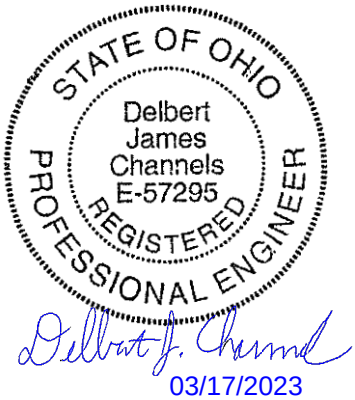
GPD GROUP
Glaus, Pyle, Schomer, Burns & DeHaven, Inc.

SUBGRADE EXPLORATION REPORT

PROPOSED BIKE TRAIL SUBGRADE ANALYSIS
GREENWAY BIKE TRAIL - PHASE 4
ODOT PID: 99804
BETWEEN BURTON STREET AND DEFOREST ROAD
HOWLAND TOWNSHIP (TRUMBULL COUNTY), OHIO

Prepared For:

Trumbull County Metro Parks



Attention:

Zachary Svette

GPD Project No. 2017109.00
March 17, 2023

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Contents

Executive Summary

The project involves field exploration and pavement recommendations for the proposed Greenway Bike Trail – Phase 4 improvements. The proposed alignment will span a distance of approximately 1.5 miles between Burton Street and DeForest Road in Trumbull County, Ohio.

A total of thirteen (13) borings and dynamic cone penetration tests (DCP) were performed at the Port Authority Property, along the proposed alignment between January 12, 2023 and February 6, 2023. The test borings were drilled to depths ranging from approximately five (5) to seven (7) feet below existing grades. In summary, the borings consisted of the following:

The Boring were drilled along Greenway Trail proposed alignment encountered a topsoil layer thickness ranging from 7.0 to 12.0-inches and generally underlain by native silt and clay cohesive soils. The ODOT classifications for the cohesive layer was determined to be A-6a, A-6b, and A-7-6. At four (4) of the boring locations a non-cohesive layer composed of silt or sandy silt was encountered. The ODOT classification of the non-cohesive layer was found to be A-4a, and A-4b. N_{60}-values ranged from 0 to 29 blows per foot indicative of a very soft to very stiff consistency. The water content in this upper stratum ranged from about 12 to 54 however more commonly found in the range of low 20's percent, indicative of moist conditions. See individual boring logs for location specific subsurface details.

Three (3) locations (B-001-0-22, B-003-0-22, and B-004-0-22) were inaccessible for the drill rig due to thick brush and saturated surface conditions. These locations were accessed using DCP hand equipment and a hand auger to obtain upper surface samples for visual and laboratory analysis. The results of these methods are shown on the boring logs and accompanying DCP calculation sheets.

The results of the laboratory tests and GB1 analysis indicate that a **CBR value of 6** can be utilized for the design of the proposed pavement structures. The above summary is intended to convey primary issues we believe are associated with this site. This report must be read in its entirety for a full description of our geotechnical recommendations.

SECTION 1

1.0 Introduction

Based on provided information, it is GPD's understanding that the project will consist of construction of a new asphalt pavement bikeway along an approximately 1.5 miles length between Burton Street and DeForest Road in Trumbull County, Ohio. This section of the bikeway is located on property owned by the Port Authority and will be constructed along a north-to-south alignment, parallel to an existing railroad.

The geotechnical recommendations presented in this report are based on the available project information. In the event changes in the project design occur, GPD Group must review this report to determine if modifications to our recommendations are warranted.

1.1 Geology and Observations

The United States Department of Agriculture ("USDA") Soil Survey of Trumbull County, Ohio, and the United States Geological Survey ("USGS") maps were reviewed to assess the subsurface geology and sedimentary makeup of the site location, as well as the topography of the region. The surrounding area is comprised of a rural landscape with a large industrial operation adjacent to the site. Elevations of the proposed trail alignment ranges from about 888 to 959 feet above sea level. Soils predominately consist of Wisconsinan age Clay to Loamy Till exhibiting low carbonate contents. The till contains silt, sand, and gravel lenses. Bedrock consists of Mississippian-age Sandstone and Shale bedrock of the Logan and Cuyahoga Formations. The frost depth in this region is approximately 40 inches per NAVFAC DM 7.01.

