Washington County
MARYLAND

PURCHASING DEPARTMENT
DIVISION OF BUDGET & FINANCE

PUR-1623
ADDENDUM NO. 2
INVITATION TO BID

SMITHSBURG WwTP ENR UPGRADE AND EXPANSION

DATE: Monday, August 28, 2023 **BIDS DUE: Wednesday, September 13, 2023**
(Revised Due Date – Addendum No.2) **2:00 P.M.(EDT/EST)**

To Bidders:

This Addendum is hereby made a part of the Contract Documents on which all bids will be based and is issued to correct and clarify the original documents.

Please acknowledge receipt of this Addendum at the appropriate space on the Proposal Form. This Addendum consists of three (3) pages and attachments.

NOTE: All Bidders must enter the Washington County Administration Complex through either the front door at the 100 West Washington Street entrance or through the rear entrance (w/blue canopy roof) which is handicap accessible and must use the elevator to access the Purchasing Department to submit their bid and/or to attend the Pre-Bid Conference. Alternate routes are controlled by a door access system. The general public will be subject to wand search and will be required to remove any unauthorized items from the building prior to entry. Prohibited items include but are not limited to: Weapons of any type; Firearms, ammunition, and explosive devices; Cutting instruments of any type - including knives, scissors, box cutters, work tools, knitting needles, or anything with a cutting edge, etc.; Pepper spray, mace, or any other chemical defense sprays; and Illegal substances.

ITEM NO. 1: *Inquiry:* The project is scheduled to bid Sept 6th, due to the MBE solicitation requirements we are requesting a bid extension of at least one week

Response: All reference in the bid document referencing the Bid Submission Deadline and Bid Opening Time shall be changed to: **No later than 2:00 P.M. (EDT/EST), Wednesday, September 13, 2023**.

ITEM NO. 2: *Inquiry:* Page GC-57: Section GC-7.10 Item D: Insurance Requirements – Are we required to carry Railroad insurance for this project?

Response: No, railroad insurance will not be required under this contract.

ITEM NO. 3: *Inquiry:* Specification Section: 03 41 13 Precast Hollow Core Planks – Please clarify what structure this specification applies to.

Response: The Precast Hollow Core Planks Specification Section: 03 41 13 applies to the DEOX Baffle Wall in the Pre-Anoxic Tank shown on Sheet PM-1.

ITEM NO. 4: *Inquiry:* Are additional visits available?

Response: Yes, please contact Joe Moss at 240-313-2618 to schedule a visit.

ITEM NO. 5: *Inquiry:* Can you please answer the following: Sheet C-1 indicates test pits and/or soil borings. Can the logs be provided?

Response: Please refer to the Boring Logs provided in the attached September 27, 2019 "GEOTECHNICAL SUBSURFACE INVESTIGATION REPORT" prepared by AB Consultants, Inc.

ITEM NO. 6: *Inquiry:* There is no coating spec for cmu. decking and joists, piping above grade and submerged, submerged coatings for pre-anoxic tank, etc. 09800 only has submerged concrete for the booster pump station? Please proved coating spec.

Response: Please see the attached ***REVISED* 09 96 00-TNEMEC-High Performance Coatings specification** which addresses these conditions and shall replace this specification provided in the bid documents in its entirety.

ITEM NO. 7: *Inquiry:* Referencing Drawing S-13: Can you please verify the dimensions or scale on this drawing? They are conflicting with one another.

Response: Drawing scale is 3/16" per 1'- 0". Sheet S-13 will be revised accordingly and reissued in Addendum No. 3.

ITEM NO. 8: *Inquiry:* Per DBE specifications: The Good Faith Effort states that we are to send out solicitations to MBE/WBE firms 30 days prior to the bid opening date – is this a requirement?

Response: Yes, this is required. Bids will be due **No later than 2:00 P.M. (EDT/EST), Wednesday, September 13, 2023**.

ITEM NO. 9: *Inquiry:* Drawing pM7 note says to paint the existing disc filters – see project manuel for cleaning and coating requirements. There is no spec section for this. Please provide.

Response: Please see the attached ***REVISED* 09 96 00-TNEMEC-High Performance Coatings specification** that covers cleaning and coating requirements for the disc filter coating.

ITEM NO. 10: *Inquiry:* Drawing S-13 Influent equalization tank, first off it shows volclay waterstop however in the specs it states all waterstop to be 9" PVC which is correct?

Response: The design intent for the Influent Equalization Tank structure is swelling waterstop as shown on Sheets S-13 and S-14. The specification for 9" PVC waterstop refers to Pre-Anoxic Tank and Chemical Tank Containment structures as shown on Sheets S-03 and S-06.

ITEM NO. 11: *Inquiry:* Also in the Influent Equalization tank, the catwalk on the structural only show one mixer and on PM-8 it showing 2 thickened slabs for the submersible mixer and hoist. Please advise

Response: Drawing PM-8 showing 2 mixers is correct. Sheet S-13 will be revised accordingly and reissued in Addendum No. 3.

ITEM NO. 12: *Inquiry:* There are no details on the site drawings for sidewalks, nor the ramp coming out of the chemical building, please advise

Response: Details will be provided in Addendum No. 3.

ITEM NO. 13: *Inquiry:* Drawing E-10 the Generator access platform pad notes to see the structural drawings but there is no mention of this nor any details showing this anywhere on the structural. Please advise

Response: All references in the Bid document made to Drawing E-10 the Generator access platform pad notes shall be **CHANGED** to read as follows: **"GENERATOR ACCESS PLATFORM PAD. SEE DETAIL THIS SHEET"**. Drawing E-10 will be revised accordingly and reissued in Addendum No. 3.

ITEM NO. 14: *Inquiry:* We missed the prebid, can we make a site visit?

Response: Yes, please contact Joe Moss at 240-313-2618 to schedule a visit.

ITEM NO. 15: *Inquiry:* Can I please have a copy of the pre-bid attendees list.

Response: Please see Attachment "A" that was included in Addendum No. 1.

ITEM NO. 16: *Inquiry:* For the MD Department of Environment DBE good faith efforts checklist, item A5 asks "did you receive bidders list from loan recipient?" Can we please be provided this list?

Response: Please see Attachment "A" that was included in Addendum No. 1.

By Authority of:

Rick F. Curry, CPPO
Director of Purchasing

***(NOTE:** The wording of all "Inquiries" submitted are displayed exactly as received.)*

GEOTECHNICAL SUBSURFACE INVESTIGATION REPORT

Smithburg Wastewater Treatment Plant Upgrade
Washington County, Maryland

PREPARED FOR:

Buchart Horn
The Russell E. Horn Building
445 West Philadelphia Street
York, PA 17401

PREPARED BY:

AB CONSULTANTS, INC.
9450 ANNAPOLIS ROAD
LANHAM, MARYLAND 20706

September 27, 2019

AB CONSULTANTS, INC.
9450 Annapolis Road
Lanham, Maryland 20706
Ph: (301) 306-3091
Fax: (301) 306-3092
www.abconsultantsinc.com
Engineers Planners Surveyors Supporting Services

September 27, 2019

Mr. Jeffrey S Culton P.E.
Buchart Horn
The Russell E. Horn Building
445 West Philadelphia Street
York, PA 17401

REF: Report of Subsurface Investigation and Studies
Smithburg Wastewater Treatment Plant Upgrade
Washington County, Maryland
AB Job No. 2019028-00

Dear Culton:

AB Consultants, Inc. (ABC) is pleased to submit this soil report containing the results of geotechnical investigation for the above referenced site. To obtain information of the subsurface condition, ten (10) 10- to 25-ft deep soil borings were proposed and ten (10) 9 to 22 feet deep borings were drilled at the site. The purpose of this study was to explore the subsurface conditions for the proposed building and stormwater management (SWM) facilities. The following report sections discuss the results of field and laboratory studies, design recommendations and construction methods for the proposed structures.

All samples obtained from soil test borings will be retained in our laboratory for a period of thirty (30) days from the date of this report. They will be available for inspection during this period. After that time, the samples will be discarded.

It has been a pleasure serving you on this project. If you have any questions regarding this report, or if we can be of further service in any way, please contact us.

Very truly yours,
AB Consultants, Inc.

Andinet Tolla, P.E.
Project Engineer

Kim-Hou Chan, P.E.
Geotechnical & Field Services

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 General

This report presents the results of the subsurface exploration and laboratory test results performed for the Smithburg Wastewater Treatment Plant Upgrade located at Smithburg, Washington County, Maryland. It is our understanding that 1-story filter building and Stormwater Management (SWM) facilities are proposed in this project site. Study has been performed in general accordance with our letter proposal dated on February 1, 2019.

1.2 Scope of Work

The investigation of existing subsurface soil conditions at the site consisted of the following:

- Planning and executing subsurface exploration programs to evaluate soil and ground conditions for the proposed upgrade project.
- Perform on-site infiltration tests.
- Performing soil laboratory tests on soil samples obtained from the borings.
- Providing geotechnical report that includes results of field and laboratory studies, SWM consideration and foundation recommendations.

1.3 Site Location

The site is located at 22523 Leitersburg Smithsburg Road Smithsburg, Maryland.

2.0 FIELD ACTIVITIES AND SUBSURFACE EXPLORATION

2.1 Soil Borings

A total of ten (10) soil borings were drilled for subsurface study on the project site. Borings were drilled at the referenced sites to depths of 9- to 22-ft below the existing ground surface on between August 1 and September 19, 2019. Due to auger refusal, soil borings were terminated at shallow depths. Soil borings were staked out in the field by ABC. Site location and boring plans are included in the Appendix.

SUMMARY OF BORINGS			
Boring No.	Proposed Depth, (ft)	Auger Refusal (ft)	Actual Boring Depth
SB-1	25	16.5	16.5
SB-2	25	17	17
SB-3	25	22	22

SUMMARY OF BORINGS			
Boring No.	Proposed Depth, (ft)	Auger Refusal (ft)	Actual Boring Depth
SB-4	25	15	15
SB-5	25	16.5	16.5
SB-6	25	12	12
SWM-1	10	10	10
SWM-2	10	10	10
SWM-3	10	10	10
SWM-4	10	9	9

2.2 Subsurface Investigation

Borings were drilled using Truck-Mounted drill rig, B-61 and CME -45B. Test borings were advanced by using hollow-stem augers and soil samples were obtained using the Standard Penetration Tests (SPT) in accordance with ASTM D1586. SPT samples were obtained for each boring at depth intervals of every 2.5 feet for the first 10 feet and at 5 feet intervals thereafter. A representative portion of each split spoon sample was placed in a glass jar and was transported to our laboratory.

In the split-barrel sampling procedure, a 2-inch O.D. split-barrel sampling spoon is driven into the ground with a 140-pound hammer, free falling a distance of 30 inches. The blows required to advance the sampling spoon to a specified distance are reported as the penetration resistance values. The values are shown on boring logs at the depths of their occurrence. The N-value is the sum of standard penetration resistance values for the last 12-inches of sampling. The N-value is an indication of the relative density of in-place granular soils and, to a lesser degree of accuracy, the consistency of cohesive soils.

Groundwater levels were monitored in soil borings. Samples obtained from the boring were inspected by a geotechnical engineer and the field logs were edited accordingly. The final logs that indicate the subsurface conditions encountered are included in the Appendix.

2.3 On-site Infiltration Test and Results

Four (4) infiltration tests were performed in auger borings drilled at 5-ft radius from the soil sample borings. Test holes were drilled with 8-inch diameter auger to a depth of 5-ft below existing ground. 5-inch diameter solid PVC casings were inserted

and water was then introduced for an overnight presoak period. Infiltration tests were performed the next day by refilling PVC casings with water to the presoak level and then monitoring water levels for one hour time. Repeat this procedure (refilling the casing each time) three additional times, for a total of four observations. Field in-situ infiltration test data are included in the Appendix and results are summarized in following table.

SUMMARY OF IN-SITU INFILTRATION TEST RESULTS				
Boring No.	Approx. Test Hole Depth, (ft)	USDA Soil Classification	USCS soil Classification	Average Infiltration Rate (in./hr)
SWM-1	5	Loamy Sand	Silty Gravel	0.3
SWM-2	5	Loamy Sand	Clayey Gravel	3
SWM-3	5	Sandy Loam	Clayey Gravel	10
SWM-4	5	Sandy Loam	Clayey Sand	12

3.0 LABORATORY TESTING PROGRAM

3.1 Laboratory Testing Program

Laboratory tests were performed on selected representative samples. Natural moisture contents were performed on all soil samples, and results are included in boring logs. Atterberg limits, sieve analysis tests were conducted on selected samples. Atterberg limits results are shown in boring logs in correspondence with the sample depths. Results of sieve analyses are presented in the Appendix.

3.2 Laboratory Results

Results of some laboratory tests are summarized in the following table. Other pertinent soil data is presented in the boring logs and the Appendix.

SUMMARY OF LABORATORY TEST RESULTS								
Boring No.	Sample Depth (ft)	Atterberg Limits			Passing #200 Sieve (%)	Modified Proctor Test		Classification
		LL	PL	PI		Max. Dry Density (pcf)	Opt. Moist. Content (%)	
SB-1	1 to 6	39	17	22	58.1	125.8	10.7	CL / A-6
SB-6	1 to 6	30	15	15	40.6	131.6	9.0	SC / A-6

4.0 GENERAL SITE AND SUBSURFACE CONDITIONS

4.1 Site Condition

The project site is located at Smithburg Wastewater Treatment Plant in Washington County, Maryland. Borings were drilled on open grass area. Site is fenced around the perimeter with chain link fence and gate is located on the north part of the site. Existing control building, SBR influent and operation building are found inside the property. Existing SWM pond was also found at the west part of the property. Utilities in the area include underground electric and sewer line.

4.2 Site Geology

Geologically the site is located in the Waynesboro Formation and Tomstown Dolomite. Waynesboro Formation consists of red, gray, and yellowish-brown, thin-bedded siltstone, shale, and ripple-marked, cross-bedded sandstone; lower part interbedded dark gray to red shale and thin-bedded dolomite; thickness approximately 600 feet. Tomstown Dolomite consist of interbedded light gray to yellowish-gray, thin- to thick-bedded dolomite and limestone; some shale layers; gradational contact with Antietam; thickness 200 to 1,000 feet.

4.3 Subsurface Soil Condition

Various soil types were grouped into the major zones noted on the boring logs. A brief explanation of the terms and notes used in the logs is included with this report. The stratification lines designating the interfaces between earth materials on the boring logs are approximate; in situ, the transitions may be gradual. Detailed soil description and depth of various soil strata are given in boring logs, together with the SPT blow counts with depth. The encountered soils in this project site are summarized as follows:

Topsoil: 1 to 7 inches of topsoil was encountered at all soil borings. Topsoil is defined as the more high-organic, weathered surficial soils horizon capable of supporting vegetation.

Stratum I: *Sandy Clay to Clayey Sand:* Underneath Topsoil, light brown, brown, gray and dark brown sandy clay to clayey sand with gravel was encountered in all borings and extended 3- to 6-ft below existing ground. N-values in this layer of soil were ranged from 6 to more than 51 blows per foot.

Stratum II: *Clayey Gravel to Silty Gravel:* Light brown, grown, reddish brown and gray clayey gravel to silty gravel with sand was encountered underneath the Stratum II in all borings except SWM-4, and extended to 8- to 12-ft below existing ground and completion depths. N-values in this layer of soil were ranged from 7 to more than 51 blows per foot.

Stratum III: *Lean Clay to Sandy Clay:* Light brown and brown lean clay to sandy clay with rock fragments was found in borings SB-1, SB-2, SB-3 and SB-5, below Stratum I and Stratum II and extended to completion depths of borings. N-values in this layer of soil were ranged from 4 to 36 blows per foot.

Stratum III: *Gravely Clay (Possible Decomposed Rock):* A possible decomposed rock consisting of brown and gray gravely clay with sand was encountered in boring SWM-4 and extended to completion depth of the boring. N-values in this layer was more than 51 blows per foot.

4.5 Groundwater Observations

Groundwater observations were made in every borehole during drilling, and after completion of drilling operations. As noted on boring logs groundwater was not encountered in all borings. Water level observations are presented at the lower left hand corner of boring logs and a summary is presented in the table below. Fluctuations in the level and quantity of ground water will occur due to variations in rainfall, temperature, soil permeability and other factors not evident at the time of the water level measurements recorded on boring logs.

SUMMARY OF GROUNDWATER OBSERVATION				
Boring No.	Boring Depths (ft)	Existing Ground Elevation	Water Encountered During Drilling (ft)	Water Observed After 24 Hours (ft)
SB-1	16.5	669	10.5	n/a
SB-2	17	667	11	n/a
SB-3	22	668	11.5	n/a
SB-4	15	666	9	n/a
SB-5	16.5	666	7.5	n/a
SB-6	12	668	7	n/a
SWM-1	10	666	6	5
SWM-2	10	666	6.5	7
SWM-3	9	665	6	6

SUMMARY OF GROUNDWATER OBSERVATION				
Boring No.	Boring Depths (ft)	Existing Ground Elevation	Water Encountered During Drilling (ft)	Water Observed After 24 Hours (ft)
SWM-4	9	680	6	Dry, caved in 5.5 ft

5.0 ANALYSIS AND RECOMMENDATIONS

5.1 Building

Based on the encountered subsurface soils, surrounding area and anticipated structural loads, recommendations including foundation systems, ground improvements techniques, floor slab and seismic considerations are provided herein. Foundations for structures must satisfy two (2) basic and independent design criteria: (a) the maximum bearing pressure transmitted to the soils should not exceed the allowable bearing pressure based on an adequate factor of safety with respect to soil or rock shear strength; and (b) foundation movements resulting from consolidation, shrinkage or swelling of the supporting soils should be within tolerable limits for the structure. Construction factors such as installation of foundation units, excavation procedures, surface and groundwater conditions must also be considered.

