GEOTEK ENGINEERING
& TESTING SERVICES, INC.
909 East 50th Street North
Sioux Falls, South Dakota 57104
Phone 605-335-5512 Fax 605-335-0773

March 15, 2022

City of Harrisburg
301 E. Willow Street
PO Box 26
Harrisburg, South Dakota 57032

Attn: Derick Wenck, Mayor

Subj: Geotechnical Exploration
Proposed West Side Sanitary Sewer Extension (Phase I)
Harrisburg, South Dakota
GeoTek #22-028

This correspondence presents our written report of the geotechnical exploration program for the referenced project. Our work was performed in accordance with your authorization. We are transmitting an electronic copy of our report for your use. Additional copies of our report are also being sent as noted below.

We thank you for the opportunity of providing our services on this project and look forward to continued participation during the design and construction phases. If you have any questions regarding this report, please contact our office at (605) 335-5512.

Respectfully Submitted,
GeoTek Engineering & Testing Services, Inc.

Jared Haskins

Jared Haskins, PE
Geotechnical Manager

Cc: Stockwell Engineers, Attn: Chad Huwe, PE
Banner Associates, Attn: Alex Welbig, PE

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APPENDIX A

GEOTECHNICAL EXPLORATION
PROPOSED WEST SIDE SANITARY SEWER EXTENSION (PHASE I)
HARRISBURG, SOUTH DAKOTA
GEOTEK #22-028

INTRODUCTION

Project Information

This report presents the results of the recent geotechnical exploration program for the proposed west side sanitary sewer extension in Harrisburg, South Dakota.

Scope of Services

Our work was performed in accordance with the authorization of Derick Wenck with the City of Harrisburg. The scope of work as presented in this report is limited to the following:

1. To perform 19 standard penetration test (SPT) borings to gather data on the subsurface conditions along the route of the sanitary sewer.

2. To perform laboratory tests that include moisture content, dry density, standard Proctor, unconfined compressive strength, pH, sulfate content, chloride content, resistivity, redox potential and sulfide content.

3. To prepare an engineering report that includes the results of the field and laboratory tests as well as our geotechnical engineering opinions and recommendations regarding the following:

    - Subsurface conditions;
    - Open cut installation method;
    - Trenchless installation method;
    - Corrosive potential of the soils;
    - Special geotechnical conditions that may impact the constructability and final performance of the project;
    - Quality control observation and testing.

The scope of our work was intended for geotechnical purposes only. This scope of work did not include determining the presence or extent of environmental contamination at the site or to characterize the site relative to wetlands status.

SITE & SUBSURFACE CONDITIONS

Site Location

The sanitary sewer will be installed from the main lift station along 274th Street to the intersection of Willow Street and Creekside Avenue in Harrisburg, South Dakota. The route of the sanitary sewer is shown on the attached test boring location maps (Figures 1 and 2).

Ground Surface Elevations & Test Boring Locations

The ground surface elevations at the test boring locations were provided by Banner Associates and varied from 1,384.6 feet at test boring 4 to 1,424.7 feet at test boring 19. Test boring location maps (Figures 1 and 2) are attached showing the relative location of the test borings.

Subsurface Conditions

Nineteen (19) test borings were performed on March 2, March 3 and March 9, 2022. The subsurface conditions encountered at the test boring locations are illustrated by means of the boring logs included in Appendix A.

The subsurface profile at the test boring locations consisted of the following soil types: existing fill materials, topsoil materials, fine alluvium soils, glacial fluvial soils and glacial till soils. The existing fill materials were encountered at test borings 11, 12, 14, 17, 18 and 19. The existing fill materials extended to depths varying from 2 feet to 7 feet. The topsoil materials were encountered at the surface at test borings 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15 and 16 or beneath the existing fill materials at test borings 11, 12 and 17. The fine alluvium soils were encountered at test borings 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 15, 17 and 18. The glacial fluvial soils were only encountered at test borings 2 and 13. The glacial till soils were encountered at all of the test borings.

The consistency or relative density of the soils is indicated by the standard penetration resistance ("N") values as shown on the boring logs. A description of the soil consistency or relative density based on the "N" values can be found on the attached Soil Boring Symbols and Descriptive Terminology data sheet.

We wish to point out that the subsurface conditions at other times and locations along the route of the sanitary sewer may differ from those found at our test boring locations. If different conditions are encountered during construction, then it is important that you contact us so that our recommendations can be reviewed.

Soil Types

Existing Fill Materials

The existing fill materials consisted of lean clay (CL). "N" values within the existing fill materials ranged from 4 to 17. The moisture condition of the existing fill materials was frozen, moist and wet.

Topsoil Materials

The topsoil materials consisted of lean clay (CL). "N" values (excluding the "N" values within frozen soils) within the topsoil materials ranged from 3 to 10 (consistency of soft, firm and stiff). The moisture condition of the topsoil materials was frozen, moist and wet.

Fine Alluvium Soils

Fine alluvium soils are soils with more than 50 percent by weight passing the #200 sieve that have been deposited by moving water. The fine alluvium soils consisted of lean clay (CL), fat clay (CH) and fat clay with sand (CH). "N" values within the fine alluvium soils ranged from 3 to 18 (consistency of soft, firm, stiff and very stiff). The moisture condition of the fine alluvium soils was frozen, moist and wet.

Glacial Fluvial Soils

Glacial Fluvial soils are soils with more than 50 percent by weight passing the #200 sieve that have been deposited by moving water from the melting ice of a glacier. The glacial fluvial soils consisted of lean clay (CL) and sandy lean clay (CL). "N" values within the glacial fluvial soils ranged from 6 to 14 (consistency of firm and stiff). The moisture condition of the glacial fluvial soils was moist and wet.

Glacial Till Soils

Glacial till soils are soils with more than 50 percent by weight passing the #200 sieve that have been deposited by a glacier. The glacial till soils consisted of lean clay with sand (CL), fat clay with sand (CH) and sandy lean clay (CL). "N" values within the glacial till soils ranged from 5 to 22 (consistency of firm, stiff and very stiff). The moisture condition of the glacial till soils was frozen, moist and wet.

Water Levels

Measurements to record the groundwater levels were made at the test boring locations. The time and level of the groundwater readings are recorded on the boring logs. Also, a summary of the groundwater levels is shown in Table 1. Delayed groundwater readings were made at test borings 1, 2, 3, 5, 6, 7, 8, 9, 14, 15, 16, 18 and 19.

Table 1. Groundwater Levels

Test Boring	Ground Surface Elevation, ft	Groundwater Level, ft		Elevation of Groundwater, ft
		End of Drilling	Delayed	
1	1,388.9	23	4	1,384.9
2	1,389.9	22	6	1,383.9
3	1,384.9	19	8	1,376.9
4	1,384.6	14	N/A	1,370.6
5	1,389.3	12	12	1,377.3
6	1,387.0	12	5	1,382.0
7	1,390.0	Dry to Cave-In Depth	16 ½	1,373.5
8	1,395.4	Dry to Cave-In Depth	21	1,374.4
9	1,400.3	Dry to Cave-In Depth	21	1,379.3
10	1,404.6	Dry to Cave-In Depth	N/A	N/A
11	1,404.9	Dry to Cave-In Depth	N/A	N/A
12	1,409.8	Dry to Cave-In Depth	N/A	N/A
13	1,408.1	Dry to Cave-In Depth	N/A	N/A
14	1,408.8	Dry to Cave-In Depth	15	1,393.8
15	1,410.6	Dry to Cave-In Depth	4	1,406.6
16	1,412.1	Dry to Cave-In Depth	13	1,399.1
17	1,421.8	Dry to Cave-In Depth	N/A	N/A

Table 1 (Continued). Groundwater Levels

Test Boring	Ground Surface Elevation, ft	Groundwater Level, ft		Elevation of Groundwater, ft
		End of Drilling	Delayed	
18	1,421.5	16	10	1,411.5
19	1,424.7	Dry to Cave-In Depth	16	1,408.7

Note: Delayed groundwater readings were made at test borings 1, 2, 3, 5, 6, 7, 8, 9, 14, 15, 16, 18 and 19.

ENGINEERING REVIEW & RECOMMENDATIONS

Project Design Data

We understand that the project will consist of installing new sanitary sewer. We expect that open cut methods will be used for the majority of the installation. Trenchless methods (directional drilling) will likely be used for a portion of the installation beneath the railroad tracks on 274th Street. Directional drilling could also be used at other locations. Installation depths of 10 feet to 18 feet are expected.

The information/assumptions detailed in the project design data section of the report are important factors in our review and recommendations. If there are any corrections or additions to the information detailed in this section, then it is important that you contact us so that we can review our recommendations with regards to the revised plans.

Open Cut Installation Method

Subgrade Soils

The subgrade soils anticipated at the invert depths of the sanitary sewer will likely consist of clay soils. Where soils having moderate moisture and density values are encountered at the bottom of the trench excavations, it is our opinion that the soils are considered suitable for support of the sanitary sewer, provided they are adequately dewatered and are not disturbed by construction traffic. Areas of wet or soft soils may be encountered at the bottom of the trench excavations. These areas will require subexcavation and trench stabilization methods and materials. Appropriate bedding materials should be used for the sanitary sewer.

Water Control

Based on the groundwater measurements at the test boring locations (see Table 1 on pages 7 and 8), it is our opinion that water will enter the majority of the trench excavations. Dewatering procedures will be needed in order to control and remove water entering the majority of the trench excavations. Where clay soils are encountered, it will likely be possible to remove and control water entering the excavations using normal sump pumping techniques. However, if waterbearing sand soils are encountered, then extensive dewatering techniques will likely be required due to the potentially large volumes of water. The contractor should provide appropriate dewatering methods and equipment. Any water that accumulates at the bottom of the excavations should be immediately removed and surface drainage away from the excavations should be provided during construction.

OSHA Requirements

All excavations must comply with the requirements of OSHA 29 CFR, Part 1926, Subpart P, "Excavations and Trenches". This document states that the excavation safety is the responsibility of the contractor. Reference to this OSHA requirement should be included in the project specifications.

Trench Backfill

We recommend that the trench backfill be placed and compacted in uniform thin lifts (6-inch maximum lifts). The moisture content of clay backfill materials should be adjusted to a moisture level that is within plus or minus 2 percent of the optimum moisture content as determined by standard Proctor (ASTM:D698). The moisture content of granular backfill materials should be maintained at a level that will be conducive for vibratory compaction. Trench backfill should be compacted to a minimum of 95 percent of standard Proctor density (ASTM:D698).

We performed 5 standard Proctor tests for the project (2 on the existing fill materials at test borings 14 and 17, 1 on the fine alluvium soils at test boring 2 and 2 on the glacial till soils at test borings 1 and 18). The results of the standard Proctor tests are shown in Table 2.