1.2 Subsurface Exploration Program

1.2.1 Historical Borings Referenced

As part of this effort, GPD reviewed previous borings performed by the company PSI, in 2020, for an overlapping project scope. The project consisted of performing 30 soil boring. Borings B-019-0-20 consecutively through B-028-0-20 were reviewed for this report as they all fall within the limits of the Port Authority property or just a short distance outside the limits of the site. The location of these historic borings trended parallel, but further west than the alignment proposed for this Geotechnical Report. The historical borings found the primary soil types to be cohesive soils, ODOT A-6a, A-6b, A-7-6, and these layers varied in consistency from stiff to hard with an N_{60}-value ranging from 8 – 44. There were less frequent locations and layers that encountered a non-cohesive soil type, A-4a, A-4b A-2-6, and these layers varied in consistency from loose to dense, with an N_{60}-value ranging from 5 to 33. Additionally, two historic borings, B-020-0-20 and B-023-0-20 encountered Sandstone and Siltstone rock at elevation of 871 and 883 feet above sea level, respectively.

1.2.2 Field Exploration

The subsurface exploration consisted of drilling and sampling thirteen (13) locations along the proposed bike trail alignment area to depths ranging from about two (2) to seven (7) feet below existing grades. The boring and dynamic cone penetration (DCP) locations were laid out by GPD personnel using a handheld GPS device. The locations of the borings and DCP testing should be considered accurate only to the degree implied by the means and methods used to define them.

The soil borings were drilled with a track-mounted Geoprobe 6620 DT rotary drill rig using hollow-stem augers and an automatic SPT hammer to advance the boreholes, at ten (10) locations. The remaining three (3) locations were sampled with a dynamic cone penetrometer and a hand auger due to access constraints. At the location of the soil borings, representative samples were obtained by the split-barrel sampling procedure in general accordance with the appropriate ASTM standards. In the split-barrel sampling procedure, the number of blows required to advance a standard 2-inch O.D. split-barrel sampler the last 12 inches of the typical total 18-inch penetration by means of a 140-pound hammer with a free fall of 30 inches, is the standard penetration resistance value (N-Value).

An automatic SPT hammer was used to advance the split-barrel sampler in the borings performed for this site, however it does not have a calibrated energy efficiency. A significantly greater efficiency is achieved with the automatic hammer compared to the conventional safety hammer operated with a cathead and rope, however because this efficiency was not available, we've assumed an energy efficiency of 60. This higher efficiency would have an appreciable effect on the standard penetration resistance blow count (N) values. The reported N_{60}-value has been considered in the interpretation and analysis of the subsurface information for this report. This value is used to estimate the in-situ relative density of cohesion-less soils and the consistency of cohesive soils. The sampling depths and penetration distance, plus the standard penetration resistance values, are shown on the boring logs. The samples were sealed and returned to the laboratory for testing and classification.

Dynamic cone testing was performed by advancing a cone having a 10 square centimeter projected end area into the subsoils using a controlled dynamic energy produced by the drop of a 35-pound hammer through a height of 15 inches. The data was recorded as the number of blows required to advance the cone through each succeeding 10 centimeters of penetration.

The field cone penetration data was reduced by computer, with the results as shown on the attached Wildcat Dynamic Cone Logs. Soil samples are not obtained during dynamic cone penetration testing. Thus, identification of soil type is not possible. The logs show the relative density of the soil being penetrated for each 10-centimeter increment if the soil being penetrated were sand or silt; and the stiffness of the soil being penetrated if it was clay. The value shown on the log as "N'" for each test interval is the approximate equivalent standard penetration blow count for the soil being tested, i.e., the equivalent blows per foot required to advance a standard split spoon sampler into that soil using a 140-pound hammer, freely falling from a height of 30 inches. This correlation between the two types of testing becomes inaccurate under high penetration resistance conditions, thus, the equivalent blow count is not given where such conditions exist.

Field logs of each boring were prepared by the drill crew. These logs included visual classifications of the materials encountered during drilling as well as the driller's interpretation of the subsurface conditions between samples. Final boring logs included with this report represent an interpretation of the field logs and include modifications based on observations made by a Geotechnical Engineer and the results of laboratory testing.

1.3 Laboratory Testing

The samples were classified in the laboratory based on visual observation, texture and plasticity. The descriptions of the soils indicated on the boring logs are in accordance with the enclosed ODOT General Notes and Soil Classification System. Calculated ODOT Group Indexes are given on the boring logs.

The laboratory testing program consisted of performing the following tests:

- Natural water content tests (ASTM D 2216 / AASHTO T-265)
- Liquid Limits (ASTM D 4318 / AASHTO T-89)
- Plastic Limits (ASTM D 4318 / AASHTO T-90)
- Particle Size Analysis (ASTM D 422 / AASHTO T-88)
- Sulfate Content (ODOT SS1122)

Information from these tests was used in conjunction with field penetration test data to evaluate soil strength in-situ, volume change potential, and soil classification. Results of these tests are attached and provided on the boring logs.