Based on information revealed from soil borings, the engineering properties of encountered soils at or around the proposed building are summarized in the following table. Soil parameters were based on laboratory results, empirical correlation from the SPT and published information.

SUMMARY OF ENCOUNTERED SOIL PROPERTIES						
Boring No.	Depth (ft)	Sample Description	USCS	Range of N-Value	Range of Effective Unit Weight, γ (pcf)	Range of Friction Angle, ϕ (deg.)
SB-1	0.5 to 5.5	Clayey Sand	SC	9 to 16	115 to 120	24 to 26
	5.5 to 8	Clayey Gravel	GC	7	120 to 125	28 to 32
	8 to 16.5	Lean Clay	CL	8 to 28	105 to 110	10
SB-2	0.5 to 3.0	Clayey Sand	SC	>51	115 to 120	24 to 26
	3.0 to 8	Clayey Gravel	GC	10 to 28	120 to 125	28 to 32
	8 to 17	Lean Clay	CL	4 to 15	105 to 110	10
SB-3	0.5 to 5.5	Clayey Sand	SC	9 to 21	115 to 120	24 to 26
	5.5 to 12	Clayey Gravel	GC	23 to 24	120 to 125	28 to 32
	12 to 22	Lean Clay	CL	6 to 36	105 to 110	10

SUMMARY OF ENCOUNTERED SOIL PROPERTIES						
Boring No.	Depth (ft)	Sample Description	USCS	Range of N-Value	Range of Effective Unit Weight, γ (pcf)	Range of Friction Angle, ϕ (deg.)
SB-4	0.5 to 3	Sandy Clay	CL	10	105 to 110	10
	3 to 15	Clayey Gravel	GC	14 to >51	115 to 125	28 to 32
SB-5	0.5 to 3.0	sandy Clay	CL	9	115 to 120	10
	3.0 to 12	Clayey Gravel	GC	6 to 36	120 to 125	28 to 32
	12 to 16.5	Sandy Clay	CL	10	105 to 110	10
SB-6	0.5 to 3.0	Sandy Clay	CL	19	105 to 110	10
	3.0 to 12	Clayey Gravel	GC	7 to >51	115 to 125	28 to 32

5.1.1 Shallow Spread Foundation

Based on the preliminary information, it is understood that the proposed filter buildings will be a one-story-height structure with slab on-grade. At the time of our study, no finish floor information is available. However, the final finish floor elevations are anticipated to be consistent with the existing contours and structure loads are anticipated to be low. No major cut of fill is expected.

As revealed from the borings in the proposed building area, N-values in the upper portion of borings are varied. It our opinion that shallow foundation can be considered. Shallow footings are anticipated to be placed in a properly prepared subgrade. Footings found in existing soil or engineering fills may be sized based on a maximum net allowable bearing pressure of 2500 lbs per sq. ft. and with a minimum footing dimension of 24 inches, or other dimensions approved by structural engineer. Shallow foundations should be placed at a minimum of 2.5 ft below grade or lowest final grade, whichever is deeper.

Positive surface drainage should be established at the start of work, be maintained during construction and following completion of the project to prevent surface water ponding and subsequent saturation of subgrade soils. Prolonged exposure or saturation of subgrade soils by ponding or runoff water may result in significant changes in strength and compressibility characteristics. Saturated subgrade soils should be excavated material shall be undercut a minimum of 24 inches below subgrade elevation and replace with suitable material or AASHTO #57 stone wrapped with non-woven geotextile fabric.

Wall foundations, maximum net allowable bearing pressure of 2500 psf. can be considered. Wall foundations should be placed at a minimum of 2.5 ft below grade or lowest final grade, whichever is deeper.

During the construction period the bearing capacity at the final footing elevations should be verified in the field by the geotechnical engineer to ensure the bearing capacity at the bottom of each footing excavation is adequate for the design loads. Localized unsuitable materials may be encountered during foundation verification and subgrade improvement is may be expected.

5.1.2 Floor Slab

Floor slabs should be supported on approved, firm natural soils, or on new compacted fill. The slab subgrade should be prepared in accordance with the procedures outlined in Sections 6.1 and 6.2 of this report. In particular, the slab subgrade should be heavily proof-rolled to delineate any soft or loose areas requiring undercutting and/or stabilization. It is recommended that slabs be supported on a 6-inch thick, clean sand or gravel layer, placed on a properly prepared subgrade. Impervious sheeting should be placed between the slab and granular course to act as a vapor barrier. The placement of a 6x6 wire mesh reinforcement is also recommended. For the design of the concrete slab, a Modulus of Subgrade Reaction (k) of 150 pci can be used.

5.1.3 Foundation Drain

All surface water shall be diverted from building foundations. It is recommended that a perimeter drainage system be placed directly against the back of building below grade foundation walls to release any hydrostatic pressure. This system may consist of perforated pipes, surrounded by crushed stone and geotextile filter fabric, located outside the wall footings and slightly below the floor level. This subdrainage system may require pump to discharge collected water into the storm or sewer system from sump pits installed in the lowest level as presented in the Foundation Wall Drain Detail in the Appendix. Alternatively, the subdrainage pipe may be day-lighted at least 10 feet away from the building.

5.1.4 Seismic Considerations

Moderate amount of low-level earthquake activities have been recorded in the mid-Atlantic Region and in the State of Maryland where numerous faults exists. In

general, the faults in the State of Maryland epicenter is dependent on medium of propagation of the seismic waves – lesser in rocks than in are regarded as **inactive**. Based on subsurface conditions from the sample borings, the following information was and utilized to determine seismic site classification.

Range of N-values	15 to <50
Soil profile	stiff to dense
Shear wave velocity	600 to 12000 ft/sec
Undrained shear strength for cohesive soils	1000 to 2000 psf

Based on the International Building Code criteria, a seismic site classification of Class D is determined. For further structural design parameters, refer to International Building Code 2012, Section 1613 and ASCE 7.

5.2 SWM Facilities Considerations

The infiltration design criteria established by the Maryland Department of the Environment (MDE) Water Management Administration advises that infiltration practices are not recommended to be utilized: (a) in regions where the bottom of the infiltration facility is in existing or newly placed fill, or (b) in materials that exhibit an infiltration rates less than 0.52 inches per hour, or (c) where the groundwater table or bedrock is within 4 feet of the bottom of the infiltration facility. For surface sand filter and bio-retention (F-6) practices, no minimum infiltration rate is required if these facilities are designed with a "day-lighting" underdrain system; otherwise these facilities require a 0.52 inch per hour rate.

5.2.1 Findings of SWM Facility

Based on the field investigation and laboratory results, the subsoils are classified per the U.S. Department of Agriculture (USDA) classification system along with some field data and engineering properties, and are summarized in the following sections. The soil parameters are summarized in the following table.

SUMMARY OF SOIL PROPERTIES PER USDA CLASSIFICATION				
Boring No.	Sample Depth (ft)	USDA Textural Classification	Minimum Infiltration Rate (in/hr)	Hydrologic Soil Grouping
SWM-1	0.5 to 3	Sandy Loam	1.02	A
	3 to 10	Loamy Sand	2.41	A
SWM-2	0.5 to 5	Sandy Clay Loam	0.17	C
	5 to 10	Loamy Sand	2.41	A

SUMMARY OF SOIL PROPERTIES PER USDA CLASSIFICATION				
Boring No.	Sample Depth (ft)	USDA Textural Classification	Minimum Infiltration Rate (in/hr)	Hydrologic Soil Grouping
SWM-3	0.5 to 5	Clay Loam	0.09	D
	5 to 10	Sandy Loam	1.02	A
SWM-4	0.5 to 6	Sandy Loam	1.02	A
	6 to 10	Sandy Clay Loam	0.17	C

A summary of the field findings and recommendations are presented below. The soil parameters are summarized in the following table.

SUMMARY OF SWM CONSIDERATIONS AT 5-ft BELOW GROUND					
Boring No.	Testing Depth Below Existing Ground Elevation (ft)	Groundwater Depth Below Existing Ground (ft)	USDA Textural Classification at the Testing Depth	On-site Infiltration Rate (in/hr)	Infiltration SWM Facility
SWM-1	5	5	Loamy Sand	0.3	Not Acceptable
SWM-2	5	7	Loamy Sand	3	Not Acceptable
SWM-3	5	6	Sandy Loam	10	Not Acceptable
SWM-4	5	6	Sandy Loam	12	Not Acceptable

Per field infiltration test results, low infiltration rate was recorded at boring SWM-1 and this might be as a result of groundwater table at testing depth. Infiltration rate of 3 to 12 in/hr was recorded at infiltration boring SWM-2, SWM-3 and SWM-4. However, groundwater was encountered 6 to 7 feet below existing ground elevations. Based on design criteria established by the MDE, infiltration practices are not advised where the groundwater table or bedrock is within 4 feet of the bottom of the infiltration facility.

Design criteria established by the Maryland Department of the Environment (MDE) advises, surface sand filter and bio-retention practices, no minimum infiltration rate is required if these facilities are designed with a “day-lighting” underdrain system; otherwise these facilities require a 0.52 inch per hour rate.

Considering the USDA classification and onsite infiltration test results, all of the proposed SWM areas are considered unsuitable for infiltration design in accordance with

general design criteria and the facilities shall be designed with a "day-lighting" underdrain system.

Note: Any infiltration near building foundations shall be diverted and liner shall be added to protect for all infiltration facilities within 10 feet of building foundations.

6.0 SITE GRADING AND CONSTRUCTION CONSIDERATIONS

6.1 Site Grading

Grading preparation should include clearing of within the limits of construction, grubbing and removal of the organic surficial soils. Design and construction should include provisions for temporary storage, hauling, and disposal of stripped materials at an approved off-site location.

Following stripping and any cut, and before any fill is placed, the subgrade should be proof-rolled with a pneumatic roller, loaded tandem-wheel dump truck, or similar equipment. Areas identified during the proof-rolling process as soft or exhibiting "pumping" tendencies should be undercut a minimum of 12 inches, processed and recompacted or removed and replaced with suitable fill, whichever is appropriate.

6.2 Suitable Fill Material

Fill and backfill for general areas should be free of organics and debris and rock fragments in excess of 3-in. in any dimension. In the upper 18 inches of fill, the maximum particle size should be limited to about 1.5 inches. Soils encountered in the site described as Stratum I in the Subsurface Soil Condition are considered suitable fills, where us site described as Stratum II are considered and unsuitable for any structural fill and shall not be used as fill material. As per ASTM D2478 classification, imported select fill should consist of sandy gravel (GM), clayey gravel (GC), gravelly sand (SP), silty sand (SM), clayey sand (SC), or low-plasticity sandy clay (CL) with a liquid limit and plasticity index of less than 40 and 15 respectively, or an approved alternate.

6.3 Compaction Requirement

Fill soils should be compacted to a minimum of 95 percent of maximum Standard Proctor dry density (ASTM D698), with a moisture content range of ±2 percent of optimum. Fill should be placed in a nominal 10-inch-thick loose lifts. Each lift of fill should be properly compacted, tested and approved prior to placing subsequent lifts.

7.0 CONSTRUCTION CONSIDERATIONS

Positive surface drainage should be established at the start of work, be maintained during construction and following completion of the project to prevent surface water ponding and subsequent saturation of subgrade soils. Prolonged exposure or saturation of subgrade soils by ponding or runoff water may result in significant changes in strength and compressibility characteristics. Saturated subgrade soils should be excavated and replaced with suitable materials.

Depending upon weather conditions during and prior to construction, groundwater may be encountered in the excavation areas. Any seepage into the construction excavation could be controlled by pumping from sump pits. During site preparation, surface runoff should be directed away from the construction areas.

8.0 GENERAL COMMENTS

The soil classifications presented in this report are based upon the data obtained from the soil borings performed at indicated locations and from any other information discussed in this report. This report does not reflect any variations that may occur across the site. The nature and extent of such variations may not become evident until construction. If variations appear evident, the conclusion and recommendations of this report should then be reviewed by ABC geotechnical engineer in light of the new information.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No other warranties, either expressed or implied, are intended or made. In the event that any changes in the nature, design or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and the conclusions of this report modified or verified in writing by ABC geotechnical engineer of record.

APPENDIX

A. General Notes

B. Foundation Wall Drain Details

C. Vicinity Map

D. Boring Plan

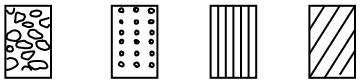
E. Boring Logs

F. Lab Test Results

G. Infiltration Test Results

A. GENERAL NOTES

Drilling and Sampling Symbols



Gravel Sand Silt Clay

Split Spoon (SS) Auger Cutting (AU) Shelby Tube (ST) Rock Core (RC)

N = Standard penetration, blows per foot of a 140 lbs hammer for 30" drop
RQD = Rock Quality Designation
LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index

Cohesionless Soils

If the sand or silt content of a soil is great enough, the soil becomes non-cohesive or semi-cohesive. The soil classification becomes SAND or SILT with the other soil constituents being modifying.

Based on N-Value

0 to 4 Blows…….Very Loose	30 to 59 Blows…….Dense
5 to 9 Blows…….Loose	Over 60 Blows…….Very Dense
10 to 29 Blows…….Medium Dense	

Cohesive Soils

If clay content is sufficient so that clay dominates soil properties, then CLAY becomes the major soil constituent as modifier. Other minor soil constituents may be added according to classification breakdown for cohesion less soils: i.e. silty clay, trace of some sand, trace of gravel.

Based on N-Value

0 to 3 Blows…….Very Soft	16 to 30 Blows……..Stiff
4 to 5 Blows…….Soft	30 to 60 Blows……..Very Stiff
6 to 16 Blows……...Firm	Over 61 Blows……..Hard

Based on Penetrometer Value

Below 0.25……...Very Soft	1.00 to 1.99……..Stiff
0.25 to 0.49……..Soft	2.00 to 3.99……..Very Stiff
0.50 to 0.99……..Firm	Over 4.00…….Hard

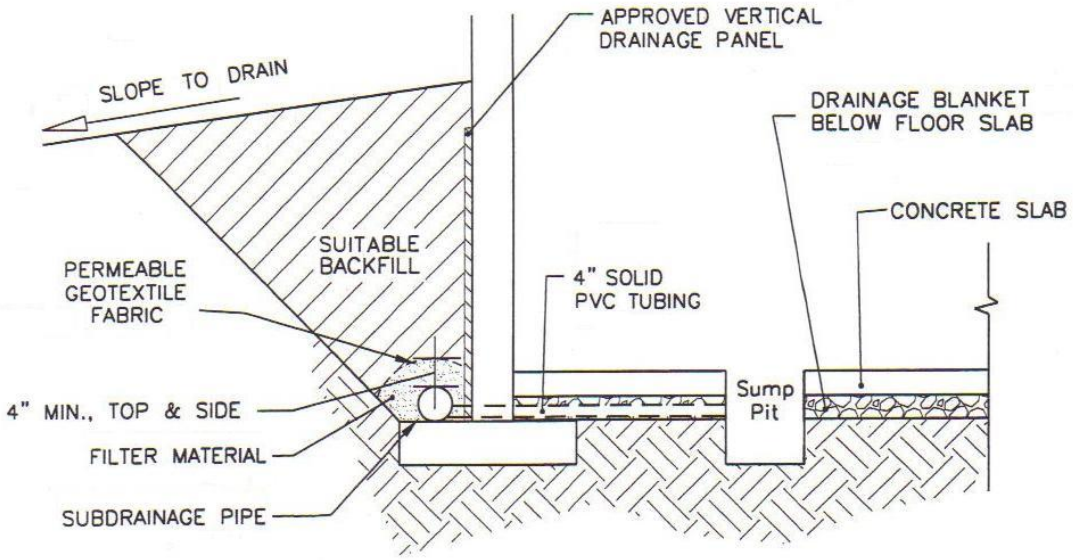
Quantity Modifiers

Term	% of Dry Weight
trace	0 to 10
little	11 to 20
some	21 to 35
and/with	36 to 50

Particle Size Identifications

Boulder ……..Over 8 inch diameter
Cobbles……...3 inch to 8 inch
Gravel……..Coarse……1 inch to 3 inch
Medium……1/2 inch to 1 inch
Fine……....4.75 mm to 1/2 inch
Sand……....Coarse……....2 mm to 4.75 mm
Medium……..0.425 mm to 2 mm
Fine……....0.075 mm to 0.425 mm
Silt/Clay…….....Below 0.075 mm

SECTION DETAIL



NOTES:

1. Subdrainage pipe should be 4" diameter slotted corrugated polyethylene tubing according to ASTM F-405 with maximum 1/8" slot width.
2. Filter material gradation should satisfy the AASHTO No. 57 crushed stone requirement.
3. Permeable fabric should have equivalent open size between #70 to #100 U.S. standard sieve size.
4. Suitable backfill should consist of material classified as ML, SM, SP, SW, GM, GP or GW per ASTM D-2478 and with a liquid limit and plasticity index not exceeding 40 and 15 respectively.
5. Drainage blanket should be at least 4" thick washed gravel or crushed stone that satisfy gradation requirement for AASHTO No. 57.
6. Solid PVC tubing should be connected to the corrugated polyethylene tubing and the sump pit.

