT	OR Th	ne Robe	ert B. Ba	alter C	Compa	ny				WA ELAPSED	TER LEVEL	S	WATER	WATER
EXCA	VATION I	METH	OD _C	Case 58	ON Bac	khoe				DAT	-	TIME	HOURS	DEPTH (ft)	HOLE DEPTH (ft)		ELEV (ft)
LOGG	ED BY _	J. Bail	еу		CI	HECKE	D BY	K. Cr	rist	_ 7/20/	/18		0 ∑			NE	
NOTE	S <u>Lat: 3</u>	9.1076	62 Lor	ng: - 77.	14041					_							
_	YPE	(Ó	೦										1	1		ı	
DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG							M	ATEF	RIAL DESC	CRIPTION				
0.0			F		Moist,	Light E	Brown,	, Silty S	SAND								
			i i i F														
		SM	F														
			F	2.3													
2.5				3.0	Trash												
			(XXXX	0.0						В	ottom	of test pit	t at 3.0 feet				

GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9/5/18

TEST PIT TP-323

www.baiterco.com							
CLIENT EA Engineering, Inc.	_ PROJECT N	NAME G	ude Landfill				
PROJECT LOCATION Montgomery County, Maryland	PROJECT	NUMBER	16943-0 M	D			
DATE STARTED 7/19/18 COMPLETED 7/19/18	GROUND E				ST PIT SIZI	=	
EXCAVATION CONTRACTOR _ The Robert B. Balter Company	_		WA ⁻	TER LEVEL	_S		
EXCAVATION METHOD Case 580N Backhoe	DATE	TIME	ELAPSED HOURS	CASING DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
LOGGED BY J. Bailey CHECKED BY K. Crist	7/19/18		0 ∑			NE	
NOTES Lat: 39.10753 Long: -77.1384	-						
	-						
SAMPLE TYPE NUMBER NUMBER U.S.C.S. GRAPHIC LOG	MATER	RIAL DES	CRIPTION				
SM F SAND SM F F F F F F F F F F F F F F F F F F F							
Trash							
5.0							
XXXXJ.Z	Bottom	of test pi	t at 5.2 feet				



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TEST PIT TP-324

WW	w.bait	erco.c	OIII											
CLIENT EAE	nginee	ering, I	Inc.				PR0	OJECT N	IAME G	ude Landfill				
PROJECT LOC	ATIO	M _Mo	ntgomer	y County, M	aryland		PR0	OJECT N	IUMBER	16943-0 M	D			
DATE STARTE	D _7/2	20/18		COMPL	ETED _7/	20/18			LEVATIO			ST PIT SIZE	=	
EXCAVATION (WA	TER LEVEL	_S		
EXCAVATION I	METH	OD C	Case 580	N Backhoe				DATE	TIME	ELAPSED HOURS	CASING DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
LOGGED BY	J. Bail	ey		CHECK	ED BY K	. Crist	7/	20/18		0 ∑			NE	
NOTES Lat: 3														
SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG						MATER	RIAL DES	CRIPTION				
2.5	SM	F	2.2	Moist, Light	Brown, S	ilty SAND								
			3.8											
								Bottom	of test pi	t at 4.0 feet				



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TEST PIT TP-325

VVVV	w.bait	- 100.0	OIII										
CLIENT EAE	nginee	ering, I	lnc.				PROJECT N	NAME G	ude Landfill				
PROJECT LOC	OITA	M _ Mo	ntgomer	y County, M	laryland		PROJECT	NUMBER	16943-0 M	D			
DATE STARTE					ETED 7/2	20/18	GROUND E				ST PIT SIZE	=	
EXCAVATION							_		WA ⁻	TER LEVEL	.S		
EXCAVATION							DATE	TIME	ELAPSED HOURS	CASING DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
LOGGED BY						. Crist	7/20/18		0 ∑			NE	
NOTES Lat: 3							-						
1				-			-						
O DEPTH O (ft) SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG					MATEF	RIAL DES	CRIPTION				
2.5	SM	FFF	2.5	Moist, Light	Brown, Si	Ity SAND							
_		XXX	4.0										
							Bottom	of test pi	t at 4.0 feet				



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TEST PIT TP-326

VVV	w.bait	erco.c	OIII										
CLIENT EAE	nginee	ering, I	nc.				PROJECT	NAME G	ude Landfill				
PROJECT LOC	ATIO	M _Mo	ntgomery	/ County, Ma	ryland		PROJECT	NUMBER	16943-0 M	D			
DATE STARTE	D 7/2	20/18		COMPLE	TED 7/20	/18	_ GROUND E				ST PIT SIZI	E	
EXCAVATION	CONT	RACT	OR The	Robert B. Ba	alter Comp	any			WA	TER LEVEL	_S		
EXCAVATION	METH	OD C	ase 580	N Backhoe			DATE	TIME	ELAPSED HOURS	CASING DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
LOGGED BY					DBY K.C	Crist	7/20/18		0 ∑			NE	
NOTES Lat: 3							_						
							_						
O DEPTH O (ft) SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG					MATE	RIAL DES	CRIPTION				
2.5	SM		3.0	Moist, Light Ε	Brown, Silty	SAND							
							Botton	i oi test pi	t at 4.5 feet				



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TEST PIT TP-327

	w.bait	erco.c	OIII										
CLIENT EAE	nginee	ering, I	nc.				 PROJECT N	NAME G	ude Landfill				
PROJECT LOC	OITA	M _Mo	ntgomer	y County, I	Maryland		 PROJECT N	NUMBER	16943-0 M	D			
DATE STARTE					LETED _		GROUND E				ST PIT SIZI	E	
EXCAVATION									WA	TER LEVEL	_S		
EXCAVATION	METH	OD C	ase 580	N Backhoe	Э		DATE	TIME	ELAPSED HOURS	CASING DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
LOGGED BY						K. Crist	 7/20/18		0 ∑			NE	
NOTES Lat: 3					-								
SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG					MATEF	RIAL DES	CRIPTION				
0.0	SM		3.3	Moist, Ligh	nt Brown,	Silty SANE	Bottom	ı of test pi	t at 4.2 feet				



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TEST PIT TP-329

CLIEN	 IT <u>EA E</u>	nginee	ering, I	nc.						PROJE	CT N	AME Gu	ude Landfill				
	ECT LOC												16943-0 M				
	STARTE								3	GROUN	ID EL	EVATIO	N	TE	ST PIT SIZI	=	
EXCA	VATION (CONT	RACT	OR Th	e Robe	rt B. Ba	lter Co	ompany	У				WA	TER LEVEL	-S	14/4TED	WATER
EXCA	VATION I	ИЕТН	OD _C	ase 58	0N Bac	khoe				DATE	_	TIME	ELAPSED HOURS	DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
LOGG	ED BY _	J. Bail	ey		CF	HECKE	BY _	K. Cris	st .	7/20/1	8		0 ⊼			NE	
NOTE	S _Lat: 3	9.107	52 Lor	ng: -77.	14253												
					-												
DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG							MA	TER	AL DES	CRIPTION				
0.0		SM		2.3	Moist,	Light B	rown,	Silty SA	AND								
			(XXXX	5.0	-					Во	ttom	of test pit	t at 3.0 feet				

The Robert B. Balter Company Geotechnical and Environmental Engineers Materials and Construction Inspection and Testing Telephone No. (410) 363-1555 www.balterco.com CLIENT EA Engineering, Inc. PROJECT LOCATION Montgomery County, Maryland

GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9/5/18

TEST PIT TP-330

CLIENT EAE										ude Landfill				
PROJECT LOC										16943-0 M				
DATE STARTE	D _7/2	20/18		COMPLE	TED _7/	20/18	G	ROUND E	LEVATIO			ST PIT SIZ	≣	
EXCAVATION	CONT	RACT	OR The F	Robert B. B	alter Con	npany	— г			WA' ELAPSED	TER LEVEL CASING	_S HOLE	WATER	WATER
EXCAVATION	METH	OD _C	Case 580N	Backhoe				DATE	TIME	ELAPSED HOURS	DEPTH (ft)	HOLE DEPTH (ft)		ELEV (ft)
LOGGED BY _	J. Bail	ey		CHECKE	D BY K	. Crist		7/20/18		0 ⊼			NE	
NOTES Lat: 3	9.1072	28 Lor	ng: -77.143	366										
O DEPTH O (ff) SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG					·	MATEF	RIAL DES	CRIPTION				
2.5 5.0	SM		6.0	oist, Light E	Brown, S	ilty SAND								
				rash										
7								Bottom	of test pi	t at 7.0 feet				



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TEST PIT TP-331

VVVV	w.bait	C100.0	OIII											
CLIENT EAE	ngine	ering, I	nc.				P	ROJECT N	IAME G	ude Landfill				
PROJECT LOC	ATIO	N <u>Mo</u>	ntgome	ry County, N	/laryland		Р	ROJECT N	IUMBER	16943-0 M	D			
DATE STARTE					ETED 7	//20/18		ROUND E				ST PIT SIZI	=	
EXCAVATION										WA	TER LEVEL	_S		
EXCAVATION	METH	OD C	ase 580	N Backhoe				DATE	TIME	ELAPSED HOURS	CASING DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
LOGGED BY						K. Crist		7/20/18		0 ∑			NE	
NOTES Lat: 3					_									
1														
O DEPTH O (ft) SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG						MATEF	RIAL DES	CRIPTION				
2.5	SM	FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF	3.5	Moist, Ligh	t Brown, \$	Silty SAND								
			4.2					Bottom	of test pi	t at 4.2 feet				



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Geotechnical and Environmental Engineers
Materials and Construction Inspection and Testing
Telephone No. (410) 363-1555

TEST PIT TP-332

ww	w.balt	erco.c	om											
CLIENT EAE	ngine	ering,	Inc.					PROJECT I	NAME Gu	ide Landfill				
PROJECT LOC	ATIO	N _Mo	ntgomer	y County, N	/laryland			PROJECT I	NUMBER _	16943-0 M	D			
DATE STARTE	D 7/2	20/18		COMPL	ETED 7	7/20/18		GROUND E	LEVATION	١	TE	ST PIT SIZE	=	
EXCAVATION	CONT	RACT	OR The	Robert B.	Balter Co	ompany	г			WA	TER LEVEL	_S	\4/4TED	14/4750
EXCAVATION	METH	OD _C	Case 580	N Backhoe				DATE	TIME	ELAPSED HOURS	DEPTH (ft)	HOLE DEPTH (ft)	WATER DEPTH (ft)	WATER ELEV (ft)
LOGGED BY	J. Bail	ey		_ CHECK	ED BY	K. Crist		7/20/18		0 ∑			NE	
NOTES Lat: 3	9.107	11 Lor	ng: -77.14	123										
O DEPTH O (ft) SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG						MATER	RIAL DESC	CRIPTION				
		F		Moist, Ligh	t Brown,	Silty SAND)							
2.5	SM	F	3.5	Trash				Pottom	of toot nit	at 4 E fact				
								Bottom	of test pit	at 4.5 feet				



TEST PIT TP-333 PAGE 1 OF 1

www.baiterco.com							
CLIENT EA Engineering, Inc.							
PROJECT LOCATION Montgomery County, Maryland	PROJECT						
DATE STARTED _7/20/18 COMPLETED _7/20/18	GROUND E	LEVATIO			ST PIT SIZI	E	
EXCAVATION CONTRACTOR The Robert B. Balter Company	DATE	TIME	ELAPSED HOURS	TER LEVEI CASING	LS HOLE DEPTH (ft)	WATER	WATER
EXCAVATION METHOD Case 580N Backhoe	7/20/18	IIIVIE	HOURS 0 ∑	DEPTH (ft)	DEPTH (ft)		ELEV (ft)
LOGGED BY J. Bailey CHECKED BY K. Crist	_ //20/16		0 ~			NE	
NOTES Lat: 39.10778 Long: -77.1409	_						
NOTES Lat: 39.10778 Long: -77.1409 H_GHORM BY OLD SHEAR BY K. Chist Reversion of the control of	MATER		t at 3.3 feet				
:RAL BH / TP / WELL 16943-0 GU							

The Robert B. Balter Company Geotechnical and Environmental Engineers Materials and Construction Inspection and Testing Telephone No. (410) 363-1555 www.balterco.com CLIENT EA Engineering, Inc. PROJECT LOCATION Montgomery County, Maryland

GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9/5/18

TEST PIT TP-334

CLIEN	—— IT <u>EA E</u>	nginee	ering, I	lnc.					PROJECT	NAME G	ude Landfill				
PROJ	ECT LOC	ATION	M _Mo	ntgomery	/ County, M	1aryland			PROJECT	NUMBER	16943-0 M	D			
DATE	STARTE	D _7/1	19/18		COMPL	ETED _	7/19/18		GROUND E	LEVATIO	N	TE	ST PIT SIZI	=	
EXCA	VATION (CONTI	RACT	OR The	Robert B.	Balter Co	ompany			I	WA	TER LEVEL	S	WATER	WATER
EXCA	VATION I	METH	OD _C	Case 580I	N Backhoe				DATE	TIME	ELAPSED HOURS	DEPTH (ft)	HOLE DEPTH (ft)		ELEV (ft)
LOGG	ED BY _	J. Bail	ey		_ CHECK	ED BY	K. Crist		7/19/18		0 ⊼			NE	
NOTE	S <u>Lat: 3</u>	9.1084	49 Lor	ng: -77.13	3795										
O DEPTH O O (ft)	SAMPLE TYPE SAMPLE TYPE NUMBER		GRAPHIC GRAPHI		Moist, Light	t Brown,	Silty SAN	ND	MATE	RIAL DES	CRIPTION				
2.5		SM		5.5	Γrash										
				1	ridori										
			* * * *	,. <u>.</u>					Botton	n of test pi	t at 6.0 feet				



TEST PIT TP-335 PAGE 1 OF 1

CLIE	—— NT <u>eae</u>	ngine	ering, I	nc.						PROJECT	NAME G	ude Landfill				
	JECT LOC											16943-0 M				
	STARTE								3			N		ST PIT SIZ	E	
EXC	AVATION	CONT	RACT	OR _T	he Rob	ert B. Ba	alter Co	ompan	У		I	WA ELAPSED	TER LEVE	LS	WATER	WATER
EXC	AVATION	METH	OD _C	case 5	80N Ba	ckhoe				DATE	TIME	ELAPSED HOURS	DEPTH (ft)	HOLE DEPTH (ft)		ELEV (ft)
LOG	GED BY _	J. Bail	ley		с	HECKE	D BY _	K. Cris	st	7/20/18		0 ⊼			NE	
NOTE	ES <u>Lat: 3</u>	9.106	95 Lor	ng: - 77	.13868					_						
O DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG							МАТЕ	RIAL DES	SCRIPTION				
2.5		SM		3.0	Moist	, Light E	Brown,	Silty S	AND	Botto	m of test p	it at 3.0 feet				
GENERAL BH / TP / WELL 16943-0 GUDE LANDFILL.GPJ ROBERT B BALTER.GDT 9/5/18																

APPENDIX B LABORATORY TEST RESULTS



TP-273

0.0' - 2.0'

BULK

30

6

25

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SUMMARY OF LABORATORY RESULTS

PAGE 1 OF 1

CLIENT EA Engineering, Inc.

PROJECT NAME Gude Landfill

SM

24.3

A-4

121.7

12.0

PROJECT LOCATION Montgomery County, Maryland PROJECT NUMBER 16943-0 MD DATE TESTED 7/31/2018												
Borehole	Depth	Sample Number	Liquid Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	AASHTO Classification	ASTM Classification	Water Content (%)	Max Dry Density (pcf)	Optimum Moisture (%)	CBR Value
TP-208	0.0' - 2.0'	BULK	36	10	37.5	48	A-4	SM	27.6	118.7	13.3	
TP-215	0.0' - 2.0'	BULK	36	11	25	62	A-6	ML	29.8	115.0	14.4	
TP-228	0.0' - 2.0'	BULK	40	13	12.5	71	A-6	ML	26.3	112.9	15.5	
TP-231	0.0' - 2.0'	BULK	34	10	19	62	A-4	ML	28.9	118.2	13.6	
TP-241	0.0' - 2.0'	BULK	38	7	12.5	52	A-4	ML	29.7	121.7	9.0	
TP-253	0.0' - 2.0'	BULK	35	6	37.5	41	A-4	SM	24.1	119.4	12.4	
TP-258	0.0' - 2.0'	BULK	37	11	37.5	60	A-6	ML	26.0	115.8	13.8	
TP-259	0.0' - 2.0'	BULK	49	12	37.5	54	A-7-5	ML	31.0	108.4	17.8	
TP-263	0.0' - 2.0'	BULK	36	6	25	41	A-4	SM	31.0	117.6	10.5	

49

LAB SUMMARY MODIFIED ASTM AASHTO 16943-0 GUDE LANDFILL.GPJ MTA REDLINE.GDT 8/6/18

GRAIN SIZE DISTRIBUTION

TEST METHOD ASTM D422

CLIENT EA Engineering, Inc. PROJECT NAME Gude Landfill PROJECT LOCATION Montgomery County, Maryland PROJECT NUMBER 16943-0 MD **DATE TESTED** 7/31/2018 U.S. SIEVE OPENING IN INCHES 6 4 3 2 1.5 1 3/4 1/23/8 U.S. SIEVE NUMBERS | 810 14 16 20 30 40 50 60 100 140 200 HYDROMETER 100 95 90 85 80 75 70 65 PERCENT FINER BY WEIGHT 60 55 50 45 40 35 30 25 20 15 COPY OF GRAIN SIZE ASTM AND AASHTO 16943-0 GUDE LANDFILL.GPJ MTA REDLINE.GDT 8/6/18 10 5 100 10 0.1 0.01 0.001 **GRAIN SIZE IN MILLIMETERS GRAVEL** SAND **COBBLES** SILT OR CLAY coarse fine medium fine coarse Specimen Identification Classification LL PL Ы Cc Cu **TP-208, BULK** Darek Yellowish Brown SILTY SAND(SM) {A-4, GI=2} 36 26 10 Specimen Identification D100 D60 D30 D10 %Gravel %Sand %Silt %Clay ● TP-208, BULK 37.5 0.16 10.6 41.5 47.8

GRAIN SIZE DISTRIBUTION

TEST METHOD ASTM D422

CLIENT EA Engineering, Inc. PROJECT NAME Gude Landfill PROJECT NUMBER 16943-0 MD PROJECT LOCATION Montgomery County, Maryland **DATE TESTED** 7/31/2018 U.S. SIEVE OPENING IN INCHES

6 4 3 2 1.5 1 3/4 1/23/8 U.S. SIEVE NUMBERS | 810 14 16 20 30 40 50 60 100 140 200 HYDROMETER 100 95 90 85 80 75 70 65 PERCENT FINER BY WEIGHT 60 55 50 45 40 35 30 25 20 15 COPY OF GRAIN SIZE ASTM AND AASHTO 16943-0 GUDE LANDFILL.GPJ MTA REDLINE.GDT 8/6/18 10 5 100 10 0.1 0.01 0.001 **GRAIN SIZE IN MILLIMETERS GRAVEL** SAND **COBBLES** SILT OR CLAY coarse fine coarse medium fine Specimen Identification LL PL Ы Сс Cu Classification **TP-215, BULK** Reddish Brown SANDY SILT(ML) {A-6, GI=5} 25 36 11 Specimen Identification D100 D60 D30 D10 %Gravel %Sand %Silt %Clay ● TP-215, BULK 25 7.1 30.7 62.2

The Robert B. Balter Company Geotechnical and Environmental Engineers

GRAIN SIZE DISTRIBUTION

TEST METHOD ASTM D422

Materials and Construction Inspection and Testing Telephone No. (410) 363-1555 www.balterco.com CLIENT EA Engineering, Inc. PROJECT NAME Gude Landfill PROJECT LOCATION Montgomery County, Maryland PROJECT NUMBER 16943-0 MD **DATE TESTED** 7/29/2018 U.S. SIEVE OPENING IN INCHES 6 4 3 2 1.5 1 3/4 U.S. SIEVE NUMBERS | 810 14 16 20 30 40 50 60 100 140 200 HYDROMETER 1/23/8 100 95 90 85 80 75 70 65 PERCENT FINER BY WEIGHT 60 55 50 45 40 35 30 25 20 15 COPY OF GRAIN SIZE ASTM AND AASHTO 16943-0 GUDE LANDFILL.GPJ MTA REDLINE.GDT 8/6/18 10 5 100 10 0.1 0.01 0.001 **GRAIN SIZE IN MILLIMETERS GRAVEL** SAND **COBBLES** SILT OR CLAY coarse fine coarse medium fine Specimen Identification LL PL Ы Сс Cu Classification **TP-228, BULK** Yellowish Red SILT with SAND(ML) {A-6, GI=9} 40 27 13 Specimen Identification D100 D60 D30 D10 %Gravel %Sand %Silt %Clay ● TP-228, BULK 12.5 27.0 70.9 2.0

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GRAIN SIZE DISTRIBUTION

TEST METHOD ASTM D422

CLIENT EA Engineering, Inc. PROJECT NAME Gude Landfill PROJECT NUMBER 16943-0 MD PROJECT LOCATION Montgomery County, Maryland **DATE TESTED** 7/29/2018 U.S. SIEVE OPENING IN INCHES U.S. SIEVE NUMBERS | 810 14 16 20 30 40 50 60 100 140 200 HYDROMETER 100 95 90 85 80 75 70 65 PERCENT FINER BY WEIGHT 60 55 50 45 40 35 30 25 20 15 COPY OF GRAIN SIZE ASTM AND AASHTO 16943-0 GUDE LANDFILL.GPJ MTA REDLINE.GDT 8/6/18 10 5 100 10 0.1 0.01 0.001 **GRAIN SIZE IN MILLIMETERS GRAVEL** SAND **COBBLES** SILT OR CLAY coarse fine medium fine coarse Specimen Identification LL PL Ы Сс Cu Classification **TP-231, BULK** Yellowish Red SANDY SILT(ML) {A-4, GI=5} 34 24 10 Specimen Identification D100 D60 D30 D10 %Gravel %Sand %Silt %Clay ● TP-231, BULK 19 32.9 4.7 62.4

GRAIN SIZE DISTRIBUTION

TEST METHOD ASTM D422

CLIENT EA Engineering, Inc. PROJECT NAME Gude Landfill PROJECT NUMBER 16943-0 MD PROJECT LOCATION Montgomery County, Maryland **DATE TESTED** 7/29/2018 U.S. SIEVE OPENING IN INCHES 6 4 3 2 1.5 1 3/4 U.S. SIEVE NUMBERS | 810 14 16 20 30 40 50 60 100 140 200 HYDROMETER 1/23/8 100 95 90 85 80 75 70 65 PERCENT FINER BY WEIGHT 60 55 50 45 40 35 30 25 20 15 COPY OF GRAIN SIZE ASTM AND AASHTO 16943-0 GUDE LANDFILL.GPJ MTA REDLINE.GDT 8/6/18 10 5 100 10 0.1 0.01 0.001 **GRAIN SIZE IN MILLIMETERS GRAVEL** SAND **COBBLES** SILT OR CLAY coarse fine medium fine coarse Specimen Identification LL PL Ы Сс Cu Classification **TP-241, BULK** Yellowish Red SANDY SILT(ML) {A-4, GI=2} 38 31 7 Specimen Identification D100 D60 D30 D10 %Gravel %Sand %Silt %Clay ● TP-241, BULK 12.5 0.123 5.0 43.4 51.6

GRAIN SIZE DISTRIBUTION

TEST METHOD ASTM D422

CLIENT EA Engineering, Inc. PROJECT NAME Gude Landfill PROJECT LOCATION Montgomery County, Maryland PROJECT NUMBER 16943-0 MD **DATE TESTED** 7/27/2018 U.S. SIEVE OPENING IN INCHES 6 4 3 2 1.5 1 3/4 1/23/8 U.S. SIEVE NUMBERS | 810 14 16 20 30 40 50 60 100 140 200 HYDROMETER 100 95 90 85 80 75 70 65 PERCENT FINER BY WEIGHT 60 55 50 45 40 35 30 25 20 15 COPY OF GRAIN SIZE ASTM AND AASHTO 16943-0 GUDE LANDFILL.GPJ MTA REDLINE.GDT 8/6/18 10 5 100 10 0.1 0.01 0.001 **GRAIN SIZE IN MILLIMETERS GRAVEL** SAND **COBBLES** SILT OR CLAY coarse fine medium fine coarse Specimen Identification LL PL Ы Cc Cu Classification **TP-253, BULK** Brown SILTY SAND with GRAVEL(SM) {A-4, GI=0} 35 29 6 Specimen Identification D100 D60 D30 D10 %Gravel %Sand %Silt %Clay ● TP-253, BULK 37.5 0.427 25.5 33.9 40.6

GRAIN SIZE DISTRIBUTION

TEST METHOD ASTM D422

CLIENT EA Engineering, Inc. PROJECT NAME Gude Landfill PROJECT LOCATION Montgomery County, Maryland PROJECT NUMBER 16943-0 MD **DATE TESTED** 7/30/2018 U.S. SIEVE OPENING IN INCHES 6 4 3 2 1.5 1 3/4 1/23/8 U.S. SIEVE NUMBERS | 810 14 16 20 30 40 50 60 100 140 200 HYDROMETER 100 95 90 85 80 75 70 65 PERCENT FINER BY WEIGHT 60 55 50 45 40 35 30 25 20 15 COPY OF GRAIN SIZE ASTM AND AASHTO 16943-0 GUDE LANDFILL.GPJ MTA REDLINE.GDT 8/6/18 10 5 100 10 0.1 0.01 0.001 **GRAIN SIZE IN MILLIMETERS GRAVEL** SAND **COBBLES** SILT OR CLAY coarse fine coarse medium fine Specimen Identification LL PL Ы Cc Cu Classification **TP-258, BULK** Reddish Brown SANDY SILT(ML) {A-6, GI=5} 37 26 11 Specimen Identification D100 D60 D30 D10 %Gravel %Sand %Silt %Clay ● TP-258, BULK 37.5 12.4 27.2 60.4

GRAIN SIZE DISTRIBUTION

TEST METHOD ASTM D422

CLIENT EA Engineering, Inc. PROJECT NAME Gude Landfill PROJECT LOCATION Montgomery County, Maryland PROJECT NUMBER 16943-0 MD **DATE TESTED** 7/28/2018 U.S. SIEVE OPENING IN INCHES 6 4 3 2 1.5 1 3/4 1/23/8 U.S. SIEVE NUMBERS | 810 14 16 20 30 40 50 60 100 140 200 HYDROMETER 100 95 90 85 80 75 70 65 PERCENT FINER BY WEIGHT 60 55 50 45 40 35 30 25 20 15 COPY OF GRAIN SIZE ASTM AND AASHTO 16943-0 GUDE LANDFILL.GPJ MTA REDLINE.GDT 8/6/18 10 5 100 10 0.1 0.01 0.001 **GRAIN SIZE IN MILLIMETERS GRAVEL** SAND **COBBLES** SILT OR CLAY coarse fine medium fine coarse Specimen Identification LL PL Ы Cc Cu Classification **TP-259, BULK** Brown SANDY SILT with GRAVEL(ML) {A-7-5, GI=5} 49 37 12 Specimen Identification D100 D60 D30 D10 %Gravel %Sand %Silt %Clay ● TP-259, BULK 37.5 0.121 17.6 28.0 54.4

GRAIN SIZE DISTRIBUTION

TEST METHOD ASTM D422

CLIENT EA Engineering, Inc. PROJECT NAME Gude Landfill PROJECT NUMBER 16943-0 MD PROJECT LOCATION Montgomery County, Maryland **DATE TESTED** 7/30/2018 U.S. SIEVE OPENING IN INCHES 6 4 3 2 1.5 <u>1</u> 3/4 1/23/8 U.S. SIEVE NUMBERS | 810 14 16 20 30 40 50 60 100 140 200 HYDROMETER 100 95 90 85 80 75 70 65 PERCENT FINER BY WEIGHT 60 55 50 45 40 35 30 25 20 15 COPY OF GRAIN SIZE ASTM AND AASHTO 16943-0 GUDE LANDFILL.GPJ MTA REDLINE.GDT 8/6/18 10 5 100 10 0.1 0.01 0.001 **GRAIN SIZE IN MILLIMETERS GRAVEL** SAND **COBBLES** SILT OR CLAY coarse fine medium fine coarse Specimen Identification Classification LL PL Ы Сс Cu **TP-263, BULK** Brown SILTY SAND(SM) {A-4, GI=0} 36 30 6 Specimen Identification D100 D60 D30 D10 %Gravel %Sand %Silt %Clay ● TP-263, BULK 25 0.207 11.1 47.5 41.4