SECTION 2

2.0 Findings

2.1 Subsurface Conditions

The Borings, drilled along Greenway Trail proposed alignment, encountered a topsoil layer thickness ranging from 7.0 to 12.0-inches and generally underlain by native silt and clay cohesive soils. The ODOT classifications for the cohesive layer was determined to be A-6a, A-6b, and A-7-6. At four (4) of the boring locations a non-cohesive layer composed of silt or sandy silt was encountered. The ODOT classification of the non-cohesive layer was found to be A-4a, and A-4b. N_{60}-values ranged from 0 to 29 blows per foot indicative of a very soft to very stiff consistency. The minimum and maximum water contents ranged from about 12 to 54 percent, respectively. However, water contents typically ranged in the mid-to-low 20 percent levels. See individual boring logs for location specific subsurface details.

2.1.1 Groundwater Conditions

The borings were monitored while drilling and immediately after completion for the presence and level of groundwater. Groundwater was not encountered in the borings performed for this project. At the time the borings were drilled, the groundwater table at the sampled locations was apparently below the maximum drilling depth. However, fluctuations in the groundwater table can occur and perched water can develop over low permeability soil following periods of heavy or prolonged precipitation. This possibility should be considered when developing design and construction plans and specifications for the project. Long term monitoring in cased holes or piezometers would be necessary to accurately evaluate the potential range of groundwater conditions on the site.

Section 3

3.0 Evaluation and Recommendations

The following engineering recommendations are based on information provided to GPD Group regarding the design of the proposed bike trail improvements, the field and laboratory testing performed on the soil encountered at this site, and other information discussed in this report. This report does not reflect variations that may occur between borings, across the site, or due to the modifying effects of weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, GPD should be immediately notified so that further evaluation and supplemental recommendations can be provided.

3.1 Site Preparation and Earthwork Operations

It is recommended that all site preparation and earthwork operations be conducted in accordance with the following generalized procedures:

All vegetation, topsoil, tree roots, organic-containing soils, and any soft or otherwise unsuitable materials should be fully removed from the site, including slopes to receive fill following the general guidelines outlined in ODOT CMS "Clearing and Grubbing.". Subsequent to stripping and rough grading; proof-rolling with heavy construction equipment such as a loaded tandem axle dump truck or other available haul vehicles is recommended in fill and/or cut areas to aid in locating unstable subgrade materials. Any unstable materials located during proofrolling should be removed and replaced with suitable compacted fill material under the direct supervision of the onsite Geotechnical Engineer or their representative.

ODOT's guidelines for Geotechnical Engineering titled, "*GB1: Plan Subgrades,"* dated July 19, 2018, and "*GB1: Subgrade Analysis Spreadsheet*," have been utilized as a guideline for development of the recommendations included in this report. Per ODOT requirements stated above, typically materials with in-situ moisture contents exceeding optimum moisture content by 3 percent or more, or materials exhibiting low SPT N_{60}-Values, require subgrade undercutting or stabilization to obtain adequate pavement support.

Based on ODOT's GB1, utilizing the test boring and laboratory results, ODOT guidelines and our analysis indicate that removal and replacement of unsuitable and unstable soils to about 12 inches will be required below the majority of proposed grades, pending proper evaluation via proof-rolling during construction. Deeper undercuts, upwards of 30 inches, may be required at or within near proximity of B-005-0-22 and B-008-22. Refer to the *GB1 Subgrade Analysis Spreadsheet* included in the Appendix A of this report for additional details.

3.1.1 Fill Material

Any fill or backfill required within construction limits should be select material, as approved by a qualified geotechnical engineer. For all filling operations, the following should be observed:

- Prior to use, the approved fill material should be tested as outlined in ASTM D-698 to determine the maximum dry density and optimum moisture content for silty or cohesive soils, or ASTM D-4253 and D-4254 for clean granular soils. For each change in borrow material, additional tests will be required.

- For all fill or backfill used, the fill material should be placed on the approved subgrade in controlled lifts, with each lift compacted to a stable condition, to current ODOT design standards.

- All filling operations should be observed by a qualified soils technician with field density tests made, to assure compaction to specification.

Proper moisture control of fine-grained silty soils is critical in attaining the required compaction. It should be noted that both in-situ soils and new fill composed of fine-grained soils are susceptible to disturbance by construction equipment traffic when wet. Thus, construction operations should be planned to prevent such disturbance and the resulting weakening of the subgrade soils. Such precautions would include, but not be limited to grading the site to prevent ponding of water, sealing the subgrade soils at the end of operations each day, and allowing wet subgrades to dry before operating heavy equipment on exposed soil surfaces.