Table 2. Standard Proctor Test Results

Test Boring	Depth (ft)	Soil Type	OMC (%)	Maximum Dry Density (pcf)
1	10 to 15	Fat Clay w/ Sand (CH) – Glacial Till	19.3	104.7
2	4 ½ to 7	Fat Clay (CH) – Fine Alluvium	23.5	96.0
14	0 to 7	Lean Clay w/ Sand (CL) – Fill	20.9	101.2
17	0 to 5	Lean Clay w/ Sand (CL) – Fill	17.6	107.2
18	5 to 10	Lean Clay w/ Sand (CL) – Glacial Till	18.4	106.9

Based on the results of the moisture content and standard Proctor tests, it is our general opinion that the majority of the existing fill materials, fine alluvium soils and glacial till soils and a small portion of the glacial fluvial soils have in-situ moisture content levels that range from 1 percent above to 4 percent above the optimum moisture content, while some of the existing fill materials, fine alluvium soils and glacial till soils and the majority of the glacial fluvial soils have in-situ moisture content levels that range from 5 percent above to 15 percent above the optimum moisture content. The soils with in-situ moisture content levels that range from 5 percent above to 15 percent above the optimum moisture content are considered “wet”. The wet existing fill materials were encountered at test boring 14, the wet fine alluvium soils were encountered at test borings 6 and 15, the wet glacial fluvial soils were encountered at test borings 2 and 13 and the wet glacial till soils were encountered at test borings 1, 2, 3, 4, 10, 12 and 18.

In our opinion, the majority of the existing fill materials, fine alluvium soils and glacial till soils and a small portion of the glacial fluvial soils can likely be reused as trench backfill, while the wet existing fill materials, wet fine alluvium soils, wet glacial fluvial soils and wet glacial till soils are not suitable or ideal for use as trench backfill. Our opinion of this is based on our observations of the collected samples and the results of the laboratory tests. The wet existing fill materials, wet fine alluvium soils, wet glacial fluvial soils and wet glacial till soils will require drying or will need to be replaced with an off-site borrow material or with suitable material available at other areas of the project. Also, the topsoil materials should not be used as trench backfill. The topsoil materials should be used as “topping” material.

If needed, the off-site borrow material should consist of either a clay or granular material. If a clay material is selected, then it should consist of a non-organic clay. Scrutiny on the clay

material's moisture content should be made prior to the acceptance and use. If a granular material is used, then it should consist of a pit-run or processed sand or gravel having a maximum particle size of 1 inch. The granular material can be placed in lifts of up to 1 foot in thickness.

Trenchless Installation Method

As previously stated, directional drilling will likely be used for a portion of the installation. It is our opinion that existing fill materials, fine alluvium soils, glacial fluvial soils or glacial till soils will be encountered during the directional drilling. It is our general opinion that the existing fill materials, fine alluvium soils and glacial fluvial soils have low to moderate strength levels and the glacial till soils have moderate to high strength levels. We estimate that the existing fill materials, fine alluvium soils and glacial fluvial soils have unconfined compressive strength values between 0.25 tons per square foot (tsf) and 1.5 tsf. We also estimate that the glacial till soils have unconfined compressive strength values between 1.0 tsf and 4.0 tsf. Rocks and cobbles may be encountered within the glacial till soils. The contractor may experience difficulties if rocks or cobbles are encountered during the installation process.

Groundwater was encountered at the majority of the test borings. With that said, water will likely enter the bore pits. Dewatering may be needed to remove and control water entering the bore pits. If water is encountered, then it would be beneficial to place a layer (12 inches) of drainage rock at the bottom of the bore pits to provide a stable base. The drainage rock should be crushed, washed and meet the gradation specifications shown in Table 3.

Table 3. Drainage Rock Gradation Specifications

Sieve Size	Percent Passing
1 ½-inch	100
1-inch	70 – 90
3/4-inch	25 – 50
3/8-inch	0 – 5

Modulus of Soil Reaction (E'n)

If needed, we estimated the range of the modulus of soil reaction (E'n) for the various soil types near the expected invert depths. The values are based on the estimated unconfined compressive strength values for the cohesive soils. The values are provided in Table 4.

Table 4. Modulus of Soil Reaction (E'n)

Soil Type	Range of Modulus of Soil Reaction (psi)
Existing Fill Materials	700 to 1,500
Fine Alluvium	700 to 1,500
Glacial Fluvial	200 to 700
Glacial Till	1,500 to 5,000

Corrosive Potential

Soil samples were collected from test borings 1, 9, 12 and 18 and were submitted for pH, sulfate content, chloride content, resistivity, redox potential and sulfide content testing. The results of the pH, resistivity, redox potential and sulfide content testing are shown in Table 5 and the results of the chloride content and sulfate content testing are shown in Table 7.

Table 5. pH, Resistivity, Redox Potential & Sulfide Content Results

Test Boring	Depth (ft)	Soil Classification	pH	Resistivity (ohm-cm)	Redox Potential (mV)	Sulfide (mg/kg)
1	9 ½ to 16	CH (Glacial Till)	8.7	1,273	186	2.50
9	4 ½ to 9 ½	CH (Glacial Till)	8.0	938	212	<0.01
12	4 ½ to 9 ½	CL (Glacial Till)	8.5	1,005	187	<0.01
18	7 to 14 ½	CL (Glacial Till)	8.4	1,139	186	0.06

Note: The resistivity values are minimum values (saturated condition).

Using the Ductile Iron Pipe Research Association's (DIPRA) 10-point system and the lab results shown in Table 5, we evaluated the corrosive potential of the tested soils. The 10-point system is based on resistivity, pH, redox potential, sulfides and moisture. An explanation of the point system is shown on Figure 3. The results of the evaluation are shown in Table 6. According to DIPRA, a value of 10 or more indicates that the soil is corrosive to underground piping, while a value below 10 indicates that the soil is not corrosive to underground piping. Based on Table 6,

the glacial till soils are corrosive. We also expect that the existing fill materials, fine alluvium soils and glacial fluvial soils would be corrosive. In our opinion, protective measures should be taken.

Table 6. Results of DIPRA 10-Point System Evaluation

Test Boring	Depth (ft)	Soil Classification	Total Value	Result
1	9 ½ to 16	CH (Glacial Till)	18.5	Corrosive
9	4 ½ to 9 ½	CH (Glacial Till)	12	Corrosive
12	4 ½ to 9 ½	CL (Glacial Till)	12	Corrosive
18	7 to 14 ½	CL (Glacial Till)	14	Corrosive

Note: A "poor drainage, continuously wet" was used for the moisture condition (2 points).

Table 7. Sulfate & Chloride Content Test Results

Test Boring	Depth (ft)	Soil Classification	Sulfate (mg/kg)	Chloride (mg/kg)
1	9 ½ to 16	CH (Glacial Till)	321	7
9	4 ½ to 9 ½	CH (Glacial Till)	2,620	3
12	4 ½ to 9 ½	CL (Glacial Till)	241	2
18	7 to 14 ½	CL (Glacial Till)	165	1

As shown in Table 7, the sulfate contents varied from 165 to 2,620 mg/kg and the chloride contents varied from 1 to 7 mg/kg. Generally, soils are considered mildly corrosive if the sulfate and chloride contents are below 250 mg/kg. Therefore, the glacial till soils are considered corrosive (based on the sulfate contents).

CONSTRUCTION CONSIDERATIONS

Groundwater & Surface Water

Water will likely enter the excavations due to subsurface water, precipitation or surface run off. Any water that accumulates in the bottom of the excavations should be immediately removed and surface drainage away from the excavations should be provided during construction.

Disturbance of Soils

The soils encountered at the test boring locations are susceptible to disturbance and can experience strength loss caused by construction traffic and/or additional moisture. Precautions will be required during earthwork activities in order to reduce the risk of soil disturbance. Where soft/wet soils are encountered, the excavations should be performed with low-ground-pressure construction equipment or an excavator (backhoe) having a smooth cutting edge on the bucket.

Cold Weather Precautions

If site preparation and construction is anticipated during cold weather, then we recommend that all subgrades, slabs and other improvements that may be affected by frost movements be insulated from frost penetration during freezing temperatures. If filling is performed during freezing temperatures, then all frozen soils, snow and ice should be removed from the areas to be filled prior to placing the new fill. The new fill should not be allowed to freeze during transit, placement and compaction. Concrete and asphalt should not be placed on frozen subgrades. If subgrades freeze, then we recommend that the frozen soils be removed and replaced, or completely thawed. The subgrade soils will likely require reworking and recompacting due to the loss of density caused by the freeze/thaw process.

Excavation Sideslopes

All excavations must comply with the requirements of OSHA 29 CFR, Part 1926, Subpart P, "Excavations and Trenches". This document states that the excavation safety is the responsibility of the contractor. Reference to this OSHA requirement should be included in the project specifications.

Observations & Testing

This report was prepared using a limited amount of information for the project and a number of assumptions were necessary to help us develop our conclusions and recommendations. It is recommended that our firm be retained to review the geotechnical aspects of the final design plans and specifications to check that our recommendations have been properly incorporated into the design documents.

The recommendations submitted in this report have been made based on the subsurface conditions encountered at the test boring locations. It is possible that there are subsurface conditions at the site that are different from those represented by the test borings. As a result, on-site observation during construction is considered integral to the successful implementation of the recommendations. We believe that qualified field personnel need to be on-site at the following times to observe the site conditions and effectiveness of the construction.

Excavation

We recommend that a geotechnical engineer or geotechnical engineering technician working under the direct supervision of a geotechnical engineer observe all excavations for utilities, slabs and pavements. These observations are recommended to determine if the exposed soils are similar to those encountered at the test boring locations, if unsuitable soils have been adequately removed and if the exposed soils are suitable for support of the proposed construction.

Testing

After the subgrade is observed by a geotechnical engineer/technician and approved, we recommend a representative number of compaction tests be taken during the placement of the backfill placed below slabs and pavements. The tests should be performed to determine if the required compaction has been achieved. As a general guideline, we recommend at least 1 test be taken for every 10,000 square feet of embankment fill placed, at least 1 test for every 500 feet in trench fill, and for every 2-foot thickness of fill or backfill placed. The actual number of tests should be left to the discretion of the geotechnical engineer. Samples of proposed fill and backfill materials should be submitted to our laboratory for testing to determine their compliance with our recommendations and project specifications.

SUBSURFACE EXPLORATION PROCEDURES

Test Borings

We performed 19 SPT borings on March 2, March 3 and March 9, 2022 with a truck rig equipped with hollow-stem auger. Soil sampling was performed in accordance with the

procedures described in ASTM:D1586. Using this procedure, a 2-inch O.D. split barrel sampler is driven into the soil by a 140-pound weight falling 30 inches. After an initial set of 6 inches, the number of blows required to drive the sampler an additional 12 inches is known as the penetration resistance, or "N" value. The "N" value is an index of the relative density of cohesionless soils and the consistency of cohesive soils. In addition, thin walled tube samples were obtained according to ASTM:D1587, where indicated by the appropriate symbol on the boring logs. We also performed 1 test boring using hand-operated equipment.

The test borings were backfilled with on-site materials and some settlement of these materials can be expected to occur. Final closure of the holes is the responsibility of the client or property owner.

The soil samples collected from the test boring locations will be retained in our office for a period of 1 month after the date of this report and will then be discarded unless we are notified otherwise.