B. FOUNDATION WALL DRAIN DETAIL

Smithburg Wastewater Treatment Plant Upgrade
Smithburg, Maryland

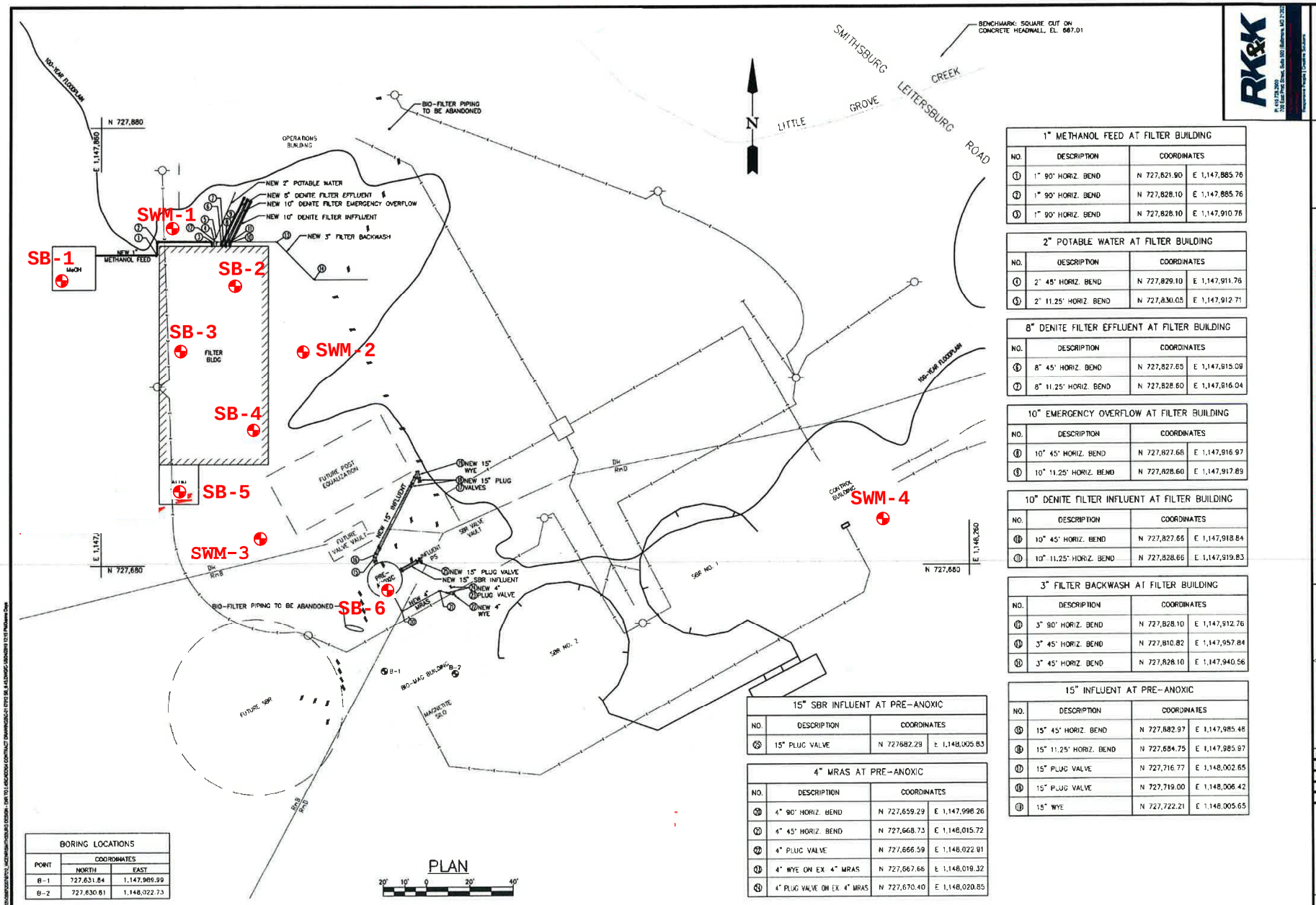
JOB NO.: 2019028-00
SCALE: N.T.S.
DATE: 9/26/19

C. VICINITY MAP

Smithburg Wastewater Treatment Plant Upgrade
Smithburg, Maryland

JOB NO.: 2019028-00
SCALE: N.T.S.
DATE: 9/26/19

D. BORING PLAN



BORING LOCATIONS		
POINT	COORDINATES	
	NORTH	EAST
B-1	727,631.84	1,147,989.99
B-2	727,630.81	1,148,022.73

15" SBR INFLUENT AT PRE-ANOXIC			
NO.	DESCRIPTION	COORDINATES	
58	15" PLUG VALVE	N 727682.29	E 1,148,005.83

4" MRAS AT PRE-ANOXIC			
NO.	DESCRIPTION	COORDINATES	
59	4" 90° HORIZ. BEND	N 727,659.29	E 1,147,996.26
60	4" 45° HORIZ. BEND	N 727,668.73	E 1,148,015.72
62	4" PLUG VALVE	N 727,666.59	E 1,148,022.91
63	4" WYE ON EX. 4" MRAS	N 727,667.66	E 1,148,019.32
61	4" PLUG VALVE ON EX. 4" MRAS	N 727,670.40	E 1,148,020.85

1" METHANOL FEED AT FILTER BUILDING			
NO.	DESCRIPTION	COORDINATES	
1	1" 90° HORIZ. BEND	N 727,821.90	E 1,147,885.76
2	1" 90° HORIZ. BEND	N 727,828.10	E 1,147,885.76
3	1" 90° HORIZ. BEND	N 727,828.10	E 1,147,910.76

2" POTABLE WATER AT FILTER BUILDING			
NO.	DESCRIPTION	COORDINATES	
4	2" 45° HORIZ. BEND	N 727,829.10	E 1,147,911.76
5	2" 11.25° HORIZ. BEND	N 727,830.05	E 1,147,912.71

8" DENITE FILTER EFFLUENT AT FILTER BUILDING			
NO.	DESCRIPTION	COORDINATES	
6	8" 45° HORIZ. BEND	N 727,827.65	E 1,147,915.09
7	8" 11.25° HORIZ. BEND	N 727,828.60	E 1,147,916.04

10" EMERGENCY OVERFLOW AT FILTER BUILDING			
NO.	DESCRIPTION	COORDINATES	
8	10" 45° HORIZ. BEND	N 727,827.68	E 1,147,916.97
9	10" 11.25° HORIZ. BEND	N 727,828.60	E 1,147,917.89

10" DENITE FILTER INFLUENT AT FILTER BUILDING			
NO.	DESCRIPTION	COORDINATES	
10	10" 45° HORIZ. BEND	N 727,827.65	E 1,147,918.84
11	10" 11.25° HORIZ. BEND	N 727,828.66	E 1,147,919.83

3" FILTER BACKWASH AT FILTER BUILDING			
NO.	DESCRIPTION	COORDINATES	
12	3" 90° HORIZ. BEND	N 727,828.10	E 1,147,932.76
13	3" 45° HORIZ. BEND	N 727,810.82	E 1,147,957.84
14	3" 45° HORIZ. BEND	N 727,828.10	E 1,147,940.56

15" INFLUENT AT PRE-ANOXIC			
NO.	DESCRIPTION	COORDINATES	
15	15" 45° HORIZ. BEND	N 727,682.97	E 1,147,985.48
16	15" 11.25° HORIZ. BEND	N 727,684.75	E 1,147,985.97
17	15" PLUG VALVE	N 727,716.77	E 1,148,002.65
18	15" PLUG VALVE	N 727,719.00	E 1,148,006.42
19	15" WYE	N 727,722.21	E 1,148,005.65

RK&K
BUCHART HORN, INC.

SMITHSBURG WWTP ENR UPGRADE AND EXPANSION

22253 LEITERSBURG SMITHSBURG ROAD
SMITHSBURG, MARYLAND 21783

WASHINGTON COUNTY, MARYLAND DEPARTMENT OF WATER QUALITY

1232 ELLOTT AVENUE
HAGERSTOWN, MARYLAND 21740

REVISIONS

MARK	ISSUED DATE	DESCRIPTION

PROJECT NO: 16408.00
ISSUED DATE: MM/DD/YY
DRAWN BY: INITIALS
CHECKED BY: RJA

SHEET TITLE

OVERALL SITE PLAN

SHEET NO.

C-1

E. BORING LOGS

Project No. 2019028-00

LOG OF BOREHOLE SB-1

CLIENT: Buchart Horn

PROJECT: **Smithburg Wastewater Treatment Plant Upgrade**

ARCHITECT/ENGINEER:

SITE: **Washington County, Maryland**

SURFACE ELEV.: **669.0** ft.

DEPTH (FT)	GRAPHIC LOG	SAMPLES: BLOWS/6" N - VALUE RQD	NUMBER	TYPE	IN. RECOVERED IN. DRIVEN	TESTS: MOISTURE (%)	DRY DENSITY (PCF)	Qu (TSF)	% PASSING #200 SIEVE	REMARKS/ ADDITIONAL DATA
0.5										
668.5										
0.5 6" Topsoil Medium dense to loose light brown and gray CLAYEY SAND (SC) with gravel		5-10-6 N=16	1	SS	18/18 100%	18				
		3-4-5 N=9	2	SS	18/18 100%	15			45	LL = 39 PL = 18 PI = 21
5										
5.5										
663.5										
Loose brown, light brown and gray CLAYEY GRAVEL (GC) with sand		4-3-4 N=7	3	SS	14/18 78%	13				
8.0										
661.0										
Firm to stiff light brown LEAN CLAY (CL) with rock fragments ▼ ▽		4-4-4 N=8	4	SS	18/18 100%	20				
10										
		9-5-23 N=28	5	SS	18/18 100%	19				
15										
16.5										
652.5										
Auger Refusal @ 16.5 ft End of Boring @ 16.5 ft Borehole was backfilled with auger cutting after water reading										

WATER LEVEL OBSERVATIONS			
WL	▽	10.5	@ drilling
WL	▼	9	@ 0 hr

AB Consultants, Inc.
9450 Annapolis Road
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Phone: 301-306-3091
Fax: 301-306-3092

STARTED:	9/19/19	FINISHED:	9/19/19
DRILL CO.:	ABC	DRILL RIG:	CME-45B
DRILLER:	RS	ASS'T DRILLER:	
LOGGED BY:		APPROVED:	

Project No. 2019028-00

LOG OF BOREHOLE SB-2

CLIENT: Buchart Horn

PROJECT: **Smithburg Wastewater Treatment Plant Upgrade**

ARCHITECT/ENGINEER:

SITE: **Washington County, Maryland**

SURFACE ELEV.: **667.0** ft.

DEPTH (FT)	GRAPHIC LOG	SAMPLES: BLOWS/6" N - VALUE RQD	NUMBER	TYPE	IN. RECOVERED IN. DRIVEN	TESTS: MOISTURE (%)	DRY DENSITY (PCF)	Qu (TSF)	% PASSING #200 SIEVE	REMARKS/ ADDITIONAL DATA
0.5 6" Topsoil 666.5										
Very Dense to medium dense light brown and gray CLAYEY SAND (SC) with gravel		7-12-53/3"	1	SS	15/15 100%	8				
3.0 664.0										
Medium dense brown, light brown and gray CLAYEY GRAVEL (GC) with sand		5-5-5 N=10	2	SS	18/18 100%	20				LL = 36 PL = 21 PI = 15
5		7-16-12 N=28	3	SS	4/18 22%	16				
8.0 659.0										
Firm to soft light brown and brown LEAN CLAY (CL) with sand, moist ▼		7-5-10 N=15	4	SS	18/18 100%	26			82	
10										
▽										
		1-2-2 N=4	5	SS	18/18 100%	37				
15										
17.0 650.0										
Auger Refusal @ 17 ft End of Boring @ 17 ft Borehole was backfilled with auger cutting after water reading		50/0"		SS	0/0.01 0%					

WATER LEVEL OBSERVATIONS

WL	▽	11	@ drilling
WL	▼	9	@ 0 hr

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DRILLER:	RS	ASS'T DRILLER:	
LOGGED BY:		APPROVED:	

BORING LOG AB09 2019028-00 SMITHBURG WASTEWATER TREATMENT PLANT UPGRADE.GPJ AB_CONS.GDT 9/27/19

Project No. 2019028-00

LOG OF BOREHOLE SB-3

CLIENT: Buchart Horn

PROJECT: **Smithburg Wastewater Treatment Plant Upgrade**

ARCHITECT/ENGINEER:

SITE: **Washington County, Maryland**

SURFACE ELEV.: **668.0** ft.

DEPTH (FT)	GRAPHIC LOG	SAMPLES: BLOWS/6" N - VALUE RQD	NUMBER	TYPE	IN. RECOVERED IN. DRIVEN	TESTS: MOISTURE (%)	DRY DENSITY (PCF)	Qu (TSF)	% PASSING #200 SIEVE	REMARKS/ ADDITIONAL DATA
0.3 667.7										
4" Topsoil										
Medium dense to loose brown and dark brown CLAYEY SAND (SC) with gravel and of trace of organics		6-7-14 N=21	1	SS	15/18 83%	12				
		7-5-4 N=9	2	SS	18/18 100%	21				
5.5 662.5										
Medium dense brown and light brown CLAYEY GRAVEL (GC) with sand		4-9-14 N=23	3	SS	10/18 56%	8			18	
▼		3-9-15 N=24	4	SS	18/18 100%	20				
▽ 12.0 656.0										
Firm to very stiff light brown SANDY CLAY (CL) with rock fragments, moist		30-3-3 N=6	5	SS	18/18 100%	37			64	
		7-14-22 N=36	6	SS	18/18 100%	16				
22.0 646.0										
Auger Refusal @ 22 ft End of Boring @ 22 ft Borehole was backfilled with auger cutting after water reading		50/0"	7	SS	0/0.01 0%					

WATER LEVEL OBSERVATIONS			
WL	▽	11.5	@ drilling
WL	▼	9.5	@ 0 hr

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DRILL CO.:	ABC	DRILL RIG:	CME-45B
DRILLER:	RS	ASS'T DRILLER:	
LOGGED BY:		APPROVED:	

BORING LOG AB09 2019028-00 SMITHBURG WASTEWATER TREATMENT PLANT UPGRADE.GPJ AB_CONS.GDT 9/27/19

Project No. 2019028-00

LOG OF BOREHOLE SB-4

CLIENT: Buchart Horn

PROJECT: **Smithburg Wastewater Treatment Plant Upgrade**

ARCHITECT/ENGINEER:

SITE: **Washington County, Maryland**

SURFACE ELEV.: **666.0** ft.

DEPTH (FT)	GRAPHIC LOG	SAMPLES: BLOWS/6" N - VALUE RQD	NUMBER	TYPE	IN. RECOVERED IN. DRIVEN	TESTS: MOISTURE (%)	DRY DENSITY (PCF)	Qu (TSF)	% PASSING #200 SIEVE	REMARKS/ ADDITIONAL DATA
0.4		5" Topsoil								
665.6		Firm light brown and brown SANDY CLAY (CL) with gravel								
		4-3-7 N=10	1	SS	18/18 100%	23			83	
3.0										
663.0		Dense to medium dense brown and light brown CLAYEY GRAVEL (GC) with sand								
		13-22-24 N=46	2	SS	12/18 67%	6				
5										
		6-8-13 N=21	3	SS	14/18 78%	11				
		-wet below 8 ft								
		4-6-8 N=14	4	SS	18/18 100%	11				LL = 25 PL = 15 PI = 10
10										
		11-7-50/5"	5	SS	17/18 94%	25				
15.0										
651.0		Auger Refusal @ 15 ft								
15		50/0"	6	SS	0/0 %					
		End of Boring @ 15 ft								
		Borehole was backfilled with auger cutting after water reading								

WATER LEVEL OBSERVATIONS

WL	▽	9	@ drilling
WL	▼	7.5	@ 0 hr

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DRILLER:	RS	ASS'T DRILLER:	
LOGGED BY:		APPROVED:	

Project No. 2019028-00

LOG OF BOREHOLE SB-5

CLIENT: Buchart Horn

PROJECT: **Smithburg Wastewater Treatment Plant Upgrade**

ARCHITECT/ENGINEER:

SITE: **Washington County, Maryland**

SURFACE ELEV.: **666.0** ft.