GRAIN SIZE DISTRIBUTION

TEST METHOD ASTM D422

CLIENT EA Engineering, Inc. PROJECT NAME Gude Landfill PROJECT LOCATION Montgomery County, Maryland PROJECT NUMBER 16943-0 MD **DATE TESTED** 7/27/2018 U.S. SIEVE OPENING IN INCHES 6 4 3 2 1.5 <u>1</u> 3/4 1/23/8 U.S. SIEVE NUMBERS | 810 14 16 20 30 40 50 60 100 140 200 HYDROMETER 100 95 90 85 80 75 70 65 PERCENT FINER BY WEIGHT 60 55 50 45 40 35 30 25 20 15 COPY OF GRAIN SIZE ASTM AND AASHTO 16943-0 GUDE LANDFILL.GPJ MTA REDLINE.GDT 8/6/18 10 5 100 10 0.1 0.01 0.001 **GRAIN SIZE IN MILLIMETERS GRAVEL** SAND **COBBLES** SILT OR CLAY coarse fine medium fine coarse Specimen Identification LL PL Ы Cc Cu Classification **TP-273, BULK** Red SILTY SAND(SM) {A-4, GI=1} 30 24 6 Specimen Identification D100 D60 D30 D10 %Gravel %Sand %Silt %Clay ● TP-273, BULK 25 0.166 7.8 43.4 48.8

GDT

MTA REDLINE

GPJ

16943-0 GUDE LANDFILL

ATTERBERG ASTM AASHTO

ATTERBERG LIMITS' RESULTS

TEST METHOD ASTM D4318

www.balterco.com CLIENT EA Engineering, Inc. PROJECT NAME Gude Landfill PROJECT LOCATION Montgomery County, Maryland PROJECT NUMBER 16943-0 MD **DATE TESTED** 7/27/2018 60 (CL)(CH) 50 A S 40 С 30 Ν 20 DE 10 CL-ML (ML)(MH)20 40 60 80 100 LIQUID LIMIT PL PI Fines LL Specimen Identification Classification ● TP-208, BULK @ 0.0' - 2.0', 36 26 10 48 Darek Yellowish Brown SILTY SAND(SM) {A-4, GI=2} TP-215, BULK @ 0.0' - 2.0', 36 25 11 62 Reddish Brown SANDY SILT(ML) {A-6, GI=5} TP-228, BULK @ 0.0' - 2.0', 40 27 13 Yellowish Red SILT with SAND(ML) {A-6, GI=9} 71 TP-231, BULK @ 0.0' - 2.0', 34 24 10 Yellowish Red SANDY SILT(ML) {A-4, GI=5} **⊙** TP-241, BULK @ 0.0' - 2.0', 7 Yellowish Red SANDY SILT(ML) {A-4, GI=2} 38 31 52 ▼ TP-253, BULK @ 0.0' - 2.0', 35 29 6 Brown SILTY SAND with GRAVEL(SM) {A-4, GI=0} 41 ○ TP-258, BULK @ 0.0' - 2.0', 37 26 11 60 Reddish Brown SANDY SILT(ML) {A-6, GI=5} 37 12 Brown SANDY SILT with GRAVEL(ML) {A-7-5, GI=5} △ TP-259, BULK @ 0.0' - 2.0', 49 54 \otimes TP-263, BULK @ 0.0' - 2.0', 36 30 6 41 Brown SILTY SAND(SM) {A-4, GI=0} ⊕ TP-273, BULK @ 0.0' - 2.0', 30 24 6 Red SILTY SAND(SM) {A-4, GI=1}

MOISTURE-DENSITY RELATIONSHIP

www.balterco.com PROJECT NAME Gude Landfill CLIENT EA Engineering, Inc. PROJECT LOCATION Montgomery County, Maryland PROJECT NUMBER 16943-0 MD **DATE TESTED** 7/31/2018 145 140 TP-208, BULK @ 0.0' - 2.0', Source of Material 135 **Description of Material** Darek Yellowish Brown SILTY SAND(SM) 130 **Test Method** ASTM D1557 Method B **Curve Number** 16943-0 MD-001 125 **TEST RESULTS Maximum Dry Density** 118.7 PCF 120 13.3 % **Optimum Water Content** 27.6 % **Natural Water Content** DRY DENSITY, pcf 115 ATTERBERG LIMITS LL PLЫ 110 Curves of 100% Saturation 105 for Specific Gravity Equal to: 2.80 100 2.70 2.60 COMPACTION 16943-0 GUDE LANDFILL.GPJ MTA REDLINE.GDT 8/6/18 95 90 85 80 75 10 15 20 30 35 40

MOISTURE-DENSITY RELATIONSHIP

www.balterco.com PROJECT NAME Gude Landfill CLIENT EA Engineering, Inc. PROJECT LOCATION Montgomery County, Maryland PROJECT NUMBER 16943-0 MD **DATE TESTED** 7/31/2018 145 140 TP-215, BULK @ 0.0' - 2.0', Source of Material 135 **Description of Material** Reddish Brown SANDY SILT(ML) ASTM D1557 Method B 130 **Test Method Curve Number** 16943-0 MD-010 125 **TEST RESULTS Maximum Dry Density** 115.0 PCF 120 14.4 % **Optimum Water Content** 29.8 % **Natural Water Content** DRY DENSITY, pcf 115 ATTERBERG LIMITS LL PLЫ 110 Curves of 100% Saturation 105 for Specific Gravity Equal to: 2.80 100 2.70 2.60 COMPACTION 16943-0 GUDE LANDFILL.GPJ MTA REDLINE.GDT 8/6/18 95 90 85 80 75 10 15 20 30 35 40

MOISTURE-DENSITY RELATIONSHIP

www.balterco.com PROJECT NAME Gude Landfill CLIENT EA Engineering, Inc. PROJECT LOCATION Montgomery County, Maryland PROJECT NUMBER 16943-0 MD **DATE TESTED** 7/29/2018 145 140 TP-228, BULK @ 0.0' - 2.0', Source of Material 135 **Description of Material** Yellowish Red SILT with SAND(ML) ASTM D1557 Method B 130 **Test Method Curve Number** 16943-0 MD-008 125 **TEST RESULTS Maximum Dry Density** 112.9 PCF 120 15.<u>5</u> % **Optimum Water Content** 26.3 % **Natural Water Content** DRY DENSITY, pcf 115 ATTERBERG LIMITS Ы 110 Curves of 100% Saturation 105 for Specific Gravity Equal to: 2.80 100 2.70 2.60 COMPACTION 16943-0 GUDE LANDFILL.GPJ MTA REDLINE.GDT 8/6/18 95 90 85 80 75 10 15 20 30 35 40

MOISTURE-DENSITY RELATIONSHIP

www.balterco.com PROJECT NAME Gude Landfill CLIENT EA Engineering, Inc. PROJECT LOCATION Montgomery County, Maryland PROJECT NUMBER 16943-0 MD **DATE TESTED** 7/29/2018 145 140 TP-231, BULK @ 0.0' - 2.0', Source of Material 135 Yellowish Red SANDY SILT(ML) **Description of Material** ASTM D1557 Method B 130 **Test Method Curve Number** 16943-0 MD-009 125 **TEST RESULTS Maximum Dry Density** 118.2 PCF 120 13.6 % **Optimum Water Content** 28.9 % **Natural Water Content** DRY DENSITY, pcf 115 ATTERBERG LIMITS Ы 110 Curves of 100% Saturation 105 for Specific Gravity Equal to: 2.80 100 2.70 2.60 COMPACTION 16943-0 GUDE LANDFILL.GPJ MTA REDLINE.GDT 8/6/18 95 90 85 80 75 10 15 20 30 35 40

MOISTURE-DENSITY RELATIONSHIP

www.balterco.com PROJECT NAME Gude Landfill CLIENT EA Engineering, Inc. PROJECT LOCATION Montgomery County, Maryland PROJECT NUMBER 16943-0 MD **DATE TESTED** 7/29/2018 145 140 TP-241, BULK @ 0.0' - 2.0', Source of Material 135 Yellowish Red SANDY SILT(ML) **Description of Material** ASTM D1557 Method B 130 **Test Method Curve Number** 16943-0 MD-007 125 **TEST RESULTS Maximum Dry Density** 121.7 PCF 120 9.0 % **Optimum Water Content** 29.7 % **Natural Water Content** DRY DENSITY, pcf 115 ATTERBERG LIMITS LL 110 Curves of 100% Saturation 105 for Specific Gravity Equal to: 2.80 100 2.70 2.60 COMPACTION 16943-0 GUDE LANDFILL.GPJ MTA REDLINE.GDT 8/6/18 95 90 85 80 75 10 15 20 30 35 40

MOISTURE-DENSITY RELATIONSHIP

www.balterco.com PROJECT NAME Gude Landfill CLIENT EA Engineering, Inc. PROJECT LOCATION Montgomery County, Maryland PROJECT NUMBER 16943-0 MD **DATE TESTED** 7/27/2018 145 140 TP-253, BULK @ 0.0' - 2.0', Source of Material 135 Brown SILTY SAND with GRAVEL(SM) **Description of Material** 130 **Test Method** ASTM D1557 Method B **Curve Number** 16943-0 MD-003 125 **TEST RESULTS Maximum Dry Density** 119.4 PCF 120 12.4 % **Optimum Water Content** 24.1 % **Natural Water Content** DRY DENSITY, pcf 115 ATTERBERG LIMITS LL Ы 110 Curves of 100% Saturation 105 for Specific Gravity Equal to: 2.80 100 2.70 2.60 COMPACTION 16943-0 GUDE LANDFILL.GPJ MTA REDLINE.GDT 8/6/18 95 90 85 80 75 10 15 20 30 35 40

MOISTURE-DENSITY RELATIONSHIP

www.balterco.com PROJECT NAME Gude Landfill CLIENT EA Engineering, Inc. PROJECT LOCATION Montgomery County, Maryland PROJECT NUMBER 16943-0 MD **DATE TESTED** 7/30/2018 145 140 TP-258, BULK @ 0.0' - 2.0', Source of Material 135 **Description of Material** Reddish Brown SANDY SILT(ML) ASTM D1557 Method B 130 **Test Method Curve Number** 16943-0 MD-004 125 **TEST RESULTS Maximum Dry Density** 115.8 PCF 120 13.8 % **Optimum Water Content** 26.0 % **Natural Water Content** DRY DENSITY, pcf 115 ATTERBERG LIMITS Ы 110 Curves of 100% Saturation 105 for Specific Gravity Equal to: 2.80 100 2.70 2.60 COMPACTION 16943-0 GUDE LANDFILL.GPJ MTA REDLINE.GDT 8/6/18 95 90 85 80 75 10 15 20 30 35 40

MOISTURE-DENSITY RELATIONSHIP

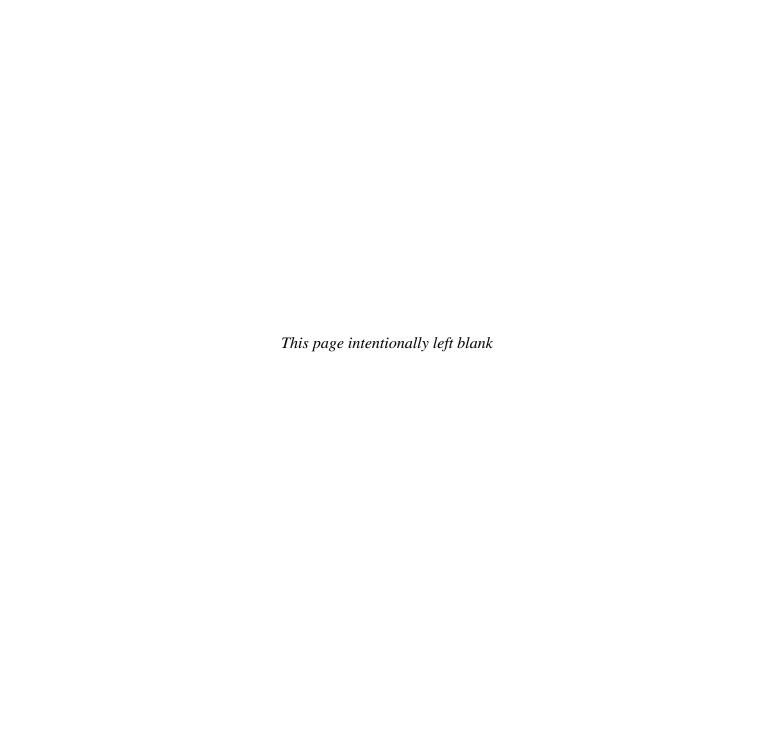
www.balterco.com PROJECT NAME Gude Landfill CLIENT EA Engineering, Inc. PROJECT LOCATION Montgomery County, Maryland PROJECT NUMBER 16943-0 MD **DATE TESTED** 7/28/2018 145 140 TP-259, BULK @ 0.0' - 2.0', Source of Material 135 Brown SANDY SILT with GRAVEL(ML) **Description of Material** 130 **Test Method** ASTM D1557 Method B **Curve Number** 16943-0 MD-005 125 **TEST RESULTS Maximum Dry Density** 108.4 PCF 120 17.8 % **Optimum Water Content** 31.0 % **Natural Water Content** DRY DENSITY, pcf 115 ATTERBERG LIMITS LL Ы 110 Curves of 100% Saturation 105 for Specific Gravity Equal to: 2.80 100 2.70 2.60 COMPACTION 16943-0 GUDE LANDFILL.GPJ MTA REDLINE.GDT 8/6/18 95 90 85 80 75 10 15 20 30 35 40

MOISTURE-DENSITY RELATIONSHIP

PROJECT NAME Gude Landfill CLIENT EA Engineering, Inc. PROJECT LOCATION Montgomery County, Maryland PROJECT NUMBER 16943-0 MD **DATE TESTED** 7/30/2018 145 140 TP-263, BULK @ 0.0' - 2.0', Source of Material 135 **Description of Material** Brown SILTY SAND(SM) ASTM D1557 Method B 130 **Test Method Curve Number** 16943-0 MD-006 125 **TEST RESULTS Maximum Dry Density** 117.6 PCF 120 10.5 % **Optimum Water Content** 31.0 % **Natural Water Content** DRY DENSITY, pcf 115 ATTERBERG LIMITS LL Ы 110 30 Curves of 100% Saturation 105 for Specific Gravity Equal to: 2.80 100 2.70 2.60 COMPACTION 16943-0 GUDE LANDFILL.GPJ MTA REDLINE.GDT 8/6/18 95 90 85 80 75 10 15 20 30 35 40

MOISTURE-DENSITY RELATIONSHIP

www.balterco.com PROJECT NAME Gude Landfill CLIENT EA Engineering, Inc. PROJECT LOCATION Montgomery County, Maryland PROJECT NUMBER 16943-0 MD **DATE TESTED** 7/27/2018 145 140 TP-273, BULK @ 0.0' - 2.0', Source of Material 135 **Description of Material** Red SILTY SAND(SM) ASTM D1557 Method B 130 **Test Method Curve Number** 16943-0 MD-002 125 **TEST RESULTS Maximum Dry Density** 121.7 PCF 120 12.0 % **Optimum Water Content** 24.3 % **Natural Water Content** DRY DENSITY, pcf 115 ATTERBERG LIMITS LL Ы 110 Curves of 100% Saturation 105 for Specific Gravity Equal to: 2.80 100 2.70 2.60 COMPACTION 16943-0 GUDE LANDFILL.GPJ MTA REDLINE.GDT 8/6/18 95 90 85 80 75 10 15 20 30 35 40



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THE ROBERT B. BALTER COMPANY®

October 27, 2020

Kerry E. Feuz, P.E. Civil Engineer EA Engineering, Science, and Technology, Inc., PBC 225 Schilling Circle, Suite 400 Hunt Valley, Maryland 21031

RE: Geotechnical Data Report Gude Landfill 600 East Gude Drive Rockville, Maryland 20850 RBB Project No. 17359-0 MD

Dear Ms. Feuz:

The Robert B. Balter Company is pleased to submit this geotechnical data report for the subject project. The purpose of this data report was to assess subsurface conditions for the slope stability analysis to be performed by EA Engineering, Science, and Technology, Inc., PBC at the existing Gude Landfill. A separate letter will be sent providing the laboratory test results for the soils collected in the purple line stockpile.

Project information provided to us by various parties helped form the basis for our data report. If any of the project information discussed in this report differs from the actual proposed analysis, we should be contacted to re-evaluate the data provided herein and provide revisions or further investigation if requested.

We have appreciated this opportunity to be of service. If you have any questions regarding this report, or if we can assist you in any way, please do not hesitate to call our office.

Sincerely,

THE ROBERT B. BALTER COMPANY

Professional Certification. I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland.

License No. 41312, Expiration Date: 01/05/2022

Christopher D. Karg II, E.I.T.

Project Engineer

Kristopher M. Crist, P.G

Senior Geotechnical Engineer OPHER

Joseph F. Whittle Jr., P.G., P.E

Chief Engineer

Headquarters: 18 Music Fair Road • Owner Mills: Marking 21117 • 410-363-1555 • 410-363-8073 (fax)

GEOTECHNICAL DATA REPORT GUDE LANDFILL 600 EAST GUDE DRIVE ROCKVILLE, MARYLAND RBB Project No. 17359-0 MD

TABLE OF CONTENTS

1.0	INTRODUCTION	. 2
1.1	General	. 2
1.2	AUTHORIZATION	. 2
1.3	SCOPE	. 2
2.0	PROJECT DESCRIPTION	. 2
2.1	SITE LOCATION AND PROPOSED PROJECT	. 2
2.2	SITE GEOLOGY	. 2
3.0	EVALUATION PROGRAM	.3
3.1	SUBSURFACE EXPLORATIONS	. 3
3.	.1.1 Environmental Measures	. 4
3.2	LABORATORY TESTING PROGRAM	. 4
4.0	SUBSURFACE CONDITIONS	. 5
4.1	General	. 5
4.2	SURFACE MATERIALS	. 5
4.3	SUBSURFACE MATERIALS	. 5
4.	.3.1 Fill Soils	. 5
4.	.3.2 Landfill Materials	. 5
4.	.3.3 Existing Residual Soils	. 6
4.	.3.4 Decomposed Rock	. 6
4.4	STANDARD PENETRATION RESISTANCES	
4.5	RESULTS OF LABORATORY TESTING	. 8
4.6	GROUND WATER CONDITIONS	C

LIST OF TABLES

- Table 1 Laboratory Test Results
- Table 2 Groundwater Measurements

LIST OF FIGURES

- Figure 1 Standard Penetration Resistances Depth vs. N₆₀ Value
- Figure 2 Standard Penetration Resistances Elevation vs. N₆₀ Value

LIST OF PLATES

- Plate 1 Site Vicinity Map
- Plate 2 Boring Location Plan

APPENDICES

i

- A Boring Logs
- $B-Laboratory\ Test\ Results$
- C Environmental Measures

1.0 INTRODUCTION

1.1 General

The proposed project generally consists of a slope stability analysis to be performed by others at the existing Gude Landfill. The purpose of our work was to perform a geotechnical evaluation of the subsurface conditions, and to provide certain geotechnical related data for the use in analysis for slope stability toward the Northwest side of the project site. Geotechnical evaluations and recommendations are not part of the scope of this work.

1.2 Authorization

The geotechnical evaluation was authorized by EA Engineering, Science, and Technology, Inc., PBC (EA), based on our August 12, 2020 Revised Proposal for Geotechnical Services.

1.3 Scope

The scope of the geotechnical evaluation included the following: site reconnaissance, subsurface sampling and testing, geotechnical laboratory testing and data report preparation.

2.0 PROJECT DESCRIPTION

2.1 Site Location and Proposed Project

The project is located at 600 East Gude Drive, Rockville, Maryland. The site is bordered to the northwest by Gude Trail, followed by a residential development, to the northeast by a heavily forested area, to the southeast by a mixed commercial/retail development, and to the southwest by East Gude Drive followed by mixed commercial/retail development. The site is currently occupied by the closed Gude MSW Landfill including a gas energy production facility and is currently being used as a radio-controlled (RC) model airplane recreational area. A Vicinity Map is shown on Plate 1, attached.

The proposed project consists of the slope stability analysis by others at existing slopes located adjacent to the road running along the Northwest portion of the site. Data collected by Balter will be used in all analyses performed by EA.

The scope of work also included the collection of bulk grab samples from the existing purple line stockpile, located at the Northeast corner of the site. These samples are to be subjected to laboratory testing for certain geotechnical parameters. That information will be presented under a separate letter.

2.2 Site Geology

According to the Geologic Map of Montgomery County and the District of Columbia (1953), the project site is underlain by the Wissahickon Formation. The age of this formation is reported as unknown. It generally consists of banded or laminated quartz-rich Phyllites and Schists with magnetite. Quartz veins, sandstone, and conglomerate beds composed of muscovite, chlorite, albite, and quartz are common throughout the formation.

Previous borings, performed by others as part of monitoring well operations, indicated the presence of 20 feet to 46 feet of landfilled materials underlain by bedrock comprised of Schist within the subject area.

3.0 EVALUATION PROGRAM

3.1 Subsurface Explorations

The subsurface exploration program for this study included a total of 3 new Standard Penetration Test (SPT) borings, including B-4 to B-6. The locations for the borings were selected by EA based on the proposed plan for the slope stability analysis, marked up on the provided "Existing Conditions Plan – Key Sheet" (Drawing No. C-101). Borings were located in the field from a hand-held GPS based on coordinates provided by EA. They were not surveyed.

Prior to the start of the drilling operation, the subject area was cleared for utilities by Miss Utility. An environmental health and safety plan, prepared by EA, was used and followed while onsite. Balter representatives were onsite with the crew and provided monitoring of the LEL and O₂ combustible gas levels during the drilling.

Balter mobilized a Mobil B45 rubber-tracked ATV-mounted drill rig to the site to drill the borings. The rig was equipped with conventional 3.25-inch I.D. hollow stem augers with carbide drill head bits and a calibrated automatic hammer. Our field personnel were OSHA Hazwoper and Supervisor trained, as appropriate.

The borings were drilled to depth ranging from 25 feet to 50 feet below the existing ground surface. Standard Penetration Testing (SPT) and sampling was performed through the auger stems at 5-foot intervals. The testing and sampling procedures were performed in general accordance with ASTM D-1586 procedures, using a standard 2-inch O.D. sampling spoon, driven by an automatic 140-pound hammer freely falling 30 inches. During the drilling operations, bulk samples and Shelby Tubes of representative soils from elevations not containing trash were recovered from the auger flights for laboratory evaluation.

The drill rig was equipped with an automatic hammer which requires an approximate correction factor of x1.5 to the recorded N-Values. This correction factor is based on calibration of our rig and hammer. This allows comparison to "standard" N values for a less-efficient manual hammer (N_{60} values, for 60 % energy efficiency). Corrected values (N_{60}) are not shown on the boring logs.

The borings were overseen by an experienced geotechnical engineer who logged each boring and collected the samples. The method of classification used in preparing the strata descriptions is based on our interpretation of the Unified Soils Classification System (USCS).

The depths at which water was observed in the uncased holes were recorded upon completion (i.e., after the augers were withdrawn). At borings B-4 and B-5, 24-hour (or longer) readings of depths at which water was observed were recorded as well. Boring B-6 did not include a 24-hour reading due to budget and time restraints. Because the borings were drilled in the existing landfill, they were backfilled with the drill spoils and topped off with Bentonite chips once water levels were recorded.

The attached **Plate 2, Boring Location Plan,** indicates the approximate as-drilled locations of the borings.

The subsurface data obtained from the recent explorations are presented in log form in **Appendix A**. Ground surfaces were estimated using the GPS and boring location plan for any boring offset. The numeric values (N-values) shown within the individual boring columns on the Boring Logs indicate the standard penetration resistances, in blows per foot, or as otherwise noted.

Boring logs show the estimated general soil classifications and the <u>assumed</u> boundaries between soil types. The actual boundaries in the field could vary significantly from those assumed for the logs. It is noted that the subsurface data shown on the figures are an integral portion of this report. Separation of the figures from the remainder of the report may lead to misinterpretation of the data by others.

3.1.1 Environmental Measures

A site specific Health and Safety Plan (HASP), developed by EA Engineering, was used onsite as a result of the potential for methane gas from the existing landfill. It was reviewed every day before work at the site commenced. The HASP covered site hazards and included information related to the use of a Combustible Gas Indicator (CGI) to measure the Oxygen levels and the LEL levels for methane. Carbon Monoxide (CO) and Hydrogen Sulfide (H_2S) were also monitored. A representative was onsite from Balter with a CGI to monitor the workspace of the drill rig.

Meter levels from each boring were recorded on an EA provided form. The completed sign-in and monitoring forms from the provided HASP are included in Appendix C.

3.2 Laboratory Testing Program

Selected samples were subjected to laboratory analyses to estimate their classifications according to the Unified Soils Classification System. This testing included moisture content determination, sieve gradation analyses and Atterberg limits determinations. Pocket penetrometers were also performed on the fine-grained samples. The Shelby tubes were subjected to Unit Weight testing.

The results of our laboratory testing are presented in Appendix B and are summarized in **Table 2** of Section 4.4 Results of Laboratory Testing. Pocket penetrometer, - #200 sieve, moisture and Atterberg limits testing results are included on the boring logs.

4.0 SUBSURFACE CONDITIONS

4.1 General

This section provides a description of the estimated subsurface conditions encountered at the borings at the time of drilling. The on-landfill borings (B-4, B-5) encountered surficial materials (i.e., topsoil, root mat) overlying fills to a depth of 8.0 feet overlying the Landfill materials. The off-landfill boring (B-6) encountered surficial materials (i.e., topsoil, root mat) overlying fills to a depth of 3.0 feet, followed by residual soils to a depth of 22.0 feet and decomposed rock to a depth of 25.5 feet. The borings were advanced into the landfill materials to the specified depths as directed by EA Engineering. The transition between the stratigraphy at the boring locations may be more gradual than indicated on the logs, and significant variations may occur outside specific boring locations or sampled intervals. The following sections provide a summary of the encountered materials.

4.2 Surface Materials

Topsoil - Topsoil was encountered in borings B-4, B-5, and B-6 to a depth of 4.0 inches at each location. The term "topsoil," as used in this report refers to surface soils having an apparently significant organic content, based only on visual estimates in the field. It does not imply that the subject materials meet the requirements or specifications for topsoil set by any particular organization or agency.

4.3 Subsurface Materials

4.3.1 Fill Soils

Fill was identified in all 3 borings under the surface soils to depths ranging from 3.0 to 8.0 feet below the existing ground surface. Borings B-4 and B-5 both exhibited 8.0 feet of fill soils above the Landfill. These soil samples did not exhibit trash and are considered to be landfill cover soils. Because all the borings are located at the existing landfill, these soils are assumed to have been imported to the site.

The fills generally consisted of Sand (SM), Gravel (GC), Silt (ML), and Clay (CL) with varying amounts of organics and gravel. SPT N-values generally ranged from 3 blows per foot (bpf) to 18 bpf. Pocket penetrometers were performed in the fine-grained soils. They ranged from 1.8 tons per square foot (tsf) to 3.2 tsf.

4.3.2 Landfill Materials

Materials associated with the landfill were encountered underlying the fills soils to the maximum explored depth of 50.5 feet below the existing ground surface. Landfill materials were comprised of layers of soil which included Sand (SC-SM, SM), Silt (ML), and Clay (CL) interbedded with trash (ie, paper, metals, etc.) and Wood. Strong organic odors were noted

throughout the landfill materials. Methane was not encountered in notable amounts throughout the three borings. This was checked by monitoring for variations in O₂ and LEL levels.

SPT samples were collected throughout the landfill materials. The resultant SPT N-values generally ranged from the 5 bpf to 60 bpf. Elevated N-values were due to the presence of the landfill materials and not soil.

4.3.3 Existing Residual Soils

Residual soils were identified in boring B-6 below the fills to a depth of 22.0 feet below the existing ground soils. The residual soils are generally the result of the in-place weathering of underlying bedrock into soils. They often will exhibit the original structure of the rock (i.e. relic rock structure).

The residual soils generally consisted of Sand (SC-SM, SM) and exhibited SPT N-values ranging from 7 bpf to 23 bpf.