Soil Classification

As the samples were obtained in the field, they were visually and manually classified by the crew chief according to ASTM:D2488. Representative portions of all samples were then sealed and returned to the laboratory for further examination and for verification of the field classification. In addition, select samples were then submitted to a program of laboratory tests. Where laboratory classification tests (sieve analysis and Atterberg limits) have been performed, classifications according to ASTM:D2487 are possible. Logs of the test borings indicating the depth and identification of the various strata, the "N" value, the laboratory test data, water level information and pertinent information regarding the method of maintaining and advancing the drill holes are also attached in Appendix A. Charts illustrating the soil classification procedures, the descriptive terminology and the symbols used on the boring logs are also attached in Appendix A.

Water Level Measurements

Subsurface groundwater levels should be expected to fluctuate seasonally and yearly from the groundwater readings recorded at the test boring locations. Fluctuations occur due to varying seasonal and yearly rainfall amounts and snowmelt, as well as other factors. It is possible that the subsurface groundwater levels during or after construction could be significantly different than the time the test borings were performed.

Laboratory Tests

We performed laboratory tests on select samples to aid in determining the index and strength properties of the soils. The tests consisted of moisture content, dry density, standard Proctor, pH, sulfate content, chloride content, resistivity, redox potential and sulfide content. The strength tests consisted of unconfined compressive strength. The laboratory tests were performed in accordance with the appropriate ASTM procedures. The results of the laboratory tests are shown on the boring logs opposite the samples upon which the tests were performed.

LIMITATIONS

The recommendations and professional opinions submitted in this report were based upon the data obtained through the sampling and testing program at the test boring locations. We wish to point out that because no exploration program can totally reveal the exact subsurface conditions for the entire site, conditions between test borings and between samples and at other times may differ from those described in our report. Our exploration program identified subsurface conditions only at those points where samples were retrieved or where water was observed. It is not standard engineering practice to continuously retrieve samples for the full depth of the test borings. Therefore, strata boundaries and thicknesses must be inferred to some extent. Additionally, some soils layers present in the ground may not be observed between sampling intervals. If the subsurface conditions encountered at the time of construction differ from those represented by our test borings, it is necessary to contact us so that our recommendations can be reviewed. The variations may result in altering our conclusions or recommendations regarding site preparation or construction procedures, thus, potentially affecting construction costs.

This report is for the exclusive use of the addressee and its representatives for use in design of the proposed project described herein and preparation of construction documents. Without written approval, we assume no responsibility to other parties regarding this report. Our conclusions, opinions and recommendations may not be appropriate for other parties or projects.

STANDARD OF CARE

The recommendations submitted in this report represent our professional opinions. Our services for your project were performed in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering profession currently practicing at this time and area.

This report was prepared by:
GeoTek Engineering & Testing Services, Inc.

Jared Haskins, PE
Geotechnical Manager

MAIN LIFT STATION TO HONEYSUCKLE ALIGNMENT

Figure 1

0 200 400 FT

BANNER
engineering a better community
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PROJECT / SHEET TITLE:
HARRISBURG WESTSIDE SANITARY SEWER EXTENSION - PHASE 1
ALIGNMENT LAYOUT
HARRISBURG, SOUTH DAKOTA

REV.	DATE	DESCRIPTION

FOR REVIEW ONLY
NOT FOR CONSTRUCTION

JOB No.:	23453.00
DATE:	FEBRUARY 2022
ENG / ARCH:	TLM
DESIGNER:	ASW
TECHNICIAN:	CKM

0 1/2" 1"
SCALE REDUCTION BAR

SHEET No. :
1

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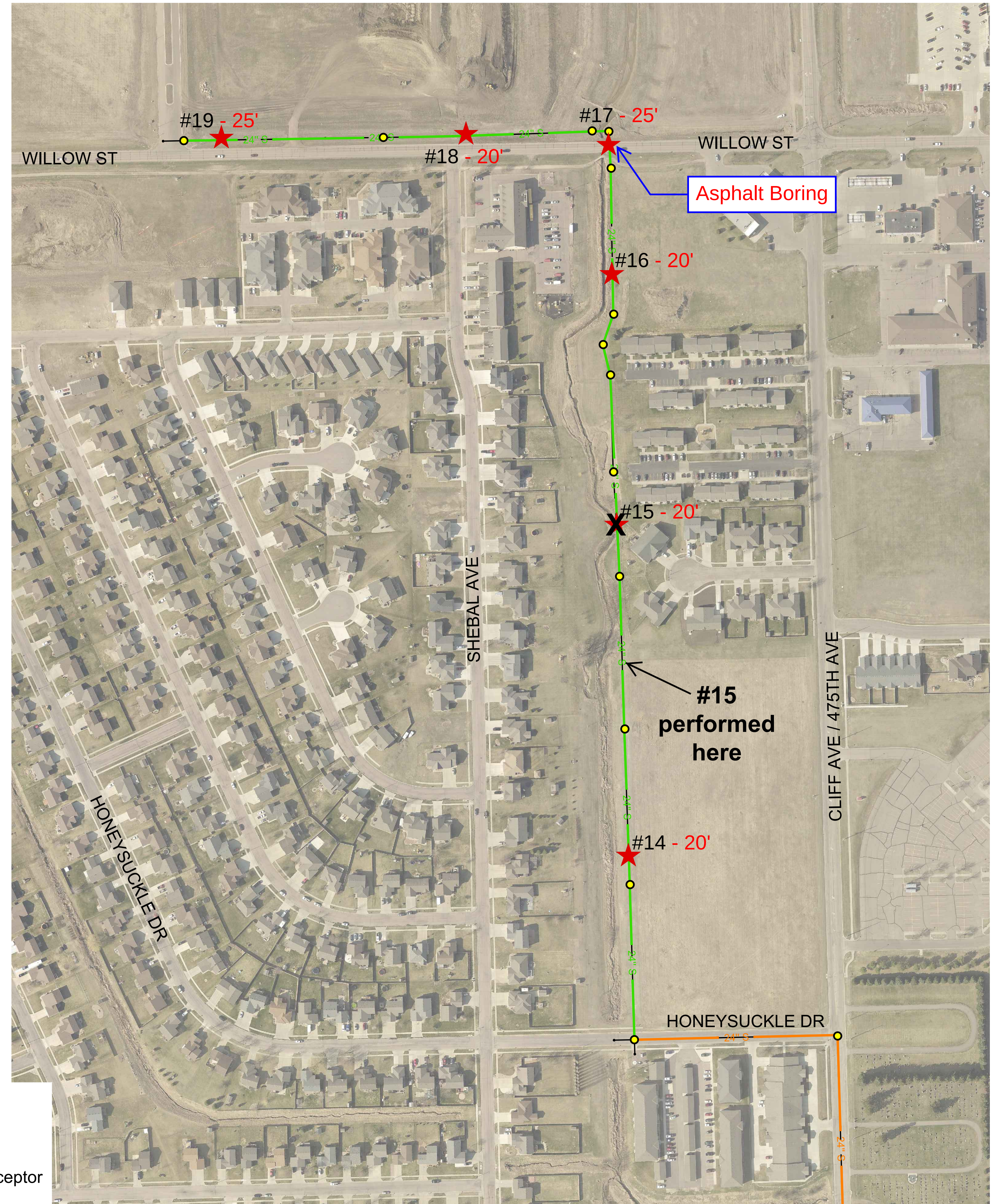
HONEYSUCKLE TO WILLOW/CREEKSIDE ALIGNMENT

Figure 2



LEGEND:

- New 36"/30"/24" Sewer Interceptor
- Replacement of Existing 12" Sewer Interceptor with 24" Sewer Interceptor

0 150 300 FT

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PROJECT / SHEET TITLE:
HARRISBURG WESTSIDE SANITARY SEWER EXTENSION - PHASE 1
ALIGNMENT LAYOUT
HARRISBURG, SOUTH DAKOTA

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FOR REVIEW ONLY
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JOB No.:	23453.00
DATE:	FEBRUARY 2022
ENG / ARCH:	TLM
DESIGNER:	ASW
TECHNICIAN:	CKM

SCALE REDUCTION BAR 0 1/2" 1"

SHEET No.: 2

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FIGURE 3

Table A.1 Soil-test evaluation

Soil Characteristics Based on Samples Taken Down to Pipe Depth		
Resistivity—ohm-cm (based on water-saturated soil box):		Points*
	<1,500	10
	≥1,500–1,800	8
	>1,800–2,100	5
	>2,100–2,500	2
	>2,500–3,000	1
	>3,000	0
pH:		
	0–2	5
	2–4	3
	4–6.5	0
	6.5–7.5	0†
	7.5–8.5	0
	>8.5	3
Redox potential:		
	> +100 mV	0
	+50 to +100 mV	3.5
	0 to +50 mV	4
	Negative	5
Sulfides:		
	Positive	3.5
	Trace	2
	Negative	0
Moisture:		
	Poor drainage, continuously wet	2
	Fair drainage, generally moist	1
	Good drainage, generally dry	0

*Ten points or greater indicates that soil is corrosive to ductile-iron pipe; protection is needed. Refer to paragraph A.3 for a description of Uniquely Severe Environments and additional considerations.

†If sulfides are present and low (<100 mv) or negative redox-potential results are obtained, add three points for this range.

GEOTEK ENGINEERING
& TESTING SERVICES, INC.
909 E 50th St N
Sioux Falls, South Dakota, 57104
605-335-5512 Fax
jhaskins@geotekeng.com

GEOTECHNICAL TEST BORING LOG

-unsuitable material for trench backfill
-wet soils - drying needed or replace

GEOTEK # **22-028** BORING NO. **1 (1 of 1)**

PROJECT **Proposed West Side Sanitary Sewer Extension (Phase 1), Harrisburg, SD**

DEPTH in FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 1388.9 ft)	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LABORATORY TESTS WC	D	LL	PL	QU
	LEAN CLAY: black, soft, 12" of gravel at surface, frozen to 2' then wet (CL)	TOPSOIL			1	HSA					
			3	▼	2	SPT	36				
4½	**LEAN CLAY WITH SAND**: a little gravel, brown and gray, moist, firm, (CL)	GLACIAL TILL	5		3	SPT	25				
7	**FAT CLAY WITH SAND**: a little gravel, brown and gray, moist, firm to stiff, (CH)	GLACIAL TILL	10		4	SPT	21				
			10		5	SPT	22				
					10	BAG					
			10		6	SPT	21				
			10		7	SPT	22				
			6		8	SPT	26				
24½	**LEAN CLAY WITH SAND**: a little gravel, gray, wet, firm, (CL)	GLACIAL TILL	8		9	SPT	23				
26	Bottom of borehole at 26 feet.										