DEPTH (FT)	GRAPHIC LOG	SAMPLES: BLOWS/6" N - VALUE ROD	NUMBER	TYPE	IN. RECOVERED IN. DRIVEN	TESTS: MOISTURE (%)	DRY DENSITY (PCF)	Qu (TSF)	% PASSING #200 SIEVE	REMARKS/ ADDITIONAL DATA
0.1		1" Topsoil								
665.9		Loose brown SANDY CLAY (CL) with gravel								
		4-5-4 N=9	1	SS	18/18 100%	19				
3.0										
663.0		Dense to loose brown and light brown CLAYEY GRAVEL (GC) with sand								
		6-17-19 N=36	2	SS	18/18 100%	11			20	
5										
		5-7-9 N=16	3	SS	8/18 44%	16				
		2-3-3 N=6	4	SS	18/18 100%	18				
10										
12.0										
654.0		Firm brown SANDY CLAY (CL) with rock fragments, wet								
		15-7-3 N=10	5	SS	18/18 100%	53				
15										
16.5										
649.5		16-50/0	6	SS	0/6 0%					
		Auger Refusal @ 16.5 ft End of Boring @ 16.5 ft Borehole was backfilled with auger cutting after water reading								

WATER LEVEL OBSERVATIONS

WL	▽	7.5	@ drilling
WL	▼	9	@ 0 hr

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DRILL CO.:	ABC	DRILL RIG:	CME-45B
DRILLER:	RS	ASS'T DRILLER:	
LOGGED BY:		APPROVED:	

Project No. 2019028-00

LOG OF BOREHOLE SB-6

CLIENT: Buchart Horn

PROJECT: **Smithburg Wastewater Treatment Plant Upgrade**

ARCHITECT/ENGINEER:

SITE: **Washington County, Maryland**

SURFACE ELEV.: **668.0** ft.

DEPTH (FT)	GRAPHIC LOG	SAMPLES: BLOWS/6" N - VALUE RQD	NUMBER	TYPE	IN. RECOVERED IN. DRIVEN	TESTS: MOISTURE (%)	DRY DENSITY (PCF)	Qu (TSF)	% PASSING #200 SIEVE	REMARKS/ ADDITIONAL DATA
0.6 7" Topsoil (667.4)										
Medium dense dark brown and brown SANDY CLAY (CL) with gravel		7-11-8 N=19	1	SS	8/18 44%	7				LL = 30 PL = 15 PI = 15
3.0 (665.0)										
Loose to medium dense brown and reddish brown CLAYEY GRAVEL (GC) with sand ▽		2-2-5 N=7	2	SS	10/18 56%	20				
5		7-8-7 N=15	3	SS	14/18 78%	13			29	
		3-3-50/0"	4	SS	12/12 100%	39				LL = 49 PL = 19 PI = 30
10										
12.0 (656.0)										
Auger Refusal @ 12 ft End of Boring @ 12 ft Borehole was backfilled with auger cutting after water reading										

WATER LEVEL OBSERVATIONS

WL	▽ 7	@ drilling
WL	Dry, caved in 7 ft	@ 0 hr

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DRILL CO.:	ABC	DRILL RIG:	CME-45B
DRILLER:	RS	ASS'T DRILLER:	
LOGGED BY:		APPROVED:	

Project No. 2019028-00

LOG OF BOREHOLE SWM-1

CLIENT: Buchart Horn

PROJECT: **Smithburg Wastewater Treatment Plant Upgrade**

ARCHITECT/ENGINEER:

SITE: **Washington County, Maryland**

SURFACE ELEV.: **666.0** ft.

DEPTH (FT)	GRAPHIC LOG	SAMPLES: BLOWS/6" N - VALUE RQD	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: IN. RECOVERED IN. DRIVEN	TESTS: MOISTURE (%)	TESTS: DRY DENSITY (PCF)	TESTS: Qu (TSF)	TESTS: % PASSING #200 SIEVE	REMARKS/ ADDITIONAL DATA
0.4										
	5" Topsoil									
	Medium dense brown CLAYEY SAND (SC) with gravel	10-10-8 N=18	1	SS	14/18 78%	7			25	
3.0										
	Very loose to very dense to medium dense brown SILTY GRAVEL (GM) with sand and trace of clay	3-2-2 N=4	2	SS	3/18 17%	10				
5										
	-wet below 5.5 ft	18-46-36 N=82	3	SS	14/18 78%	10			13	
		9-10-9 N=19	4	SS	12/18 67%	12				
10.0										
10	End of Boring @ 10 ft Borehole was backfilled with auger cutting after 24 hour water reading									

WATER LEVEL OBSERVATIONS

WL	▽	6	@ drilling
WL	▼	7.5	@ 0 hr
WL	▼	5	@ 24 hr

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Lanham, MD 20706
Phone: 301-306-3091
Fax: 301-306-3092

STARTED:	8/1/19	FINISHED:	8/1/19
DRILL CO.:	ABC	DRILL RIG:	B-61
DRILLER:	PS	ASS'T DRILLER:	
LOGGED BY:		APPROVED:	

Project No. 2019028-00

LOG OF BOREHOLE SWM-2

CLIENT: Buchart Horn

PROJECT: **Smithburg Wastewater Treatment Plant Upgrade**

ARCHITECT/ENGINEER:

SITE: **Washington County, Maryland**

SURFACE ELEV.: **666.0** ft.

DEPTH (FT)	GRAPHIC LOG	SAMPLES: BLOWS/6" N - VALUE RQD	NUMBER	TYPE	IN. RECOVERED IN. DRIVEN	TESTS: MOISTURE (%)	DRY DENSITY (PCF)	Qu (TSF)	% PASSING #200 SIEVE	REMARKS/ ADDITIONAL DATA
0.4 / 665.6	5" Topsoil Medium dense brown CLAYEY SAND (SC) with gravel	3-4-6 N=10	1	SS	2/18 11%	17				
		8-7-6 N=13	2	SS	12/18 67%	14			45	
5.0 / 661.0	Dense brown and gray CLAYEY GRAVEL (GC) with sand and silt -wet below 6 ft	6-19-23 N=42	3	SS	15/18 83%	9			13	
		13-20-19 N=39	4	SS	3/18 17%	14				
10.0 / 656.0	End of Boring @ 10 ft Borehole was backfilled with auger cutting after 24 hour water reading									

5

10

WATER LEVEL OBSERVATIONS

WL	▽	6.5	@ drilling
WL	▼	8.4	@ 0 hr
WL	▼	7	@ 24 hr

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9450 Annapolis Road
Lanham, MD 20706
Phone: 301-306-3091
Fax: 301-306-3092

STARTED:	8/1/19	FINISHED:	8/1/19
DRILL CO.:	ABC	DRILL RIG:	B-61
DRILLER:	PS	ASS'T DRILLER:	
LOGGED BY:		APPROVED:	

BORING LOG AB09 2019028-00 SMITHBURG WASTEWATER TREATMENT PLANT UPGRADE.GPJ AB_CONS.GDT 9/27/19

Project No. 2019028-00

LOG OF BOREHOLE SWM-3

CLIENT: Buchart Horn

PROJECT: **Smithburg Wastewater Treatment Plant Upgrade**

ARCHITECT/ENGINEER:

SITE: **Washington County, Maryland**

SURFACE ELEV.: **665.0** ft.

				SAMPLES				TESTS					
		GRAPHIC LOG	DEPTH (FT)	BLOWS/6" N - VALUE RQD	NUMBER	TYPE	IN. RECOVERED IN. DRIVEN	MOISTURE (%)	DRY DENSITY (PCF)	Qu (TSF)	% PASSING #200 SIEVE	REMARKS/ ADDITIONAL DATA
0.6	7" Topsoil (664.4)											
	Stiff to firm brown and gray SANDY CLAY (CL) with gravel			10-10-8 N=18	1	SS	12/18 67%	15				
				5-3-3 N=6	2	SS	2/18 11%	13			57	
5.0	(660.0)		5									
	Hard brown and gray CLAYEY GRAVEL (GC) with sand ▼ -wet below 6 ft			4-5-6 N=11	3	SS	12/18 67%	17				
				11-9-11 N=20	4	SS	4/18 22%	11				
10.0	(655.0)											
	End of Boring @ 10 ft Borehole was backfilled with auger cutting after 24 hour water reading											

WATER LEVEL OBSERVATIONS		
WL	▽ 6	@ drilling
WL	Dry, caved in 8.5 ft	@ 0 hr
WL	▼ 6	@ 24 hr

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STARTED:	8/1/19	FINISHED:	8/1/19
DRILL CO.:	ABC	DRILL RIG:	B-61
DRILLER:	PS	ASS'T DRILLER:	
LOGGED BY:		APPROVED:	

BORING LOG AB09 2019028-00 SMITHBURG WASTEWATER TREATMENT PLANT UPGRADE.GPJ AB_CONS.GDT 9/27/19

Project No. 2019028-00

LOG OF BOREHOLE SWM-4

CLIENT: Buchart Horn

PROJECT: **Smithburg Wastewater Treatment Plant Upgrade**

ARCHITECT/ENGINEER:

SITE: **Washington County, Maryland**

SURFACE ELEV.: **680.0** ft.

DEPTH (FT)	GRAPHIC LOG	SAMPLES: BLOWS/6" N - VALUE RQD	NUMBER	TYPE	IN. RECOVERED IN. DRIVEN	TESTS: MOISTURE (%)	DRY DENSITY (PCF)	Qu (TSF)	% PASSING #200 SIEVE	REMARKS/ ADDITIONAL DATA
0.3 679.7 4" Topsoil Loose to medium dense brown and gray CLAYEY SAND (SC) with gravel		2-3-6 N=9	1	SS	14/18 78%	18				
5		14-13-8 N=21	2	SS	16/18 89%	11			22	
6.0 ▽ 674.0 Hard brown and gray GRAVELY CLAY (CG) with sand (Possible Decomposed Rock)		2-6-51/4"	3	SS	10/16 63%	30			54	
9.0 671.0		51/6"	4	SS	0/6 0%					

End of boring @ 9 ft
Borehole was backfilled with auger cutting after 24 hour water reading

WATER LEVEL OBSERVATIONS		
WL	▽ 6	@ drilling
WL	Dry, caved in 5.5 ft	@ 0 hr
WL	Dry, caved in 5.5 ft	@ 24 hr

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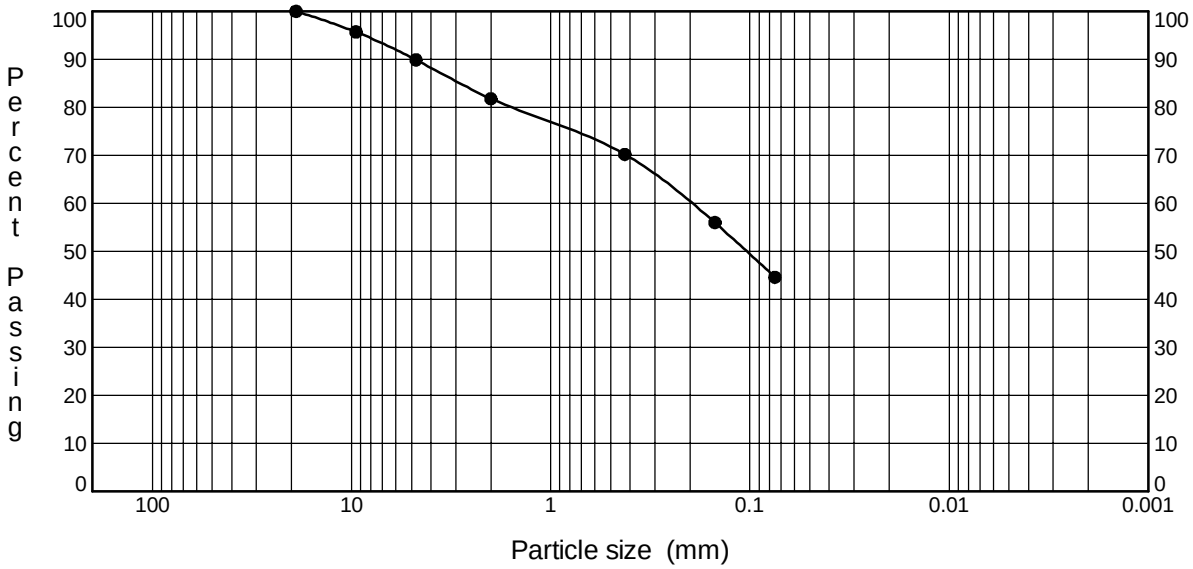
STARTED:	8/8/19	FINISHED:	8/8/19
DRILL CO.:	ABC	DRILL RIG:	B-61
DRILLER:	PS	ASS'T DRILLER:	
LOGGED BY:		APPROVED:	

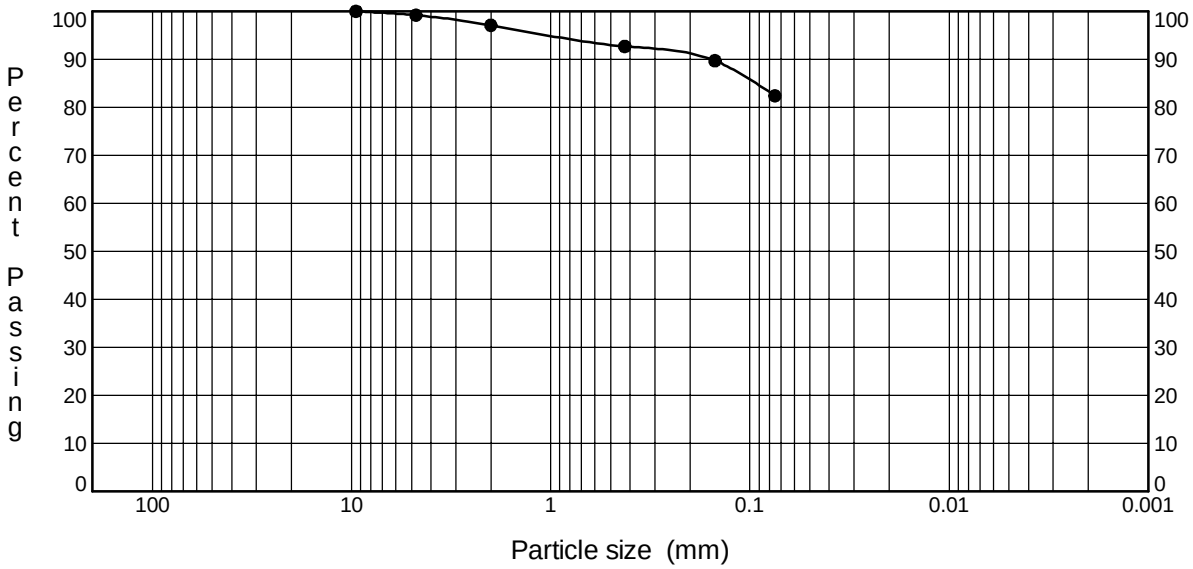
F. LAB TEST RESULTS

BOREHOLE NO. **SB-1** DEPTH **3.5**



Cobbles	Gravel		Sand			Silt	Clay
	coarse	fine	coarse	medium	fine		

BOREHOLE NO. **SB-2** DEPTH **8.5**



Cobbles	Gravel		Sand			Silt	Clay
	coarse	fine	coarse	medium	fine		

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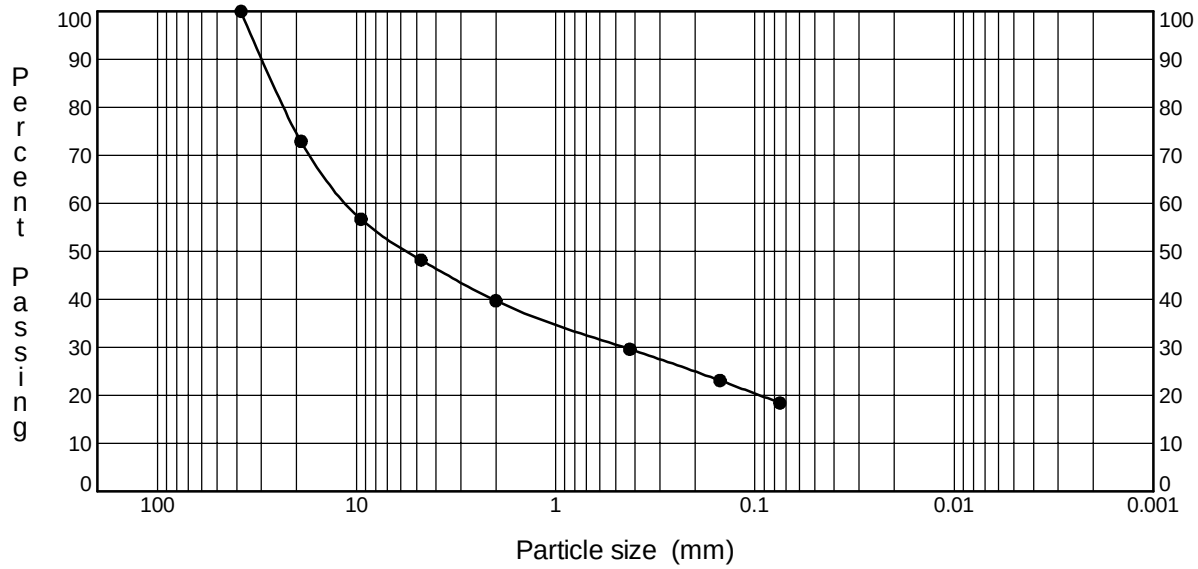
GRAIN SIZE DISTRIBUTION