4.3.4 Decomposed Rock

Decomposed Rock was encountered underlying the fills and residual soils in boring B-6 to a depth up to 25.5 feet below the existing ground surface (approximate elevation EL 388.0). Decomposed rock is arbitrarily defined as having SPT N-values greater than 50 bpf and up to 50 blows for 4 inches of penetration. During the sampling process, the split spoon sampler pulverizes the material; therefore, the actual sample may not be representative of the true insitu condition.

The pulverized decomposed rock sample generally consisted of Sand (SM) exhibiting an SPT N-value of 51 blows per foot of penetration.

4.4 Standard Penetration Resistances

Figure 1 below shows the distribution of the collected N_{60} -values, of all soil types, versus depth across the site.

Figure 1 - Standard Penetration Resistances Depth vs. N_{60}

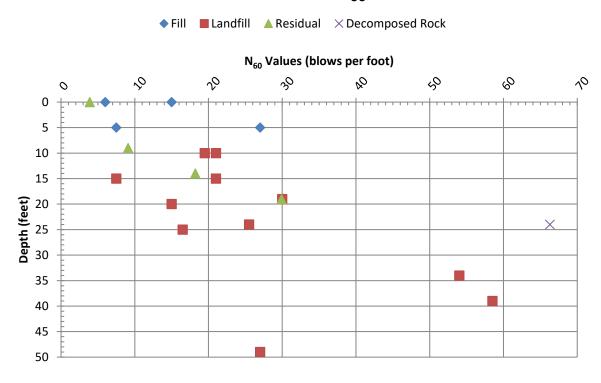
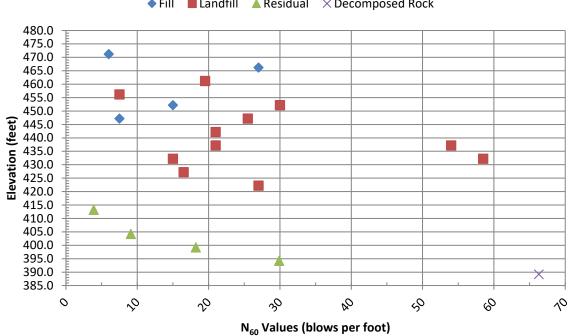


Figure 2 below shows the distribution of the collected N_{60} -values, of all soil types, versus elevation across the site.

Figure 2 - Standard Penetration Resistances

Elevation vs. N₆₀

◆ Fill ■ Landfill ▲ Residual × Decomposed Rock



4.5 Results of Laboratory Testing

The completed laboratory index tests performed on samples of the subsurface materials are summarized on the following Table 1 - Laboratory Test Results. The laboratory results are presented in graphic form in **Appendix B**.

Table 1 – Laboratory Test Results

Tuble 1 Lubolutoly Test Results										
Boring	Sample Depth	USCS	In-Place Moisture (%)	Atterberg Limits ⁽¹⁾			#200	Unit Weight		
	(ft)	Class.		LL	PL	PΙ	Sieve (%)	(lb/ft ³)		
B-4	0-1.5	SM ⁽¹⁾	5.5	30	26	4				
B-4	4-6	CL ⁽¹⁾	19.1					118.4		
B-4	9-10.5	SM ⁽¹⁾	26.8							
B-5	0-1.5	SM ⁽¹⁾	16.4							
B-5	4-6	SM ⁽¹⁾	15.3					118.6		
B-5	5-6.5	SM	13.4	26	23	3	41			
B-6	4-6	SC-SM	20.7	27	20	7	50	112.4		
B-6	9-10.5	SM ⁽¹⁾	18.2							
B-6	14-15.5	SM ⁽¹⁾	15.6							
B-6	19-20.5	SM	13.0	26	22	4	32			

Notes: (1) USCS Classification for samples noted are determined by visual observation

4.6 Ground Water Conditions

Ground water observations were made during the drilling operation, immediately after the augers were withdrawn, and after 26 to 68-hours from the augers being withdrawn. Borings were backfilled at completion of water readings with the drill spoils and capped off with Bentonite chips.

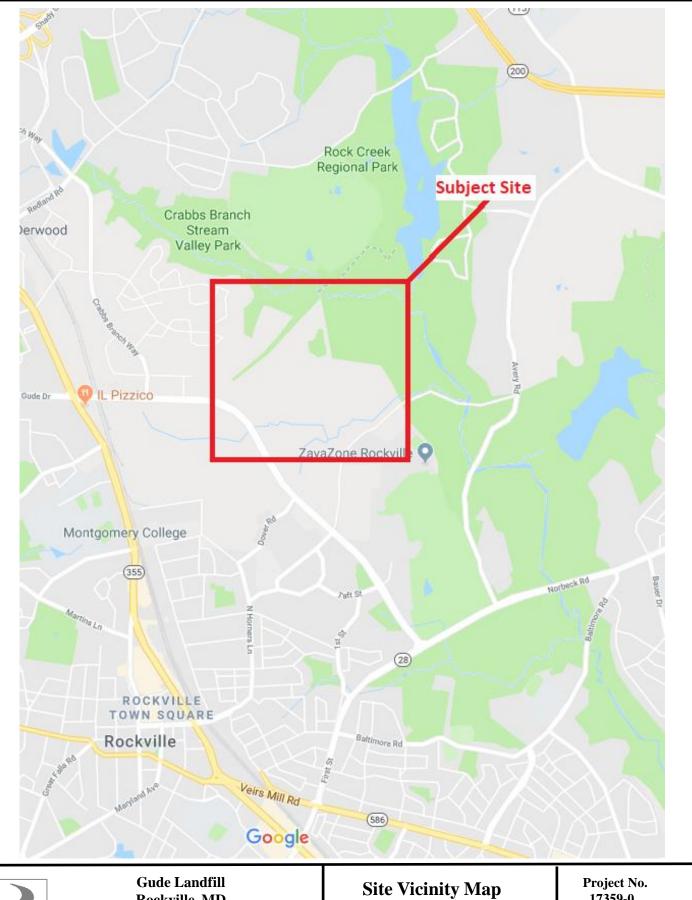
Based on the water readings collected, ground water was encountered in 2 of the 3 borings at depths ranging from 10.0 feet to 14.0 feet below the existing ground surface (approximate elevations EL 443.7 to EL 457.2). We understand that ground water in this area is generally around EL 340 to EL 350 based off previous information provided by EA; therefore, the presence of water in the recent borings would suggest that it is trapped or perched in the landfill.

Boring B-6 exhibited dry conditions during drilling and after removal of the augers. It must be noted that this does not indicate that water is not present, only that ground water did not seep into the borehole while it was drilled, or that the boreholes caved at depths shallower than the current water levels. It should be assumed that ground water at this location is present at a deeper depth than drilled. Table 2 below provides the at-completion and 24+ hours ground water measurements recorded.

Measured Measured At-Water Ground Water Water **Completion** Elevation **Boring** Elev. Depth at Depth after Water After 24+ Completion 24-hours (feet) Elevation Hours (feet) (feet) (feet) (feet) 457.0 13.3 443.7 447.2 B-4 9.8 14.3 11.0 471.2 457.2 460.5 B-5 413.2 N/A B-6 Dry Dry <388.0

Table 2 – Ground Water Measurements

Subsurface water levels will fluctuate with changes in rainfall and runoff, construction and development activities, and other causes. Future groundwater levels across the site should be expected to vary from those noted during the recent exploration program.





Rockville, MD

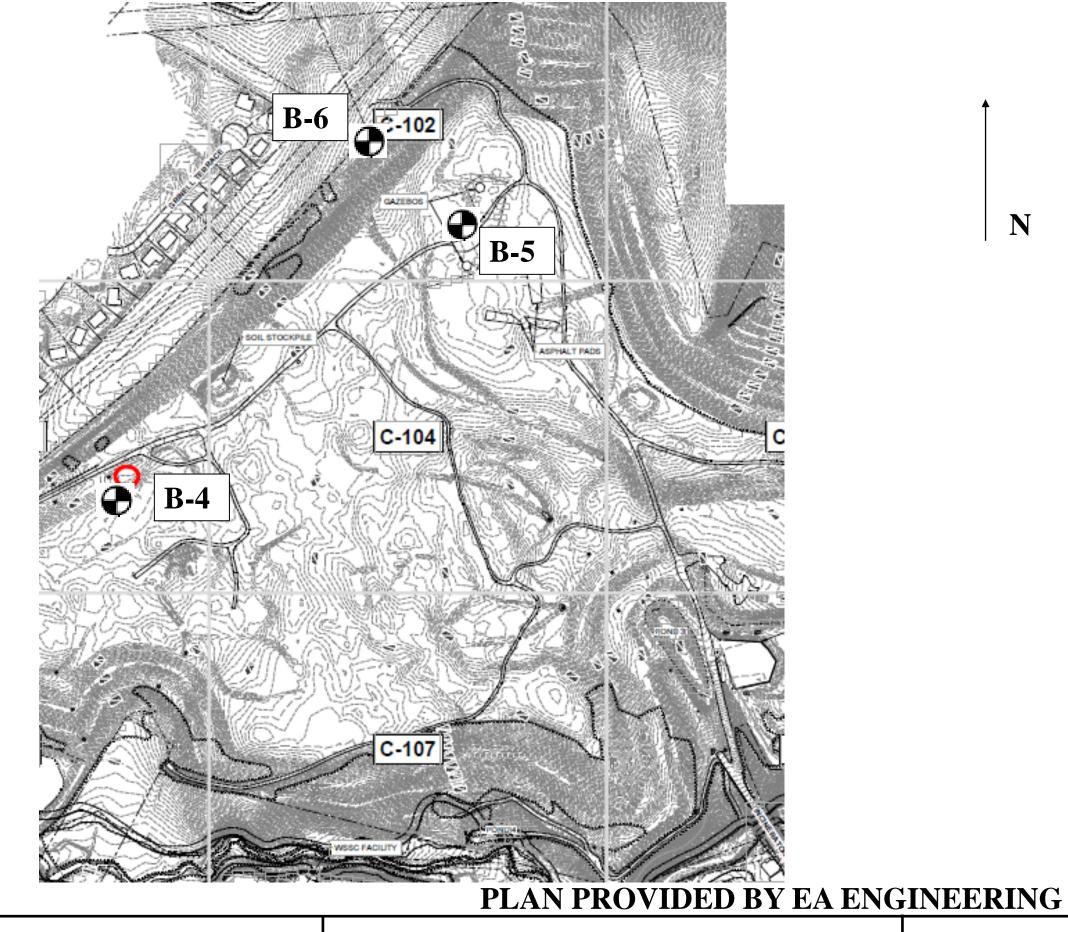
THE ROBERT B. BALTER COMPANY® Geotechnical and Geo-environmental Engineers

17359-0

Scale: None

Date: Oct. 2020

PLATE 1



THE ROBERT B. BALTER COMPANY® Geotechnical and Geo-environmental Engineers

Legend

- Approximate as-drilled location

Gude Landfill Rockville, MD

Project No. 17359-0 DRAFT BORING LOCATION PLAN Date: October 2020 Plate 2 Scale: 1" ~ 457'

N

APPENDIX A BORING LOGS

The Robert B. Balter Company

THE ROBERT B. BALTER COMPANY IDENTIFICATION OF SOIL SAMPLES

Soils are described in the boring logs according to the following criteria with the principal constituents written in capital letters. Other constituents are preceded by descriptive terminology that is used to denote the percentage of weight of each component. Soil descriptions are determined visually except where laboratory classification test data are available. Classifications are based on The Robert B. Balter Company's interpretation of ASTM D 2487-00.

		0 to 50/ Finas	Well Graded GW			GRAVEL
		0 to 5% Fines	Poorly Graded		GP	GRAVEL
			Cilta Finas	Well Graded	GW-GM	GRAVEL with Silt
	EL	6 to 12% Fines	Silty Fines	Poorly Graded	GP-GM	GRAVEL with Silt
. , e	AV	0 to 12% rines	Classes Finan	Well Graded	GW-GC	GRAVEL with Clay
OII Siev	GRAVEL		Clayey Fines	Poorly Graded	GP-GC	GRAVEL with Clay
D S (00	•		Silty Fines		GM	Silty GRAVEL
Ze. 2		13 to 50% Fines	Poorly Graded			Silty, Clayey GRAVEL
AII on N			Clayey Fines		GC	Clayey GRAVEL
GR ned (0 to 5% Fines	Well Graded		SW	SAND
COARSE GRAINED SOIL > 50% Retained on No. 200 Sieve	0 to 3/6 Filles	Poorly Graded		SP	SAND	
			Silty Fines	Well Graded	SW-SM	SAND with Silt
	SAND	6 to 12% Fines		Poorly Graded	SP-SM	SAND with Silt
_ ^			Clavey Fines	Well Graded	SW-SC	SAND with Clay
	S		Clayey Filles	Poorly Graded	SP-SC	SAND with Clay
			Silty Fines		SM	Silty SAND
		13 to 50% Fines	Silty, Clayey Fi	ines	SC-SM	Silty, Clayey SAND
			Clayey Fines		SC	Clayey SAND
, e		Low Plastic Fines, PI<4	Plots below "A	" line	ML	SILT
OII Siev	SILT & CLAY (ILL<50)	Low Plastic Fines, 4≤PI≤7	Plots on or above	ve "A" line	CL-ML	Silty CLAY
003 000	LT	Plastic Fines, PI>7	Plots on or above	ve "A" line	CL	Lean CLAY
VEI Io. 2		Significant Organics, PI<4	Plots below "A	" line	OL	Organic SILT
AIIA		Significant Organics, PI≥4	Plots on or above	ve "A" line	OL	Organic CLAY
FINE GRAINED SOIL > 50% Passing No. 200 Sieve	2	Elastic Fines	Plots below "A	" line	MH	Elastic SILT
IE (SILT & CLAY (LL≥50)	Plastic Fines	Plots on or above	ve "A" line	СН	Fat CLAY
FIN 50%	i di	Significant Organics	Significant Organics Plots below "A" line		ОН	Organic SILT
		Significant Organics	Plots on or above	ve "A" line	OH	Organic CLAY
HIGHLY ORGANIC SOIL		Dark, highly organic, decomp	posed vegetative t	issue	PT	PEAT

ADDITIONAL TERMINOLOGY:

Descriptive Components

Descriptive Terms	Proportions			
Trace	1 - 5%			
Little (Sand, Gravel)	6 - 14%			
With (Sand, Gravel)	15 – 30%			
With (Silt, Clay)	6 – 12%			
Adjective Form (Sandy, Gravelly)	31 - 50%			
Adjective Form (Silty, Clayey)	13 - 50%			

Density or Consistency

SAND	and GRAVEL	SILT and CLAY			
N-Value	Density	N-Value	Consistency		
0-4	Very Loose	0-1	Very Soft		
5-10	Loose	2-4	Soft		
11-30	Medium Dense	5-8	Medium Stiff		
31-50	Dense	9-15	Stiff		
> 50	> 50 Very Dense		Very Stiff		
		> 30	Hard		

Fill materials are placed by man, and may be identified by unnatural artifacts, unnatural mixed grain sizes or layering, or trustworthy documentation of fill placement.

Possible Fill materials are difficult to distinguish from natural soils, exhibiting minor distinctions.

Decomposed Rock consists of residual soil with SPT N-values between 50 blows per foot and blows per 4 inches (50/4"). **Highly Weathered Rock** consists of residual soil with SPT N-values between 50/3" and 50/1".

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The Robert B. Balter Company Geotechnical and Environmental Engineers Materials and Construction Inspection and Testing Telephone No. (410) 363-1555

BORING LOG

BORING B-4

PAGE 1 OF 1

CLIENT EA Engineering PROJECT NAME Gude Landfill PROJECT LOCATION Rockville, MD PROJECT NUMBER 17359-0 **DATE TESTED** METHOD Hollow Stem Auger SAMPLER: 2-in OD SS **RIG** Mobil B45 HAMMER: 140# FALL: 30" AUTO? Yes WATER LEVELS DATE STARTED 10/1/20 **COMPLETED** 10/1/20 ELAPSED CASING HOLE WATER WATER DATE TIME DEPTH (ft) DEPTH (ft) ELEV (ft) HOURS DEPTH (ft) DRILLER Dan Ditman **HELPER** Kenny Putman 10/1/20 10/2/20 13.3 9.8 443.7 447.2 REVIEWED BY Chris Karg SITE DELAYS LOCATION approximately 40' South **BULK SAMPLES** 1'-5' STRATUM CHANGE DEPTH/EL (ft) SPT BLOWS/6" OR REC IN/IN 9 GRAPHIC LOG LEVEL SAMPLE TYPE AND NUMBER N VALUE OR CORE RQD **MATERIAL** REMARKS DEPTH (ft) WATER **DESCRIPTION** (tst) **ATTERBERGS** USCS - #200 NMC ద SURFACE EL = 457.0 ft ы ы 0.3 Topsoil (4") S1 4-6-4 10 5 26 30 4 456.7 Moist, Loose, Brown Silty Sand with Small Rock Fragments (Fill) SM 4.0 19 453.0 Moist, Medium Stiff, Grayish Sandy Clay (Fill) 5 S2 3-2-3 5 1.90 27 CL 8.0 11 / 24 449.0 LANDFILL 10 Wet, Medium Dense, Brown Silty Sand and Trash (1) SM (Plastic, Wood, etc.) S3 5-11-3 14 13.0 444.0 Wet, Stiff, Brown Sandy Silt 15 ML 10/26/20 S4 9-9-5 14 17.0 NEW GEOTECH BH LOG 17359-0 GUDE LANDFILL - PURPLE LINE STOCKPILE.GPJ MTA REDLINE.GDT 440.0 Moist, Stiff, Brown Sandy, Clayey Silt with Rock and Trash (Wallpaper, etc.) 20 S5 3.25 3-4-6 10 CI -ML 25 S6 9-5-6 26.5 430.5 Terminated at 26.5 feet **REMARKS**: (1) Water encountered on spoon at 10'

3

10/26/20

NEW GEOTECH BH LOG 17359-0 GUDE LANDFILL - PURPLE LINE STOCKPILE.GPJ MTA REDLINE.GDT

The Robert B. Balter Company Geotechnical and Environmental Engineers Materials and Construction Inspection and Testing Telephone No. (410) 363-1555 www.balterco.com

BORING LOG

BORING B-5

PAGE 1 OF 3

CLIENT EA Engineering PROJECT NAME Gude Landfill PROJECT LOCATION Rockville, MD PROJECT NUMBER 17359-0 **DATE TESTED METHOD** Hollow Stem Auger SAMPLER: 2-in OD SS **RIG** Mobil B45 HAMMER: 140# FALL: 30" AUTO? Yes WATER LEVELS **DATE STARTED** 10/1/20 **COMPLETED** 10/2/20 **ELAPSED** HOLE WATER CASING WATER DATE TIME DEPTH (ft) DEPTH (ft) HELPER Kenny Putman HOURS DEPTH (ft) ELEV (ft) DRILLER Dan Ditman 10/2/20 10/5/20 457.2 460.5 REVIEWED BY Chris Karg SITE DELAYS LOCATION As Staked **BULK SAMPLES** 1'-5' STRATUM CHANGE DEPTH/EL (ft) SPT BLOWS/6" OR REC IN/IN 9 SAMPLE TYPE AND NUMBER GRAPHIC LOG LEVEL N VALUE OR CORE RQD **MATERIAL** REMARKS DEPTH (ft) WATER DESCRIPTION (tst) **ATTERBERGS** USCS - #200 NMC ద SURFACE EL = 471.5 ft ы PΙ 0.3 Topsoil (4") S1 1-2-2 4 1.80 16 471 2 Moist, Loose to Medium Dense, Orangish Brown Silty Sand (Fill) Tube at 4' in offset hole (Recovery = 13") 15 SM 5 S2 7-9-9 18 3.25 13 41 23 26 3 8.0 463.5 LANDFILL 10 Moist, Stiff, Orangish Brown/Black Sandy Silt (Fill, ML Possible wood obstruction augering) S3 8-8-5 13 Y 458.5 Wet, Loose, Grayish Silty Sand with Trash (Wood, Metal) (1) ∇ 15 SM S4 4-3-2 5 18.0 (2)453.5 Offset hole 5' West at approximately 18' after hitting F obstruction (possible steel pieces) 15-10-20 S5 20 Moist, Medium Dense Trash (Wood, Newspaper) 10 22.0 449.5 Wet, Medium Dense, Light Brown Silty Sand with Trash (Wood) SM <u>25</u> S6 14-9-8 17 27.0 444.5 Wet, Very Dense, Gravel with Sand and Trash (Wood) GC **≤** S7 50 440.5 Wet, Medium Dense to Very Dense, Dark Gray Trash F (Rubber, Plastic Pieces) 15-20-REMARKS: (1)Water encountered on spoon at 14' (2)Hole offset 5' West after hitting obstruction/refusal

BORING LOG

BORING B-5

PAGE 2 OF 2

www.balterco.com **CLIENT** EA Engineering PROJECT NAME Gude Landfill PROJECT LOCATION Rockville, MD PROJECT NUMBER 17359-0 **DATE TESTED** STRATUM CHANGE DEPTH/EL (ft) SAMPLE TYPE AND NUMBER SPT BLOWS/6" OR REC IN/IN % GRAPHIC LOG **WATER LEVEL** N VALUE OR CORE RQD DEPTH (ft) **MATERIAL** REMARKS **DESCRIPTION** PP (tsf) **ATTERBERGS USCS** #200 NMC PL Ы Wet, Medium Dense to Very Dense, Dark Gray Trash (Rubber, Plastic Pieces) (continued) 18-25 40 S9 39 14 24-33 45 S10 60 27 20-11-S11 18 50.5 Terminated at 50.5 feet NEW GEOTECH BH LOG 17359-0 GUDE LANDFILL - PURPLE LINE STOCKPILE.GPJ MTA REDLINE.GDT 10/26/20

REMARKS: (1)Water encountered on spoon at 14' (2)Hole offset 5' West after hitting obstruction/refusal

BORING LOG

BORING B-6
PAGE 1 OF 1

	WW																	
1	IT EAE																	
	ECT LOC										17359-0			ESTE				
I -								Stem Auger SAMPLE	R : 2-in OE) SS		MER:		_ FAL	L: <u>3</u>	<u>0"</u> A	UTO?	_Yes
								ED 10/5/20	DATE	TIME	ELAPSED	CASIN	G	HOLE		VATER		ATER
								Kenny Putman	10/5/20		HOURS 0 ♀	DEPTH	(π) υ	16.3	T) DE	PTH (ft Dry) ELI	EV (ft)
								YS								,		
LOCA	TION A	s Stake	ea				-	BULK SAMPLES _1'-14'										1
DEРТН (ft)	SAMPLE TYPE AND NUMBER	SPT BLOWS/6" OR REC IN/IN %	N VALUE OR CORE RQD	STRATUM CHANGE DEPTH/EL (ft)	GRAPHIC LOG	nscs	WATER LEVEL	N. DE SURFACE EL = 413.5	MATERIAL SCRIPTION	1		PP (tsf)	NMC %	- #200	ATT	ERBE LL	RGS PI	REMARKS
	S1	1-1-2	3	0.3 413.2	ille Ille		\vdash	Topsoil (4")			/				FL	LL	FI	
	31	1-1-2		413.2		ML		Moist, Soft, Brown Clay (Fill)	yey Silt, little	Sand, tra	ce roots							
-				3.0				,			0.111	_						
- -			-	410.5		:		Moist, Loose to Mediur Clayey Sand (Residual	n Dense, R∈)	eddish Bro	wn Silty							
5	T1	23 / 24				sc-		,	,				21	50	20	27	7	
-			1			SM												
				8.0														
-				405.5				Moist, Loose to Mediur Sand (Residual)	n Dense, R	eddish Bro	wn Silty							
10	S2	2-3-4	7					,					18					
-																		
-																		
15	S3	5-6-8	14			SM		Relic Rock Structure					16					
-														1				
: - : -						:		Color to Light Brown										
20	S4	8-11- 12	23										13	32	22	26	4	
		12		1		:												
				22.0 391.5	$\bigwedge \triangleleft \lambda$			Decomposed Rock sar	npled as: M	oist, Verv	Dense,							
╟ -					\\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	SM		Brown Silty Sand		, ,	,							
25	S5	14-24- 27	51	25.5	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\)												
				25.5 388.0	V 4 y			Termi	nated at 25	.5 feet		_						
						L							L					
25 REM	ARKS:											•						
!																		

APPENDIX B LABORATORY TEST RESULTS



SUMMARY OF LABORATORY RESULTS

PAGE 1 OF 1

CLIENT EA Engineering PROJECT NAME Gude Landfill

PROJECT LOCATION PROJECT NUMBER1738								<u>0</u> D .	ATE TESTE	D	
Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	Class- ification	Water Content (%)	Dry Density (pcf)	Satur- ation (%)	Void Ratio
B-4	0.0	30	26	4				5.5			
B-4	4.0							19.1			
B-4	5.0							26.8			
B-5	0.0							16.4			
B-5	4.0							15.3			
B-5	5.0	26	23	3	12.5	41	SM	13.4			
B-6	4.0	27	20	7	25	50	SC-SM	20.7			
B-6	9.0							18.2			
B-6	14.0							15.6			·
B-6	19.0	26	22	4	4.75	32	SM	13.0			

LAB SUMMARY 17359-0 GUDE LANDFILL - PURPLE LINE STOCKPILE.GPJ MTA REDLINE.GDT 10/22/20

GRAIN SIZE DISTRIBUTION

TEST METHOD ASTM D422

CLIENT EA Engineering PROJECT NAME Gude Landfill **PROJECT LOCATION** PROJECT NUMBER 17359-0 **DATE TESTED** U.S. SIEVE OPENING IN INCHES 6 4 3 2 1.5 1 3/4 U.S. SIEVE NUMBERS | 810 14 16 20 30 40 50 60 100 140 200 HYDROMETER 1/23/8 100 95 90 85 80 75 70 65 PERCENT FINER BY WEIGHT 60 55 50 45 40 35 30 25 20 15 GUDE LANDFILL - PURPLE LINE STOCKPILE.GPJ MTA REDLINE.GDT 10/22/20 10 5 100 10 0.1 0.01 0.001 **GRAIN SIZE IN MILLIMETERS GRAVEL** SAND **COBBLES** SILT OR CLAY coarse fine medium fine coarse Specimen Identification Classification LL PL Ы Сс Cu B-5, S-2 @ 5.0' - 6.5', Reddish Brown SILTY SAND(SM) 26 23 3 Specimen Identification D100 D60 D30 D10 %Gravel %Sand %Silt %Clay ● B-5, S-2 @ 5.0' - 6.5', 12.5 0.192 53.2 5.3 41.4 **GRAIN SIZE**

GRAIN SIZE DISTRIBUTION

TEST METHOD ASTM D422

CLIENT EA Engineering PROJECT NAME Gude Landfill **PROJECT LOCATION** PROJECT NUMBER 17359-0 **DATE TESTED** U.S. SIEVE OPENING IN INCHES U.S. SIEVE NUMBERS | 810 14 16 20 30 40 50 60 100 140 200 HYDROMETER 1/23/8 100 95 90 85 80 75 70 65 PERCENT FINER BY WEIGHT 60 55 50 45 40 35 30 25 20 15 GUDE LANDFILL - PURPLE LINE STOCKPILE.GPJ MTA REDLINE.GDT 10/22/20 10 5 100 10 0.1 0.01 0.001 **GRAIN SIZE IN MILLIMETERS GRAVEL** SAND **COBBLES** SILT OR CLAY coarse fine medium fine coarse Specimen Identification LL PL Ы Сс Cu Classification B-6, T-1 @ 4.0' - 6.0', Red SILTY, CLAYEY SAND(SC-SM) 27 20 7 Specimen Identification D100 D60 D30 D10 %Gravel %Sand %Silt %Clay ● B-6, T-1 @ 4.0' - 6.0', 25 0.176 6.7 43.6 49.7 **GRAIN SIZE**

GRAIN SIZE DISTRIBUTION

TEST METHOD ASTM D422

CLIENT EA Engineering PROJECT NAME Gude Landfill **PROJECT LOCATION** PROJECT NUMBER 17359-0 **DATE TESTED** U.S. SIEVE OPENING IN INCHES 6 4 3 2 1.5 1 3/4 1/23/8 U.S. SIEVE NUMBERS | 810 14 16 20 30 40 50 60 100 140 200 HYDROMETER 100 95 90 85 80 75 70 65 PERCENT FINER BY WEIGHT 60 55 50 45 40 35 30 25 20 15 GUDE LANDFILL - PURPLE LINE STOCKPILE.GPJ MTA REDLINE.GDT 10/22/20 10 5 100 10 0.1 0.01 0.001 **GRAIN SIZE IN MILLIMETERS GRAVEL** SAND **COBBLES** SILT OR CLAY coarse fine medium fine coarse Specimen Identification Classification LL PL Ы Сс Cu B-6, S-4 @ 19.0' - 20.5', Reddish Yellow SILTY SAND(SM) 26 22 4 Specimen Identification D100 D60 D30 D10 %Gravel %Sand %Silt %Clay ● B-6, S-4 @ 19.0' - 20.5', 4.75 0.251 0.0 68.5 31.5 **GRAIN SIZE**

APPENDIX C ENVIRONMENTAL MEASURES

HEALTH AND SAFETY PLAN REVIEW RECORD

SITE: Gude Landfill									
EA Project No	1564601								

I have read the Health and Safety Plan (s) and have been briefed on the nature, level, and degree of exposure likely as a result of participation of field activities. I agree to conform to all the requirements of this Plan.