WATER LEVEL MEASUREMENTS

START 3-2-22 COMPLETE 3-3-22 12:28 pm

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL
3-3-22	12:26 pm	26	--	22	23
3-3-22	4:00 pm	26	--	22	▼ 4
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METHOD
3.25" ID Hollow Stem Auger

CREW CHIEF Mike Wagner

GEOTECHNICAL TEST BORING 22-028.GPJ GEOTEKENG.GDT 3/11/22

GEOTEK ENGINEERING
& TESTING SERVICES, INC.
909 E 50th St N
Sioux Falls, South Dakota, 57104
605-335-5512 Fax
jhaskins@geotekeng.com

GEOTECHNICAL TEST BORING LOG

-unsuitable material for trench backfill
-wet soils - drying needed or replace

GEOTEK # **22-028** BORING NO. **2 (1 of 1)**

PROJECT **Proposed West Side Sanitary Sewer Extension (Phase 1), Harrisburg, SD**

DEPTH in FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 1389.9 ft)	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LABORATORY TESTS WC	D	LL	PL	QU
	LEAN CLAY: black, 12" of gravel at surface, frozen to 3' then moist (CL)	TOPSOIL			1	HSA					
			15		2	SPT	24				
					10	BAG					
4½	**FAT CLAY**: dark brown, moist, firm, (CH)	FINE ALLUVIUM	6	▼	3	SPT	24				
7	**SANDY LEAN CLAY**: a little gravel, brown and gray, wet, firm, (CL)	GLACIAL TILL	5		4	SPT	29				
			8		5	SPT	24				
12	**LEAN CLAY WITH SAND**: a little gravel, brown and gray, wet, firm, (CL)	GLACIAL TILL	8		6	SPT	28				
14½	**SANDY LEAN CLAY**: brown, wet, stiff, (CL)	GLACIAL FLUVIAL	11		7	SPT	33	98			400
19½	**LEAN CLAY**: brown, wet, firm, (CL)	GLACIAL FLUVIAL	7		8	SPT	37				
23	**LEAN CLAY WITH SAND**: a little gravel, gray, moist, stiff, (CL)	GLACIAL TILL									
			12		9	SPT	24				
26	Bottom of borehole at 26 feet.										

WATER LEVEL MEASUREMENTS

START 3-2-22 COMPLETE 3-2-22 1:35 pm

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL
3-3-22	1:36 pm	26	--	19	22
3-3-22	4:11 pm	26	--	18	▼ 6
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METHOD
3.25" ID Hollow Stem Auger

CREW CHIEF Mike Wagner

GEOTECHNICAL TEST BORING 22-028.GPJ GEOTEKENG.GDT 3/11/22

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GEOTECHNICAL TEST BORING LOG

-unsuitable material for trench backfill
-wet soils - drying needed or replace

GEOTEK # **22-028** BORING NO. **3 (1 of 1)**

PROJECT **Proposed West Side Sanitary Sewer Extension (Phase 1), Harrisburg, SD**

DEPTH in FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 1384.9 ft)	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LAB WC	LAB D	LAB LL	LAB PL	LAB QU
	LEAN CLAY: black, firm, 12" of gravel at surface, frozen to 2.5' then moist (CL)	TOPSOIL			1	HSA					
			7		2	SPT	43				
4½	**FAT CLAY**: very dark brown, moist, stiff, (CH)	FINE ALLUVIUM	10		3	SPT	24				
6	**SANDY LEAN CLAY**: with gravel, brown, wet, firm, (CL)	GLACIAL TILL	6	▼	4	SPT	28				
8½	**LEAN CLAY WITH SAND**: a little gravel, brown and gray, moist, firm, (CL)	GLACIAL TILL	8		5	SPT	21				
12	**FAT CLAY WITH SAND**: a little gravel, brown and gray, moist, firm, (CH)	GLACIAL TILL	7		6	SPT	21				
14½	**LEAN CLAY WITH SAND**: a little gravel, gray, moist, firm to stiff, (CL)	GLACIAL TILL	8		7	SPT	23				
			11		8	SPT	20				
21	Bottom of borehole at 21 feet.										

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL
3-2-22	2:47 pm	21	--	19	19
3-2-22	4:19 pm	21	--	16	▼ 8
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START 3-2-22 COMPLETE 3-2-22 2:50 pm

METHOD
3.25" ID Hollow Stem Auger

CREW CHIEF Mike Wagner

GEOTECHNICAL TEST BORING 22-028.GPJ GEOTEKENG.GDT 3/11/22

GEOTEK ENGINEERING
& TESTING SERVICES, INC.
909 E 50th St N
Sioux Falls, South Dakota, 57104
605-335-5512 Fax
jhaskins@geotekeng.com

GEOTECHNICAL TEST BORING LOG

-unsuitable material for trench backfill
-wet soils - drying needed or replace

GEOTEK # **22-028** BORING NO. **4 (1 of 1)**

PROJECT **Proposed West Side Sanitary Sewer Extension (Phase 1), Harrisburg, SD**

DEPTH in FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 1384.6 ft)	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LAB WC	LAB D	LAB LL	LAB PL	LAB QU
	LEAN CLAY: black, 12" of gravel at surface, frozen to 3' then moist (CL)	TOPSOIL			1	HSA					
			17		2	SPT	39				
4½	**LEAN CLAY**: brown and gray, moist, firm, (CL)	FINE ALLUVIUM	7		3	SPT	22				
7	**SANDY LEAN CLAY**: a little gravel, brown, moist, firm, (CL)	GLACIAL TILL	7		4	SPT	22				
8½	**LEAN CLAY WITH SAND**: a little gravel, brown, moist, firm, (CL)	GLACIAL TILL	5		5	SPT	27				
12	**LEAN CLAY WITH SAND**: grayish brown, moist, (CL)	GLACIAL TILL	9	▼	6	SPT	21				
14½	**LEAN CLAY WITH SAND**: a little gravel, gray, moist, firm, (CL)	GLACIAL TILL	8		7	SPT	22				
			8		8	SPT	23				
21	Bottom of borehole at 21 feet.										

WATER LEVEL MEASUREMENTS

START 3-2-22 COMPLETE 3-2-22 3:48 pm

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL
3-2-22	3:59 pm	21	--	18	▼ 14
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METHOD
3.25" ID Hollow Stem Auger

CREW CHIEF Mike Wagner

GEOTECHNICAL TEST BORING 22-028.GPJ GEOTEKENG.GDT 3/11/22

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GEOTECHNICAL TEST BORING LOG

-unsuitable material for trench backfill

GEOTEK # **22-028** BORING NO. **5 (1 of 1)**

PROJECT **Proposed West Side Sanitary Sewer Extension (Phase 1), Harrisburg, SD**

DEPTH in FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 1389.3 ft)	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LABORATORY TESTS WC	D	LL	PL	QU
1	**LEAN CLAY**: very dark brown, frozen, (CL)	TOPSOIL			1	HSA					
2	**LEAN CLAY**: brown, frozen, (CL)	FINE ALLUVIUM									
	LEAN CLAY WITH SAND: a little gravel, brown and gray, moist, stiff, (CL)	GLACIAL TILL	9		2	SPT	22				
			11		3	SPT	21				
			11		4	SPT	21				
			12		5	SPT	21				
			12	▼	6	SPT	20				
			12		7	SPT	23				
			12		8	SPT	22				
21	Bottom of borehole at 21 feet.										

WATER LEVEL MEASUREMENTS

START 3-9-22 COMPLETE 3-9-22 9:23 am

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL
3-9-22	10:39 am	26	--	24	▼ 12
3-10-22	4:00 pm	26	--	22	▼ 12
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METHOD
3.25" ID Hollow Stem Auger

CREW CHIEF Cody Osthus

GEOTECHNICAL TEST BORING 22-028.GPJ GEOTEKENG.GDT 3/11/22

GEOTEK ENGINEERING
& TESTING SERVICES, INC.
909 E 50th St N
Sioux Falls, South Dakota, 57104
605-335-5512 Fax
jhaskins@geotekeng.com

GEOTECHNICAL TEST BORING LOG

-unsuitable material for trench backfill
-wet soils - drying needed or replace

GEOTEK # **22-028** BORING NO. **6 (1 of 1)**

PROJECT **Proposed West Side Sanitary Sewer Extension (Phase 1), Harrisburg, SD**

SURFACE ELEVATION 1387.0 ft

DEPTH in FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LABORATORY TESTS WC	D	LL	PL	QU
	LEAN CLAY: black, frozen to 2' then wet, soft, (CL)	TOPSOIL			1	HSA					
			4		2	SPT	26				
5	**LEAN CLAY**: dark gray, wet, soft to firm, (CL)	FINE ALLUVIUM	3	▼	3	SPT	31				
			3		4	SPT	33				
			5		5	SPT	46				
11	**LEAN CLAY WITH SAND**: a trace of gravel, gray, moist, firm, (CL)	GLACIAL TILL	8		6	SPT	22				
			6		7	SPT	21				
			6		8	SPT	21				
			7		9	SPT	21				
26	Bottom of borehole at 26 feet.										

WATER LEVEL MEASUREMENTS

START 3-9-22 COMPLETE 3-9-22 10:48 am

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL
3-9-22	10:45 am	26	--	24	12
3-9-22	11:48 am	26	--	22	6
3-10-22	4:05 pm	26	--	10	▼ 5
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METHOD
3.25" ID Hollow Stem Auger

CREW CHIEF Cody Osthus

GEOTECHNICAL TEST BORING 22-028.GPJ GEOTEKENG.GDT 3/11/22

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& TESTING SERVICES, INC.
909 E 50th St N
Sioux Falls, South Dakota, 57104
605-335-5512 Fax
jhaskins@geotekeng.com

GEOTECHNICAL TEST BORING LOG

-unsuitable material for trench backfill

GEOTEK # **22-028** BORING NO. **7 (1 of 1)**

PROJECT **Proposed West Side Sanitary Sewer Extension (Phase 1), Harrisburg, SD**

DEPTH in FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 1390.0 ft)	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LABORATORY TESTS WC	D	LL	PL	QU
	LEAN CLAY: very dark brown to black, frozen to 2' then moist, (CL)	TOPSOIL			1	HSA					
2½	**FAT CLAY**: dark brown, moist, stiff, (CH)	FINE ALLUVIUM	12		2	SPT	23				
			11		3	SPT	20				
6	**LEAN CLAY WITH SAND**: a trace of gravel, brown and gray, moist, stiff, (CL)	GLACIAL TILL									
			12		4	SPT	23				
			11		5	SPT	22				
12	**FAT CLAY WITH SAND**: a trace of gravel, brown and gray, moist, stiff to very stiff, (CH)	GLACIAL TILL	11		6	SPT	21				
			12	▼	7	SPT	22				
			17		8	SPT	21				
21	Bottom of borehole at 21 feet.										