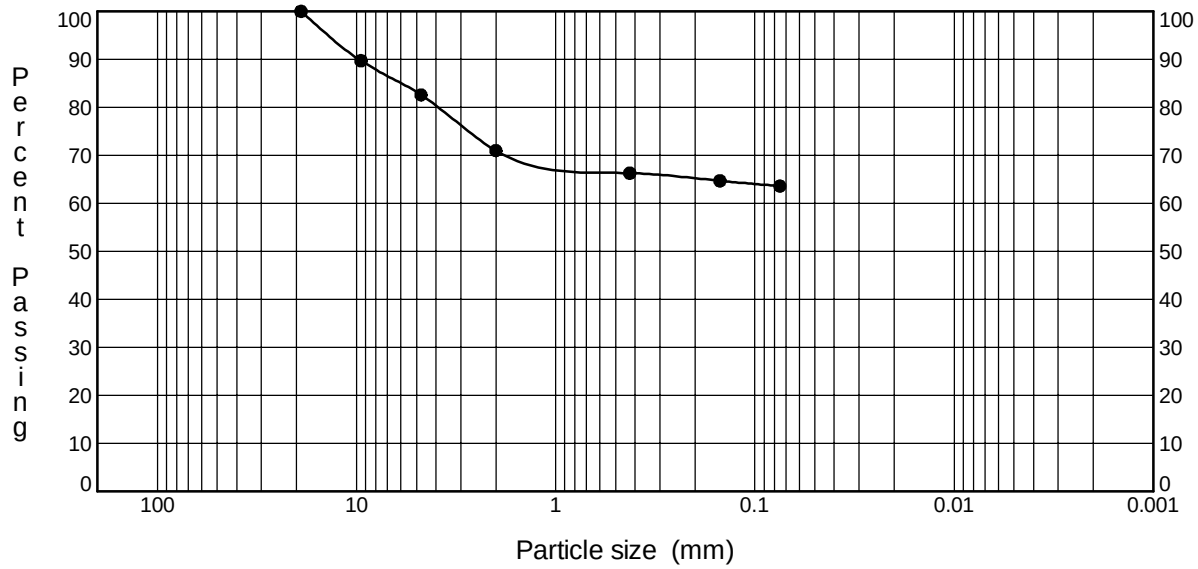
CLIENT: Buchart Horn
PROJECT NO.: 2019028-00
PROJECT: Smithburg Wastewater Treatment Plant Upgrade
SITE:
Washington County, Maryland

BOREHOLE NO. **SB-3** DEPTH **6.0**



Cobbles	Gravel: coarse	Gravel: fine	Sand: coarse	Sand: medium	Sand: fine	Silt	Clay

BOREHOLE NO. **SB-3** DEPTH **13.5**



Cobbles	Gravel: coarse	Gravel: fine	Sand: coarse	Sand: medium	Sand: fine	Silt	Clay

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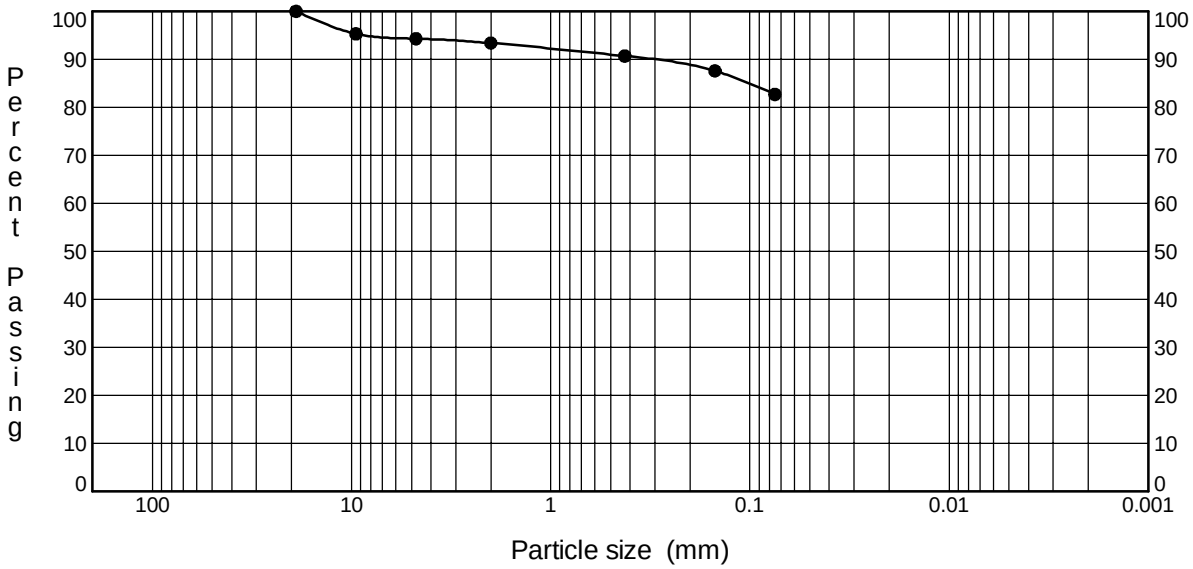
GRAIN SIZE DISTRIBUTION

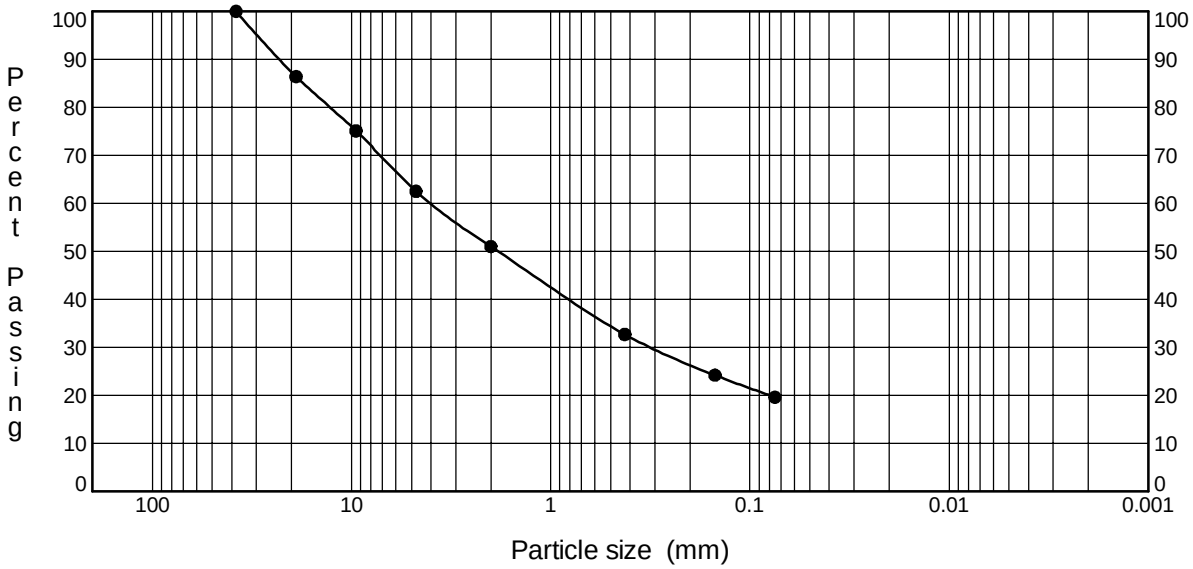
CLIENT: Buchart Horn
PROJECT NO.: 2019028-00
PROJECT: Smithburg Wastewater Treatment Plant Upgrade
SITE:
Washington County, Maryland

BOREHOLE NO. **SB-4** DEPTH **1.0**



Cobbles	Gravel: coarse	Gravel: fine	Sand: coarse	Sand: medium	Sand: fine	Silt	Clay

BOREHOLE NO. **SB-5** DEPTH **3.5**



Cobbles	Gravel: coarse	Gravel: fine	Sand: coarse	Sand: medium	Sand: fine	Silt	Clay

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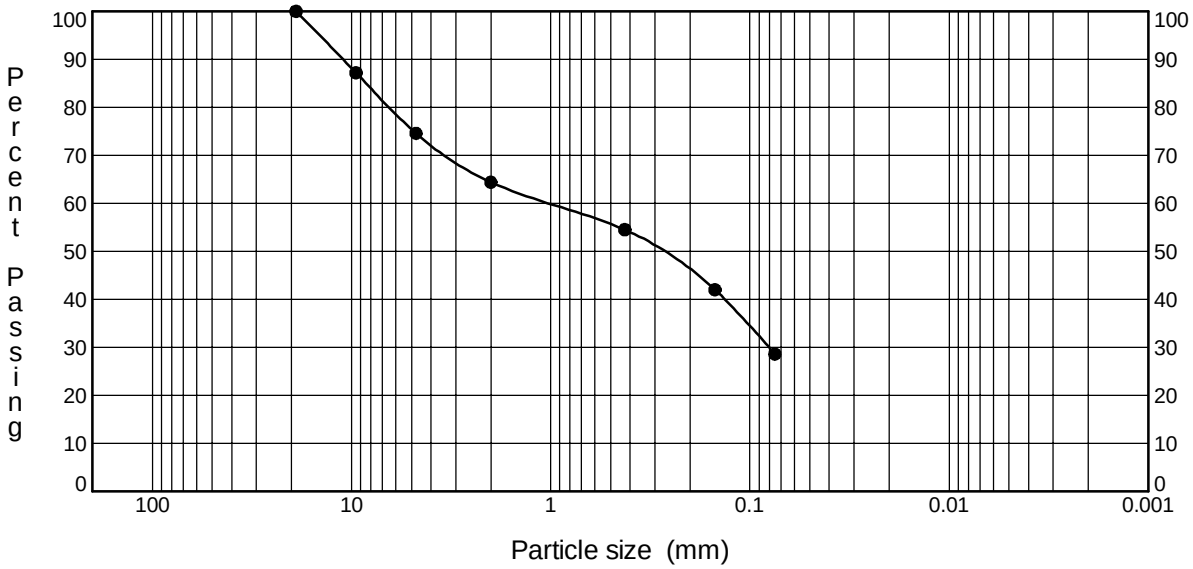
GRAIN SIZE DISTRIBUTION

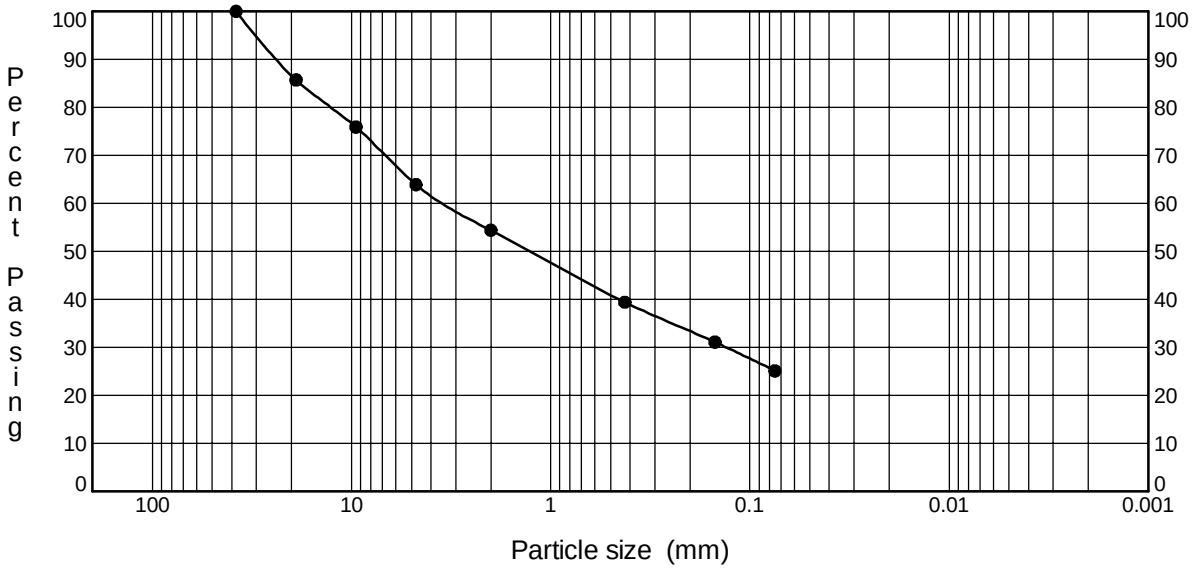
CLIENT: Buchart Horn
PROJECT NO.: 2019028-00
PROJECT: Smithburg Wastewater Treatment Plant Upgrade
SITE:
Washington County, Maryland

BOREHOLE NO. **SB-6** DEPTH **6.0**



Cobbles	Gravel: coarse	Gravel: fine	Sand: coarse	Sand: medium	Sand: fine	Silt	Clay

BOREHOLE NO. **SWM-1** DEPTH **1.0**



Cobbles	Gravel: coarse	Gravel: fine	Sand: coarse	Sand: medium	Sand: fine	Silt	Clay

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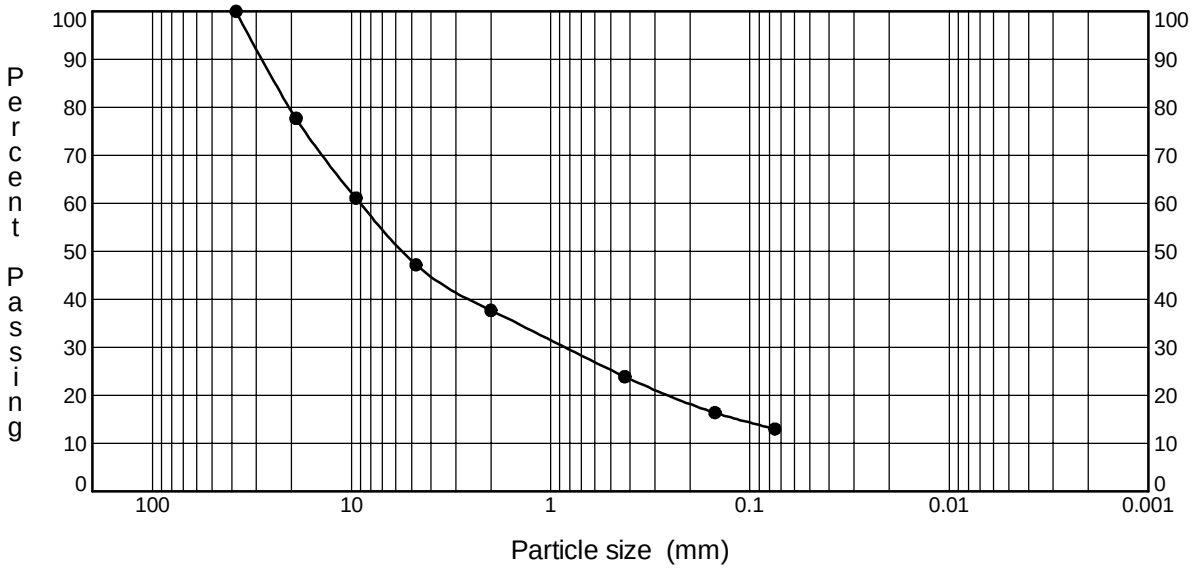
GRAIN SIZE DISTRIBUTION

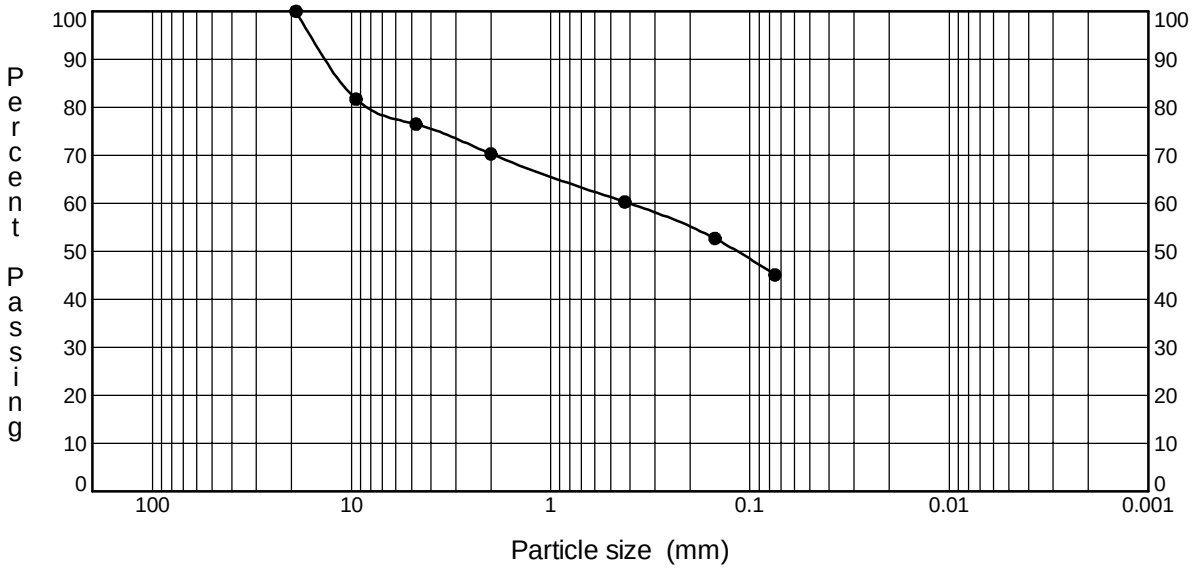
CLIENT: Buchart Horn
PROJECT NO.: 2019028-00
PROJECT: Smithburg Wastewater Treatment Plant Upgrade
SITE:
Washington County, Maryland

BOREHOLE NO. **SWM-1** DEPTH **6.0**



Cobbles	Gravel: coarse	Gravel: fine	Sand: coarse	Sand: medium	Sand: fine	Silt	Clay

BOREHOLE NO. **SWM-2** DEPTH **3.5**



Cobbles	Gravel: coarse	Gravel: fine	Sand: coarse	Sand: medium	Sand: fine	Silt	Clay