<u>Name</u>	Signature	Affiliation	Date
Kristopher Crist	THE STATE OF THE S	RB BAYER Co	9/29/2020
Dennis STranserman	Marthan	RR Balter Co.	9-29-20
Remety Pulman or	1//	ABBONIEC Co.	9-29-20
David D. tman	Juny 7. Vito	18 Balter Co.	9-29-20
Chris Kang		RB Balter Co.	9-29-20
Kristophe Chot	7	- ft	18-1-20
Dennis Strucerma	- Shope	7 11 11	10-1-20
Kenneth Putman Tr	10/1	11 11	10-1-20
Daniel D. Luna	Chal T. Ostu	> / "	16.1-20
Chris Karg	Man de la	7 11 11	10-1-20
Chris Karg		1) 6	10-2-20
Kuneth Putman 50	1/1/20	11 94	10-2-20
Dariel Ditaron	Clink 7. Jak	S	10-2-20
Dennis STranderna	dry Men	A u	10-2.00
Chris Kara		11 11	10-5-20
Dankel B. Lang	and T. Other	11 11	16-5-20
Countly Putman Jr	1 get y	1111	10-5-20
Dennis Strandbruges	dhi th	- 1	10-5-20

SITE ENTRY AND EXIT LOG

Project/Site : Gude Landfill
Project No.: 1564601

			<u>T</u>	<u>ime</u>
Date 10/1/20	Name Kris Crist	Representing RBB	<u>In</u> ∂:05	Out 1: 30
	Chris strandom			
	Kenny Putner Dan Ditmen			
10/2/20	Pennis Stranking	RBB	8:10	2:00
	Van Pitman			
10/5/20	De Anis Stranksman		8:15	12:00
	Kenny Putman Dan Putman			1

ENVIRONMENTAL MONITORING RECORD

	CALIBRATIO	N: Gas: Conc:	_ Span:	
o lao	Time	B-4 e beginning B-4 e beginning B-4 e completion B-4 e completion B-5 e 10' B-5@ 15' B-5@ 20' B-5@ 40' B-6@ beginning B-6@ 18' B-6@ completion	Reading $L \in L = 0$ $20.8 \ 0z$ $0 \ Co$ $0 \ H15$ $0_{1}^{2} 20.8 \cdot C_{0} = 0 \ H_{2}S = 0$ $0_{2} = 20.8 \cdot C_{0} = 0 \cdot H_{2}S$ $0_{1} = 20.8 \cdot C_{0} = 0 \cdot H_{2}S$ $0_{2} = 20.8 \cdot C_{0} = 0 \cdot H_{2}S = 0$ $0_{3} = 20.8 \cdot C_{0} = 0 \cdot H_{2}S = 0$ $0_{4} = 20.8 \cdot C_{0} = 0 \cdot H_{2}S = 0$ $0_{5} = 20.8 \cdot C_{0} = 0 \cdot H_{5}S = 0$ $0_{5} = 20.8 \cdot C_{0} = 0 \cdot H_{5}S = 0$	COntrand Contrand
	Comments:			



THE ROBERT B. BALTER COMPANY®

November 23, 2020

Kerry E. Feuz, P.E. Civil Engineer EA Engineering, Science, and Technology, Inc., PBC 225 Schilling Circle, Suite 400 Hunt Valley, Maryland 21031

RE:

Laboratory Soils Test Results Purple Line Stockpile 600 East Gude Drive Rockville, Maryland 20850 RBB Project No. 17359-0 MD

Dear Ms. Feuz:

The Robert B. Balter Company is pleased to submit the laboratory test results from the samples collected at six (6) locations from the purple line stockpile within the Gude Landfill. The laboratory testing included six (6) of each of the following: Atterberg Limits, Direct Shears (remolded), Flexible Wall Permeability tests (remolded), Moisture Contents, Sieve Analyses, and Standard Proctors. See the lab summary sheet and associated laboratory test reports attached at the end of this document for further information.

Project information provided to us by various parties helped form the basis for our data report. If any of the project information discussed in this report differs from the actual proposed analysis, we should be contacted to re-evaluate the data provided herein and provide revisions or further investigation if requested.

We have appreciated this opportunity to be of service. If you have any questions regarding this report, or if we can assist you in any way, please do not hesitate to call our office.

Sincerely.

THE ROBERT B. BALTER COMPANY

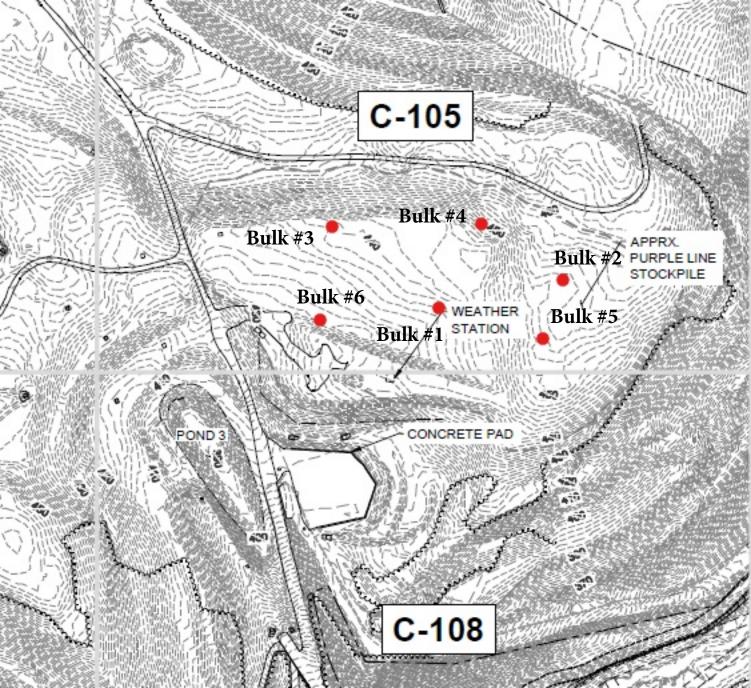
Professional Certification. I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland.

License No. 41312, Expiration Date: 01/05/2022

Christopher D. Karg II, E.I.T.

Project Engineer

Senior Geotechnical Engineer



Purple Line Stockpile Bulk #1 Lab Results

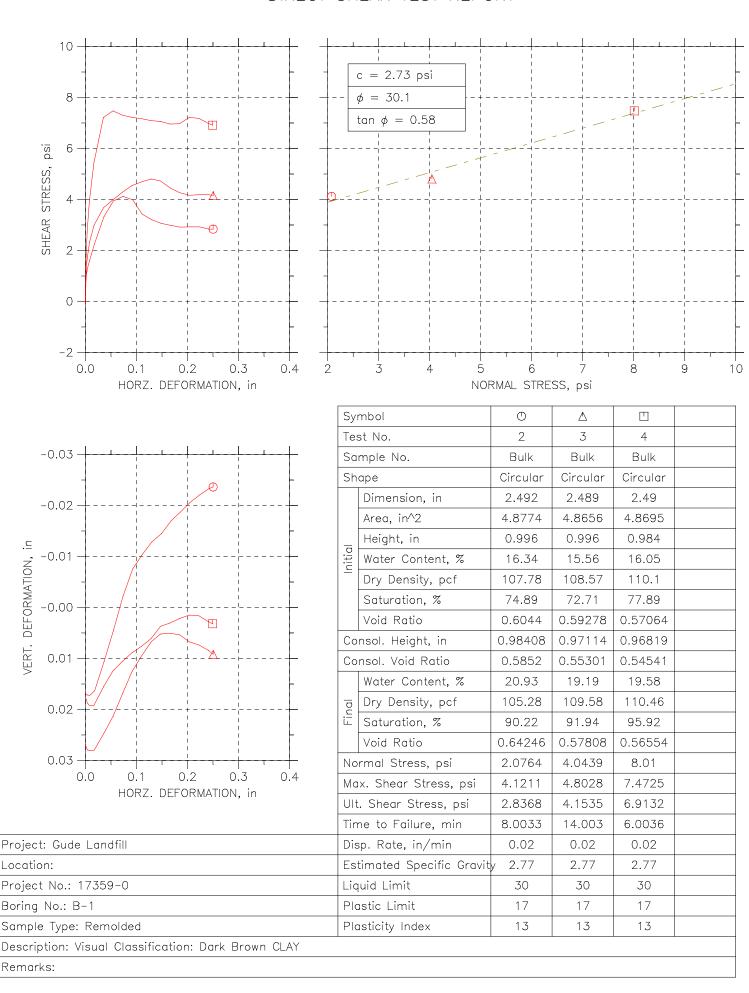
ATTERBERG LIMITS 17359-0 GUDE LANDFILL - PURPLE LINE STOCKPILE.GPJ MTA REDLINE.GDT

ATTERBERG LIMITS' RESULTS

TEST METHOD ASTM D4318

Telephone No. (410) 363-1555 www.balterco.com CLIENT EA Engineering PROJECT NAME Gude Landfill PROJECT LOCATION Rockville, MD PROJECT NUMBER 17359-0 **DATE TESTED** 60 (cl)(CH) 50 L A S T I 40 C I T 30 N D E X 20 10 CL-ML (ML) (MH)20 40 80 100 60 LIQUID LIMIT Specimen Identification LL PL PI Fines Classification Purple Line - Bulk 1, Bulk @ 0.0' - 5.0', 30 17 13 37 CLAYEY SAND(SC)

DIRECT SHEAR TEST REPORT





Client: Robert B. Balter Company Project Name: Gude Landfill Project Location: Maryland GTX #: 312644 Start Date: 11/13/2020 Tested By: jlw End Date: 11/18/2020 Checked By: emm Boring #: Sample #: Bulk 1 Depth: 0.0-5.0 ft Visual Description: Clayey Sand

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter by ASTM D5084 Constant Volume

Sample Type: Remolded Permeant Fluid: De-aired Distilled water

Orientation: Vertical Cell #: ---

Sample Preparation: Target Compaction: 95% of the 115.9 pcf at 13.5% moisture content. Values specified by client. Material >

3/8-inch screened out of sample prior to testing (0%). Trimmings moisture content = 13.3%

Assumed Specific Gravity: 2.70

Parameter	Initial	Final
Height, in	2.00	1.97
Diameter, in	2.86	2.83
Area, in ²	6.42	6.29
Volume, in ³	12.8	12.4
Mass, g	420.7	436.7
Bulk Density, pcf	124.5	134.0
Moisture Content, %	13.3	17.6
Dry Density, pcf	109.9	114.0
Degree of Saturation, %	67	99

B COEFFICIENT DETERMINATION

Cell Pressure, psi: 89.99 Increased Cell Pressure, psi: 95.04 Cell Pressure Increment, psi: 5.05 Sample Pressure, psi: 84.97 Corresponding Sample Pressure, psi: 89.67 Sample Pressure Increment, psi: 4.70

B Coefficient: 0.93

FLOW DATA

*B value did not increase with increase in pressure. Final degree of saturation >95%.

	Trial	Press	ure, psi	Manom	neter Read	ings	Elapsed Time,		Permeability K,	Temp,		Permeability K @ 20 °C,
Date	#	Cell	Sample	Z_1	Z_2	Z_1 - Z_2	sec	Gradient	cm/sec	°C	R _t	cm/sec
11/17 11/17 11/17 11/17	1 2 3 4	90.0 90.0 90.0 90.0	85.0 85.0 85.0 85.0	8.0 8.0 8.0 8.0	7.7 7.7 7.7 7.7	0.3 0.3 0.3 0.3	33 32 34 33	20.1 20.1 20.1 20.1	3.6E-07 3.7E-07 3.5E-07 3.6E-07	19.5 19.5 19.5 19.5	1.013 1.013 1.013 1.013	3.6E-07 3.7E-07 3.5E-07 3.6E-07

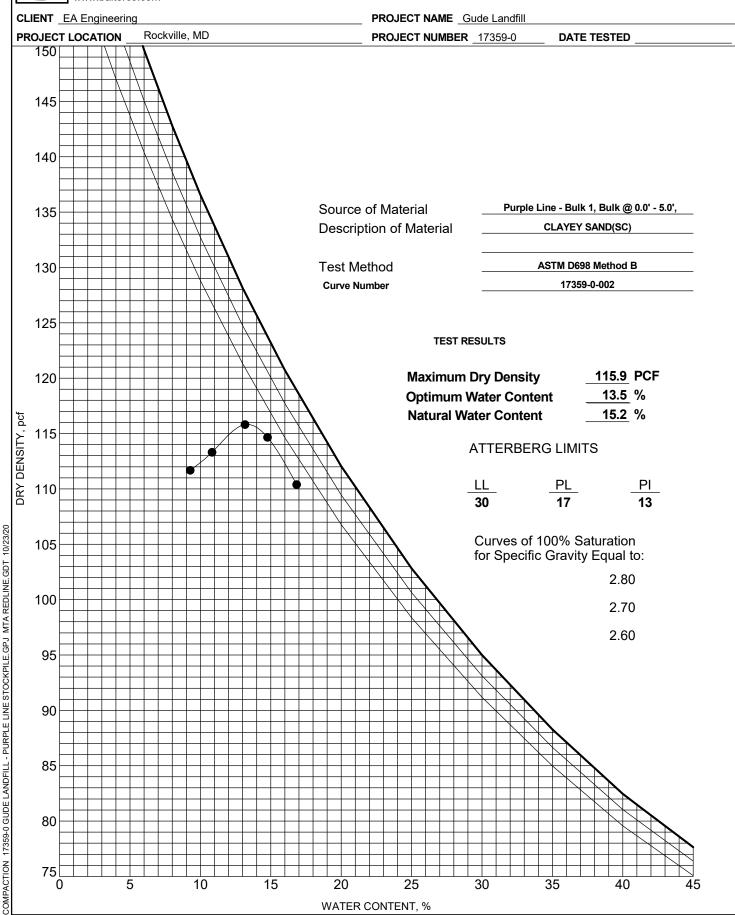
PERMEABILITY AT 20° C: 3.7 x 10⁻⁷ cm/sec (@ 5 psi effective stress)

GRAIN SIZE DISTRIBUTION

TEST METHOD ASTM D422

CLIENT EA Engineering PROJECT NAME Gude Landfill PROJECT LOCATION Rockville, MD PROJECT NUMBER 17359-0 **DATE TESTED** U.S. SIEVE OPENING IN INCHES U.S. SIEVE NUMBERS | 810 14 16 20 30 40 50 60 100 140 200 HYDROMETER 1/23/8 100 95 90 85 80 75 70 65 PERCENT FINER BY WEIGHT 60 55 50 45 40 35 30 25 20 15 GUDE LANDFILL - PURPLE LINE STOCKPILE.GPJ MTA REDLINE.GDT 11/23/20 10 5 100 10 0.1 0.01 0.001 **GRAIN SIZE IN MILLIMETERS GRAVEL** SAND **COBBLES** SILT OR CLAY coarse fine medium fine coarse Specimen Identification Classification LL PL Ы Сс Cu Purple Line - Bulk 1, Bulk @ 0.0' - 5.0', CLAYEY SAND(SC) 17 30 13 Specimen Identification D100 D60 D30 D10 %Gravel %Sand %Silt %Clay Purple Line - Bulk 1, Bulk @ 0.0' - 5.0', 19 0.181 2.0 60.5 37.5 **GRAIN SIZE**

MOISTURE-DENSITY RELATIONSHIP



WATER CONTENT, %

Purple Line Stockpile Bulk #2 Lab Results

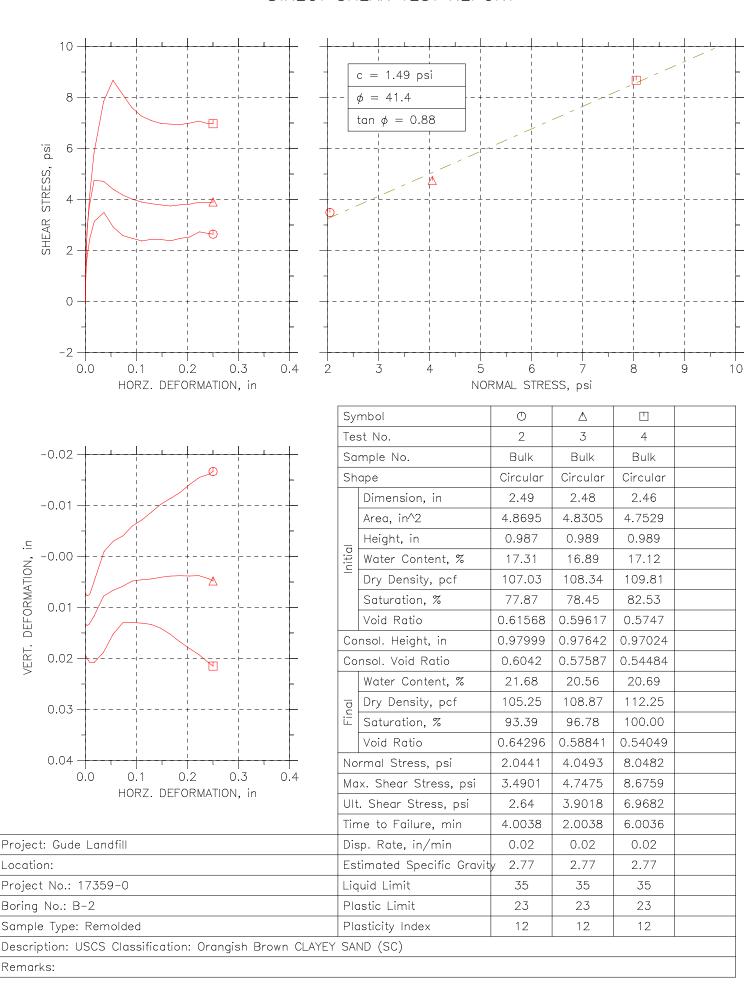
ATTERBERG LIMITS 17359-0 GUDE LANDFILL - PURPLE LINE STOCKPILE.GPJ MTA REDLINE.GDT

ATTERBERG LIMITS' RESULTS

TEST METHOD ASTM D4318

CLIENT EA Engineering PROJECT NAME Gude Landfill PROJECT LOCATION Rockville, MD PROJECT NUMBER 17359-0 **DATE TESTED** 60 (cl)(CH) 50 L A S T I 40 C I T 30 N D E X 20 10 CL-ML (ML) (MH)20 40 80 100 60 LIQUID LIMIT Specimen Identification LL PL PI Fines Classification Purple Line - Bulk 2, Bulk @ 0.0' - 5.0', 35 23 12 CLAYEY SAND(SC)

DIRECT SHEAR TEST REPORT





Client: Robert B. Balter Company

312644

Project Name: Gude Landfill Project Location: Maryland

Start Date: 11/19/2020 Tested By: jlw End Date: 11/20/2020 Checked By: emm

Boring #: Sample #: Bulk 2 Depth: 0.0-5.0 ft

Visual Description: Orangish Brown Clayey Sand

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter by ASTM D5084 **Constant Gradient**

Sample Type: Remolded Permeant Fluid: De-aired Distilled water

Orientation: Vertical Cell #:

GTX #:

Target Compaction: 95% of 114.0 pcf at 13.8% moisture content. Values specified by client. Material > Sample Preparation:

3/8-inch screened out of sample prior to testing (0%). Trimmings moisture content = 13.7%

Assumed Specific Gravity: 2.70

Parameter	Initial	Final		
Height, in	2.00	2.00		
Diameter, in	2.86	2.80		
Area, in ²	6.42	6.16		
Volume, in ³	12.8	12.3		
Mass, g	415.3	431.0		
Bulk Density, pcf	122.9	133.1		
Moisture Content, %	13.7	18.0		
Dry Density, pcf	108.0	112.7		
Degree of Saturation, %	66	98		

B COEFFICIENT DETERMINATION

Cell Pressure, psi: 90.00 Increased Cell Pressure, psi: 94.99 Cell Pressure Increment, ps 4.99 Sample Pressure, psi: 85.04 Corresponding Sample Pressure, psi: 89.25 Sample Pressure Increment 4.21

B Coefficient: 0.84

B-value did not increase with increase in pressure. **FLOW DATA**

Final degree of saturation >95%.

Date	Time,	Pressure, psi Cell Inlet Outlet			Gradient	Flow Volume, cc In Out Δ In Δ Out				Temp, °C	R _t	Permeability K @ 20 °C, cm/sec
	500							211	_ out		T\t	citiy see
11/20		90.0	85.5	84.5	13.8	7.00	14.00					
11/20	118	90.0	85.5	84.5	13.8	7.10	13.90	0.10	0.10	19.5	1.013	1.6E-06
11/20		90.0	85.5	84.5	13.8	7.00	14.00					
11/20	112	90.0	85.5	84.5	13.8	7.10	13.90	0.10	0.10	19.5	1.013	1.6E-06
11/20		90.0	85.5	84.5	13.8	7.00	14.00					
11/20	132	90.0	85.5	84.5	13.8	7.10	13.90	0.10	0.10	19.5	1.013	1.4E-06
11/20		90.0	85.5	84.5	13.8	7.00	14.00					
11/20	129	90.0	85.5	84.5	13.8	7.10	13.90	0.10	0.10	19.5	1.013	1.4E-06

PERMEABILITY AT 20° C: 1.5 x 10⁻⁶ cm/sec (@ 5 psi effective stress)

GRAIN SIZE DISTRIBUTION

TEST METHOD ASTM D422

CLIENT EA Engineering PROJECT NAME Gude Landfill PROJECT LOCATION Rockville, MD PROJECT NUMBER 17359-0 **DATE TESTED** U.S. SIEVE OPENING IN INCHES
6 4 3 2 1.5 1 3/4 U.S. SIEVE NUMBERS | 810 14 16 20 30 40 50 60 100 140 200 HYDROMETER 1/23/8 100 95 90 85 80 75 70 65 PERCENT FINER BY WEIGHT 60 55 50 45 40 35 30 25 20 15 GUDE LANDFILL - PURPLE LINE STOCKPILE.GPJ MTA REDLINE.GDT 11/23/20 10 5 100 10 0.1 0.01 0.001 **GRAIN SIZE IN MILLIMETERS GRAVEL** SAND **COBBLES** SILT OR CLAY coarse fine medium fine coarse Specimen Identification Classification LL PL Ы Сс Cu Purple Line - Bulk 2, Bulk @ 0.0' - 5.0', CLAYEY SAND(SC) 23 35 12 Specimen Identification D100 D60 D30 D10 %Gravel %Sand %Silt %Clay Purple Line - Bulk 2, Bulk @ 0.0' - 5.0', 25 0.248 55.0 6.6 38.3 **GRAIN SIZE**

MOISTURE-DENSITY RELATIONSHIP

PROJECT NAME Gude Landfill **CLIENT** EA Engineering Rockville, MD PROJECT LOCATION PROJECT NUMBER 17359-0 **DATE TESTED** 145 140 Purple Line - Bulk 2, Bulk @ 0.0' - 5.0', Source of Material 135 **Description of Material** CLAYEY SAND(SC) ASTM D698 Method B 130 **Test Method Curve Number** 17359-0-003 125 **TEST RESULTS Maximum Dry Density** 114.0 PCF 120 13.8 % **Optimum Water Content** 15.9 % **Natural Water Content** DRY DENSITY, pcf 115 ATTERBERG LIMITS LL Ы 110 COMPACTION 17359-0 GUDE LANDFILL - PURPLE LINE STOCKPILE. GPJ MTA REDLINE. GDT 10/23/20 Curves of 100% Saturation 105 for Specific Gravity Equal to: 2.80 100 2.70 2.60 95 90 85 80 75 10 15 20 30 35 40

WATER CONTENT, %

Purple Line Stockpile Bulk #3 Lab Results

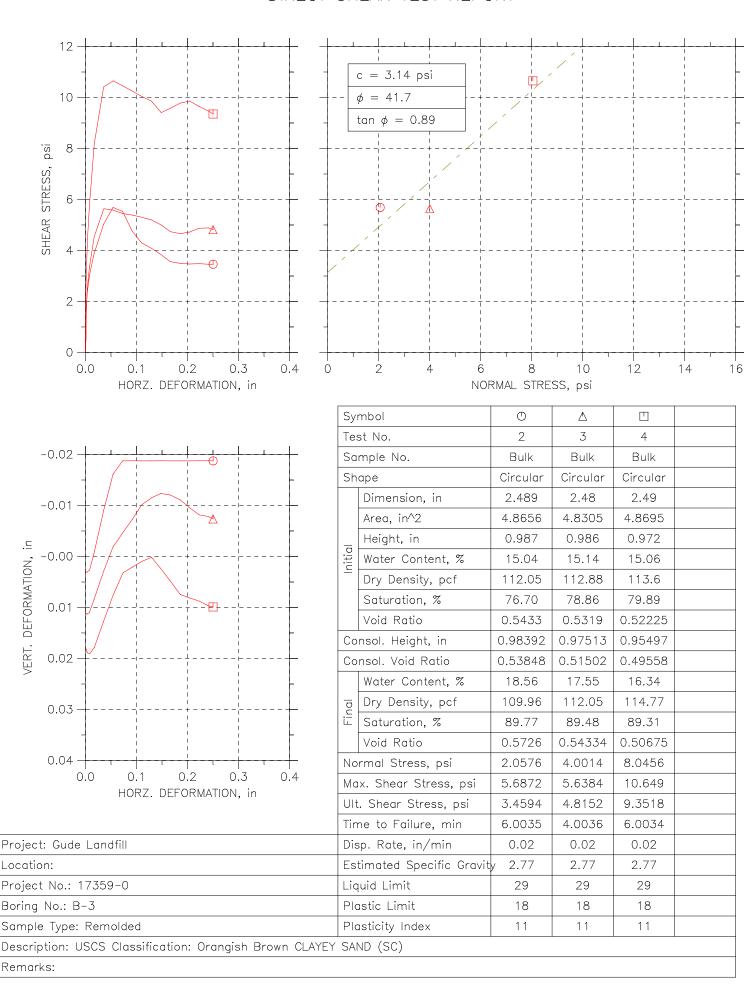
ATTERBERG LIMITS 17359-0 GUDE LANDFILL - PURPLE LINE STOCKPILE.GPJ MTA REDLINE.GDT

ATTERBERG LIMITS' RESULTS

TEST METHOD ASTM D4318

CLIENT EA Engineering PROJECT NAME Gude Landfill PROJECT LOCATION Rockville, MD PROJECT NUMBER 17359-0 **DATE TESTED** 60 (cl)(CH) 50 L A S T I 40 C I T 30 N D E X 20 10 CL-ML (ML) (MH)20 40 80 100 60 LIQUID LIMIT Specimen Identification LL PL PI Fines Classification Purple Line - Bulk 3, Bulk @ 0.0' - 5.0', 29 18 11 36 CLAYEY SAND(SC)

DIRECT SHEAR TEST REPORT





Client: Robert B. Balter Company Project Name: Gude Landfill Project Location: Maryland GTX #: 312644 Start Date: 11/19/2020 Tested By: jlw End Date: 11/20/2020 Checked By: emm Boring #: Sample #: Bulk 3 Depth: 0.0-5.0 ft Visual Description: Orangish Brown Clayey Sand

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter by ASTM D5084 Constant Volume

Sample Type: Remolded Permeant Fluid: De-aired Distilled water

Orientation: Vertical Cell #: ---

Sample Preparation: Target Compaction: 95% of 117.8 pcf at 12.7% moisture content. Values specified by client. Material > 3/8-

inch screened out of sample prior to testing (0%). Trimmings moisture content = 13.1%

Assumed Specific Gravity: 2.70

Parameter	Initial	Final			
Height, in	2.00	2.00			
Diameter, in	2.86	2.86			
Area, in ²	6.42	6.42			
Volume, in ³	12.8	12.8			
Mass, g	426.9	445.7			
Bulk Density, pcf	126.3	131.9			
Moisture Content, %	13.1	18.1			
Dry Density, pcf	111.7	111.7			
Degree of Saturation, %	69	96			

B COEFFICIENT DETERMINATION

Cell Pressure, psi: 89.99 Increased Cell Pressure, psi: 95.01 Cell Pressure Increment, psi: 5.02 Sample Pressure, psi: 84.99 Corresponding Sample Pressure, psi: 89.04 Sample Pressure Increment, psi: 4.05

B Coefficient: 0.81

FLOW DATA

*B value did not increase with increase in pressure. Final degree of saturation >95%.