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL
3-9-22	11:42 am	21	--	18	none
3-10-22	4:10 pm	21	--	18	▼ 16.5
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START 3-9-22 COMPLETE 3-9-22 11:43 am

METHOD
3.25" ID Hollow Stem Auger

CREW CHIEF Cody Osthus

GEOTECHNICAL TEST BORING 22-028.GPJ GEOTEKENG.GDT 3/11/22

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& TESTING SERVICES, INC.
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GEOTECHNICAL TEST BORING LOG

-unsuitable material for trench backfill

GEOTEK # **22-028** BORING NO. **8 (1 of 1)**

PROJECT **Proposed West Side Sanitary Sewer Extension (Phase 1), Harrisburg, SD**

DEPTH in FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 1395.4 ft)	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LABORATORY TESTS WC	D	LL	PL	QU
	LEAN CLAY: very dark brown, frozen, (CL)	TOPSOIL			1	HSA					
2	**LEAN CLAY**: brown and gray, moist, very stiff, (CL)	FINE ALLUVIUM	18		2	SPT	22				
4½	**FAT CLAY WITH SAND**: a little gravel, brown, moist, stiff, (CH)	GLACIAL TILL	14		3	SPT	21				
			11		4	SPT	23				
			11		5	SPT	23				
12	**FAT CLAY WITH SAND**: a little gravel, brown and grayish brown, stiff, (CH)	GLACIAL TILL	13		6	SPT	24	102			6400
			13		7	SPT	21				
19	**FAT CLAY WITH SAND**: a little gravel, brown, stiff to very stiff, (CH)	GLACIAL TILL	16	▼	8	SPT	21				
			13		9	SPT	23				
26	Bottom of borehole at 26 feet.										

WATER LEVEL MEASUREMENTS

START 3-3-22 COMPLETE 3-3-22 5:46 pm

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL
3-3-22	10:45 am	26	--	23	none
3-3-22	4:00 pm	26	--	22	▼ 21
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METHOD
3.25" ID Hollow Stem Auger

CREW CHIEF Mike Wagner

GEOTECHNICAL TEST BORING 22-028.GPJ GEOTEKENG.GDT 3/11/22

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& TESTING SERVICES, INC.
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Sioux Falls, South Dakota, 57104
605-335-5512 Fax
jhaskins@geotekeng.com

GEOTECHNICAL TEST BORING LOG

-unsuitable material for trench backfill

GEOTEK # **22-028** BORING NO. **9 (1 of 1)**

PROJECT **Proposed West Side Sanitary Sewer Extension (Phase 1), Harrisburg, SD**

DEPTH in FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 1400.3 ft)	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LABORATORY TESTS WC	D	LL	PL	QU
1	**LEAN CLAY**: very dark brown, frozen, (CL)	TOPSOIL									
	LEAN CLAY: brown, frozen, (CL)	FINE ALLUVIUM			1	HSA					
2	**LEAN CLAY WITH SAND**: a little gravel, brown, moist, stiff, (CL)	GLACIAL TILL	10		2	SPT	20				
4½	**FAT CLAY WITH SAND**: a little gravel, brown, moist, stiff to very stiff, (CH)	GLACIAL TILL	13		3	SPT	21				
			13		4	SPT	22				
			12		5	SPT	22				
			12		6	SPT	22				
			12		7	SPT	23				
			13	▼	8	SPT	23				
26	Bottom of borehole at 26 feet.		18		9	SPT	23				

WATER LEVEL MEASUREMENTS

START 3-3-22 COMPLETE 3-3-22 5:52 pm

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL
3-3-22	12:00 pm	26	--	24	none
3-3-22	4:05 pm	26	--	23	▼ 21
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METHOD
3.25" ID Hollow Stem Auger

CREW CHIEF Mike Wagner

GEOTECHNICAL TEST BORING 22-028.GPJ GEOTEKENG.GDT 3/11/22

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& TESTING SERVICES, INC.
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605-335-5512 Fax
jhaskins@geotekeng.com

GEOTECHNICAL TEST BORING LOG

-unsuitable material for trench backfill
-wet soils - drying needed or replace

GEOTEK # **22-028** BORING NO. **10 (1 of 1)**

PROJECT **Proposed West Side Sanitary Sewer Extension (Phase 1), Harrisburg, SD**

DEPTH in FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 1404.6 ft)	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LABORATORY TESTS WC	D	LL	PL	QU
1	**LEAN CLAY**: very dark brown, frozen, (CL)	TOPSOIL									
2	**FAT CLAY**: brown, frozen, (CH)	FINE ALLUVIUM			1	HSA					
	FAT CLAY WITH SAND: a little gravel, brown, moist, stiff, (CH)	GLACIAL TILL	11		2	SPT	22				
			12		3	SPT	21				
			10		4	SPT	22				
9½	**FAT CLAY WITH SAND**: brown and dark gray, moist, stiff, (CH)	GLACIAL TILL	12		5	SPT	22				
			12		6	SPT	21				
			12		7	SPT	22				
			11		8	SPT	23				
24½	**SANDY LEAN CLAY**: a trace of gravel, brown, moist, firm, (CL)	GLACIAL TILL	7		9	SPT	28				
26	Bottom of borehole at 26 feet.										

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL
3-3-22	1:00 pm	26	--	18	none
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START 3-3-22 COMPLETE 3-3-22 5:57 pm

METHOD
3.25" ID Hollow Stem Auger

CREW CHIEF Mike Wagner

GEOTECHNICAL TEST BORING 22-028.GPJ GEOTEKENG.GDT 3/11/22

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GEOTECHNICAL TEST BORING LOG

-unsuitable material for trench backfill

GEOTEK # **22-028** BORING NO. **11 (1 of 1)**

PROJECT **Proposed West Side Sanitary Sewer Extension (Phase 1), Harrisburg, SD**

DEPTH in FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 1404.9 ft)	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LAB WC	LAB D	LAB LL	LAB PL	LAB QU
	FILL, MOSTLY LEAN CLAY: a little gravel, brown and black, frozen to 2.5' then moist, 6" of asphalt and 6" of gravel at the surface	FILL			1	HSA					
			17		2	SPT	16				
4½	**LEAN CLAY**: black, moist, firm, (CL)	TOPSOIL	8		3	SPT	30				
7	**LEAN CLAY**: brown and gray, moist, firm, (CL)	FINE ALLUVIUM	5		4	SPT	22				
9½	**LEAN CLAY WITH SAND**: a little gravel, brown and grayish brown, moist, firm, (CL)	GLACIAL TILL	8		5	SPT	22				
			8		6	SPT	21				
14½	**FAT CLAY WITH SAND**: a little gravel, brown and dark gray, moist, firm to stiff, (CH)	GLACIAL TILL	8		7	SPT	22				
			13		8	SPT	21				
24½	**LEAN CLAY WITH SAND**: a little gravel, gray, moist, stiff, (CL)	GLACIAL TILL	14		9	SPT	21				
26	Bottom of borehole at 26 feet.										

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL
3-3-22	2:30 pm	26	--	23	none
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START 3-3-22 COMPLETE 3-3-22 6:01 pm

METHOD
3.25" ID Hollow Stem Auger

CREW CHIEF Mike Wagner

GEOTECHNICAL TEST BORING 22-028.GPJ GEOTEKENG.GDT 3/11/22

GEOTEK ENGINEERING
& TESTING SERVICES, INC.
909 E 50th St N
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605-335-5512 Fax
jhaskins@geotekeng.com

GEOTECHNICAL TEST BORING LOG

-unsuitable material for trench backfill
-wet soils - drying needed or replace

GEOTEK # **22-028** BORING NO. **12 (1 of 1)**

PROJECT **Proposed West Side Sanitary Sewer Extension (Phase 1), Harrisburg, SD**

DEPTH in FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 1409.8 ft)	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LABORATORY TESTS WC	D	LL	PL	QU
	FILL, MOSTLY LEAN CLAY: a little gravel, brown, frozen, 4" of asphalt and 8" of gravel at the surface	FILL			1	HSA					
2	**LEAN CLAY**: black, moist, stiff, (CL)	TOPSOIL	10		2	SPT	30				
4½	**LEAN CLAY WITH SAND**: a little gravel, brown and dark brown, moist, firm to stiff, (CL)	GLACIAL TILL	7		3	SPT	27				
			9		4	SPT	22				
			9		5	SPT	21				
			9		6	SPT	20				
14½	**FAT CLAY WITH SAND**: brown and dark gray, moist, firm to stiff, (CH)	GLACIAL TILL	14		7	SPT	23				
			7		8	SPT	22				
26			14		9	SPT	24				
	Bottom of borehole at 26 feet.										

WATER LEVEL MEASUREMENTS

START 3-3-22 COMPLETE 3-3-22 6:07 pm

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL
3-3-22	3:30 pm	26	--	24	none
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--	--	--	--	--	--

METHOD
3.25" ID Hollow Stem Auger

CREW CHIEF Mike Wagner

GEOTECHNICAL TEST BORING 22-028.GPJ GEOTEKENG.GDT 3/11/22

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605-335-5512 Fax
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GEOTECHNICAL TEST BORING LOG

-wet soils - drying needed or replace

GEOTEK # **22-028** BORING NO. **13 (1 of 1)**

PROJECT **Proposed West Side Sanitary Sewer Extension (Phase 1), Harrisburg, SD**

DEPTH in FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 1408.1 ft)	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LAB WC	LAB D	LAB LL	LAB PL	LAB QU
	LEAN CLAY WITH SAND: a little gravel, brown and gray, frozen to 2' then moist, firm to stiff, 6" of asphalt and 6" of gravel at the surface (CL)	GLACIAL TILL			1	HSA					
			7		2	SPT	23				
			9		3	SPT	21				
7	**LEAN CLAY**: a trace of gravel, brown, moist to wet, firm, (CL)	GLACIAL FLUVIAL	7		4	SPT	21				
			6		5	SPT	28				
			7		6	SPT	30				
14½	**LEAN CLAY**: a trace of gravel, brown and gray, wet, stiff, (CL)	GLACIAL FLUVIAL	14		7	SPT	26				
19½	**FAT CLAY WITH SAND**: a little gravel, brown and dark gray, moist, stiff to very stiff, (CH)	GLACIAL TILL	14		8	SPT	23				
			22		9	SPT	22				
26	Bottom of borehole at 26 feet.										

WATER LEVEL MEASUREMENTS

START 3-3-22 COMPLETE 3-3-22 4:27 pm

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL
3-3-22	4:27 pm	26	--	24	none
--	--	--	--	--	--
--	--	--	--	--	--
--	--	--	--	--	--

METHOD
3.25" ID Hollow Stem Auger

CREW CHIEF Mike Wagner

GEOTECHNICAL TEST BORING 22-028.GPJ GEOTEKENG.GDT 3/11/22

GEOTEK ENGINEERING
& TESTING SERVICES, INC.
909 E 50th St N
Sioux Falls, South Dakota, 57104
605-335-5512 Fax
jhaskins@geotekeng.com

GEOTECHNICAL TEST BORING LOG

-wet soils - drying needed or replace

GEOTEK # **22-028** BORING NO. **14 (1 of 1)**

PROJECT **Proposed West Side Sanitary Sewer Extension (Phase 1), Harrisburg, SD**

DEPTH in FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 1408.8 ft)	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LABORATORY TESTS WC	D	LL	PL	QU
	FILL, MOSTLY LEAN CLAY: brown and dark brown, frozen to 2' then wet	FILL			1	HSA					
			6		2	SPT	27				
			4		3	SPT	30				
7					9	BAG					
	FAT CLAY WITH SAND: a little gravel, dark brown and gray, moist, stiff, (CH)	GLACIAL TILL	10		4	SPT	21				
			15		5	SPT	19				
12											
	FAT CLAY WITH SAND: a little gravel, brown and dark brown, moist, stiff to very stiff, (CH)	GLACIAL TILL	15		6	SPT	19				
			16	▼	7	SPT	21				
			15		8	SPT	22				
21	Bottom of borehole at 21 feet.										