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GRAIN SIZE DISTRIBUTION

CLIENT: Buchart Horn
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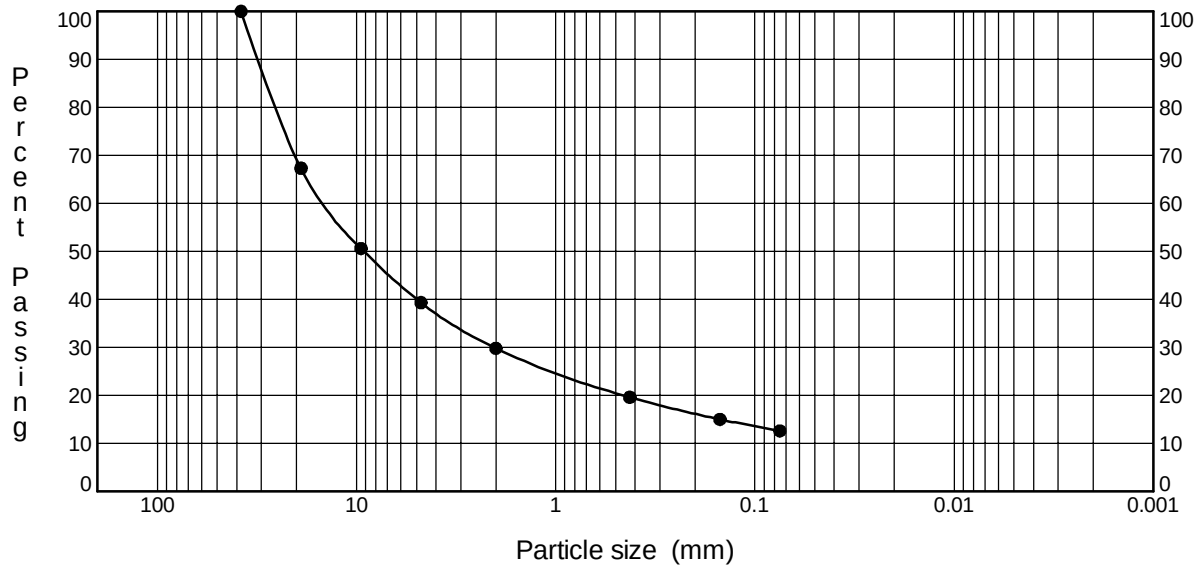
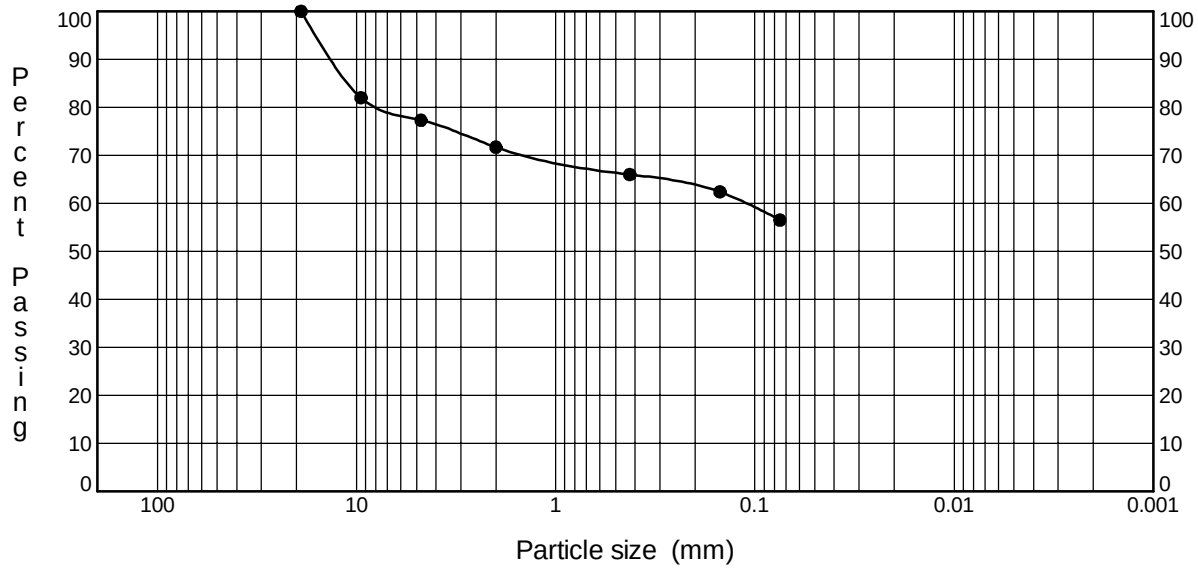
PROJECT: Smithburg Wastewater Treatment Plant Upgrade
SITE:
Washington County, Maryland

BOREHOLE NO. **SWM-2** DEPTH **6.0**



Cobbles	Gravel: coarse	Gravel: fine	Sand: coarse	Sand: medium	Sand: fine	Silt	Clay

BOREHOLE NO. **SWM-3** DEPTH **3.5**



Cobbles	Gravel: coarse	Gravel: fine	Sand: coarse	Sand: medium	Sand: fine	Silt	Clay

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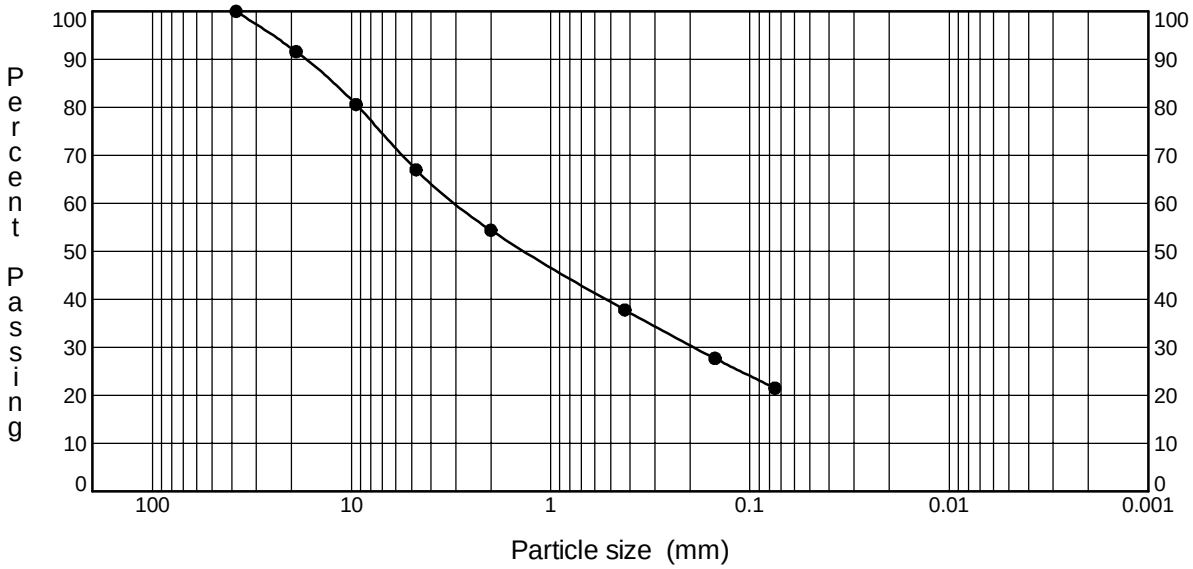
GRAIN SIZE DISTRIBUTION

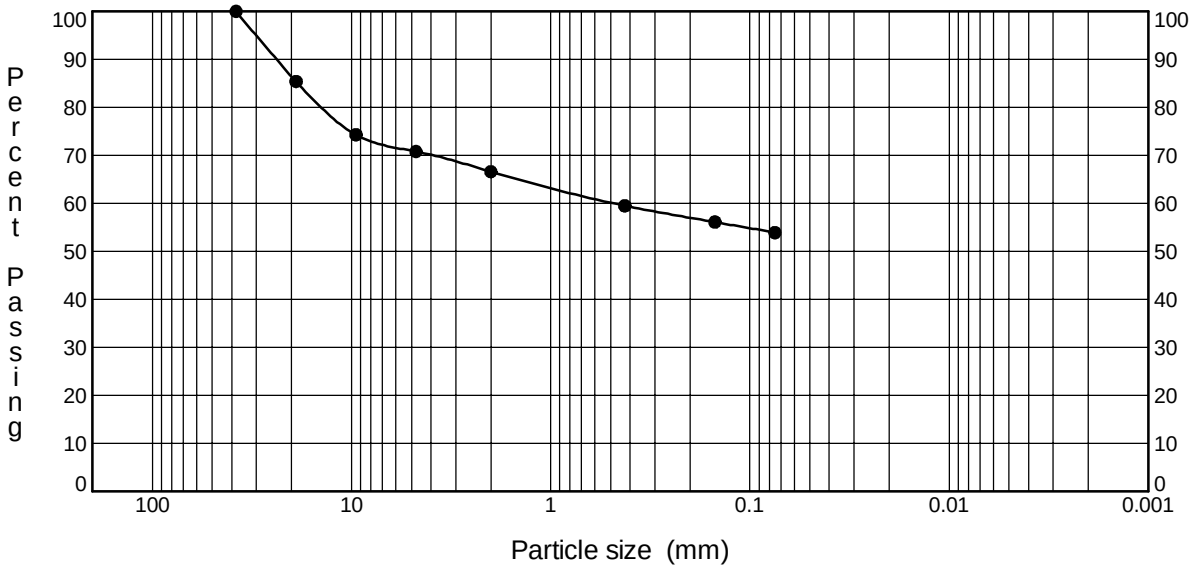
CLIENT: Buchart Horn
PROJECT NO.: 2019028-00
PROJECT: Smithburg Wastewater Treatment Plant Upgrade
SITE:
Washington County, Maryland

BOREHOLE NO. **SWM-4** DEPTH **3.5**



Cobbles	Gravel: coarse	Gravel: fine	Sand: coarse	Sand: medium	Sand: fine	Silt	Clay

BOREHOLE NO. **SWM-4** DEPTH **6.0**



Cobbles	Gravel: coarse	Gravel: fine	Sand: coarse	Sand: medium	Sand: fine	Silt	Clay

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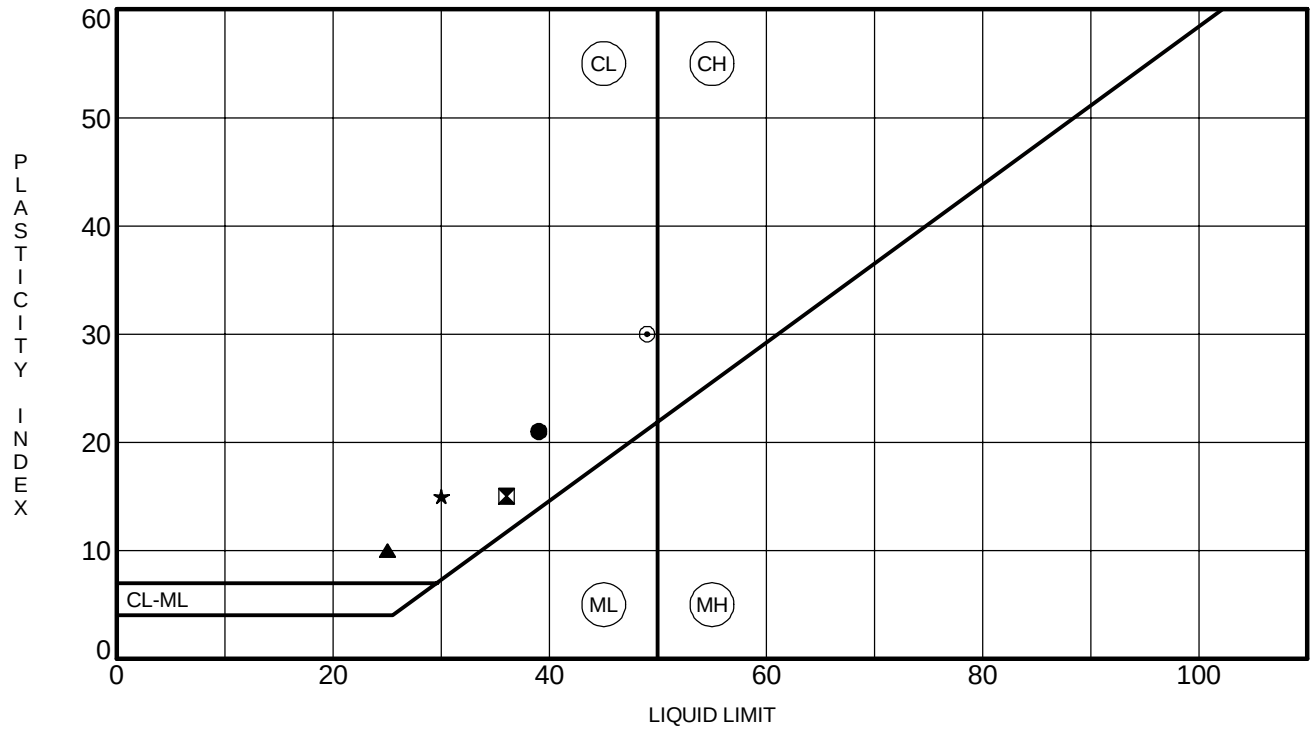
GRAIN SIZE DISTRIBUTION

CLIENT: Buchart Horn
PROJECT NO.: 2019028-00
PROJECT: Smithburg Wastewater Treatment Plant Upgrade
SITE:
Washington County, Maryland



	Specimen Identification		LL	PL	PI	Fines	Classification
●	**SB-1**	**3.5**	**39**	**18**	**21**	**45**	**CLAYEY SAND(A-6)**
⊠	**SB-2**	**3.5**	**36**	**21**	**15**		
▲	**SB-4**	**8.5**	**25**	**15**	**10**		
★	**SB-6**	**1.0**	**30**	**15**	**15**		
⊙	**SB-6**	**8.5**	**49**	**19**	**30**		

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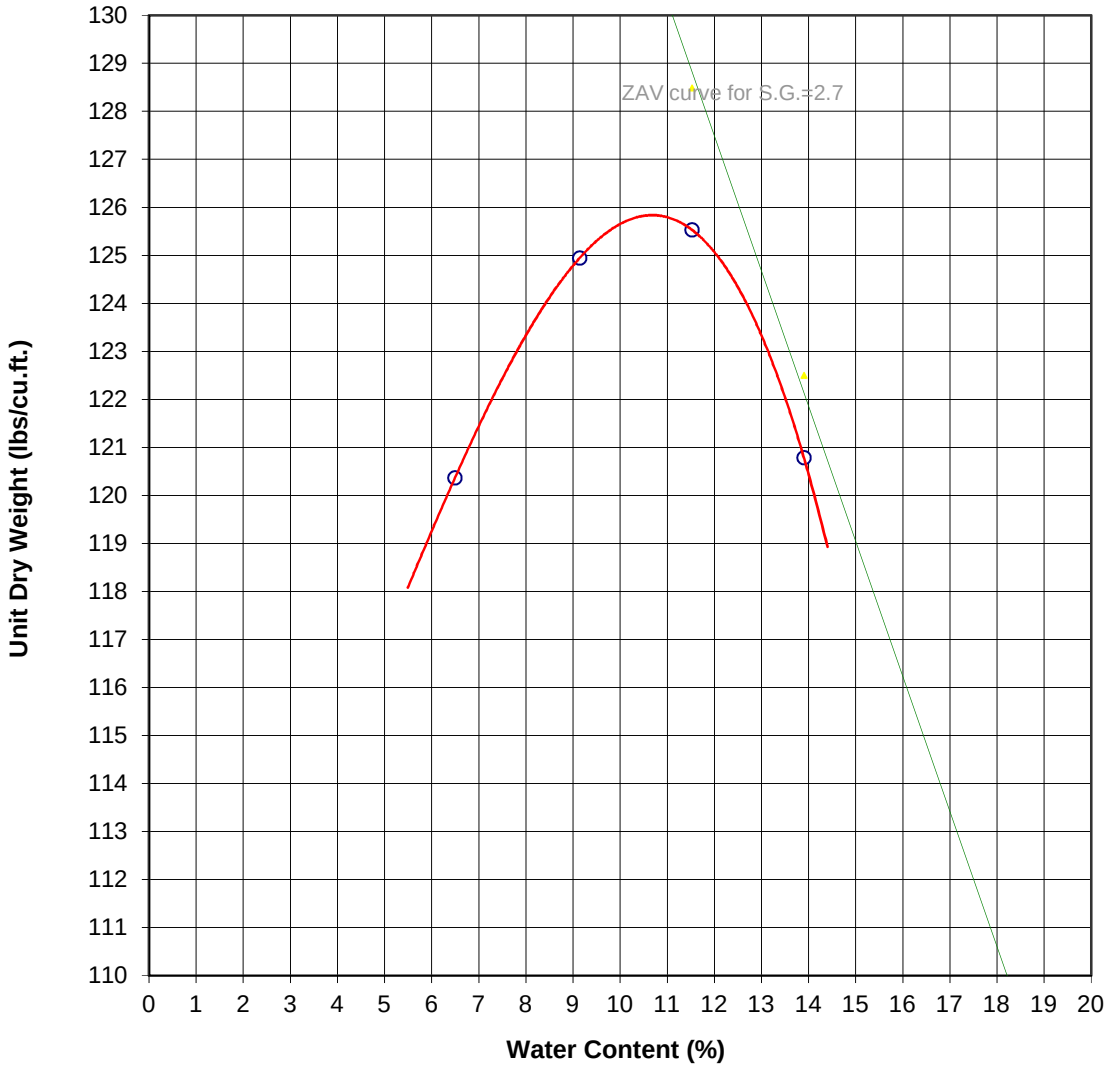
ATTERBERG LIMITS' RESULTS