	Trial	Pressure, psi		Manometer Readings			Elapsed Time,		Permeability K,	Temp,		Permeability K @ 20 °C,
Date	#	Cell	Sample	Z_1	Z_2	Z_1 - Z_2	sec	Gradient	cm/sec	°C	R _t	cm/sec
11/20 11/20 11/20 11/20	1 2 3 4	90.0 90.0 90.0 90.0	85.0 85.0 85.0 85.0	8.0 8.0 8.0 8.0	7.5 7.5 7.5 7.5	0.5 0.5 0.5 0.5	35 38 36 37	19.8 19.8 19.8 19.8	5.6E-07 5.2E-07 5.5E-07 5.3E-07	19.5 19.5 19.5 19.5	1.013 1.013 1.013 1.013	5.7E-07 5.3E-07 5.6E-07 5.4E-07

PERMEABILITY AT 20° C: 5.5 x 10⁻⁷ cm/sec (@ 5 psi effective stress)

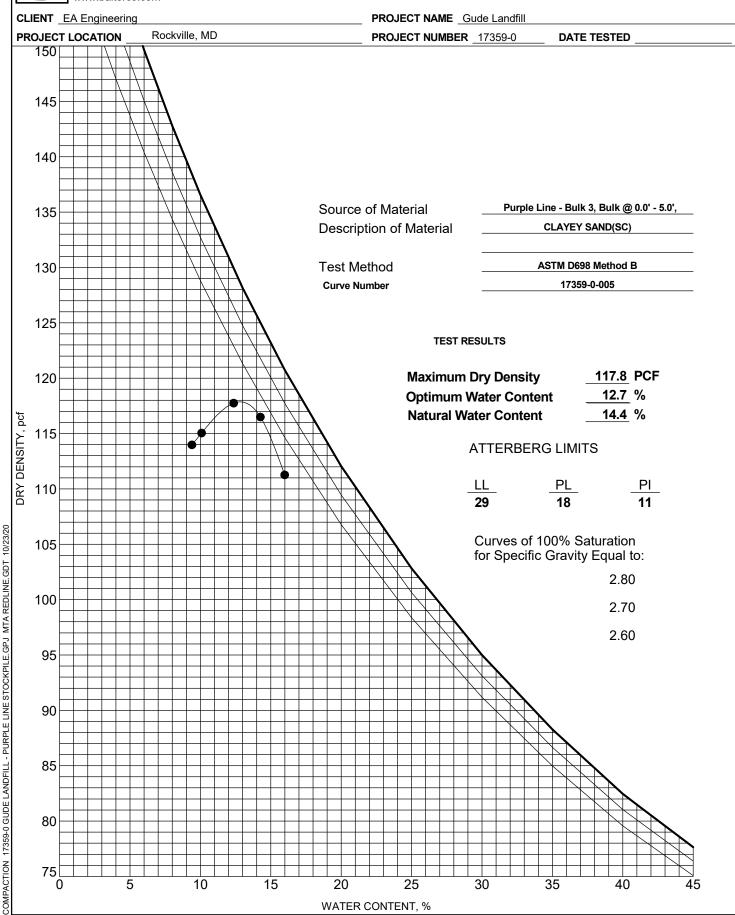
GRAIN SIZE DISTRIBUTION

TEST METHOD ASTM D422

CLIENT EA Engineering PROJECT NAME Gude Landfill PROJECT LOCATION Rockville, MD PROJECT NUMBER 17359-0 **DATE TESTED** U.S. SIEVE OPENING IN INCHES

6 4 3 2 1.5 1 3/4 U.S. SIEVE NUMBERS | 810 14 16 20 30 40 50 60 100 140 200 HYDROMETER 1/23/8 3 100 95 90 85 80 75 70 65 PERCENT FINER BY WEIGHT 60 55 50 45 40 35 30 25 20 15 GUDE LANDFILL - PURPLE LINE STOCKPILE.GPJ MTA REDLINE.GDT 11/23/20 10 5 100 10 0.1 0.01 0.001 **GRAIN SIZE IN MILLIMETERS GRAVEL** SAND **COBBLES** SILT OR CLAY coarse fine medium fine coarse Specimen Identification Classification LL PL Ы Сс Cu Purple Line - Bulk 3, Bulk @ 0.0' - 5.0', CLAYEY SAND(SC) 29 18 11 Specimen Identification D100 D60 D30 D10 %Gravel %Sand %Silt %Clay Purple Line - Bulk 3, Bulk @ 0.0' - 5.0', 25 0.205 9.9 54.2 35.9 **GRAIN SIZE**

MOISTURE-DENSITY RELATIONSHIP



WATER CONTENT, %

Purple Line Stockpile Bulk #4 Lab Results

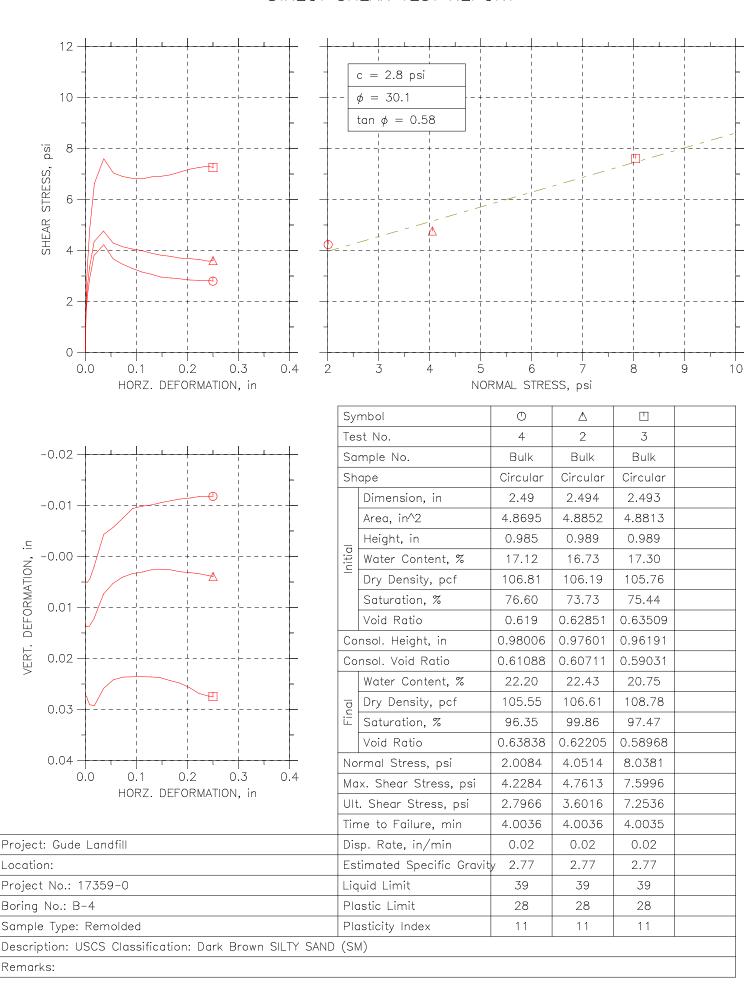
ATTERBERG LIMITS 17359-0 GUDE LANDFILL - PURPLE LINE STOCKPILE.GPJ MTA REDLINE.GDT

ATTERBERG LIMITS' RESULTS

TEST METHOD ASTM D4318

Telephone No. (410) 363-1555 www.balterco.com CLIENT EA Engineering PROJECT NAME _Gude Landfill PROJECT LOCATION Rockville, MD PROJECT NUMBER 17359-0 **DATE TESTED** 60 (cl)(CH) 50 L A S T I 40 C I T 30 N D E X 20 10 CL-ML (ML) (MH)20 40 80 100 60 LIQUID LIMIT Specimen Identification LL PL PI Fines Classification Purple Line - Bulk 4, Bulk @ 0.0' - 5.0', 39 28 11 40 SILTY SAND(SM)

DIRECT SHEAR TEST REPORT





Client: Robert B. Balter Company

Project Name: Gude Landfill Project Location: Maryland 312644 GTX #:

Start Date: 11/19/2020 Tested By: jlw End Date: 11/20/2020 Checked By: emm

Boring #:

Sample #: Bulk 4 Depth: 0.0-5.0 ft

Visual Description: Dark Brown Silty Sand

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter by ASTM D5084 **Constant Gradient**

Sample Type: Remolded Permeant Fluid: De-aired Distilled water

Orientation: Vertical Cell #:

Target Compaction: 95% of the 111.8 pcf at 15.2% moisture content. Values specified by client. Material Sample Preparation:

> 3/8-inch screened out of sample prior to testing (0%). Trimmings moisture content = 15.4%

2.70 Assumed Specific Gravity:

Parameter	Initial	Final
Height, in	2.00	2.00
Diameter, in	2.86	2.86
Area, in ²	6.42	6.42
Volume, in ³	12.8	12.8
Mass, g	412.7	432.1
Bulk Density, pcf	122.1	127.8
Moisture Content, %	15.4	20.8
Dry Density, pcf	105.8	105.8
Degree of Saturation, %	70	95

B COEFFICIENT DETERMINATION

Cell Pressure, psi: 90.01 Increased Cell Pressure, psi: 94.99 Cell Pressure Increment, ps 4.98 Sample Pressure, psi: 85.02 Corresponding Sample Pressure, psi: 89.44 Sample Pressure Increment 4.42

B Coefficient: 0.89

B-value did not increase with increase in pressure. **FLOW DATA**

Final degree of saturation >95%.

Date sec Cell 11/20 90.0 11/20 83 90.0 11/20 90.0				Flow Vo	lume, cc		Temp,		Permeability K @ 20 °C,
11/20 83 90.0	Cell Inlet Outle	Gradient	In	Out	Δ _{In}	Δ Out	°C	R _t	cm/sec
11/20 79 90.0 11/20 90.0 11/20 89 90.0 11/20 90.0 11/20 92 90.0	90.0 85.5 84.5 90.0 85.5 84.5 90.0 85.5 84.5 90.0 85.5 84.5 90.0 85.5 84.5 90.0 85.5 84.5	13.8 13.8 13.8 13.8 13.8 13.8 13.8 13.8	7.00 7.10 7.00 7.10 7.00 7.10 7.00 7.10	14.00 13.90 14.00 13.90 14.00 13.90 14.00 13.90	0.10 0.10 0.10 0.10	0.10 0.10 0.10 0.10	19.5 19.5 19.5 19.5	1.013 1.013 1.013 1.013	2.1E-06 2.2E-06 2.0E-06 1.9E-06

PERMEABILITY AT 20° C: 2.1 x 10⁻⁶ cm/sec (@ 5 psi effective stress)

GRAIN SIZE DISTRIBUTION

TEST METHOD ASTM D422

CLIENT EA Engineering PROJECT NAME Gude Landfill PROJECT LOCATION Rockville, MD PROJECT NUMBER 17359-0 **DATE TESTED** U.S. SIEVE OPENING IN INCHES U.S. SIEVE NUMBERS | 810 14 16 20 30 40 50 60 100 140 200 HYDROMETER 1/23/8 100 95 90 85 80 75 70 65 PERCENT FINER BY WEIGHT 60 55 50 45 40 35 30 25 20 15 GUDE LANDFILL - PURPLE LINE STOCKPILE.GPJ MTA REDLINE.GDT 11/23/20 10 5 100 10 0.1 0.01 0.001 **GRAIN SIZE IN MILLIMETERS GRAVEL** SAND **COBBLES** SILT OR CLAY coarse fine medium fine coarse Specimen Identification Classification LL PL Ы Сс Cu Purple Line - Bulk 4, Bulk @ 0.0' - 5.0', SILTY SAND(SM) 39 28 11 Specimen Identification D100 D60 D30 D10 %Gravel %Sand %Silt %Clay Purple Line - Bulk 4, Bulk @ 0.0' - 5.0', 19 0.2 4.2 56.0 39.8 **GRAIN SIZE**

MOISTURE-DENSITY RELATIONSHIP

PROJECT NAME Gude Landfill **CLIENT** EA Engineering Rockville, MD PROJECT LOCATION PROJECT NUMBER 17359-0 **DATE TESTED** 145 140 Purple Line - Bulk 4, Bulk @ 0.0' - 5.0', Source of Material 135 **Description of Material** SILTY SAND(SM) ASTM D698 Method B 130 **Test Method Curve Number** 17359-0-006 125 **TEST RESULTS Maximum Dry Density** 111.8 PCF 120 15.2 % **Optimum Water Content** 16.1 % **Natural Water Content** DRY DENSITY, pcf 115 ATTERBERG LIMITS LL PLЫ 110 COMPACTION 17359-0 GUDE LANDFILL - PURPLE LINE STOCKPILE GPJ MTA REDLINE GDT 10/23/20 Curves of 100% Saturation 105 for Specific Gravity Equal to: 2.80 100 2.70 2.60 95 90 85 80 75 10 15 20 30 35 40

WATER CONTENT, %

Purple Line Stockpile Bulk #5 Lab Results

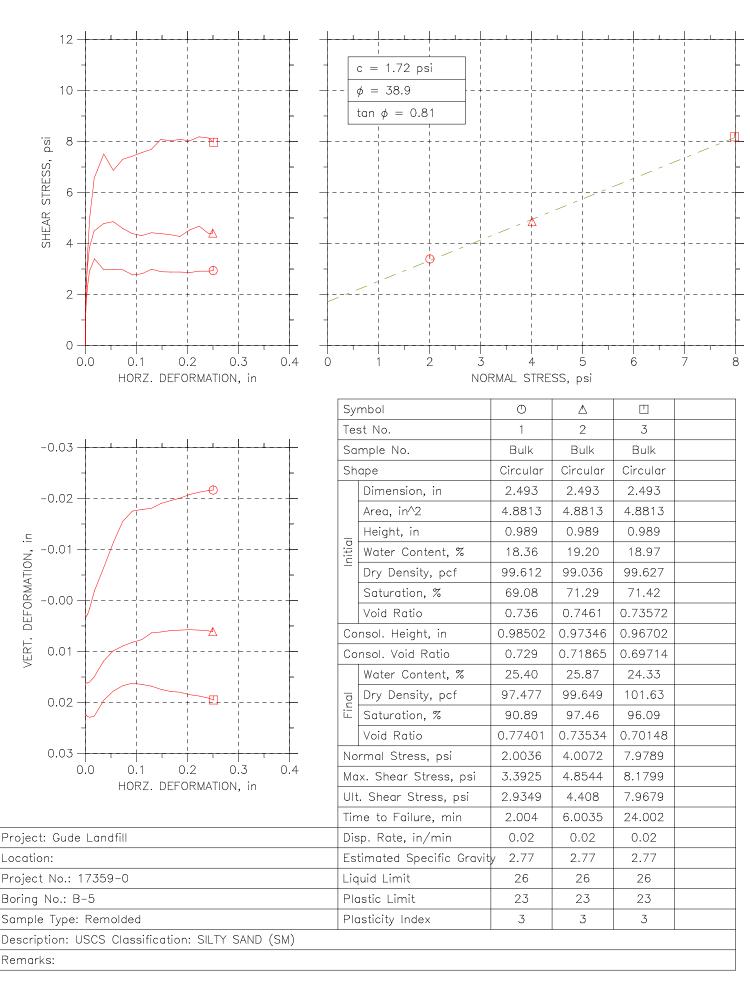
ATTERBERG LIMITS 17359-0 GUDE LANDFILL - PURPLE LINE STOCKPILE.GPJ MTA REDLINE.GDT

ATTERBERG LIMITS' RESULTS

TEST METHOD ASTM D4318

Telephone No. (410) 363-1555 www.balterco.com CLIENT EA Engineering PROJECT NAME _Gude Landfill PROJECT LOCATION Rockville, MD PROJECT NUMBER 17359-0 **DATE TESTED** 60 (cl)(CH) 50 L A S T I 40 С 30 N D E X 20 10 CL-ML (ML) (MH)20 40 80 100 60 LIQUID LIMIT Specimen Identification LL PL PI Fines Classification Purple Line - Bulk 5, Bulk @ 0.0' - 5.0', 48 34 14 Brown SILTY SAND(SM)

DIRECT SHEAR TEST REPORT





Client: Robert B. Balter Company Project Name: Gude Landfill Project Location: Maryland GTX #: 312644 Start Date: 11/12/2020 Tested By: jlw End Date: 11/16/2020 Checked By: emm Boring #: Sample #: Bulk 5 Depth: 0.0-5.0 ft Visual Description: Brown Silty Sand

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter by ASTM D5084 Constant Volume

Sample Type: Remolded Permeant Fluid: De-aired Distilled water

Orientation: Vertical Cell #: ---

Sample Preparation: Target Compaction: 95% of 104.1 pcf at 18.0%. Values specified by client. Material > 3/8-inch screened out

of sample prior to testing (0%). Trimmings moisture content = 18.0%

Assumed Specific Gravity: 2.70

Parameter	Initial	Final
Height, in	2.00	2.00
Diameter, in	2.86	2.83
Area, in ²	6.42	6.29
Volume, in ³	12.8	12.6
Mass, g	393.6	416.6
Bulk Density, pcf	116.5	125.9
Moisture Content, %	18.0	25.0
Dry Density, pcf	98.6	100.8
Degree of Saturation, %	69	100

B COEFFICIENT DETERMINATION

Cell Pressure, psi: 90.01 Increased Cell Pressure, psi: 95.00 Cell Pressure Increment, psi: 4.99 Sample Pressure, psi: 85.00 Corresponding Sample Pressure, psi: 89.48 Sample Pressure Increment, psi: 4.48

B Coefficient: 0.90

FLOW DATA

*B value did not increase with increase in pressure. Final degree of saturation >95%.

	Trial	Press	ure, psi	Manom	neter Read	ings	Elapsed Time,		Permeability K,	Temp,		Permeability K @ 20 °C,
Date	#	Cell	Sample	Z_1	Z_2	Z_1 - Z_2	sec	Gradient	cm/sec	°C	R _t	cm/sec
11/13 11/13 11/13 11/13	1 2 3 4	90.0 90.0 90.0 90.0	85.0 85.0 85.0 85.0	8.0 8.0 8.0 8.0	7.3 7.3 7.3 7.3	0.7 0.7 0.7 0.7	37 39 41 42	19.8 19.8 19.8 19.8	7.7E-07 7.3E-07 7.0E-07 6.8E-07	19.5 19.5 19.5 19.5	1.013 1.013 1.013 1.013	7.8E-07 7.4E-07 7.1E-07 6.9E-07

PERMEABILITY AT 20° C: 7.3 x 10⁻⁷ cm/sec (@ 5 psi effective stress)

GRAIN SIZE DISTRIBUTION

TEST METHOD ASTM D422

CLIENT EA Engineering PROJECT NAME Gude Landfill PROJECT LOCATION Rockville, MD PROJECT NUMBER 17359-0 **DATE TESTED** U.S. SIEVE OPENING IN INCHES
6 4 3 2 1.5 1 3/4 1/23/8 U.S. SIEVE NUMBERS | 810 14 16 20 30 40 50 60 100 140 200 HYDROMETER 3 100 95 90 85 80 75 70 65 PERCENT FINER BY WEIGHT 60 55 50 45 40 35 30 25 20 15 GUDE LANDFILL - PURPLE LINE STOCKPILE.GPJ MTA REDLINE.GDT 11/23/20 10 5 100 10 0.1 0.01 0.001 **GRAIN SIZE IN MILLIMETERS GRAVEL** SAND **COBBLES** SILT OR CLAY coarse fine medium fine coarse Specimen Identification Classification LL PL Ы Сс Cu Purple Line - Bulk 5, Bulk @ 0.0' - 5.0', Brown SILTY SAND(SM) 48 34 14 Specimen Identification D100 D60 D30 D10 %Gravel %Sand %Silt %Clay Purple Line - Bulk 5, Bulk @ 0.0' - 5.0', 50 0.177 13.0 42.8 44.2 **GRAIN SIZE**

MOISTURE-DENSITY RELATIONSHIP

PROJECT NAME Gude Landfill CLIENT EA Engineering PROJECT LOCATION Rockville, MD PROJECT NUMBER 17359-0 **DATE TESTED** 145 140 Purple Line - Bulk 5, Bulk @ 0.0' - 5.0', Source of Material 135 **Description of Material Brown SILTY SAND(SM)** ASTM D698 Method B 130 **Test Method Curve Number** 17359-0-001 125 **TEST RESULTS Maximum Dry Density** 104.1 PCF 120 18.0 % **Optimum Water Content** 22.8 % **Natural Water Content** DRY DENSITY, pcf 115 ATTERBERG LIMITS LL Ы 110 COMPACTION 17359-0 GUDE LANDFILL - PURPLE LINE STOCKPILE. GPJ MTA REDLINE. GDT 10/29/20 Curves of 100% Saturation 105 for Specific Gravity Equal to: 2.80 100 2.70 2.60 95 90 85 80 75 10 15 20 30 35 40

WATER CONTENT, %

Purple Line Stockpile Bulk #6 Lab Results

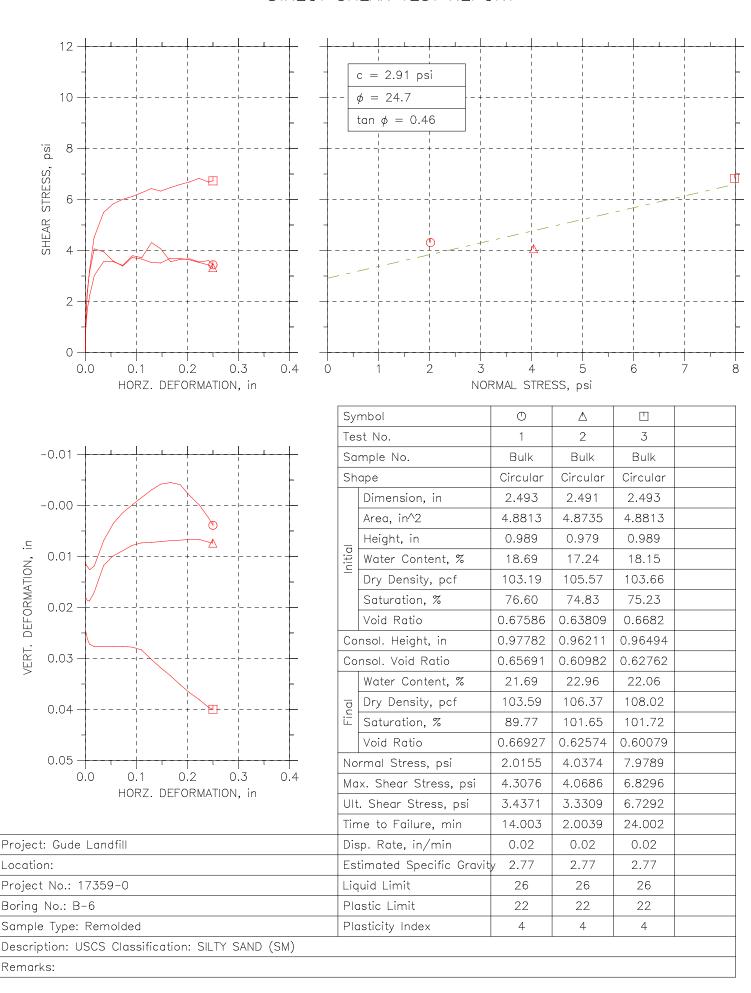
ATTERBERG LIMITS 17359-0 GUDE LANDFILL - PURPLE LINE STOCKPILE.GPJ MTA REDLINE.GDT

ATTERBERG LIMITS' RESULTS

TEST METHOD ASTM D4318

CLIENT EA Engineering PROJECT NAME _Gude Landfill PROJECT LOCATION Rockville, MD PROJECT NUMBER 17359-0 **DATE TESTED** 60 (cl)(CH) 50 L A S T I 40 C I T 30 N D E X 20 10 CL-ML (ML) (MH)20 40 80 100 60 LIQUID LIMIT Specimen Identification LL PL PI Fines Classification Purple Line - Bulk 6, Bulk @ 0.0' - 5.0', 31 29 2 Light Brown SILTY SAND(SM)

DIRECT SHEAR TEST REPORT





Client: Robert B. Balter Company

Project Name: Gude Landfill
Project Location: Maryland
GTX #: 312644

Start Date: 11/12/2020 Tested By: jlw
End Date: 11/18/2020 Checked By: emm

Boring #: --Sample #: Bulk 6

Visual Description: Light Brown Silty Sand

0.0-5.0 ft

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter by ASTM D5084 Constant Gradient

Sample Type: Remolded Permeant Fluid: De-aired Distilled water

Orientation: Vertical Cell #: ---

Depth:

Sample Preparation: Target Compaction: 95% of 110.8 pcf at 15.0%. Values specified by client. Material > 3/8-inch screened

out of sample prior to testing (0%). Trimmings moisture content = 15.2%

Assumed Specific Gravity: 2.70

Parameter	Initial	Final
Height, in	2.00	2.00
Diameter, in	2.86	2.83
Area, in ²	6.42	6.29
Volume, in ³	12.8	12.6
Mass, g	409.0	430.3
Bulk Density, pcf	121.0	130.0
Moisture Content, %	15.2	21.2
Dry Density, pcf	105.1	107.3
Degree of Saturation, %	68	100

B COEFFICIENT DETERMINATION

Cell Pressure, psi: 89.98 Increased Cell Pressure, psi: 95.01 Cell Pressure Increment, ps 5.03 Sample Pressure, psi: 85.03 Corresponding Sample Pressure, psi: 89.20 Sample Pressure Increment 4.17

B Coefficient: 0.83

FLOW DATA

Final degree of saturation >95%

B-value did not increase with increase in pressure. Final degree of saturation >95%.