WATER LEVEL MEASUREMENTS

START 3-3-22 COMPLETE 3-3-22 3:24 pm

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL
3-3-22	3:24 pm	21	--	19	none
3-4-22	4:00 pm	21	--	16	▼ 15
--	--	--	--	--	--
--	--	--	--	--	--

METHOD
3.25" ID Hollow Stem Auger

CREW CHIEF Mike Wagner

GEOTECHNICAL TEST BORING 22-028.GPJ GEOTEKENG.GDT 3/11/22

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& TESTING SERVICES, INC.
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jhaskins@geotekeng.com

GEOTECHNICAL TEST BORING LOG

-unsuitable material for trench backfill
-wet soils - drying needed or replace

GEOTEK # **22-028** BORING NO. **15 (1 of 1)**

PROJECT **Proposed West Side Sanitary Sewer Extension (Phase 1), Harrisburg, SD**

DEPTH in FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 1410.6 ft)	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LABORATORY TESTS WC	D	LL	PL	QU
	LEAN CLAY: black, frozen to 2' then moist, firm, (CL)	TOPSOIL			1	HSA					
3	**LEAN CLAY**: brown and gray, moist, stiff, (CL)	FINE ALLUVIUM	5	▼	2	SPT	33				
5½	**FAT CLAY WITH SAND**: a little gravel, brown and gray, moist, stiff, (CH)	GLACIAL TILL	9		3	SPT	24				
			11		4	SPT	19				
			13		5	SPT	20				
			14		6	SPT	23				
14½	**LEAN CLAY WITH SAND**: a little gravel, brown and dark brown, moist, very stiff, (CL)	GLACIAL TILL	16		7	SPT	21				
19½	**LEAN CLAY WITH SAND**: a little gravel, gray, moist, stiff, (CL)	GLACIAL TILL	10		8	SPT	22				
21	Bottom of borehole at 21 feet.										

WATER LEVEL MEASUREMENTS

START 3-3-22 COMPLETE 3-3-22 1:12 pm

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL
3-3-22	1:12 pm	21	--	19	none
3-4-22	4:05 pm	21	--	9	▼ 4
--	--	--	--	--	--
--	--	--	--	--	--

METHOD
3.25" ID Hollow Stem Auger

CREW CHIEF Mike Wagner

GEOTECHNICAL TEST BORING 22-028.GPJ GEOTEKENG.GDT 3/11/22

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& TESTING SERVICES, INC.
909 E 50th St N
Sioux Falls, South Dakota, 57104
605-335-5512 Fax
jhaskins@geotekeng.com

GEOTECHNICAL TEST BORING LOG

-unsuitable material for trench backfill

GEOTEK # **22-028** BORING NO. **16 (1 of 1)**

PROJECT **Proposed West Side Sanitary Sewer Extension (Phase 1), Harrisburg, SD**

DEPTH in FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 1412.1 ft)	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LAB WC	LAB D	LAB LL	LAB PL	LAB QU
	LEAN CLAY: very dark brown to black, frozen, (CL)	TOPSOIL			1	HSA					
3	**LEAN CLAY WITH SAND**: a little gravel, brown and gray, moist, stiff, (CL)	GLACIAL TILL	7		2	SPT	38				
			9		3	SPT	22				
			12		4	SPT	22				
9½	**LEAN CLAY WITH SAND**: a little gravel, brown and dark brown, moist, stiff, (CL)	GLACIAL TILL	15		5	SPT	21				
12	**LEAN CLAY WITH SAND**: a little gravel, gray, moist, stiff, (CL)	GLACIAL TILL	13	▼	6	SPT	22				
			11		7	SPT	22				
			11		8	SPT	22				
21	Bottom of borehole at 21 feet.										

WATER LEVEL MEASUREMENTS

START 3-3-22 COMPLETE 3-3-22 11:44 am

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL
3-3-22	11:44 am	21	--	19	none
3-4-22	4:10 pm	21	--	14	▼ 13
--	--	--	--	--	--
--	--	--	--	--	--

METHOD
3.25" ID Hollow Stem Auger

CREW CHIEF Mike Wagner

GEOTECHNICAL TEST BORING 22-028.GPJ GEOTEKENG.GDT 3/11/22

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605-335-5512 Fax
jhaskins@geotekeng.com

GEOTECHNICAL TEST BORING LOG

-unsuitable material for trench backfill

GEOTEK # **22-028** BORING NO. **17 (1 of 1)**

PROJECT **Proposed West Side Sanitary Sewer Extension (Phase 1), Harrisburg, SD**

DEPTH in FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 1421.8 ft)	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LABORATORY TESTS WC	D	LL	PL	QU
	FILL, MOSTLY LEAN CLAY: brown and dark brown, frozen to 2.5' then moist, 6" of asphalt and 8" of gravel at the surface	FILL			1	HSA					
			13		2	SPT	23				
					10	BAG					
			12		3	SPT	21				
7	**LEAN CLAY**: very dark brown to black, moist, firm, (CL)	TOPSOIL	5		4	SPT	32				
9½	**FAT CLAY WITH SAND**: dark brown, moist, stiff, (CH)	FINE ALLUVIUM	9		5	SPT	23				
12	**FAT CLAY WITH SAND**: a little gravel, brown and gray, moist, stiff to very stiff, (CL)	GLACIAL TILL	14		6	SPT	22				
			17		7	SPT	20	101			8100
			18		8	SPT	22				
24½	**LEAN CLAY WITH SAND**: a little gravel, gray, moist, very stiff, (CL)	GLACIAL TILL	16		9	SPT	21				
26	Bottom of borehole at 26 feet.										

WATER LEVEL MEASUREMENTS

START 3-3-22 COMPLETE 3-3-22 2:09 pm

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL
3-3-22	2:10 pm	26	--	24	none
--	--	--	--	--	--
--	--	--	--	--	--
--	--	--	--	--	--

METHOD
3.25" ID Hollow Stem Auger

CREW CHIEF Mike Wagner

GEOTECHNICAL TEST BORING 22-028.GPJ GEOTEKENG.GDT 3/11/22

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& TESTING SERVICES, INC.
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Sioux Falls, South Dakota, 57104
605-335-5512 Fax
jhaskins@geotekeng.com

GEOTECHNICAL TEST BORING LOG

-wet soils - drying needed or replace

GEOTEK # **22-028** BORING NO. **18 (1 of 1)**

PROJECT **Proposed West Side Sanitary Sewer Extension (Phase 1), Harrisburg, SD**

DEPTH in FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 1421.5 ft)	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LABORATORY TESTS WC	D	LL	PL	QU
	FILL, MOSTLY LEAN CLAY: brown and dark brown, frozen	FILL			1	HSA					
2											
	FAT CLAY: brown, frozen to 3' then moist, (CH)	FINE ALLUVIUM	10		2	SPT	25				
3½	**LEAN CLAY WITH SAND**: a little gravel, brown and gray, moist to wet, firm to stiff, (CL)	GLACIAL TILL	9		3	SPT	21				
					9	BAG					
			9		4	SPT	21				
			7	▼	5	SPT	22				
			9		6	SPT	27				
14½	**FAT CLAY WITH SAND**: a little gravel, brown and dark brown, moist, stiff, (CL)	GLACIAL TILL	12		7	SPT	21				
			13		8	SPT	23				
21	Bottom of borehole at 21 feet.										

WATER LEVEL MEASUREMENTS

START 3-3-22 COMPLETE 3-3-22 10:43 am

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL
3-3-22	10:43 am	21	--	16	16
3-3-22	4:55 pm	21	--	15	▼ 10
--	--	--	--	--	--
--	--	--	--	--	--

METHOD
3.25" ID Hollow Stem Auger

CREW CHIEF Mike Wagner

GEOTECHNICAL TEST BORING 22-028.GPJ GEOTEKENG.GDT 3/11/22

GEOTEK ENGINEERING
& TESTING SERVICES, INC.
909 E 50th St N
Sioux Falls, South Dakota, 57104
605-335-5512 Fax
jhaskins@geotekeng.com

GEOTECHNICAL TEST BORING LOG

GEOTEK # **22-028** BORING NO. **19 (1 of 1)**

PROJECT **Proposed West Side Sanitary Sewer Extension (Phase 1), Harrisburg, SD**

DEPTH in FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 1424.7 ft)	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LAB WC	LAB D	LAB LL	LAB PL	LAB QU
	FILL, MOSTLY LEAN CLAY: brown and dark brown, frozen to 2.5' then moist	FILL			1	HSA					
			9		2	SPT	16				
4½	**LEAN CLAY WITH SAND**: a little gravel, brown and gray, moist, stiff, (CL)	GLACIAL TILL	9		3	SPT	21				
			9		4	SPT	22				
			9		5	SPT	22				
12	**FAT CLAY WITH SAND**: a little gravel, brown and gray, moist, (CH)	GLACIAL TILL	11		6	SPT	24				
14½	**LEAN CLAY WITH SAND**: a little gravel, brown and dark brown, moist, stiff, (CL)	GLACIAL TILL	15	▼	7	SPT	23				
19½	**LEAN CLAY WITH SAND**: a little gravel, gray, moist, stiff, (CL)	GLACIAL TILL	13		8	SPT	22				
			12		9	SPT	23				
26	Bottom of borehole at 26 feet.										