CLIENT: Buchart Horn
PROJECT NO.: 2019028-00
PROJECT: Smithburg Wastewater Treatment Plant Upgrade
SITE:
Washington County, Maryland

LABORATORY COMPACTION TEST RESULT

Modified Effort (ASTM D1557 / AASHTO T180)



Sample Description:	Light brown and gray SANDY CLAY	
Classification:	CL / A-6	
Test Method:	A	
Soil Engineering Properties		
Liquid Limit:	39	
Plastic Limit:	17	
Plasticity Index:	22	
Proctor Data and Results		
Max. Unit Dry Weight	**125.8**	lbs/cu.ft.
Opt. Water Content	**10.7**	%
Corr. Max. Unit Dry Weight	**n/a**	
Corr. Opt. Water Content	**n/a**	

Gradation	
Sieve No.	% Passing
3"	
1 1/2"	100.0
3/4"	96.8
3/8"	93.4
4	90.8
10	85.6
40	75.4
200	58.1

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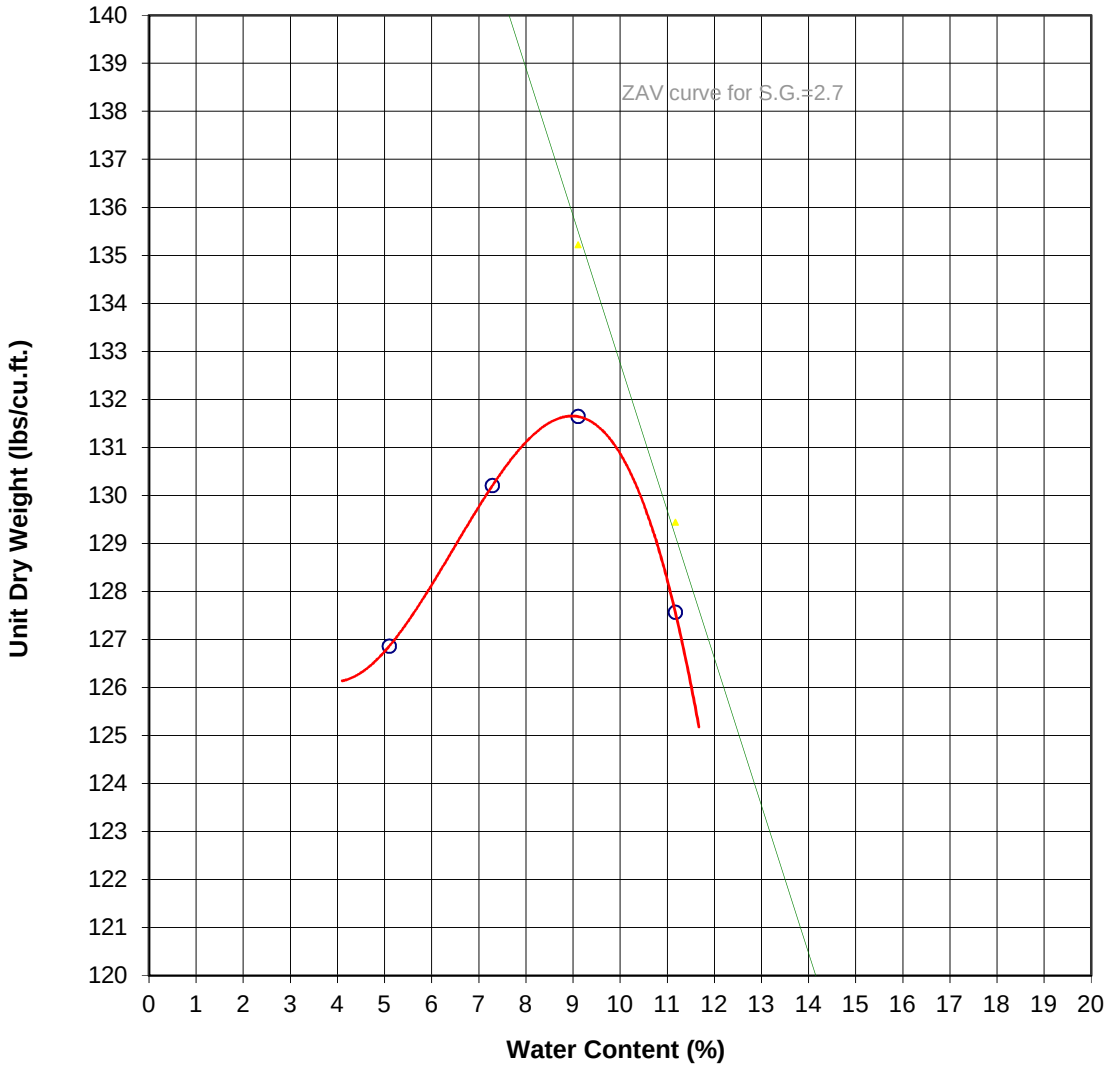
Fax: 301-306-3092

Job No.:	2019028-00
Project:	Smithburg WWTP
Sample No.:	Bag (1 to 6 ft)
Sample Location:	SB-1
Test Date:	9/25/2019

LABORATORY COMPACTION TEST RESULT

Modified Effort (ASTM D1557 / AASHTO T180)



Sample Description:	Brown CLAYEY SAND with gravel	
Classification:	SC / A-6	
Test Method:	B	
Soil Engineering Properties		
Liquid Limit:	30	
Plastic Limit:	15	
Plasticity Index:	15	
Proctor Data and Results		
Max. Unit Dry Weight	**131.6**	lbs/cu.ft.
Opt. Water Content	**9.0**	%
Corr. Max. Unit Dry Weight	**138.0**	lbs/cu.ft.
Corr. Opt. Water Content	**7.5**	%

Gradation	
Sieve No.	% Passing
3"	
1 1/2"	100.0
3/4"	96.3
3/8"	78.9
4	77.5
10	59.3
40	52.1
200	40.6

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Job No.:	2019028-00
Project:	Smithburg WWTP
Sample No.:	Bag (1 to 6 ft)
Sample Location:	SB-6
Test Date:	9/25/2019

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	Class-ification	Water Content (%)	Dry Density (pcf)	Satur-ation (%)	Void Ratio
SB-1	1.0							18.2			
SB-1	3.5	39	18	21	19	45	SC	15.2			
SB-1	6.0							13.4			
SB-1	8.5							19.8			
SB-1	13.5							18.9			
SB-2	1.0							7.7			
SB-2	3.5	36	21	15				19.7			
SB-2	6.0							16.1			
SB-2	8.5				9.5	82		26.0			
SB-2	13.5							37.0			
SB-3	1.0							11.5			
SB-3	3.5							21.1			
SB-3	6.0				38	18		7.5			
SB-3	8.5							20.1			
SB-3	13.5				19	64		36.6			
SB-3	18.5							16.3			
SB-4	1.0				19	83		22.9			
SB-4	3.5							5.8			
SB-4	6.0							11.3			
SB-4	8.5	25	15	10				10.7			
SB-4	13.5							24.5			
SB-5	1.0							19.0			
SB-5	3.5				38	20		10.7			
SB-5	6.0							15.5			
SB-5	8.5							17.7			
SB-5	13.5							52.6			
SB-6	1.0	30	15	15				6.5			
SB-6	3.5							20.4			
SB-6	6.0				19	29		12.8			
SB-6	8.5	49	19	30				38.6			
SWM-1	1.0				38	25		7.4			
SWM-1	3.5							10.2			
SWM-1	6.0				38	13		9.9			
SWM-1	8.5							12.3			
SWM-2	1.0							16.8			
SWM-2	3.5				19	45		13.8			
SWM-2	6.0				38	13		9.2			
SWM-2	8.5							13.5			
SWM-3	1.0							15.0			
SWM-3	3.5				19	57		12.5			
SWM-3	6.0							16.6			
SWM-3	8.5							10.6			

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20715
Phone: 301-306-3091
Fax: 301-306-3092

Summary of Laboratory Results

CLIENT: Buchart Horn
PROJECT NO.: 2019028-00
PROJECT: Smithburg Wastewater Treatment Plant Upgrade
SITE: Maryland
Washington County

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	Class-ification	Water Content (%)	Dry Density (pcf)	Satur-ation (%)	Void Ratio
SWM-4	1.0							18.1			
SWM-4	3.5				38	22		10.9			
SWM-4	6.0				38	54		30.2			

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Summary of Laboratory Results

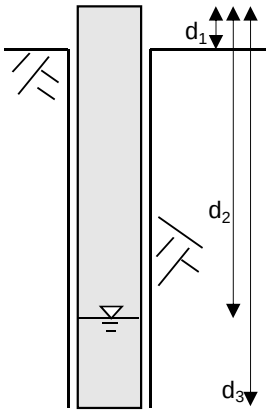
CLIENT: Buchart Horn
PROJECT NO.: 2019028-00
PROJECT: Smithburg Wastewater Treatment Plant Upgrade
SITE: Maryland
Washington County

G. FIELD INFILTRATION TEST RESULTS

ON-SITE INFILTRATION TEST

JOB NO.:	2019028-00	**DRILLED BY:**	PS
PROJECT:	Smithburg Wastewater Treatment Plant	**DATE:**	8/1/2019
LOCATION:			

			Measurements (in.)
HOLE NO.:	SWM-1	d_1	15
HOLE DEPTH:	4.750 Feet		
HOLE DIAMETER:	8 Inch		
PRE-SOAK DATE:	8/1/2019	d_2	58 15/16
PIPE DIAMETER:	5"		
PIPE MATERIAL:	PVC		
TESTED BY:	GA		
TESTED DATE:	8/2/2019	d_3	72



Pre-soak water remaining in the hole: Yes / No **Depth:** (from bottom) 13 1/16

Time of Reading (Hr : Min)		**Time Escaped**	**Water Level (Below Reference**		**Drop in Level**	**Infiltration Rate**
Initial	final	(min)	Initial	Final	(in.)	(in./hr)
10:09	11:09	60	48	48 8/16	0.480	0.48
11:10	12:10	60	48 8/16	48 10/16	0.120	0.12
12:11	1:11	60	47 12/16	48	0.240	0.24
1:11	2:11	60	48	48	0.000	0.00

NOTE: * Reading accuracy to 1/16"

Average of 4-hr Monitoring Period: **0.21** **in./hr**

Recommended Infiltration Rate: **0.20** **in./hr**

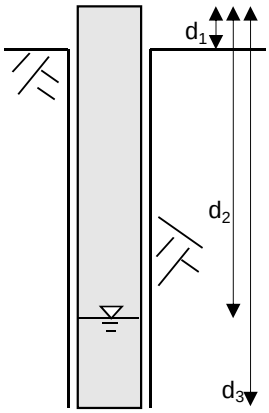
Report Reviewed and Prepared By: AT

REMARKS:

ON-SITE INFILTRATION TEST

JOB NO.:	2019028-00	**DRILLED BY:**	PS
PROJECT:	Smithburg Wastewater Treatment Plant	**DATE:**	8/1/2019
LOCATION:			

HOLE NO.:	SWM-2		**Measurements (in.)**
HOLE DEPTH:	4.750	Feet	d_1 14 6/16
HOLE DIAMETER:	8	Inch	
PRE-SOAK DATE:	8/1/2019		
			d_2 60 4/16
PIPE DIAMETER:	5"		
PIPE MATERIAL:	PVC		
TESTED BY:	GA		
TESTED DATE:	8/2/2019		d_3 71 6/16



Pre-soak water remaining in the hole: Yes / No **Depth:** (from bottom) 11 3/16

Time of Reading (Hr : Min)		Time Escaped	Water Level (Below Reference		Drop in Level	Infiltration Rate
Initial	final	(min)	Initial	Final	(in.)	(in./hr)
10:13	11:13	60	46 13/16	50 6/16	3.600	3.60
11:13	12:13	60	47 6/16	51 4/16	3.840	3.84
12:14	1:14	60	47 1/16	49 11/16	2.640	2.64
1:15	2:15	60	47 3/16	49 5/16	2.160	2.16

NOTE: * Reading accuracy to 1/16"

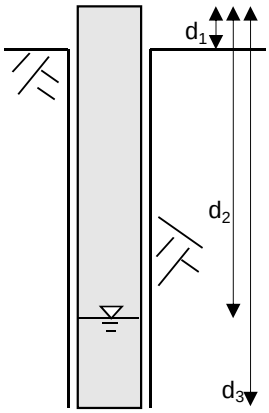
Average of 4-hr Monitoring Period:	**3.06**	**in./hr**
Recommended Infiltration Rate:	**3.00**	**in./hr**
Report Reviewed and Prepared By:	AT	

REMARKS:

ON-SITE INFILTRATION TEST

JOB NO.:	2019028-00	**DRILLED BY:**	PS
PROJECT:	Smithburg Wastewater Treatment Plant	**DATE:**	8/1/2019
LOCATION:			

			Measurements (in.)
HOLE NO.:	SWM-3		
HOLE DEPTH:	4.920	Feet	
HOLE DIAMETER:	8	Inch	
PRE-SOAK DATE:	8/1/2019		
PIPE DIAMETER:	5"		
PIPE MATERIAL:	PVC		
TESTED BY:	GA		
TESTED DATE:	8/2/2019		



d_1	12 10/16
d_2	71 10/16
d_3	71 10/16

Pre-soak water remaining in the hole: Yes / No **Depth:** (from bottom) 0

Time of Reading (Hr : Min)		**Time Escaped**	**Water Level (Below Reference**		**Drop in Level**	**Infiltration Rate**
Initial	final	(min)	Initial	Final	(in.)	(in./hr)
10:20	11:20	60	47 3/16	58 3/16	11.040	11.04
11:22	12:22	60	47 1/16	57 4/16	10.200	10.20
12:23	1:23	60	47 3/16	57 6/16	10.200	10.20
1:25	2:25	60	47 6/16	57 6/16	9.960	9.96

NOTE: * Reading accuracy to 1/16"

Average of 4-hr Monitoring Period: **10.35** **in./hr**

Recommended Infiltration Rate: **10.00** **in./hr**

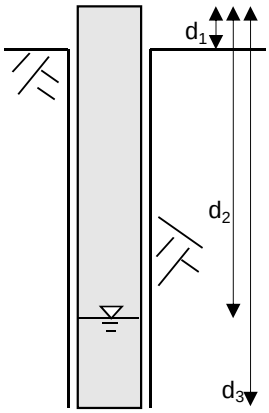
Report Reviewed and Prepared By:

REMARKS:

ON-SITE INFILTRATION TEST

JOB NO.:	2019028-00	**DRILLED BY:**	PS
PROJECT:	Smithburg Wastewater Treatment Plant	**DATE:**	8/8/2019
LOCATION:			

			Measurements (in.)
HOLE NO.:	SWM-4	d_1	12 13/16
HOLE DEPTH:	4.930 Feet		
HOLE DIAMETER:	Inch		
PRE-SOAK DATE:	8/8/2019	d_2	72
PIPE DIAMETER:	5"		
PIPE MATERIAL:	PVC		
TESTED BY:	GA		
TESTED DATE:	8/9/2019	d_3	72



Pre-soak water remaining in the hole: Yes / No **Depth:** (from bottom) 0

Time of Reading (Hr : Min)		**Time Escaped**	**Water Level (Below Reference**		**Drop in Level**	**Infiltration Rate**
Initial	final	(min)	Initial	Final	(in.)	(in./hr)
9:30	10:30	60	46 13/16	60	13.200	13.20
10:32	11:32	60	47 14/16	60 6/16	12.480	12.48
11:34	12:34	60	48	60 4/16	12.240	12.24
12:36	1:36	60	47 12/16	59 3/16	11.400	11.40

NOTE: * Reading accuracy to 1/16"

Average of 4-hr Monitoring Period: **12.33** **in./hr**

Recommended Infiltration Rate: **12.00** **in./hr**

Report Reviewed and Prepared By:

REMARKS:

SECTION 09 96 00
HIGH PERFORMANCE COATINGS

PART 1 GENERAL

1.1 DESCRIPTION

A. The Work of this section includes, but is not limited to:
   1. All workmanship, materials, equipment, and quality requirements for lining work of concrete structures. Provide and apply all lining materials as specified, as indicated on drawings, and per Manufacturer's instructions design details. Areas to be coated are as follows:
      a. All new interior concrete surfaces of the chemical containment area.
      b. All new interior concrete surfaces of the pre-anoxic tank.
   2. All workmanship, materials, equipment, and quality requirements for lining work of existing steel tanks. Provide and apply all lining materials as specified, as indicated on drawings, and per Manufacturer's instructions design details. Areas to be coated are as follows:
      a. All existing interior and exterior steel surfaces of the disc filter tanks.

B. General:
   1. Cleaning, surface preparation, coating application, and thicknesses shall be as specified herein and shall meet or exceed the coating manufacturer's recommendations. When the manufacturer's minimum recommendations exceed the specified requirements, Contractor shall comply with the Manufacturer's minimum recommendations.