Permeability K @ 20 °C, Time, Pressure, psi Flow Volume, cc Temp, Δ In △ Out ٥С Date Cell Inlet Outlet Gradient In Out cm/sec sec R_t 90.0 85.5 13.8 7.00 11/13 84.5 14.00 11/13 61 90.0 85.5 84.5 13.8 7.10 13.90 0.10 0.10 19.5 1.013 3.0E-06 11/13 85.5 84.5 14.00 90.0 13.8 7.00 64 11/13 90.0 85.5 84.5 13.8 7.10 13.90 0.10 0.10 19.5 1.013 2.8E-06 11/13 90.0 85.5 84.5 13.8 7.00 14.00 11/13 56 90.0 85.5 84.5 13.8 7.10 13.90 0.10 0.10 19.5 1.013 3.2E-06 11/13 90.0 85.5 84.5 13.8 7.00 14.00 11/13 57 90.0 85.5 84.5 13.8 7.10 13.90 0.10 0.10 19.5 1.013 3.2E-06

PERMEABILITY AT 20° C: 3.0 x 10⁻⁶ cm/sec (@ 5 psi effective stress)

GRAIN SIZE DISTRIBUTION

TEST METHOD ASTM D422

CLIENT EA Engineering PROJECT NAME Gude Landfill PROJECT LOCATION Rockville, MD PROJECT NUMBER 17359-0 **DATE TESTED** U.S. SIEVE OPENING IN INCHES 6 4 3 2 15 1 3/4 U.S. SIEVE NUMBERS | 810 14 16 20 30 40 50 60 100 140 200 HYDROMETER 1/23/8 3 100 95 90 85 80 75 70 65 PERCENT FINER BY WEIGHT 60 55 50 45 40 35 30 25 20 15 GUDE LANDFILL - PURPLE LINE STOCKPILE.GPJ MTA REDLINE.GDT 11/23/20 10 5 100 10 0.1 0.01 0.001 **GRAIN SIZE IN MILLIMETERS GRAVEL** SAND **COBBLES** SILT OR CLAY coarse fine medium fine coarse Specimen Identification Classification LL PL Ы Сс Cu Purple Line - Bulk 6, Bulk @ 0.0' - 5.0', Light Brown SILTY SAND(SM) 29 31 2 Specimen Identification D100 D60 D30 D10 %Gravel %Sand %Silt %Clay Purple Line - Bulk 6, Bulk @ 0.0' - 5.0', 37.5 0.217 10.0 52.8 37.2 **GRAIN SIZE**

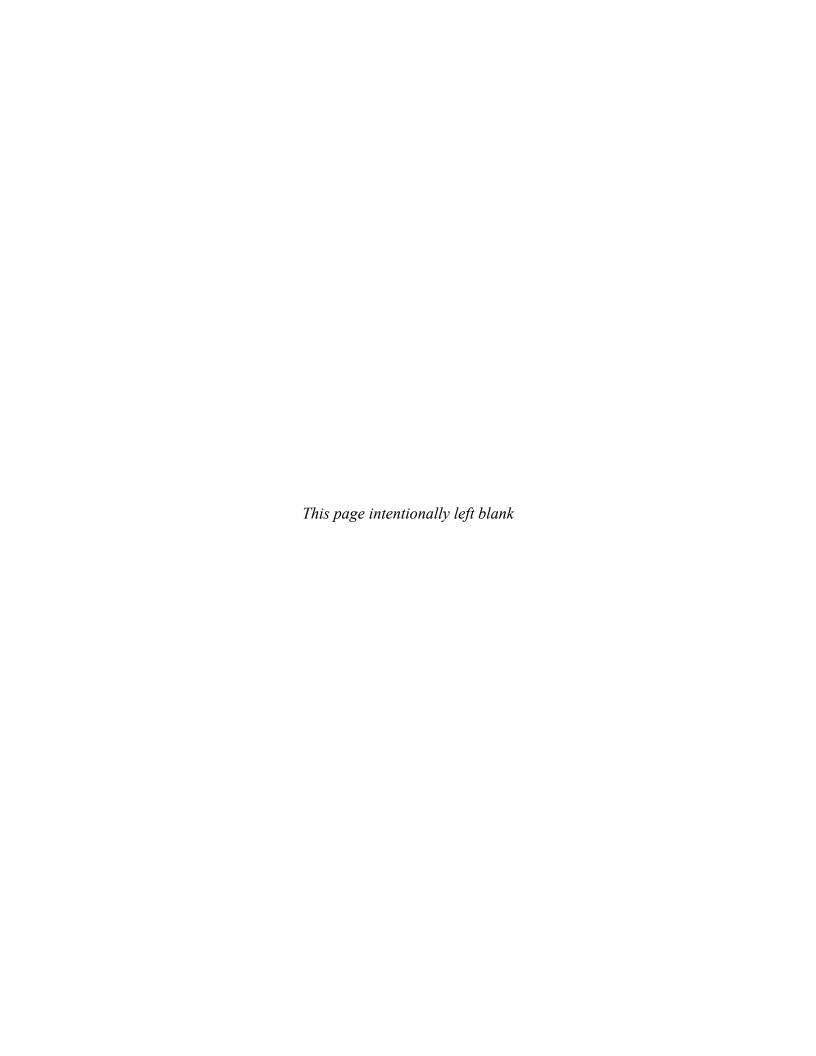
MOISTURE-DENSITY RELATIONSHIP

PROJECT NAME Gude Landfill **CLIENT** EA Engineering PROJECT LOCATION Rockville, MD PROJECT NUMBER 17359-0 **DATE TESTED** 145 140 Purple Line - Bulk 6, Bulk @ 0.0' - 5.0', Source of Material 135 **Description of Material** Light Brown SILTY SAND(SM) ASTM D698 Method B 130 **Test Method Curve Number** 17359-0-004 125 **TEST RESULTS Maximum Dry Density** 110.8 PCF 120 15.0 % **Optimum Water Content** 15.9 % **Natural Water Content** DRY DENSITY, pcf 115 ATTERBERG LIMITS Ы 110 COMPACTION 17359-0 GUDE LANDFILL - PURPLE LINE STOCKPILE GPJ MTA REDLINE GDT 10/23/20 Curves of 100% Saturation 105 for Specific Gravity Equal to: 2.80 100 2.70 2.60 95 90 85 80 75 10 15 20 30 35 40

WATER CONTENT, %

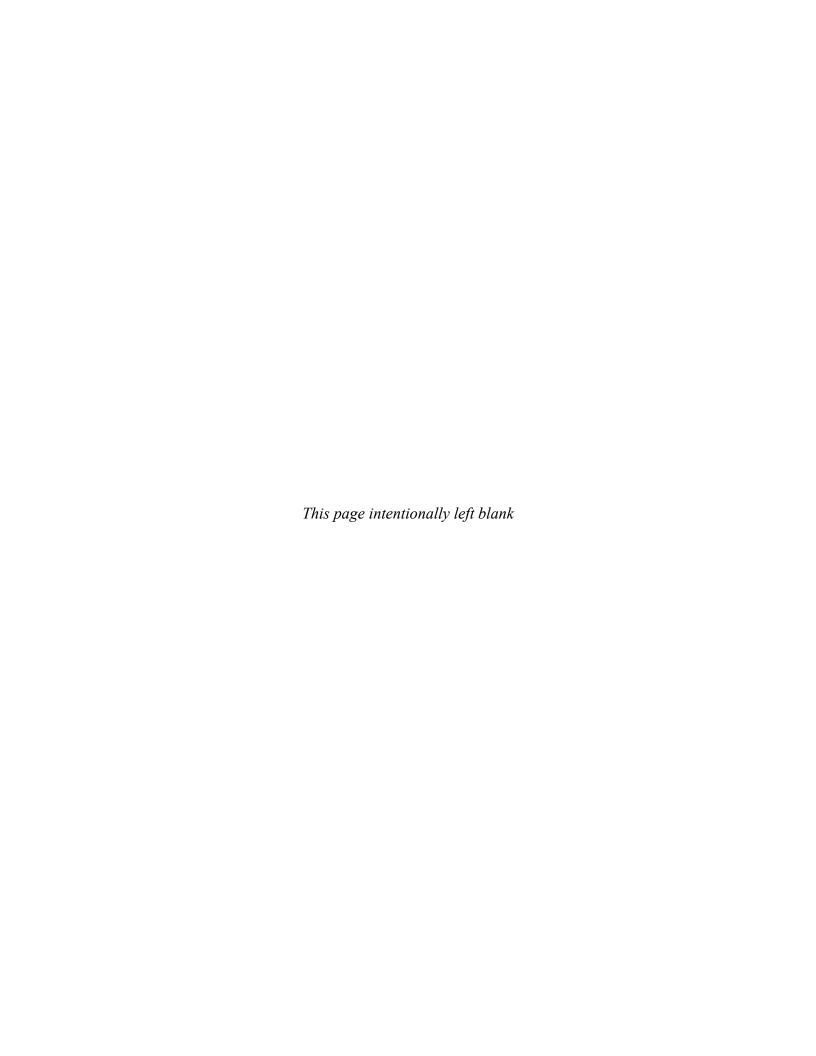
Attachment B

General Permit for Discharges of Stormwater
Associated with Construction Activity
[To Be Included Prior to Construction Document
Finalization]



Attachment C

Temporary Traffic Control Plan Requirements





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TEMPORARY TRAFFIC CONTROL PLAN REQUIREMENTS

General Requirements:

- 1. The permittee must always have a certified traffic control manager on site during all phases of construction.
- 2. Road closures of any duration shall require the submittal of a written request to the Traffic Engineering Design and Operations Section with justification as to why work activity cannot occur while traffic is being maintained. Road closure shall require additional temporary traffic controls including advance notification, approach, and detour signage, as approved by Traffic Engineering Design and Operations Section.
- 3. All sidewalk closures shall require the approval of the Traffic Engineering Design and Operations Section. Any sidewalk closure greater than two (2) weeks shall require the submittal of a written request to the Division of Traffic Engineering and Operations and may require additional temporary traffic controls and/or temporary sidewalk by-pass. Any work affecting sidewalk shall be specified and a proper pedestrian detour shall be shown on plans and submitted for review. Sidewalk closures shall be limited to occur only during the actual work activity. During closure, sidewalks shall be barricaded to physically prevent pedestrian passage and appropriate pedestrian detours shall be posted. During all other times, provisions for safe pedestrian access through the work area, via a temporary walkway shall be provided.
- 4. Construction activity, loading or unloading of equipment shall not block any traffic lane other than those delineated within the work zone.
- 5. Exclusive of emergency work, the permittee shall contact occupants of all adjoining properties and inform them of the scope and the timing of construction. A minimum of 24 hours notification shall be required prior to the commencement of any activity on the site.
- 6. Access shall be maintained to all driveways unless permission for closure is granted by the property owner/manager. However, accessibility for emergency vehicles shall be maintained at all times.
- 7. If any temporary traffic control signs are to be placed along a MDSHA roadway or within the limits of an incorporated area, the permittee shall notify the appropriate agency of signage to be installed.
- 8. No hazardous materials shall be stored within public right-of-way. No materials or equipment shall be stored on the roadway surfaces or sidewalk during non-work hours.
- 9. All existing traffic control devices (i.e. signs, marking, etc.) that must be removed shall be replaced in their proper location prior to the completion of the project. Cost for the replacement and/or repair of devices damaged as a result of the project shall be assessed to the permittee.
- 10. For merging, shifting, shoulder taper, the MAXIMUM spacing between devices equals the posted speed in feet.
- 11. All traffic control devices shall conform to the most recent edition of the Maryland MUTCD and shall meet or exceed NCHRP 350 Crash Worthiness requirements. All temporary traffic control devices shall be on the Maryland Qualified Products List. All signs, traffic drums and cones shall be fully reflectorized with high intensity, reflective sheeting as per the Maryland MUTCD.



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- 12. Provision shall be made for safe maintenance of pedestrian and bicycle traffic, subject to approval of the County's DPS Inspector. At least one 10-foot travel lane shall be available for traffic at all times
- 13. Signage, traffic drums, traffic cones, and arrow panels shall be placed in accordance with the appropriate typical and spacing chart. Work Area Ahead (W20-1 modified) signs must be installed at the end of each workday when temporary aggregate ramping is implemented. Channelizing devices shall be placed along excavations at ten (10) foot intervals. Arrow Panels (flashing mode only) shall be used at the beginning of any lane closure on a multi-lane roadway.
- 14. Appropriate distances for sign legends are *AHEAD*, *500 FT*, *1000 FT*, *1500 FT*, or *1/2 MILE*. For distances less than 500 feet, *AHEAD* shall be used.
- 15. All warning signs, unless otherwise specified, shall be a minimum of 48" X 48", black symbol or legend on orange background and diamond shaped. All warning signs not applicable to the actual situation shall be removed or covered during non-applicable periods. All portable signs shall be mounted a minimum of one (1) foot above the level of the roadway, with higher mounting heights desirable.
- 16. During nighttime operations traffic drums shall be used. However, for emergency work activities where traffic drums are not readily available, reflectorized traffic cones that are a minimum of twenty eight (28) inches in height and having six (6) inch and four (4) inch reflective collars within the top sixteen (16) inches of the cone may be used. All work areas left unattended at night shall be delineated with traffic drums.
- 17. When temporary concrete barrier (TCB) is used, reflectorized markers (8"x 12") are required as per TTCP 109.02. Also, a 12" X 36" object marker (vertical panel as per TTCP 109.01) shall be installed.
- 18. When pavement markings have been obliterated by the work activity, the permittee shall install any critical interim pavement markings prior to the end of the workday as specified by the county's DPS Inspector and/or the Division of Traffic Engineering and Operations. On road sections that are not scheduled to be overlaid, all temporary pavement markings shall be (removable) detour grade marking tape. Any conflicting markings, which need to be temporarily removed, are to be masked using "3M Removable Black Lane Mask" or an approved equal. On road sections that are to be overlaid, temporary markings can be either tape or paint. Any conflicting markings should be removed via hydro-blasting.
- 19. Any excavation(s) in the roadway shall be paved to level grade or plated and the roadway reopened to its full cross-section prior to the end of each workday. "STEEL PLATES" (W95-5(1)) signs shall be placed approximately 250 feet in advance of any steel plate. Any excavations in the sidewalk shall be backfilled or plated prior to the end of each workday and sidewalk reopened to its full cross section.
- 20. Traffic shall not be permitted within ten (10) feet of any excavation that results in a vertical drop-off of more than five (5) inches in the level of pavement during non-working hours unless protected by temporary concrete barriers or ramped with aggregate material at a 3:1 or flatter slope from the edge of pavement. When ramping is utilized, Temporary Traffic Control drums shall be positioned adjacent to the edge of the work area on the traffic side of the slope.
- 21. Traffic shall not be permitted within two (2) feet of any excavation that results in a vertical dropoff of more than two (2) inches but no more than five (5) inches in the level of pavement during



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non-working hours unless either ramped with aggregate material at a 3:1 or flatter slope, provided with an abutting wedge of bituminous material at a 3:1 or flatter slope or protected by traffic drums.

- 22. In areas where a drop-off in the level of pavement is two (2) inches or less, traffic may be allowed to freely cross under the following conditions:
 - Where longitudinal paving joints of two (2) inches or less are exposed to traffic, warning signs shall be posted indicating "UNEVEN LANES" (W8-11). These signs should be placed 250 feet in advance of the uneven joint and be spaced at appropriate intervals throughout the area of the uneven joint.
 - Where lateral paving joints of two (2) inches or less are exposed to traffic, a "BUMP" (W8-1) sign shall be posted 100 feet in advance of the joint.
 - When milled pavement is left exposed to traffic a "ROUGH ROAD" (W8-8) or "GROOVED PAVEMENT" (W8-8a) sign shall be placed 250 feet in advance of the milled area.
- 23. Bagging agreement shall be kept available by the contractor/permittee for inspection by the DPS inspector at any time. Prohibiting the use of metered spaces by the contractor/permittee without receipt of *bagging agreement* is subject to fines.
- 24. When it is necessary to restrict parking in a non-metered area to facilitate work activity, the permittee shall contact the appropriate County Police Station for temporary "No Parking" signs.
- 25. The contractor/permittee shall restore all affected Montgomery County parking signage to its previous condition.
- 26. The County's Department of Permitting Services (DPS) Inspector has the authority to modify the TTCP as deemed necessary. The Inspector has the authority to order the permittee to stop work and vacate the public right-of-way if they are not compliant with the TTCP.
- 27. The implementation date and continuance of work activities may be altered at the discretion of the County's DPS Inspector in the event of conflicts with previously approved or emergency activities.
- 28. All drainage conditions and mitigations during construction shall be detailed in the Erosion and Sediment Control Plans.
- 29. Contractor shall install W11-10(1) sign truck crossing (symbol) sign at designated construction entrance locations.



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Communications:

- The Contractor shall arrange and host a pre-phase traffic switch meeting at least two weeks prior to switching traffic pattern. The following offices shall be notified of this meeting and of the impending traffic switch:
 - ♦ Montgomery County Division of Traffic Engineering and Operations at 240-777-6000
 - ♦ Montgomery County Transportation Systems Engineering Team at 240-777-2100
 - ♦ Montgomery County Transit at 240-777-5800
 - ♦ Montgomery County Public Schools, Local Depot Manager
 - ♦ Montgomery County Fire and Rescue, Local Fire Department Captain Station 26 at 240-773-4726
 - ♦ Montgomery County Police, Local Traffic Sergeant at 240-773-6600
 - ♦ Montgomery County Department of Permitting Services, Permit Inspection Section at 240-777-6300
- Prior to approved road closures, the Contractor shall notify the following offices a minimum of seventy- two (72) hours in advance:
 - ♦ Montgomery County Division of Traffic Engineering & Operations at 240-777-6000
 - ♦ Montgomery County Emergency Operations Center at 240-777-0751
 - ♦ Montgomery County Police, Local Traffic Sergeant at 240-773-6600
 - ♦ Montgomery County Transportation Management Center at 240-777-2100
 - ♦ Montgomery County Fire and Rescue, Local Fire Department Captain Station 26 at 240-773-4726
 - ♦ Montgomery County Public Schools, Local Deport Manager.
- For work on SHA-maintained roadways, the Contractor shall coordinate with the following offices as well:
 - ♦ Mr. Andre Futrell District Engineer at 301-513-7311
 - ♦ Mr. Derek Gunn Assistant District Engineer Traffic at 301-513-7498
 - ♦ Mr. Michael Brown Assistant District Engineer Construction at 301-513-7341
 - ◆ Mr. Gregory Edwards Assistant District Engineer Maintenance at 301-513-7304
 - ♦ Mr. Mark Loeffler District Utility Engineer at 301-513-7350
 - ◆ Mrs. Rebecca Lichtenstein, P.E. Assistant Division Chief Traffic Operations at 410-787-7625
 - ♦ Mr. Edward Rodenhizer Manager Signal Operations Section at 410-787-7650
 - ◆ Mr. Paul Stout Assistant Division Chief Sign Operations Section at 410-787-7637



Fairfax, Virginia 22030-2518

Phone: 703.359.5861 Fax 703.359.5863 Visit us at www.t3design.us

Applicable Standards Listed Below, But Not Limited To:

SHA MD 104.00-13

10.5 When a police vehicle is required, the vehicle shall not be located in the buffer and/or taper, but should be located as directed by the Engineer, depending on the type of work. It is sometimes preferable to deploy the police vehicle in advance of the work zone or queue (if queue exists) to encourage speed reduction prior to the work zone.

11.0 STRATEGIES FOR SAFE ENTRY/EXIT OF WORK ZONE VEHICLES TO/FROM THE WORK AREA

- 11.1 Use TRUCK CROSSING signs (W11-(10)1) when:
 - 1) A work area entrance is allowed along a controlled access highway; OR
 - 2) A work area entrance provided along highways other than controlled access does not have adequate decision sight distance for approaching traffic and the entrance cannot be relocated to provide adequate decision sight distance. Refer to Standard No. MD 104.00-03 of the General Notes for decision sight distance criteria.

TRUCK CROSSING signs shall be placed according to the Shoulder Work Typical Applications, with TRUCK CROSSING signs replacing all SHOULDER WORK signs.

Any distances to be displayed on the TRUCK CROSSING sign shall be installed using supplemental distance plaques.



- 11.2 All work zone vehicles when entering/exiting the work area or operating within the work zone shall display flashing warning lights, as specified in Standards MD 104.01-18A & B.
- 11.3 PVMS may be used as a supplementary sign to warn drivers of work zone vehicles entering or exiting the work area.
- 11.4 Coordinate deliveries of materials with proposed lane closures, preferably during occurences when traffic volumes are low.

SPECIFICATION CATEGORY CODE ITEMS				
APPROVED	DIRECTOR -	Cadric OFFICE OF	10.0 TRAFFIC AN	D SAFETY
QUA	APPROVAL	· SHA	APPROVAL HIGHWAY A	• FEDERAL DMINISTRATION
	APPROVAL	6-20-03	APPROVAL	9-23-03
	REVISED	7-1-09	REVISED	7-27-09
StateHighway	REVISED	8-11-10	HEVISED	7-29-10
	REVISED	8-20-14	REVISED	8-11-14

Maryland Department of Transportation STATE HIGHWAY ADMINISTRATION

STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

GENERAL NOTES

STANDARD NO.

MD 104.00-13

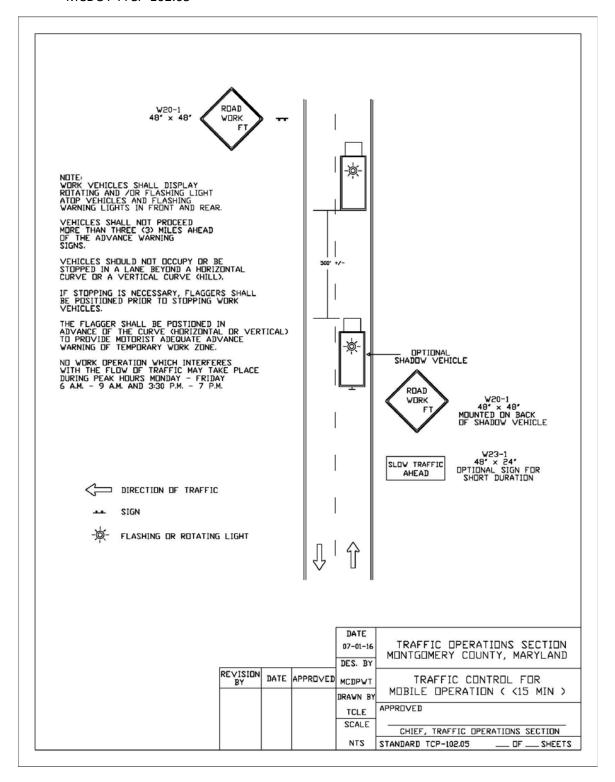


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MCDOT TTCP-102.05

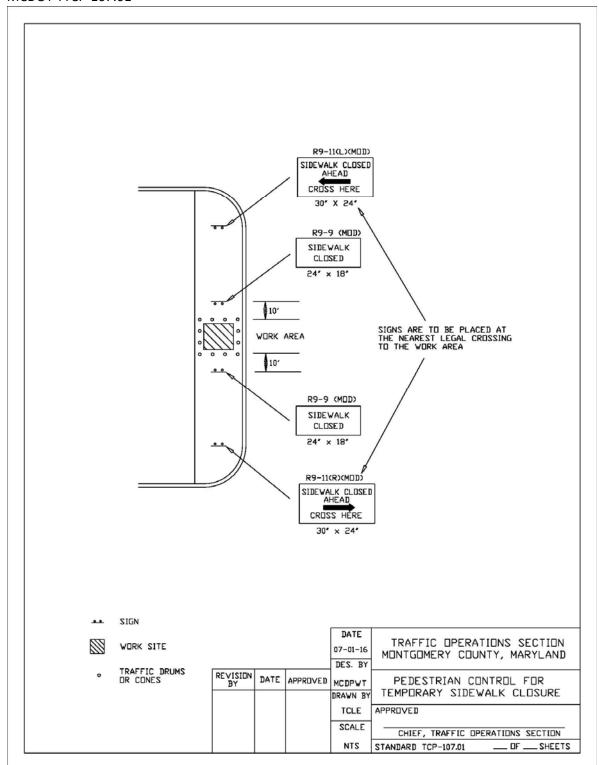


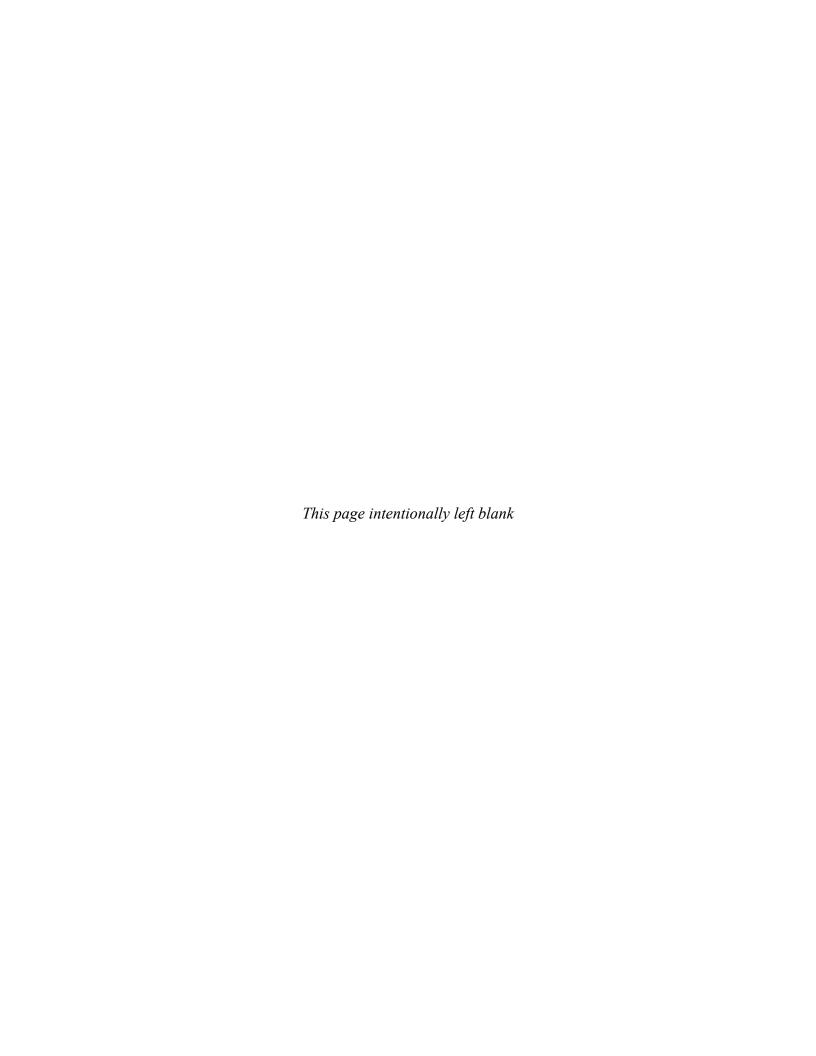


Fairfax, Virginia 22030-2518

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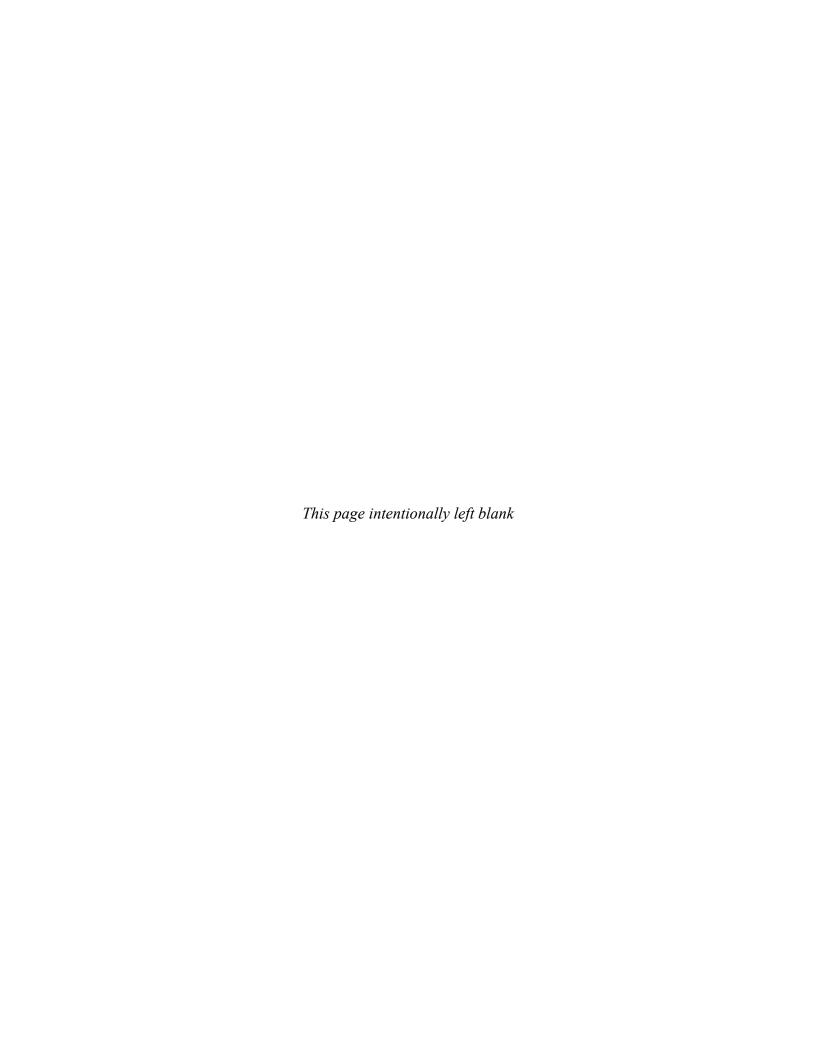
MCDOT TTCP-107.01