WATER LEVEL MEASUREMENTS

START 3-3-22 COMPLETE 3-3-22 10:00 am

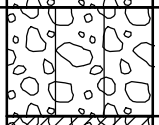
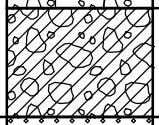
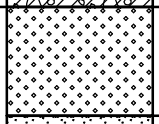
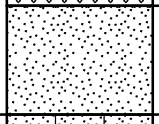
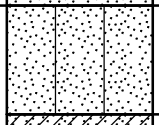
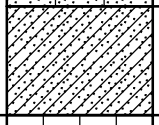
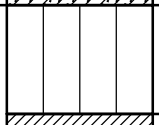
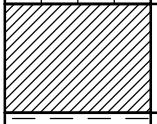
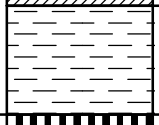
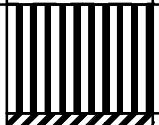
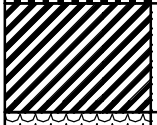
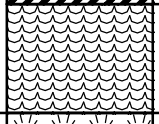
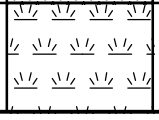
DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL
3-3-22	10:00 am	26	--	24	none
3-3-22	4:59 pm	26	--	18	▼ 16
--	--	--	--	--	--
--	--	--	--	--	--

METHOD
3.25" ID Hollow Stem Auger

CREW CHIEF Mike Wagner

GEOTECHNICAL TEST BORING 22-028.GPJ GEOTEKENG.GDT 3/11/22

SOIL CLASSIFICATION CHART

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

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

BORING LOG SYMBOLS AND DESCRIPTIVE TERMINOLOGY

SYMBOLS FOR DRILLING AND SAMPLING

Symbol	Definition
Bag	Bag sample
CS	Continuous split-spoon sampling
DM	Drilling mud
FA	Flight auger; number indicates outside diameter in inches
HA	Hand auger; number indicates outside diameter in inches
HSA	Hollow stem auger; number indicates inside diameter in inches
LS	Liner sample; number indicates outside diameter of liner sample
N	Standard penetration resistance (N-value) in blows per foot
NMR	No water level measurement recorded, primarily due to presence of drilling fluid
NSR	No sample retrieved; classification is based on action of drilling equipment and/or material noted in drilling fluid or on sampling bit
SH	Shelby tube sample; 3-inch outside diameter
SPT	Standard penetration test (N-value) using standard split-spoon sampler
SS	Split-spoon sample; 2-inch outside diameter unless otherwise noted
WL	Water level directly measured in boring
▼	Water level symbol

SYMBOLS FOR LABORATORY TESTS

Symbol	Definition
WC	Water content, percent of dry weight; ASTM:D2216
D	Dry density, pounds per cubic foot
LL	Liquid limit; ASTM:D4318
PL	Plastic limit; ASTM:D4318
QU	Unconfined compressive strength, pounds per square foot; ASTM:D2166

DENSITY/CONSISTENCY TERMINOLOGY

Density		Consistency
Term	N-Value	Term
Very Loose	0-4	Soft
Loose	5-8	Firm
Medium Dense	9-15	Stiff
Dense	16-30	Very Stiff
Very Dense	Over 30	Hard

PARTICLE SIZES

Term	Particle Size
Boulder	Over 12”
Cobble	3” – 12”
Gravel	#4 – 3”
Coarse Sand	#10 – #4
Medium Sand	#40 – #10
Fine Sand	#200 – #40
Silt and Clay	passes #200 sieve

DESCRIPTIVE TERMINOLOGY

Term	Definition
Dry	Absence of moisture, powdery
Frozen	Frozen soil
Moist	Damp, below saturation
Waterbearing	Pervious soil below water
Wet	Saturated, above liquid limit
Lamination	Up to ½” thick stratum
Layer	½” to 6” thick stratum
Lens	½” to 6” discontinuous stratum

GRAVEL PERCENTAGES

Term	Range
A trace of gravel	2-4%
A little gravel	5-15%
With gravel	16-50%

GEOTEK ENGINEERING
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909 East 50th Street North
Sioux Falls, SD 57104
605-335-5512 Fax 605-335-0773
www.geotekeng.com

MOISTURE - DENSITY TEST REPORT

REPORTED TO:

City of Harrisburg
Derick Wenck
PO Box 26
Harrisburg, SD 57032

PROJECT: 22-028

Proposed West Side Sanitary
Sewer Extension (Phase 1)
Harrisburg, SD

COPIES TO:

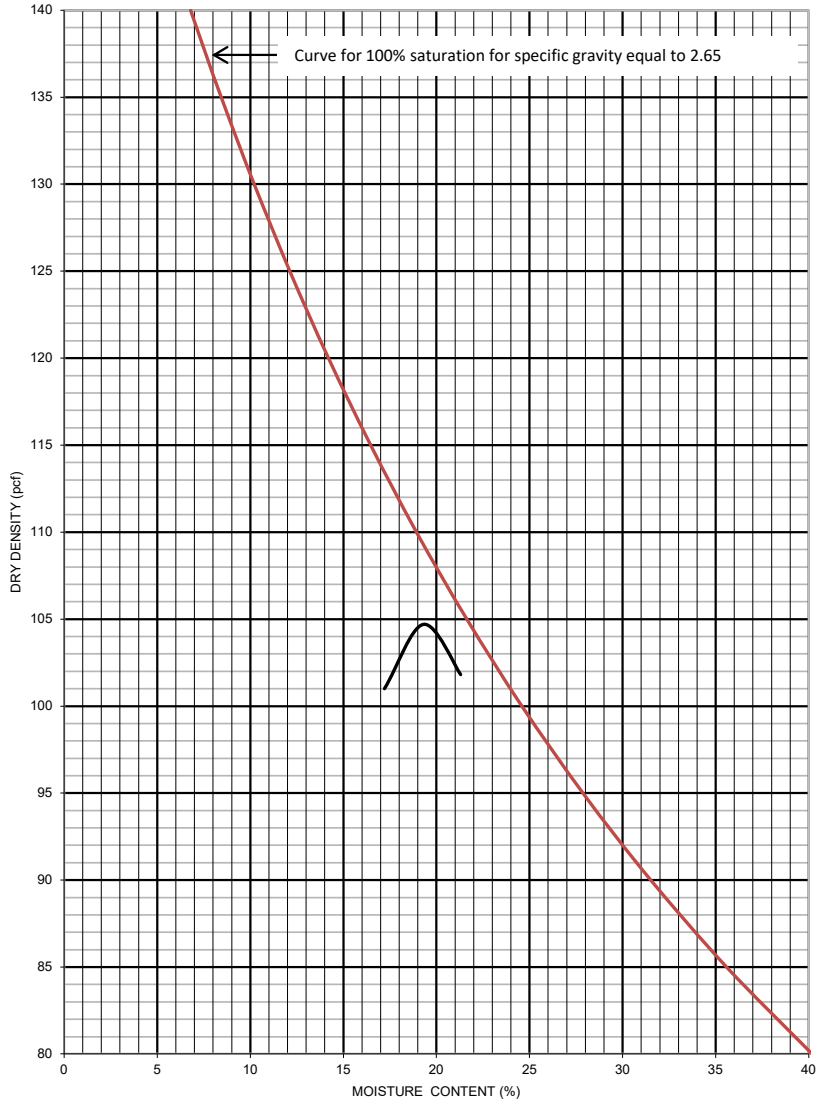
DATE REPORTED: 3/10/2022

SAMPLE DATA

Sample No.: 1
ASTM Test Method: D698B Manual
Soil Classification: Fat Clay with Sand, Brown and Gray (CH)
Remarks: SB 1 (10' to 15')

Date Received: 3/2/2022
Date Tested: 3/8/2022

TEST DATA



Maximum Density, pcf: 104.7

Optimum Moisture, %: 19.3

Percent Passing, %:
3/4": 100
3/8": 100
#4: 100
#200: 78

Atterberg Limits (ASTM: D4318):
Liquid Limit:
Plastic Limit:
Plasticity Index:

Nick Bierle, Materials Lab Supervisor

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MOISTURE - DENSITY TEST REPORT

REPORTED TO:

City of Harrisburg
Derick Wenck
PO Box 26
Harrisburg, SD 57032

PROJECT: 22-028

Proposed West Side Sanitary Sewer Extension (Phase 1)
Harrisburg, SD

COPIES TO:

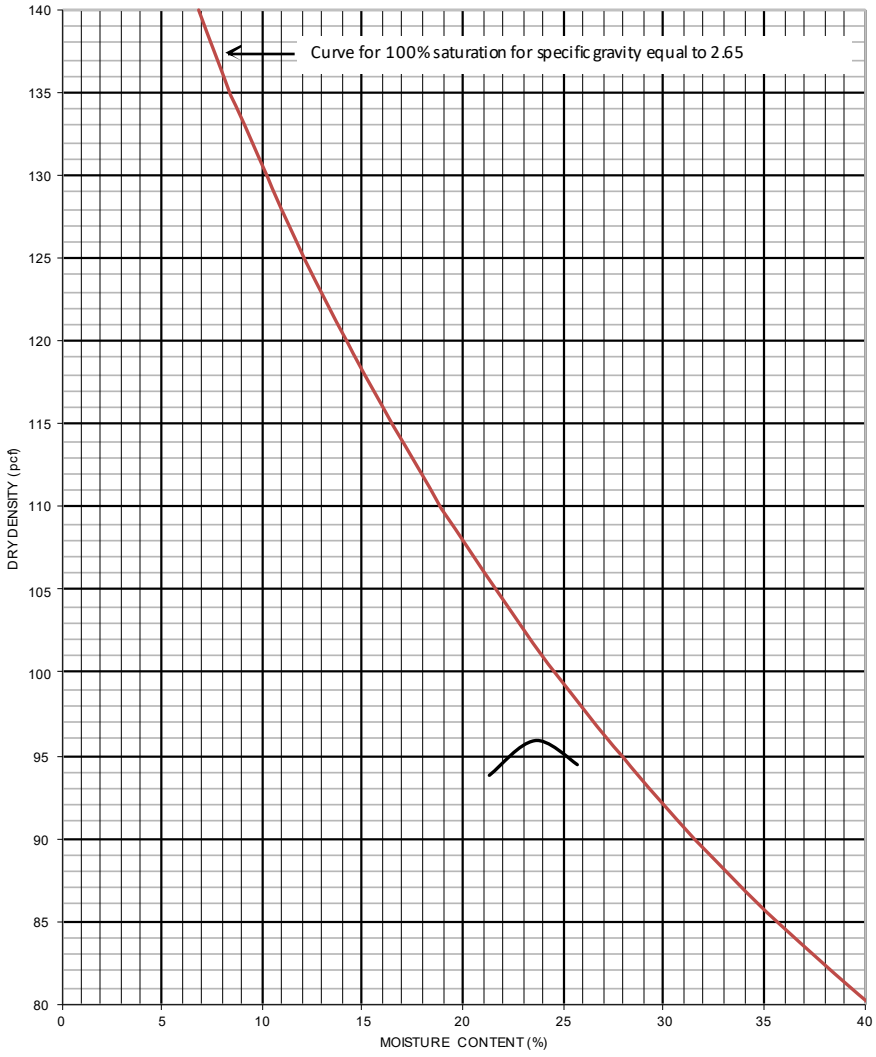
DATE REPORTED: 3/10/2022

SAMPLE DATA

Sample No.: 2
ASTM Test Method: D698B Manual
Soil Classification: Fat Clay, Dark Brown (CH)
Remarks: SB 2 (4 1/2' to 7')

Date Received: 3/2/2022
Date Tested: 3/7/2022

TEST DATA



Maximum Density, pcf: 96.0
Optimum Moisture, %: 23.5

Percent Passing, %:
3/4": 100
3/8": 100
#4: 100
#200: 87

Atterberg Limits (ASTM: D4318):
Liquid Limit:
Plastic Limit:
Plasticity Index:

Nick Bierle, Materials Lab Supervisor

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MOISTURE - DENSITY TEST REPORT

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PROJECT: 22-028

Proposed West Side Sanitary
Sewer Extension (Phase 1)
Harrisburg, SD

COPIES TO:

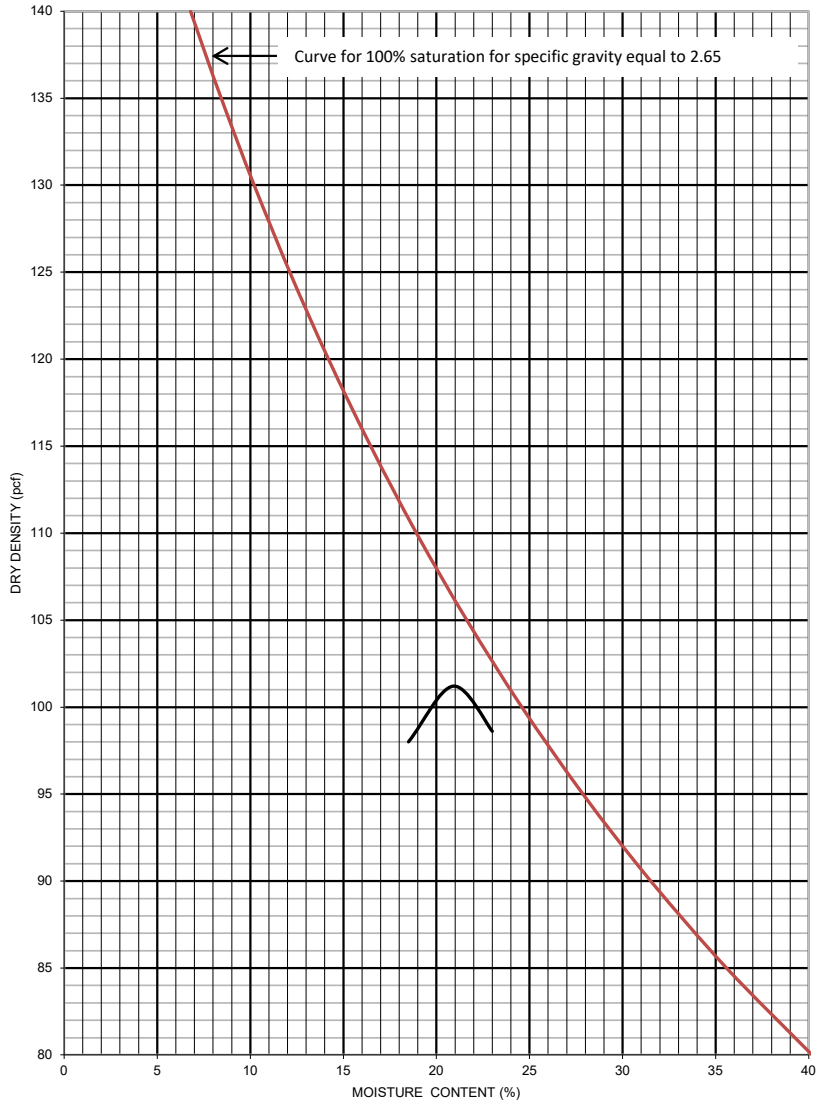
DATE REPORTED: 3/10/2022

SAMPLE DATA

Sample No.: 3
ASTM Test Method: D698B Manual
Soil Classification: Lean Clay with Sand, Brown and Dark Brown (CL)
Remarks: SB 14 (0' to 7')

Date Received: 3/3/2022
Date Tested: 3/7/2022

TEST DATA



Maximum Density, pcf: 101.2
Optimum Moisture, %: 20.9

Percent Passing, %:
3/4": 100
3/8": 100
#4: 100
#200: 73

Atterberg Limits (ASTM: D4318):
Liquid Limit:
Plastic Limit:
Plasticity Index:

Nick Bierle, Materials Lab Supervisor

GEOTEK ENGINEERING
& TESTING SERVICES, INC.
909 East 50th Street North
Sioux Falls, SD 57104
605-335-5512 Fax 605-335-0773
www.geotekeng.com

MOISTURE - DENSITY TEST REPORT

REPORTED TO:

City of Harrisburg
Derick Wenck
PO Box 26
Harrisburg, SD 57032

PROJECT: 22-028

Proposed West Side Sanitary
Sewer Extension (Phase 1)
Harrisburg, SD

COPIES TO:

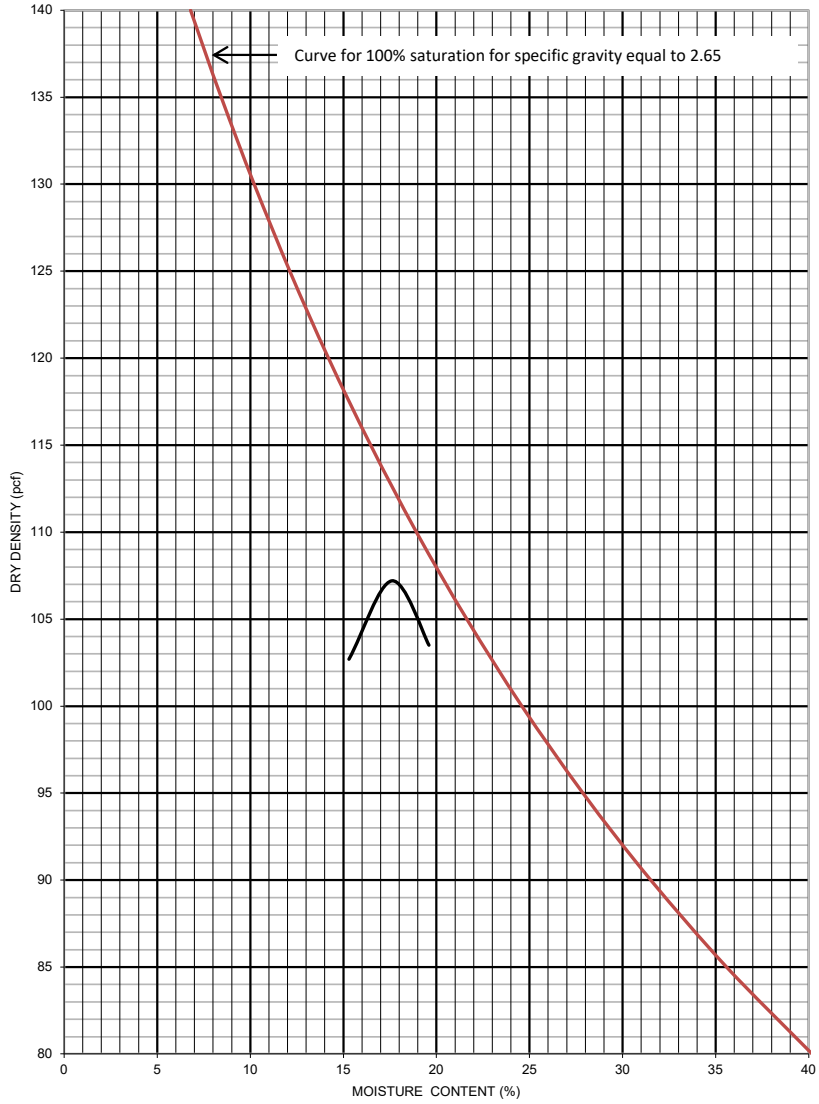
DATE REPORTED: 3/10/2022

SAMPLE DATA

Sample No.: 4
ASTM Test Method: D698B Manual
Soil Classification: Lean Clay with Sand, Brown (CL)
Remarks: SB 17 (0' to 5')

Date Received: 3/3/2022
Date Tested: 3/9/2022

TEST DATA



Maximum Density, pcf: 107.2

Optimum Moisture, %: 17.6

Percent Passing, %:

3/4":	100
3/8":	100
#4:	100
#200:	74

Atterberg Limits (ASTM: D4318):
Liquid Limit:
Plastic Limit:
Plasticity Index:

Nick Bierle, Materials Lab Supervisor

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MOISTURE - DENSITY TEST REPORT

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Harrisburg, SD

COPIES TO:

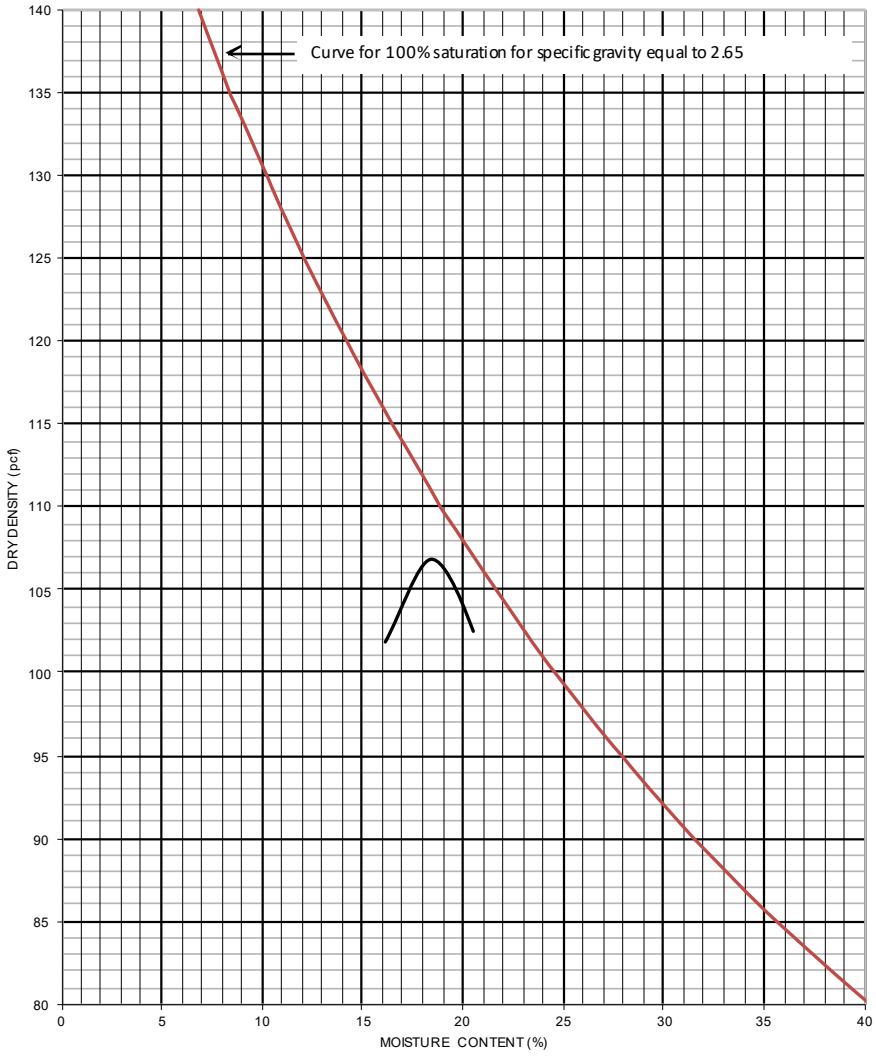
DATE REPORTED: 3/10/2022

SAMPLE DATA

Sample No.: 5
ASTM Test Method: D698B Manual
Soil Classification: Lean Clay with Sand, Brown (CL)
Remarks: SB 18 (5' to 10')

Date Received: 3/3/2022
Date Tested: 3/8/2022

TEST DATA



Maximum Density, pcf: 106.9
Optimum Moisture, %: 18.4

Percent Passing, %:
3/4": 100
3/8": 100
#4: 100
#200: 77

Atterberg Limits (ASTM: D4318):
Liquid Limit:
Plastic Limit:
Plasticity Index:

Nick Bierle, Materials Lab Supervisor