1.2 REFERENCES

A. American Concrete Institute (ACI):
   1. ACI 301 - Specifications for Structural Concrete;
   2. ACI 308R - Guide to Curing Concrete

B. ASTM International (ASTM):
   1. ASTM D4285 - Standard Test Method for Indicating Water or Oil in Compressed Air
   2. ASTM D4263 - Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
   3. ASTM E337 - Standard Test Method for Measuring Humidity with a Psychrometer
   4. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

C. International Concrete Repair Institute (ICRI):
   1. Guideline No. 03732 Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays

D. NACE International (NACE):
   1. NACE Publication 6D-173 A Manual for Painter Safety;
   2. NACE RP0188 Standard Recommended Practice, Discontinuity (Holiday) Testing of Protective Coatings

E. SSPC: The Society for Protective Coatings (SSPC):
   1. SSPC-SP5/NACE No. 1 White Metal Blast Cleaning;
   2. SSPC-SP10/NACE No. 2 Near White Metal Blast Cleaning;
   3. SSPC-SP13/NACE No. 6 Surface Preparation of Concrete;
   4. SSPC-Guide 12 Guide for Illumination of Industrial Painting Projects;
   5. SSPC-PA3 A Guide to Safety in Paint Applications

1.3 DEFINITIONS

A. The term "coating" and "lining" as used herein are considered interchangeable and mean coating systems materials, including any applicable resinous primers and finish coats that function to provide protection of steel or concrete substrates.

B. The terms "coating system" and "lining system" as used herein are considered interchangeable and mean all total resurfacing and coating materials combined to function as a total system to provide the designed protection.

1.4 SUBMITTALS

A. General: Submit in accordance with Section 01 30 00.

B. Submit the following prior to commencing with any phase of the work covered by this Section:

1. Manufacturer's project reference lists containing a minimum of 10 projects of similar capacity within the last three (3) years. The reference list shall comprise of the project location, and coating system.
2. Manufacturer's current printed recommendations and product data sheets for all coating system products supplied under this section including surface preparation and application instructions, volatile organic compound (VOC) data, and safety requirements.
3. Manufacturer's Performance Criteria Data Sheet detailing product performance testing.
4. Material Safety Data Sheets (MSDS) for any materials brought on-site including all solvents and lining system materials.
5. Submit certification that all materials comply with Federal, State, and Local regulations for VOC (Volatile Organic Compounds).
6. Submit storage and application temperature requirements for all coating system materials.
7. Manufacturer's recommended standard lining details for all materials specified, including: leading edge termination, metal embedment in concrete, termination at pipe penetration, control/construction joint, expansion joint detail, and wall to slab detail. All details must be computer generated by the coating Manufacturer and approved by the Engineer.
8. Contractor shall submit list of projects of similar size and complexity along with names of tradesman and work experience employed by the Contractor.

C. Submit the following information at the completion of the work identified within the scope of this section:

1. Submit daily reports that contain the following information: surface preparation, substrate conditions, ambient conditions, application procedures, coating materials used, coating material quantities, batch numbers of materials used, and work completed and location thereof. Mark-up drawings that show location of work.

1.5 QUALITY ASSURANCE

A. Requirements:

1. If any requirements of this specification conflict with a referenced standard, the more stringent requirement shall apply.
2. Do not use or retain contaminated, outdated, or diluted materials for coating operations. Do not use materials from previously opened containers.

3. Make available all locations and phases of the work for access by the Engineer or other personnel designated by the Engineer. The Contractor shall provide ventilation and egress to safely access the coating work areas for inspection.
4. Conduct work so that the lining system is installed as specified herein. Inspect work continually to ensure that the lining system is installed as specified herein. The Contractor shall inspect the work to determine conformance with the specifications and referenced documents. The Contractor shall inform the Engineer of the progress and the quality of the work through daily reports as specified below. Any nonconforming coating system work shall be corrected as specified herein or as recommended by the Manufacturer.
5. Summarize test data, work progress, areas covered, ambient conditions, quality control inspection test findings, and other information pertinent to the lining system installation in daily reports to be submitted to the Engineer.
6. The methods of construction shall be in accordance with all requirements of this specification.
7. Employ only tradespeople who have at least three (3) years of experience performing lining system work of similar size and complexity as the work specified in this Section. Submittals to verify these qualifications are to be made within thirty (30) days of the Notice-to-Proceed and are subject to approval by the Engineer.

B. Single Source Responsibility:
   1. All lining system materials, including resurfacing materials, primers, and applicable topcoats shall be products of a single manufacturer.

1.6 DELIVERY AND STORAGE

A. Materials shall be stored in accordance with Manufacturer's recommendations in enclosed structures and shall be protected from weather and adverse temperature conditions. Flammable materials shall be stored in accordance with state and local codes. Materials exceeding storage life recommended by the Manufacturer shall be removed from the site.

B. Store all materials only in area or areas designated by the Engineer solely for this purpose. Confine mixing, thinning, clean-up and associated operations, and storage of materials-related debris before authorized disposal, to these areas. All materials are to be stored on pallets or similar storage/handling skids off the ground in sheltered areas in which the temperature is maintained between 40° F and 90° F.

C. Mix all lining materials in an enclosed mixing area proposed by the Contractor and approved by the Owner. This enclosed area must protect the mixing operation and materials from direct sunlight, inclement weather, freezing, or other means of damage or contamination. Protect all other concrete and metallic surfaces and finishes from any spillage of material(s) within the mixing area. The material temperature should be between 70o F and 90o F prior to application, unless noted otherwise on the product data sheet.

D. Do not use floor drains, dikes or storm drains for disposal of coating system materials.

E. The Contractor shall take all precautions and implement all measures necessary to avert potential hazards associated with the resurfacing system materials as described on the pertinent Material Safety Data Sheets or container labels.

F. Deliver all materials to the jobsite in their original, unopened containers. Each container shall bear the Manufacturer's name and label.
   1. Labels on all material containers must show the following information:

a. Name or title of product.
b. Manufacturer's batch number and date of manufacture.
c. Manufacturer's name.
d. Generic type of material.
e. Application and mixing instructions.
f. Hazardous material identification label.
g. Shelf life date.
h. Storage requirements.

G. All containers shall be clearly marked indicating any personnel safety hazards associated with the use of or exposure to the materials.
1. All materials shall be handled and stored to prevent damage or loss of label.
2. Coating material storage and mixing areas shall be proposed by the Contractor and approved by the Owner.
3. Do not use or retain contaminated, outdated, prematurely opened, diluted materials, or materials which have exceeded their shelf life.

1.7 PROJECT CONDITIONS

A. Environmental Requirements:
1. For containment and pre-anoxic tank lining, concrete substrate shall have cured a minimum of 28 days utilizing a dissipating curing membrane (water). If a curing compound is used on the slab, it must be completely removed prior to application of final topping, and compound and removal system must be approved in writing by topping manufacturer. Concrete sub floors on or below grade shall be adequately waterproofed beneath and at the perimeter of the slab.
2. Proceed with lining Work only when temperature and moisture conditions of substrates, air temperature, relative humidity, dew point and other conditions comply with the containment lining manufacturer's written recommendations and when no damaging environmental conditions are forecasted for the time when the material will be vulnerable to such environmental damage. Record all such conditions and include in final Site Quality Control Report.
3. Do not begin Work when relative humidity is expected to rise above 90 percent during the time of installation and catalyzation, nor when substrate temperature are not at least five degrees above the dew point temperature and rising.
4. Utilities, including electric, water, heat (air temperature between 65 degrees F and 90 degrees F), and finished lighting to be supplied by the general contractor.
5. Job area to be free of other trades during, and for a period of 24 hours, after lining installation.
6. Do not begin lining Work until manufacturer's recommended environmental conditions can be maintained and only when manufacturer and installer are willing to guarantee the Work as required and without additional reservations and restrictions.
7. Protection of finished walls and floor from damage by subsequent trade shall be the responsibility of the general contractor.

B. Dust and Contaminants: Protect work and adjacent areas from excessive dust and airborne contaminates during protective lining application and curing. Schedule Work to avoid excessive dust and airborne contaminants.

1.8 FIELD SERVICES

A. Coatings manufacturer's representative shall inspect the surfaces to be coated and provide written acceptance of surface prep prior to the initial primer coating and written concurrence to proceed with each subsequent coating. The manufacturer's representative shall also provide written acceptance of the total final applied coating system.

B. Provide the above for each structure scheduled for the high performance coatings.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Products of the Tnemec Company, Inc. are listed to establish a minimum standard of quality. Materials from other manufacturers will be reviewed and accepted if the materials are equivalent to the products listed.

2.2 MATERIALS

A. High-Performance Coating Materials - concrete:
   1. Epoxy Surfacer/Filler/Patcher to surface and repair concrete substrate and eliminate bug-hole induced outgassing: Tnemec Series 218 MortarClad
   2. High Solids Cycloaliphatic Amine Epoxy: Tnemec Series 61 Tneme-Liner

B. Sealants:
   1. Where directed, use a non-sag industrial Polysulfide Joint Sealant Thiokol 2235M manufactured by PolySpec, Houston, TX, or equal.
   2. The approved joint sealants shall be installed at joints and cracks in the concrete in conjunction with the coating material in accordance with the instructions and details of the Coating Manufacturer and as follows:
      a. All joints to receive sealant shall be cleaned, primed, backed and caulked in complete accordance with the sealant manufacturer's instructions. Existing caulk joints and residual caulking where new caulk joints will be applied or where surfaces will be left exposed in the new work shall all be removed by grinding or other approved means to leave surfaces acceptable to receive sealant or clean as approved where surfaces will be left exposed. Provide specified backing rods for all joints or, where authorized, approved bond breaker tape.

C. High-Performance Coating Materials – steel:
   1. Base and Topcoat: Tnemec Series N69 Hi-Build Expoxoline II, Polyamidoamine Epoxy paint.
   2. Top-coating: Tnemec Series 1075 Endura-Shield II, Aliphatic Acrylic Polyurethane paint.
   3. Color: 11SF Safety Blue

PART 3 EXECUTION

3.1 GENERAL

A. Hoisting, Scaffolding, Staging and Planking:
   1. Provide, set-up, and maintain all required hoists, scaffolds, and staging and planking, and perform all access related hoisting work required to complete the work of this section as indicated and specified.
   2. Scaffolds shall have solid backs and floors to prevent dropping materials from there to the floors or ground below.

B. Environmental Requirements:
   1. Comply with the Manufacturer's recommendations as to environmental conditions under which lining system materials can be applied.
   2. Air and Surface Temperatures: Prepare surfaces and apply and cure coatings within air and surface temperature range in accordance with Manufacturer's instructions.
   3. Surface Temperature: Minimum of 5 degrees F (3 degrees C) above the dew point.
   4. Relative Humidity: Prepare surfaces and apply and cure coatings within relative humidity range in accordance with Manufacturer's instructions.
   5. Precipitation: Do not prepare surfaces or apply coatings in rain, snow, fog, or mist.
   6. Wind: Do not spray coatings if wind velocity is above Manufacturer's limit or causes overspray of the coating materials.
   7. Provide ventilation during and following coating application per the Manufacturer's instructions.
   8. Ventilation must be maintained a minimum of 24 hrs following the completion of application to facilitate cure of the materials, or as directed by the Manufacturer.
   9. Contractor shall provide all necessary artificial lighting in accordance with SSPC-Guide 12.

C. Protection:
   1. Cover or otherwise protect finish work or other surfaces not being coated within the scope of this section.
   2. Erect and maintain protective tarps, enclosures and/or masking to contain debris (such as dust or airborne particles resulting from surface preparation) generated during any and all work activities. This includes, but is not limited to, the use of dust/debris collection apparatus as required.

D. Initial Inspection of Surfaces to be Coated:
   1. It is the responsibility of the Contractor to inspect and report unacceptable substrate surface conditions to the Engineer prior to the commencement of surface preparation activities.
   2. Unacceptable concrete surface conditions are defined as the presence of water infiltration/inflow, cracked surfaces or concrete deteriorated to a depth of greater than 1" or otherwise unable to withstand surface preparation as specified herein.
   3. Verify that the pH of the cleaned concrete surfaces to be coated is within the range of 9 to 11. Application of coating materials outside this range will not be permitted without written approval from the Engineer.

E. Thinners and Solvents:
   1. The Contractor shall use only solvents and thinners as recommended by the coating Manufacturer.

3.2 SUBSTRATE PREPARATION

A. Concrete surfaces to be coated shall be free of curing compounds and form release agents, laitance and foreign particles that my inhibit bonding. Prior to start of protective lining systems application, high-pressure water clean, waterjet or abrasive blast surfaces to be covered as required, and inspect the substrate in accordance with SSPC-SP13/NACE No. 6. Surface preparation procedures shall be in accordance with SSPC-SP13/NACE No. 6 and ICRI Guideline No. 310.2. Surface preparation requirement is to expose aggregate and obtain a uniform surface texture resembling an ICRI-CSP 3 or greater.

B. All new cast-in-place and precast concrete shall cure for a period of 28 days in accordance with ACI 308R before protective lining system is installed, unless otherwise recommended by the Containment Lining manufacturer.

C. Concrete surfaces to receive protective lining shall be a Smooth Form Finish as defined in ACI 301. Surfaces shall not be rubbed, sacked, troweled or otherwise finished in any manner that will obscure or cover the firm substrate surface.
D. Level or grind concrete substrates to manufacturer's recommended tolerances and produce a smooth, uniform installation, including removal of all sharp edges, ridges, or depressions.
E. All surfaces must be clean, dry and free of oil, grease and other contaminants, prior to preparation in accordance with SSPC-SP13/NACE No. 6. Concrete surfaces must be sound and capable of supporting the protective lining system as determined by the engineer. Surface preparation requirement is to expose a sound, uniform surface texture conforming to the minimum recommended ICRI-CSP. The appropriate surface/filler/patcher shall be applied to the prepared surface to condition the substrate making suitable for protective lining system.
F. Remove all remaining paint from existing metal surfaces. Sandblast existing metal surfaces to bare metal in accordance with SSPC-SP1. Metal surfaces must be clean, dry, and free of debris. All weld slag, splatter, and fluxes must be removed from welded areas. All parts are to be de-burred and all rough or shar edges must be removed and smoothed out in order to provide a level surface for paint. Protect all internal and external pipe threads.

3.3 SYSTEM INSTALLATION

A. Concrete lining system:

1. All surfaces shall be surfaced, filled or patched utilizing Series 218 MortarClad to fill all bugholes, spalls, cracks and other surface defects prior to the installation of the containment lining system.
2. To all horizontal and vertical surfaces, apply a uniform prime coat of Series 61 Tneme-Liner at 8.0 - 12.0 mils DFT.
3. To all horizontal and vertical surfaces, apply a uniform finish coat of Series 61 Tneme-Liner at 8.0 - 12.0 mils DFT.
4. Saw cuts - All areas where the installed lining does not transition into another surface of a different angle shall be saw cut. The saw cut shall be ¼" wide by a ¼"in depth.
5. Expansion and Control Joints - Where specified, a joint shall be saw-cut after the lining installation and filled with a flexible epoxy or urethane sealant.
6. Application in direct sunlight and/or with rising surface temperature is not allowed, as this may result in blistering of the materials due to expansion of entrapped air or moisture in the concrete. In such cases, it will be necessary to postpone the application until later in the day when the temperature of the substrate is falling.
7. Areas not to receive concrete lining shall be masked or otherwise protected to prevent these surfaces from being coated.
8. Ensure straight, even termination of protective lining system on wall edges and flush with embedded steel.

B. Metal lining system:
1. External – Apply two coats at 3-4 mil DFT per coat of base coat for total thickness of 6-8 mil DFT. Follow with 2-3 mil DFT of top coating. Total lining thickness of 8-11 mils DFT.
2. Internal – Apply two coats of 4-6 mil DFT per coat of base and topcoat for total thickness of 8-12 mil DFT.

3.4 FIELD QUALITY CONTROL, INSPECTION, AND TESTING

A. Inspection by the Engineer or others does not limit the Contractor's responsibilities for quality control inspection and testing as specified herein or as required by the Manufacturer's instructions.
B. Contractor and his Installer shall examine the areas and conditions under which the containment lining Work is to be performed in accordance with SSPC-SP13/NACE No. 6 and notify Engineer in writing of conditions deleterious or otherwise detrimental to the proper and timely completion of the work.
C. Commencement of the Work of this Section shall indicate that the substrate and other conditions of installation are acceptable to the Contractor and his Installer, and will produce a finished product meeting the requirements of the Specifications. All defects resulting from such accepted conditions shall be corrected by Contractor at his own expense.
D. Dry-Film Thickness:
    1. Wet-Film Thickness shall be taken every 100 square feet in accordance with ASTM D 4414 and recorded.
    2. The Dry-Film Thickness can be determined using surface area calculation for material consumption.

3.5 ACCEPTANCE CRITERIA

A. All surfaces shall be prepared in accordance with the specification and referenced standards herein.

3.6 ADJUSTMENTS AND CLEANING

A. At the completion of the Work, Contractor shall remove all materials and debris associated with the Work of this Section.
B. Clean all surfaces not designated to receive protective lining. Restore all other work in a manner acceptable to Engineer.
C. Provide non-staining protective construction paper as approved over the entire surface area, with joints taped, and boards or planks where subjected to especially heavy traffic or hazards.
D. All finished protective lining shall be protected from damage until Final Acceptance of the Work. Protective lining damaged in any manner shall be repaired or replaced at the discretion of Engineer, at no additional cost to Owner.
E. Clean all protective lining as recommended by the manufacturer to provide finished Work acceptable to Owner just prior to Final Acceptance.

END OF SECTION 09 96 00