Attachment D

Property Markers



ATTACHMENT D

PROPERTY MARKERS

PT#	COORDINATES	NAD-83/91	ELEV.	DESC.
1	N 524388.655	E 1270728.730	423.71	MON
1A	N 524588.832	E 1270726.730	416.13	R&C
1B	N 524979.283	E 1271469.334	422.78	R&C
1C	N 525122.727	E 1271649.202	425.00	R&C
2	N 525430.301	E 1272034.877	433.71	MON
2A	N 525660.138	E 1272245.128	431.41	R&C
2B	N 525978.666	E 1272536.511	407.45	R&C
3	N 526248.348	E 1272783.211	419.65	MON
4	N 526636.135	E 1272608.768	390.28	STONE
5	N 526974.996	E 1272444.368	368.93	MON
5A	N 527068.498	E 1272773.308	382.22	R&C
5B	N 527110.856	E 1272922.322	396.94	R&C
6	N 527178.066	E 1273158.764	362.71	MON
7	N 527104.341	E 1273195.780	360.05	MON
7A	N 526723.193	E 1273303.477	365.69	R&C
7B	N 526633.347	E 1273328.864	385.25	R&C
7C	N 526495.691	E 1273367.760	419.02	R&C
7D	N 526286.450	E 1273426.883	466.08	R&C
7E	N 526097.107	E 1273480.384	465.60	R&C
7F	N 525751.819	E 1273577.949	470.53	R&C
8	N 525393.510	E 1273679.193	474.06	MON
8A	N 525364.469	E 1273824.899	470.57	R&C
8B	N 525313.823	E 1274079.001	449.61	R&C
8C	N 525228.220	E 1274508.491	460.16	R&C
8D 8E	N 525206.429 N 525166.638	E 1274617.820 E 1274817.463	460.44	R&C
8F	N 525166.638 N 525137.527	E 1274817.463 E 1274963.518	434.64 393.36	R&C R&C
9	N 525137.527 N 525110.587	E 1275098.685	408.82	STONE
9A	N 524955.733	E 1275106.149	400.07	R&C
9B	N 524498.015	E 1275128.210	326.27	R&C
9C	N 524256.526	E 1275139.849	326.99	R&C
10	N 524219.480	E 1275141.635	330.00	MON
11	N 524193.766	E 1275142.903	*	**
12	N 523735.060	E 1274675.936	*	**
13	N 523695.289	E 1274605.591	*	**
14	N 523706.045	E 1274593.054	329.47	MON
14A	N 523832.295	E 1274445.938	326.17	R&C
15	N 523955.151	E 1274302.776	325.17	MON
16	N 523904.443	E 1274171.252	345.62	MON
17	N 523644.758	E 1274341.977	337.10	MON
18	N 523608.283	E 1274293.706	339.59	R&C
19	N 523882.386	E 1274113.947	345.67	MON
19A	N 523848.306	E 1274025.572	331.49	R&C
19B	N 523799.279	E 1273898.437	770.05	R&C
19C	N 523758.374	E 1273792.363	339.25	R&C
20	N 523702.476	E 1273647.409	384.08	MON
20A 20B	N 523716.339 N 523755.153	E 1273592.042 E 1273437.012	390.14 359.82	R&C
20B	N 523755.153 N 523830.395	E 1273136.543	362.99	R&C R&C
20D	N 523830.395 N 523912.337	E 1272809.206	399.96	R&C
20E	N 523912.337 N 523999.059	E 1272462.830	432.98	R&C
20F	N 524058.524	E 1272225.320	427.29	R&C
21	N 524095.212	E 1272078.784	404.78	STONE
22	N 524033.212	E 1272127.707	414.78	MON
23	N 524284.720	E 1271969.212	403.32	MON
23A	N 524108.707	E 1271862.147	399.59	R&C
24	N 523763.488	E 1271652.156	411.16	MON
	NO ELEVATION WAS		IEGE DOING	

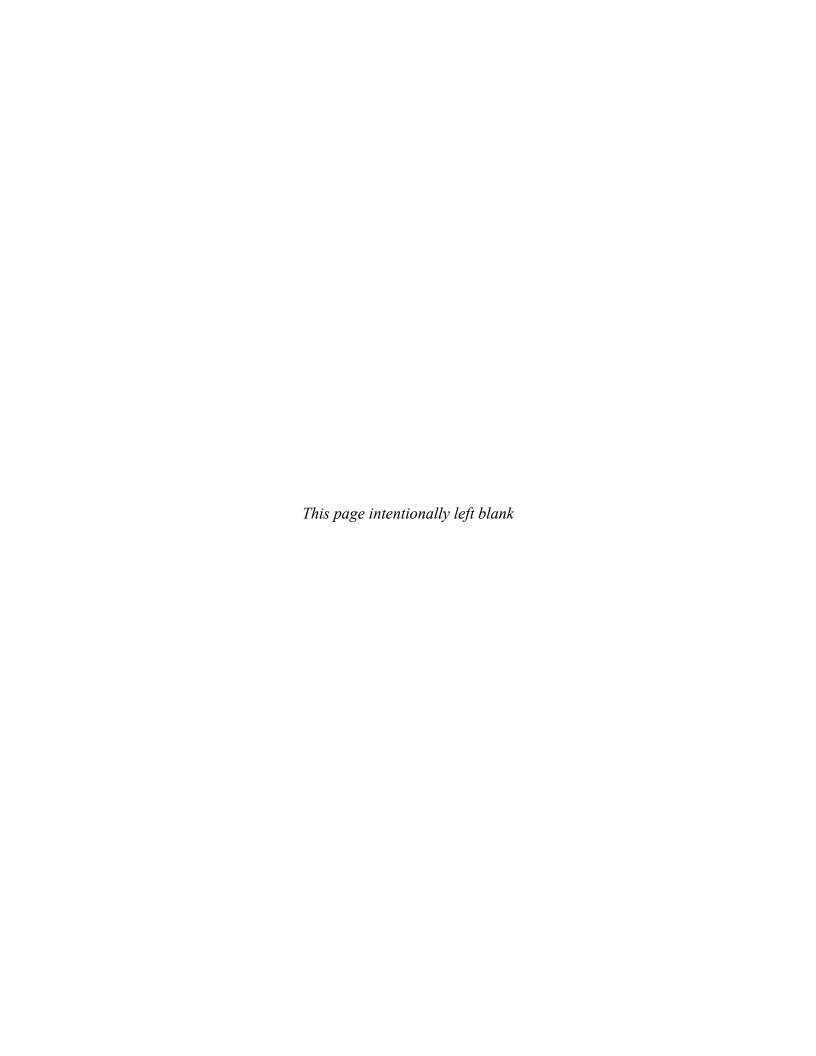
NO ELEVATION WAS ESTABLISHED ON THESE POINTS.

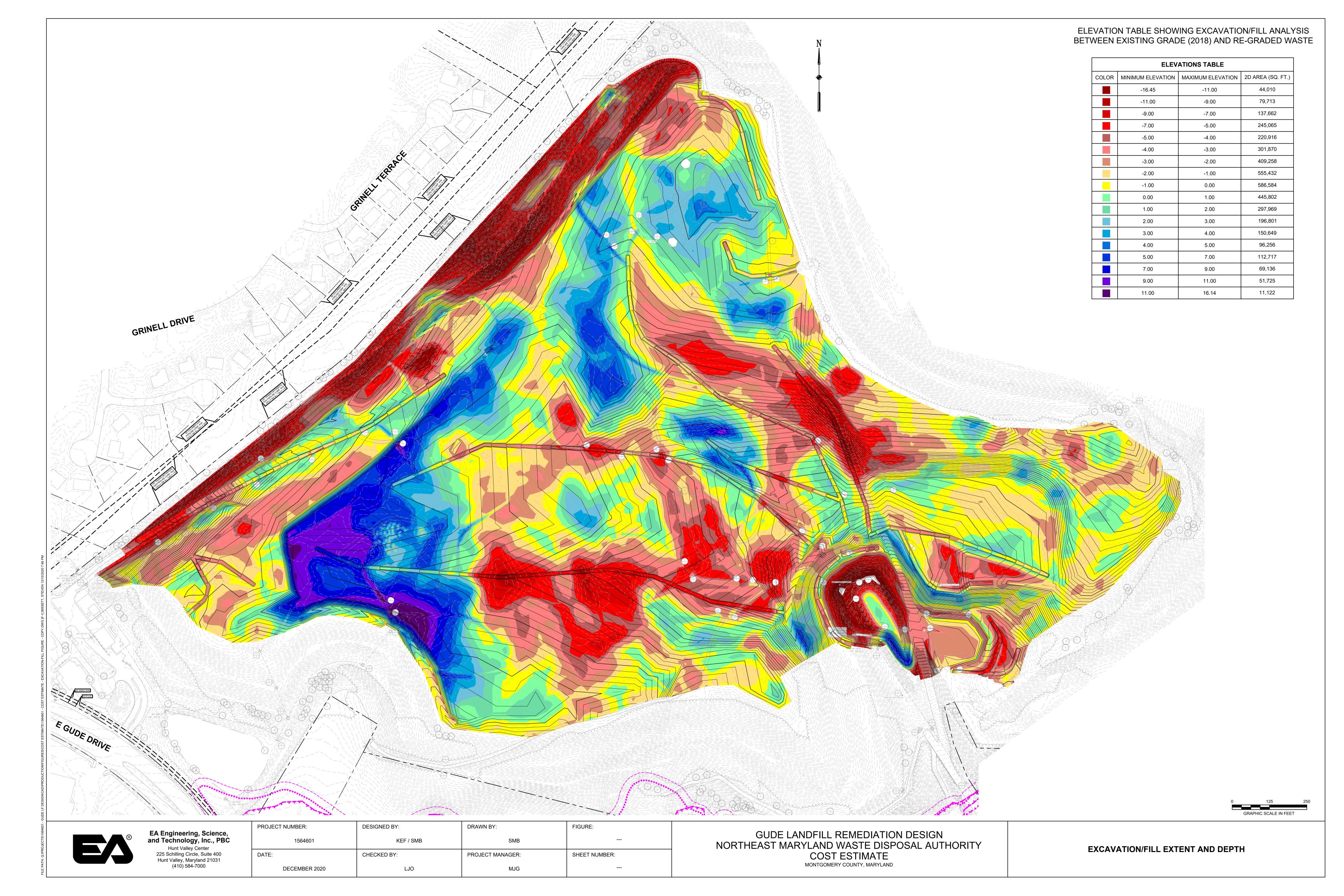
^{**} NO MARKER WAS SET. CORNER FALLS IN ROADWAY.

ATTACHMENT D PROPERTY MARKERS

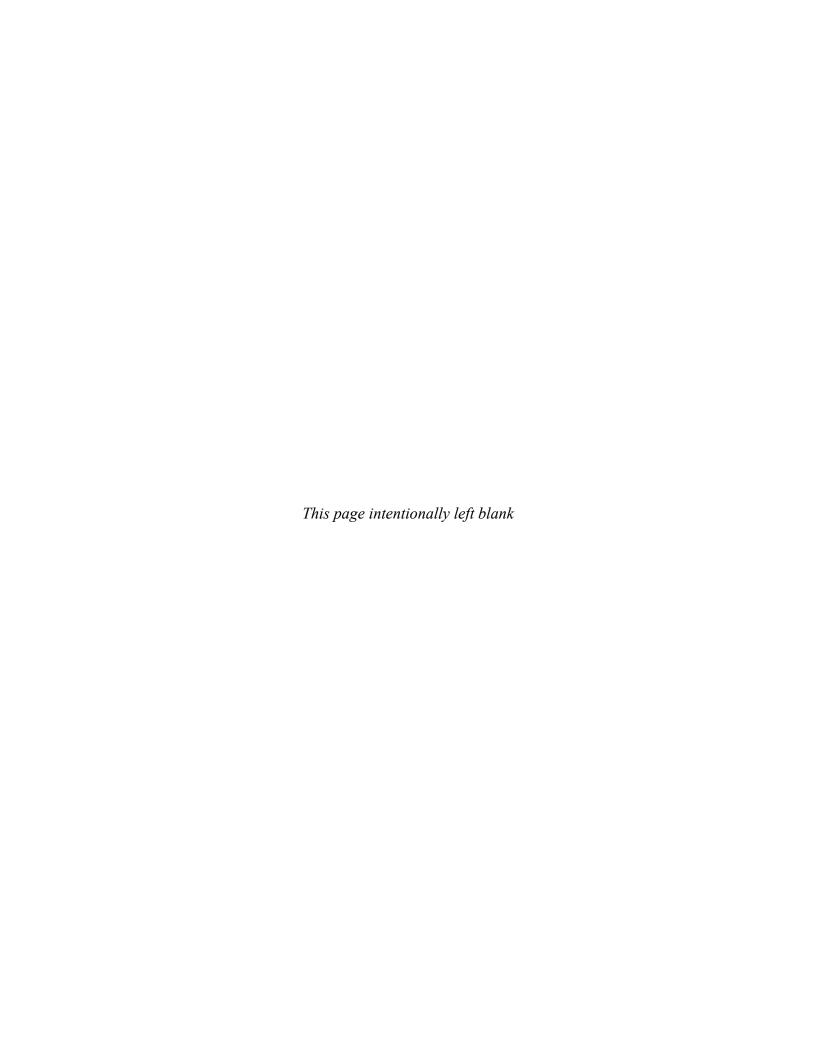
					_
PT#	COORDINATES	NAD-83/91	ELEV.	DESC.	4
0.5		F 4077007.000	707.10		4
25	N 526794.925	E 1273283.209	363.42	MON	4
25A	N 526593.952	E 1273099.362	403.24	R&C	1
25B	N 526480.755	E 1272995.812	421.67	R&C	١,
26	N 524555.977	E 1275125.434	337.13	MON	╛
27	N 524418.194	E 1275061.458	324.17	MON	_ ;
28	N 524225.006	E 1274853.912	329.77	MON	l.
28A	N 524159.370	E 1274560.533	346.06	R&C	
29	N 524104.842	E 1274316.543	375.19	MON	
30	N 524108.829	E 1274134.376	397.26	MON	
31	N 524263.286	E 1274058.252	405.37	MON	
32	N 524250.413	E 1274024.313	391.33	MON	7
33	N 524125.625	E 1274054.822	373.59	MON	7
34	N 524009.103	E 1274102.445	358.56	MON	7
35	N 526824.557	E 1273310.048	361.66	MON	7
36	N 526744.303	E 1273534.820	361.07	MON	7
36A	N 526643.051	E 1273609.173	404.41	R&C	1
37	N 526558.737	E 1273671.088	424.13	MON	7
37A	N 526342.888	E 1273730.950	441.01	R&C	7
37B	N 526118.560	E 1273793.164	454.25	MON	1
37C	N 525916.357	E 1273849.242	443.53	R&C	1
38	N 525628.976	E 1273928.943	430.07	MON	7
39	N 525635.997	E 1273991.915	401.76	MON	1
40	N 525882.136	E 1274111.304	395.81	MON	1
41	N 525801.707	E 1274342.694	383.45	MON	٦.
42	N 525564.863	E 1274312.081	400.92	MON	7
42A	N 525474.659	E 1274462.125	436.22	R&C	1
43	N 525382.088	E 1274616.107	444.99	MON	٦.
43A	N 525270.989	E 1274911.115	421.74	R&C	7
43B	N 525227.733	E 1275025.981	395.97	R&C	1
44	N 525170.080	E 1275179.062	429.02	MON	7

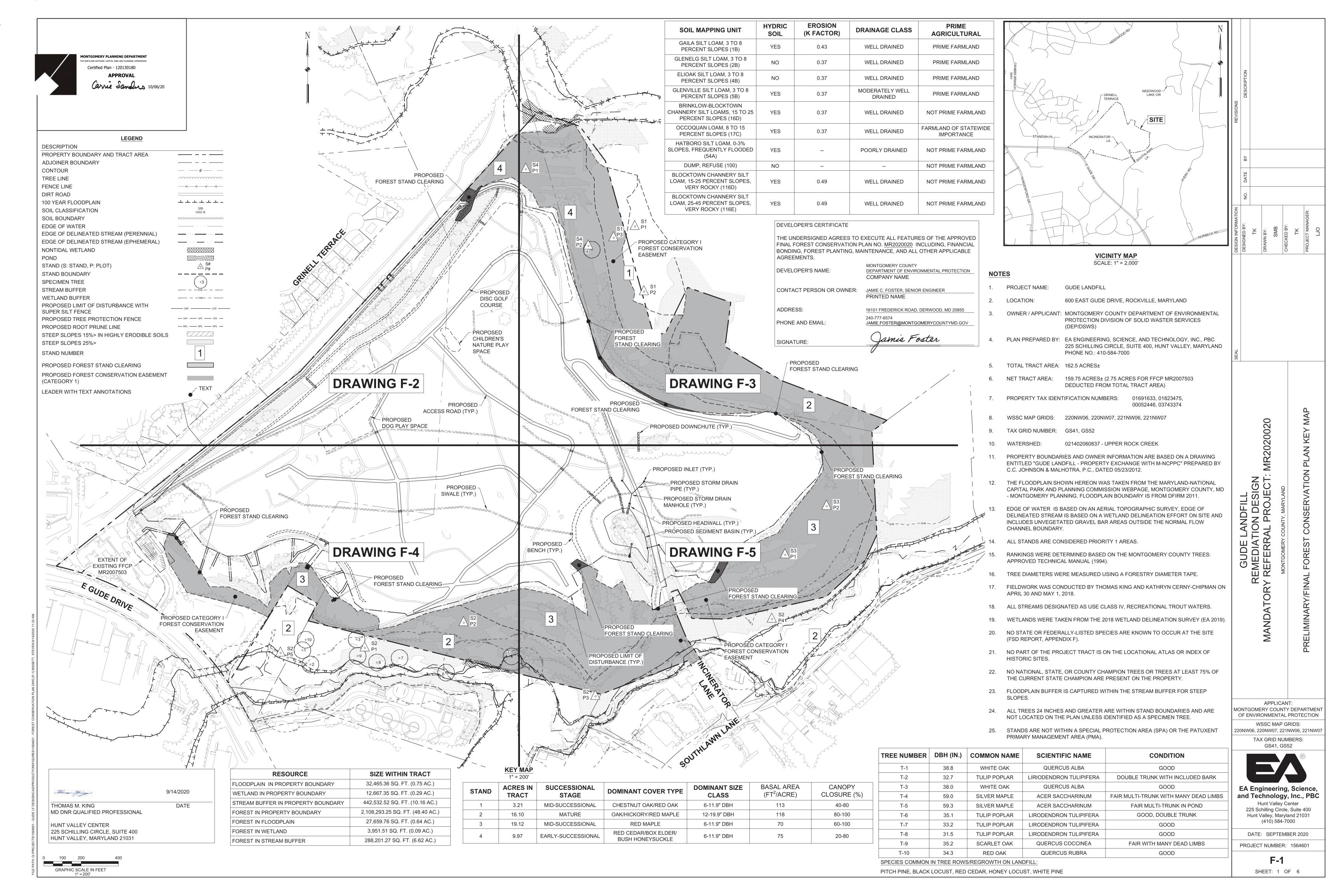
Attachment E Waste Cut and Fill Visualization





Attachment F Forest Conservation Plan







DESCRIPTION PROPERTY BOUNDARY AND TRACT AREA _____ ADJOINER BOUNDARY CONTOUR — #— — TREE LINE FENCE LINE DIRT ROAD 100 YEAR FLOODPLAIN SfB HSG B SOIL CLASSIFICATION SOIL BOUNDARY EDGE OF WATER EDGE OF DELINEATED STREAM (PERENNIAL) EDGE OF DELINEATED STREAM (EPHEMERAL) NONTIDAL WETLAND STAND (S: STAND, P: PLOT) STAND BOUNDARY _____ SPECIMEN TREE STREAM BUFFER ____ _ _ _ _ _ _ _ WETLAND BUFFER ____ _ _ _wb__ _ ___ PROPOSED LIMIT OF DISTURBANCE WITH SUPER SILT FENCE PROPOSED TREE PROTECTION FENCE PROPOSED ROOT PRUNE LINE — RPL —— RPL —— RPL — STEEP SLOPES 15%> IN HIGHLY ERODIBLE SOILS STEEP SLOPES 25%> STAND NUMBER PROPOSED FOREST STAND CLEARING PROPOSED FOREST CONSERVATION EASEMENT (CATEGORY 1) _ TEXT LEADER WITH TEXT ANNOTATIONS

NOTES

- 1. SEE DRAWING NO. F-1 FOR NOTES, DATA REFERENCES, AND FOREST STAND DELINEATION INFORMATION.
- 2. EDGE OF WATER IS BASED ON AN AERIAL TOPOGRAPHIC SURVEY, EDGE OF DELINEATED STREAM IS BASED ON A WETLAND DELINEATION EFFORT ON SITE AND INCLUDES UNVEGETATED GRAVEL BAR AREAS OUTSIDE THE NORMAL FLOW CHANNEL BOUNDARY.

DEVELOPER'S CERTIFICATE

THE UNDERSIGNED AGREES TO EXECUTE ALL FEATURES OF THE APPROVED FINAL FOREST CONSERVATION PLAN NO. MR2020020 INCLUDING, FINANCIAL BONDING, FOREST PLANTING, MAINTENANCE, AND ALL OTHER APPLICABLE AGREEMENTS.

DEVELOPER'S NAME:

MONTGOMERY COUNTY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
COMPANY NAME

CONTACT PERSON OR OWNER: JAMIE C. FOSTER, SENIOR ENGINEER

ADDRESS:

JAMIE C. FOSTER, SENIOR ENGINEER

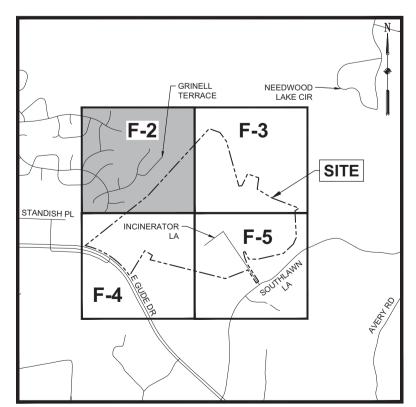
PRINTED NAME

16101 FREDERICK ROAD, DERWOOD, MD 2088

ADDRESS: 16101 FREDERICK ROAD, DERWOOD, MD 20855
240-777-6574
PHONE AND EMAIL: JAMIE.FOSTER@MONTGOMERYCOUNTYMD.GOV

Jamie Foster

SIGNATURE:

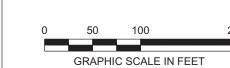


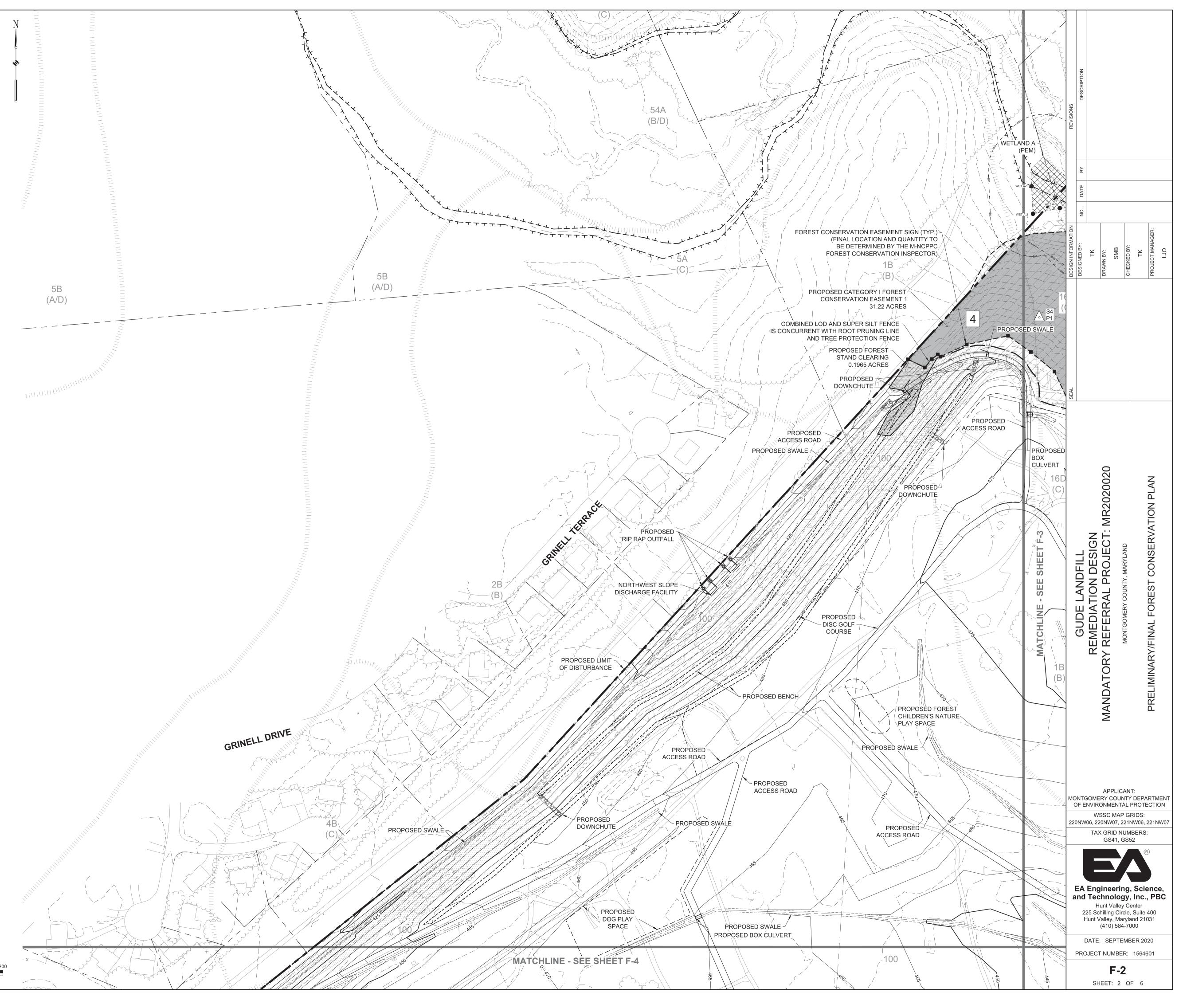
KEY MAP NOT TO SCALE

9/14/2020

THOMAS M. KING
DATE
MD DNR QUALIFIED PROFESSIONAL

HUNT VALLEY CENTER
225 SCHILLING CIRCLE, SUITE 400
HUNT VALLEY, MARYLAND 21031







DESCRIPTION PROPERTY BOUNDARY AND TRACT AREA ADJOINER BOUNDARY CONTOUR TREE LINE FENCE LINE DIRT ROAD 100 YEAR FLOODPLAIN SfB HSG B SOIL CLASSIFICATION SOIL BOUNDARY **EDGE OF WATER** EDGE OF DELINEATED STREAM (PERENNIAL) EDGE OF DELINEATED STREAM (EPHEMERAL) NONTIDAL WETLAND STAND (S: STAND, P: PLOT) STAND BOUNDARY _____ SPECIMEN TREE STREAM BUFFER ____ _ _ _ _ _ _ _ WETLAND BUFFER PROPOSED LIMIT OF DISTURBANCE WITH SUPER SILT FENCE PROPOSED TREE PROTECTION FENCE PROPOSED ROOT PRUNE LINE STEEP SLOPES 15%> IN HIGHLY ERODIBLE SOILS STEEP SLOPES 25%> STAND NUMBER PROPOSED FOREST STAND CLEARING PROPOSED FOREST CONSERVATION EASEMENT (CATEGORY 1) TEXT LEADER WITH TEXT ANNOTATIONS

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THE UNDERSIGNED AGREES TO EXECUTE ALL FEATURES OF THE APPROVED FINAL FOREST CONSERVATION PLAN NO. MR2020020 INCLUDING, FINANCIAL BONDING, FOREST PLANTING, MAINTENANCE, AND ALL OTHER APPLICABLE

AGREEMENTS.

MONTGOMERY COUNTY
DEVELOPER'S NAME:

DEVELOPER'S NAME:

DEVELOPER'S NAME:

COMPANY NAME

CONTACT PERSON OR OWNER: JAMIE C. FOSTER, SENIOR ENGINEER

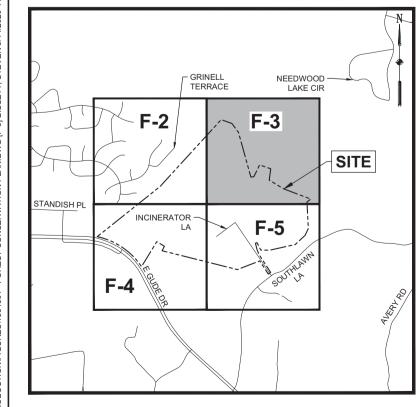
ADDRESS: 16101 FREDERICK ROAD, DERWOOD, MD 20855

PHONE AND EMAIL:

JAMIE.FOSTER@MONTGOMERYCOUNTYMD.GOV

SIGNATURE:

Jamie Foster



KEY MAP NOT TO SCALE

House Minga	9/14/2020
THOMAS M. KING MD DNR QUALIFIED PROFESSIONAL	DATE
HUNT VALLEY CENTER 225 SCHILLING CIRCLE, SUITE 400 HUNT VALLEY, MARYLAND 21031	





DESCRIPTION PROPERTY BOUNDARY AND TRACT AREA ADJOINER BOUNDARY CONTOUR TREE LINE FENCE LINE DIRT ROAD 100 YEAR FLOODPLAIN SfB HSG B SOIL CLASSIFICATION SOIL BOUNDARY EDGE OF WATER EDGE OF DELINEATED STREAM (PERENNIAL) EDGE OF DELINEATED STREAM (EPHEMERAL) NONTIDAL WETLAND STAND (S: STAND, P: PLOT) STAND BOUNDARY _____ SPECIMEN TREE STREAM BUFFER ___ _ _ _ _ _ _ _ _ WETLAND BUFFER PROPOSED LIMIT OF DISTURBANCE WITH SUPER SILT FENCE PROPOSED TREE PROTECTION FENCE PROPOSED ROOT PRUNE LINE — RPL —— RPL — STEEP SLOPES 15%> IN HIGHLY ERODIBLE SOILS STEEP SLOPES 25%> STAND NUMBER PROPOSED FOREST STAND CLEARING PROPOSED FOREST CONSERVATION EASEMENT (CATEGORY 1) ∠ TEXT LEADER WITH TEXT ANNOTATIONS

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MONTGOMERY COUNTY

Jamie Foster

DEVELOPER'S CERTIFICATE

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DEPARTMENT OF ENVIRONMENTAL PROTECTION **COMPANY NAME**

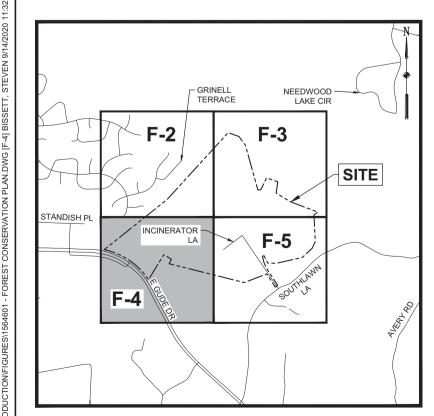
CONTACT PERSON OR OWNER: JAMIE C. FOSTER, SENIOR ENGINEER PRINTED NAME

ADDRESS: 16101 FREDERICK ROAD, DERWOOD, MD 20855

PHONE AND EMAIL: JAMIE.FOSTER@MONTGOMERYCOUNTYMD.GOV

SIGNATURE:

DEVELOPER'S NAME:



KEY MAP NOT TO SCALE

Thurs Mings	9/14/2020
THOMAS M. KING	DATE
MD DNR QUALIFIED PROFESSIONAL	
HUNT VALLEY CENTER	
225 SCHILLING CIRCLE, SUITE 400	
HUNT VALLEY, MARYLAND 21031	
	THOMAS M. KING MD DNR QUALIFIED PROFESSIONAL HUNT VALLEY CENTER 225 SCHILLING CIRCLE, SUITE 400





DESCRIPTION		
PROPERTY BO	UNDARY AND TRACT AREA	
ADJOINER BOL	JNDARY	
CONTOUR		— #— —
TREE LINE		
FENCE LINE		
DIRT ROAD		
100 YEAR FLOO	DDPLAIN	
SOIL CLASSIFIC	CATION	SfB HSG B
SOIL BOUNDAR	RY	
EDGE OF WATE	ER .	· · · ·
EDGE OF DELIN	NEATED STREAM (PERENNIAL)	
EDGE OF DELIN	NEATED STREAM (EPHEMERAL)	
NONTIDAL WET	TLAND	
POND		
STAND (S: STA	ND, P: PLOT)	S#
STAND BOUND	ARY	
SPECIMEN TRE	E	(•3)
STREAM BUFFE	ER	
WETLAND BUF	FER	wb
PROPOSED LIM SUPER SILT FE	MIT OF DISTURBANCE WITH NCE	SSF LOD
PROPOSED TR	EE PROTECTION FENCE	— TPF —— TPF —— TPF —
PROPOSED RO	OT PRUNE LINE	— RPL —— RPL —
STEEP SLOPES	S 15%> IN HIGHLY ERODIBLE SOILS	
STEEP SLOPES	S 25%>	
STAND NUMBE	R	1
PROPOSED FO	REST STAND CLEARING	
PROPOSED FO (CATEGORY 1)	REST CONSERVATION EASEMENT	
LEADER WITH	TEXT ANNOTATIONS	TEXT
1		

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DEVELOPER'S CERTIFICATE

THE UNDERSIGNED AGREES TO EXECUTE ALL FEATURES OF THE APPROVED FINAL FOREST CONSERVATION PLAN NO. MR2020020 INCLUDING, FINANCIAL BONDING, FOREST PLANTING, MAINTENANCE, AND ALL OTHER APPLICABLE AGREEMENTS.

DEVELOPER'S NAME:

MONTGOMERY COUNTY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
COMPANY NAME

CONTACT PERSON OR OWNER:

JAMIE C. FOSTER, SENIOR ENGINEER
PRINTED NAME

16101 FREDERICK ROAD, DERWOOD, MD 20855

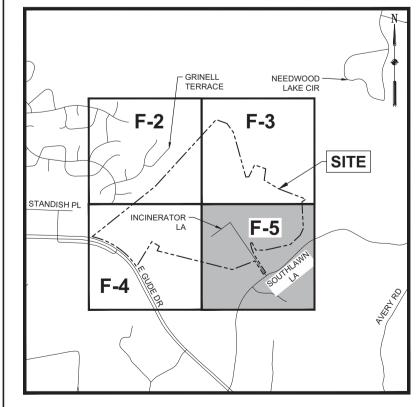
JAMIE.FOSTER@MONTGOMERYCOUNTYMD.GOV

PHONE AND EMAIL:

ADDRESS:

SIGNATURE:

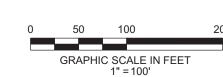
Jamie Foster

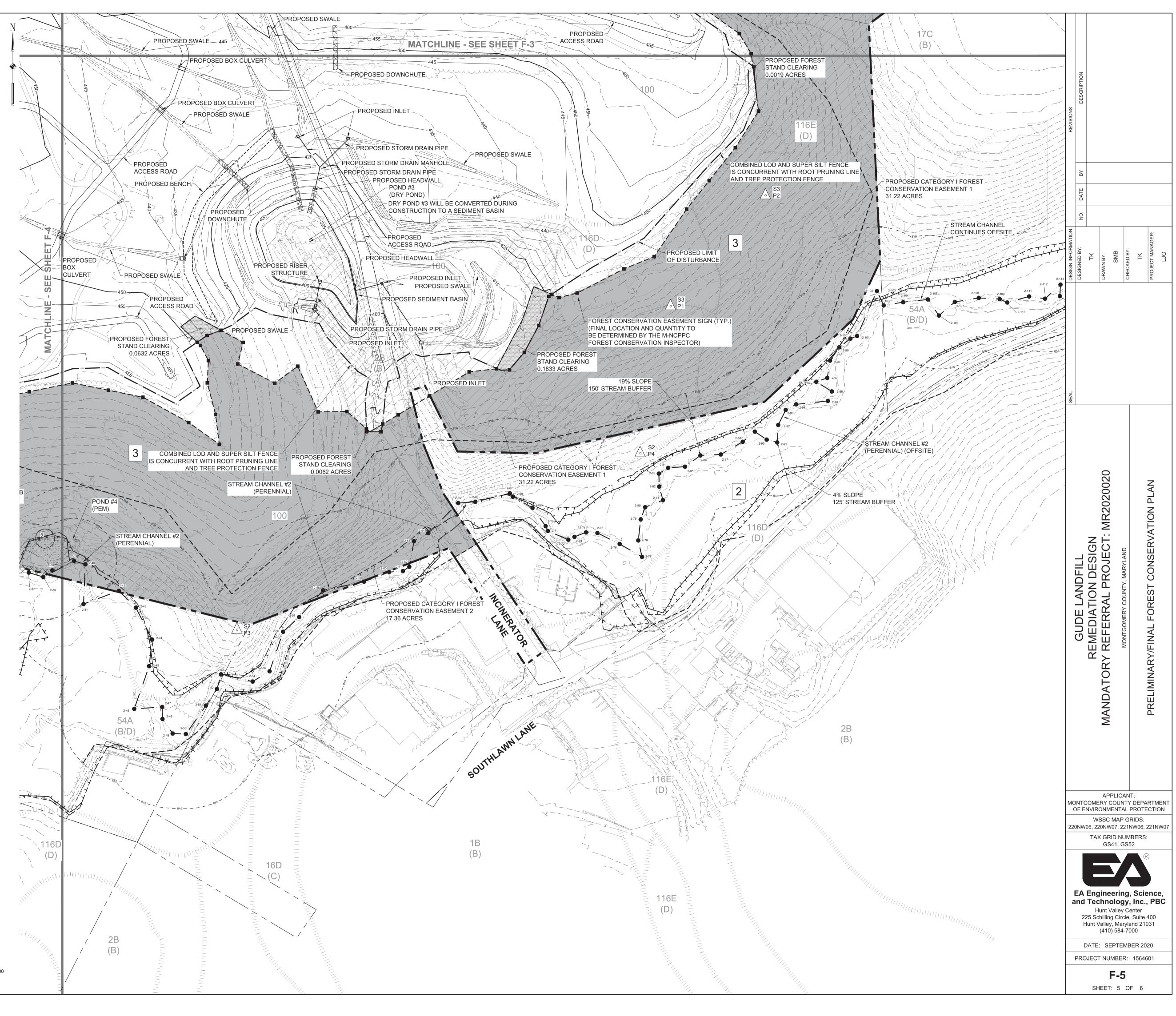


KEY MAP NOT TO SCALE

THOMAS M. KING DATE
MD DNR QUALIFIED PROFESSIONAL

HUNT VALLEY CENTER
225 SCHILLING CIRCLE, SUITE 400
HUNT VALLEY, MARYLAND 21031





THE UNDERSIGNED AGREES TO EXECUTE ALL FEATURES OF THE APPROVED FINAL FOREST CONSERVATION PLAN NO. MR2020020 INCLUDING, FINANCIAL BONDING, FOREST PLANTING, MAINTENANCE, AND ALL OTHER APPLICABLE AGREEMENTS.

MONTGOMERY COUNTY

PRINTED NAME

DEPARTMENT OF ENVIRONMENTAL PROTECTION

16101 FREDERICK ROAD, DERWOOD, MD 20855

JAMIE.FOSTER@MONTGOMERYCOUNTYMD.GOV

DEVELOPER'S NAME:

COMPANY NAME JAMIE C. FOSTER, SENIOR ENGINEER

CONTACT PERSON OR OWNER:

ADDRESS:

PHONE AND EMAIL:

SIGNATURE:

Jamie Foster Montgomery Planning

THE MARYLAND-NATIONAL CAPITAL PARK AND PLANNING COMMISSION

September 30, 2020

Mr. Jamie Foster, PE **Resource Conversion Section** Recycling and Resource Management Division Department of Environmental Protection 16101 Frederick Road Derwood, MD 20855

Re: Preliminary/Final Forest Conservation Plan Property Name: Gude Landfill Remediation Design Plan Number: MR2020020 Net Tract Size/Land Use Category: 159.75 acres/IDA

Dear Mr. Foster:

On April 9, 2020, the Montgomery Department of Environmental Protection ("Applicant") filed an application for approval of a Preliminary/Final Forest Conservation Plan on approximately 159.75 acres of land located at 600 East Gude Drive, Rockville, MD 20855 ("Subject Property"). The Applicant's forest conservation plan application was designated Preliminary/Final Forest Conservation Plan No. MR2020020 ("Forest Conservation Plan", "FCP" or "Application"). The Application proposes to install a permanent toupee capping system (geomembrane and soil cover system), additional below grade landfill gas collection piping and numerous passive land uses to include multiple walking trails, high point overlook, disc golf course, bird watching stations, outdoor art, a dog play area and a children's play area accessible via the existing M-NCPPC Gude Trail. In addition, the Applicant is installing 433.252 square feet (9.95 acres) of three different pollinator meadow seed mixes in the open areas between the trails and play areas.

Based on the review by the Planning Staff ("Staff") of The Maryland National Capital Park and Planning Commission ("M-NCPPC"), the FCP submitted to M-NCPPC is approved with the following conditions: 1. The Applicant must schedule the required site inspections by M-NCPPC Forest Conservation

- 2. The Applicant must comply with all tree protection and tree save measures shown on the approved Final Forest Conservation Plan. Tree save measures not specified on the Final Forest Conservation Plan may be required by the M-NCPPC Forest Conservation Inspection Staff.
- 3. Prior to the final pre-construction inspection by the M-NCPPC Forest Conservation Inspection Staff, the Applicant must install permanent conservation easement signage along the perimeter of the conservation easements as shown on the FCP or as determined by the Forest Conservation Inspection Staff.
- 4. The Limits of Disturbance ("LOD") shown on the Final Sediment and Erosion Control Plan must be consistent with the LOD shown on the approved Final Forest Conservation Plan.

Upcounty Planning Division: 301.495.4645 Fax: 301.495.1304 2425 Reedie Dr., Floor 13, Wheaton, Maryland 20902 www.MongtomeryPlanning.org

5. Prior to the start of any demolition, clearing, grading, or construction for this Application, the Applicant must record a Category I Conservation Easement over all areas of forest retention as specified on the approved FCP. The Category I Conservation Easement must be in a form approved by the M-NCPPC Office of the General Counsel and must be recorded in the Montgomery County Land Records by deed. The Book/Page for the easement must be referenced on the record plat.

FOREST CONSERVATION

The Application meets the requirements of Chapter 22A of the Montgomery County Forest Conservation Law ("FCL") and the requirements for a minor amendment to an FCP as outlined in Section 22A.00.01.13.A.1 of the Forest Conservation Regulations. As required by Chapter 22A, an FCP was submitted with the Application. The total net tract area for forest conservation purposes is 159.75 acres which includes the Subject Property of 162.50 acres, minus 2.75 acres for the Men's Shelter Area, Plan No. MR2007503. The Subject Property is zoned IDA and is classified as Institutional Development Area as defined in Section 22A-3 of the FCL and specified in the Trees Technical Manual. The Subject Property contains 48.40 acres of forest. The Applicant proposes to remove 0.65 acres of forest and retain 47.75 acres of forest. This results in a total reforestation requirement of 0.00 acres as calculated in the Forest Conservation Worksheet. The Applicant will place the 47.75 acres of retained forest in Category I Conservation Easements.

In order to prepare the plans for certification, please download this Approval Letter, attach it to the FCP, sign the Qualified Professional and Developer's Certificate, and re-upload the plans for final review and approval. The FCP must be certified before a pre-construction meeting can be

Any changes from the approved Forest Conservation Plan may constitute grounds to rescind or amend any approval actions taken, and to re-evaluate the Subject Property for additional or amended plantings. If there are any subsequent additions or modifications planned for this development, a separate amendment must be submitted to M-NCPPC for review and approval prior to those changes occurring. Please contact Mr. David Wigglesworth at 301-495-4581 or David.wigglesworth@montgomeryplanning.org at least 7 days in advance to schedule your preconstruction meeting. If you have any questions regarding these actions, please feel free to contact Doug Johnsen at 301-495-4559 or at douglas.johnsen@montgomeryplanning.org.

Sandra Pereira, Supervisor

Upcounty Planning Team, Montgomery County Planning

cc: File: MR2020020 Ms. Laura Oakes, PE (EA Engineering, Science and Technology, Inc.)

Page 2 of 2



Sequence of Events for Properties Required to Comply With Forest Conservation Plans, Exemptions from Submitting Forest Conservation Plans, and Tree Save Plans

The property owner is responsible for ensuring all tree protection measures are performed in accordance with the approved final forest conservation plan or tree save plan, and as modified in the field by a Planning Department Forest Conservation Inspector. The measures must meet or exceed the most recent standards published by the American National Standards Institute (ANSI

Pre-Construction

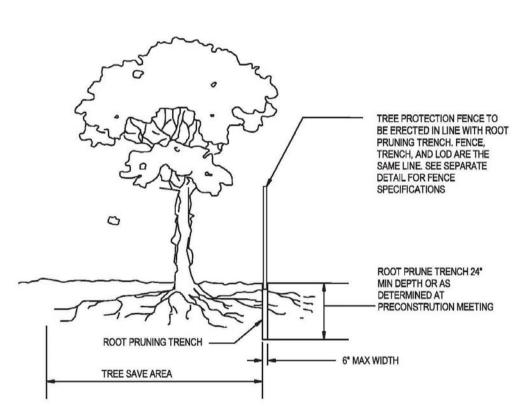
- 1. An on-site pre-construction meeting is required after the limits of disturbance have been staked and flagged and before any land disturbance.
- 2. The property owner must arrange for the meeting and following people should must participate at the pre-construction meeting: the property owner or their representative, construction superintendent, International Society of Arboriculture (ISA) certified arborist/Maryland Licensed Tree Expert (representing owner) that will implement the tree protection measures, The Planning Department Forest Conservation Inspector, and Montgomery County Department of Permitting Services (DPS) Sediment Control Inspector. The purpose of this meeting is verify the limits of disturbance and discuss specific tree protection and tree care measures shown on the approved plan. No land disturbance shall begin before tree protection and stress-reduction measures have been implemented and approved by the Planning Department's Forest Conservation Inspector.
 - a. Typical tree protection devices include: i. Chain link fence (four feet high)
 - ii. Super silt fence with wire strung between the support poles (minimum 4
 - feet high) with high visibility flagging. iii. 14 gauge, 2 inch x 4 inch welded wire fencing supported by steel T-bar posts (minimum 4 feet high) with high visibility flagging.
 - b. Typical stress reduction measures may include, but are not limited to: i. Root pruning with a root cutter or vibratory plow designed for that
 - purpose. Trenchers are not allowed, unless approved by the Forest Conservation Inspector
 - ii. Crown Reduction or pruning
 - iii. Watering iv. Fertilizing
 - v. Vertical mulching

vi. Root aeration systems Measures not specified on the Forest Conservation Plan may be required as determined by the Forest Conservation Inspector in coordination with the property owner's arborist.

3. A Maryland Licensed Tree expert must perform, or directly supervise, the

implementation of all stress reduction measures. Documentation of the process (including

Page 1 of 3 February 2017



1. RETENTION AREAS WILL BE SET AS PART OF THE REVIEW PROCESS AND PRECONSTRUCTION

2. BOUNDARIES OF RETENTION AREAS MUST BE STAKED AT THE PRECONSTRUCTION MEETING AND FLAGGED PRIOR TO TRENCHING.

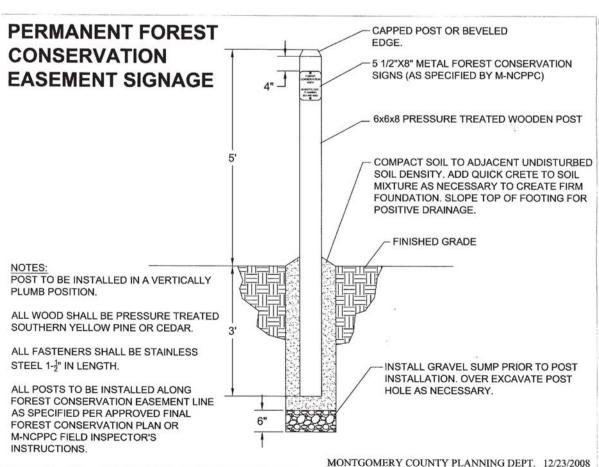
3. EXACT LOCATION OF TRENCH SHALL BE DETERMINED IN THE FIELD IN COORDINATION WITH THE FOREST CONSERVATION (FC) INPECTOR. 4. TRENCH SHOULD BE IMMEDIATELY BACKFILLED WITH EXCAVATED SOIL OR OTHER ORGANIC

SOIL AS SPECIFIED PER PLAN OR BY THE FC INSPECTOR. 5. ROOTS SHALL BE CLEANLY CUT USING VIBRATORY KNIFE OR OTHER ACCEPTABLE

6. ALL PRUNING MUST BE EXECUTED WITH LOD SHOWN ON PLANS OR AS AUTHORIZED IN WRITING BY THE FC INSPECTOR.

ROOT PRUNING DETAIL

CAPPED POST OR BEVELED



photographs) may be required by the Forest Conservation Inspector, and will be determined at the pre-construction meeting.

- 4. Temporary tree protection devices must be installed per the approved Forest Conservation Plan, Exemption Plan, or Tree Save Plan and prior to any land disturbance. The Forest Conservation Inspector, in coordination with the DPS Sediment Control Inspector, may make field adjustments to increase the survivability of trees and forest shown as saved on the approved plan.
- 5. Tree protection fencing must be installed and maintained by the property owner for the duration of construction project and must not be altered without prior approval from the Forest Conservation Inspector. All construction activity within protected tree and forest areas is prohibited. This includes the following activities:
- a. Parking or driving of equipment, machinery or vehicles of any type.
- b. Storage of any construction materials, equipment, stockpiling, fill, debris, etc. c. Dumping of any chemicals (i.e., paint thinner), mortar or concrete remainder,
- trash, garbage, or debris of any kind. Felling of trees into a protected area.
- e. Trenching or grading for utilities, irrigation, drainage, etc.
- 6. Forest and tree protection signs must be installed as required by the Forest Conservation Inspector. The signs must be waterproof and wording provided in both English and

During Construction

- 7. Periodic inspections will be made by the Forest Conservation Inspector. Corrections and repairs to tree protection devices must be completed within the timeframe given by the
- 8. The property owner must immediately notify the Forest Conservation Inspector of any damage to trees, forests, understory, ground cover, and any other undisturbed areas shown on the approved plan. Remedial actions, and the relative timeframes to restore these areas, will be determined by the Forest Conservation Inspector.

Post-Construction

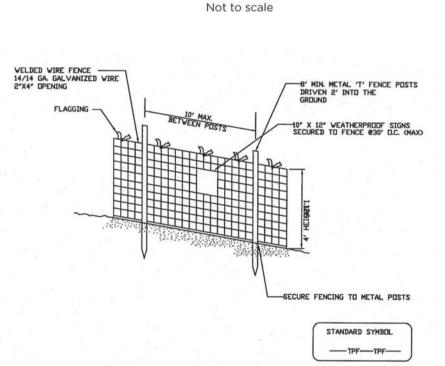
- 9. After construction is completed, but before tree protection devices have been removed, the property owner must request a final inspection with the Forest Conservation Inspector. At the final inspection, the Forest Conservation Inspector may require
- additional corrective measures, which may include: a. Removal, and possible replacement, of dead, dying, or hazardous trees
- b. Pruning of dead or declining limbs c. Soil aeration
- d. Fertilization
- e. Watering

f. Wound repair

Page 2 of 3

Tree Protection Fence Detail

February 2017



- Practice may be combined with sediment control
- Location and limits of fencing should be
- coordinated in field with arborist. Boundaries of protection area should be staked
- prior to installing protective device. Root damage should be avoided.
- Protection signage is required.
- Fencing shall be maintained throughout construction.

g. Clean up of retention areas, including trash removal

- 10. After the final inspection and completion of all corrective measures the Forest Conservation Inspector will request all temporary tree and forest protection devices be removed from the site. Removal of tree protection devices that also operate for erosion and sediment control must be coordinated with both DPS and the Forest Conservation Inspector and cannot be removed without permission of the Forest Conservation Inspector. No additional grading, sodding, or burial may take place after the tree protection fencing is removed.
- 11. Long-term protection measures, including permanent signage, must be installed per the approved plan. Installation will occur at the appropriate time during the construction project. Refer to the approved plan drawing for the long-term protection measures to be

Page 3 of 3 February 2017

INSPECTIONS

All field inspections must be requested by the applicant.

Field Inspections must be conducted as follows:

Plans without Planting Requirements

- 1. After the limits of disturbance have been staked and flagged, but before any clearing or
- grading begins. 2. After necessary stress reduction measures have been completed and protection measures have been installed, but before any clearing and grading begin and before release of the
- 3. After completion of all construction activities, but before removal of tree protection fencing, to determine the level of compliance with the provision of the forest conservation.

Additional Requirements for Plans with Planting Requirements

- 4. Before the start of any required reforestation and afforestation planting. 5. After the required reforestation and afforestation planting has been completed to verify
- that the planting is acceptable and prior to the start the maintenance period. 6. At the end of the maintenance period to determine the level of compliance with the provisions of the planting plan, and if appropriate, release of the performance bond.

Total Tract	162.50	
Net Tract	159.75	excludes area on existing FFCP 20075030
Remaining in Agricultural Use	0.00	
Road & Utility ROWs ¹	0.00	
Total Existing Forest	48.40	
Forest Retention	47.75	
Forest Cleared	0.65	

Number of Acres

Forest Conservation Data Table

Land Use & Thresholds Land Use Category

Total Channel

ARA, MDR, IDA, HDR, MDP, or CIA. **Conservation Threshold** 20% percent Afforestation Threshold 15% percent

Stream(s)	Length (ft.)	Width (ft.) ³	ľ		Ö						
Acres of Forest in	Retained	Cleared	Planted	MATION							AGER:
Wetlands	0.32	-	:=	INFORM	D BY:	¥	BY:	SMB	BY:	X	MAN
100-Year Floodplain	0.75	-	.=	NS NS	GNED	_	WN B	S	CKED	_	JECT
Stream Buffers	10.16	-	-	ESI	DESIG		ORA		뿚		PRO,

Average Buffer

- Only Road or Utility ROWs not to be improved as part of development application.
- ² Information from FC Land Use Categories & Thresholds document.
- Measured from stream edge to buffer edge

Priority Areas

FOREST CONSERVATION WORKSHEET

47.75

Gude Landfill Remediation Design NET TRACT AREA:

162.50 A. Total tract area . 0.00 B. Land dedication acres (parks, county facility, etc.) .. 0.00 C. Land dedication for roads or utilities (not being constructed by this plan). 0.00 D. Area to remain in commercial agricultural production/use ... 2.75 E. Other deductions (specify) Mens Shelter Area under FFCP 20075030 159.75 F. Net Tract Area .

LAND USE CATEGORY: (from Trees Technical Manual) Input the number "1" under the appropriate land use

limit to only o		er the appi	opriate land	d use,		
ARA	MDR	IDA	HDR	MPD	CIA	
0	0	1	0	0	0	
G. Afforestation Threshold				15%	xF=	23.96
H. Conservation Threshold				20%	xF=	31.95
EXISTING FOREST COVER:						
I. Existing forest cover		*************	=			48.40
J. Area of forest above afforest	24.44					

K. Area of forest above conservation threshold ... BREAK EVEN POINT:

L. Forest retention above threshold with no mitigation= M. Clearing permitted without mitigation ... PROPOSED FOREST CLEARING:

U. Credit for landscaping (may not exceed 20% of "S")=

V. Total reforestation and afforestation required

N. Total area of forest to be cleared . O. Total area of forest to be retained .

PLANTING REQUIREMENTS: P. Reforestation for clearing above conservation threshold= 0.00 Q. Reforestation for clearing below conservation threshold= 15.80 R. Credit for retention above conservation threshold= 0.00 S. Total reforestation required . 0.00 T. Total afforestation required

NOTES

- THE REMAINING 47.75 ACRES OF RETAINED FOREST, AND 0.83 ACRES OF NON-FORESTED AREA SHALL BE PLACED INTO A CATEGORY I CONSERVATION EASEMENT.
- FOR ADDITIONAL SITE NOTES AND FOREST CONSERVATION DATA, SEE DRAWING F-1

MONTGOMERY COUNTY DEPARTMENT OF ENVIRONMENTAL PROTECTION

WSSC MAP GRIDS: 220NW06, 220NW07, 221NW06, 221NW07 TAX GRID NUMBERS: GS41, GS52

35.24

13.16

47.75

0.00

0.00



and Technology, Inc., PBC **Hunt Valley Center** 225 Schilling Circle, Suite 400 Hunt Valley, Maryland 21031 (410) 584-7000

DATE: SEPTEMBER 2020

PROJECT NUMBER: 1564601

F-6

SHEET: 6 OF 6

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