Careful attention will be required in fine grading the subgrade surfaces in order to eliminate undulations and depressions that would tend to collect water. The pavement subgrade surface should be graded in a manner such that positive drainage towards the pavement edges and/or drainage systems will be insured.

Throughout the course of the earthwork operations, surface grades are to be maintained to facilitate positive drainage within the construction area and to prevent inundation of either the existing subgrade or new fill material. No water should be allowed to impound on the subgrade surfaces during this time.

Compaction equipment and techniques will be dependent on the type of material being used as fill. A sheepsfoot roller should provide adequate compaction for cohesive (clayey) soils. A vibratory type compactor such as a drum roller will be required for non-cohesive (sandy) soils.

3.2 Pavement Design and Construction

Pavement design for the roadway structure will include proper preparation of subgrade sections, design of the pavement drainage systems and utilization of an adequate pavement section. It should be emphasized that an adequately design and installed permanent surface and subsurface drainage system is considered critical in maintaining proper base and subbase support to achieve the desired service life. It is recommended that the subsurface drainage system consist of perforated drainpipes bedded in and backfilled with suitable filter materials. The drainage system should be installed along either side of all roadways at an elevation, such that groundwater will be maintained a minimum of 3 feet below the top of the pavement structures. The filter around the drainage members is to terminate in direct contact with the aggregate base course for the pavements.

All subgrade sectors should be graded to direct water by gravity toward the drainage lines. At all low points and at regular intervals, lateral underdrain lines connected to suitably located outlet points are to be provided. Site surface grades should be such that no pavement sectors are allowed to impound water. All surface and subsurface water is to be directed to the existing or new storm sewer line or drainage ditches.

The results of the laboratory tests and GB1 analysis indicate that the CBR value of 6 can be utilized for the design of the proposed pavement structures. In addition, all materials and field operations required for this project should follow recommendations and procedural details in accordance with the Ohio Department of Transportation guidelines and specifications.

3.3 Groundwater Control

At the time of this investigation, groundwater was not encountered in the soil boring or DCP sampled locations. It is not anticipated that significant groundwater will be encountered during the construction of this project, however some locations were near surface waters that would need to be managed during construction. Any water encountered would likely be the result of water bearing pervious seams, and/or a perched water table condition. Conventional dewatering methods, such as pumping from sumps, should be adequate for temporary removal of any groundwater encountered during excavation at the site. GPD should be notified in the event springs or other significant groundwater is exposed during the excavation process that cannot be controlled with conventional methods.

3.4 Excavations

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The contractor's "responsible person" as defined in "CFR Part 1926," should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations.

If the excavations are left open and exposed to the elements for a significant length of time, desiccation of the clays may create minute shrinkage cracks which could allow large pieces of clay to collapse or slide into the excavation. Materials removed from the excavation should not be stockpiled immediately adjacent to the excavation, as this load may cause a sudden collapse of the embankment.

We are providing this information solely as a service to our client. GPD is not assuming responsibility for construction site safety or the contractor's activities; No warranties, either express or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others.

3.4 Geohazard Considerations

Additional geohazards, outside those previously stated, are not anticipated.

3.5 General Comments

GPD Group should be retained to review the final design plans and specifications so comments can be made regarding interpretation and implementation of our geotechnical recommendations in the design and specifications. Subsequent to initial grading, GPD should also be retained to provide testing and observation during site preparation and fill placement operations as well as during the pavement construction phases of the project.

The analysis and recommendations presented in this report are based upon the data obtained from the borings performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between borings, across the site, or due to the modifying effects of weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, GPD should be immediately notified so that further evaluation and supplemental recommendations can be provided.

The scope of services for this project does not include either specifically or by implication any environmental assessment of the site or identification of contaminated or hazardous materials or conditions. If the owner is concerned about the potential for such contamination, other studies should be undertaken.

This report has been prepared for the exclusive use of the **Trumbull County Metro Parks** for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either express or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that 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 should not be considered valid unless GPD Group reviews the changes and either verifies or modifies the conclusions of this report in writing.

Appendix A

Boring Location Plan

GB1 Subgrade Analysis Spreadsheet

Boring Logs

ODOT General Notes

LOCATION PLAN – NORTHERN SECTION

N

Legend

Soil Boring:

PROJECT: TRU Greenway Ph4 Trail

PROJECT NUMBER: 2017109.00 **DATE**: 2-22-2023

LOCATION: Pine Ave SE, Warren, OH

520 S Main St, Suite 2531 Akron, Ohio 44311

LOCATION PLAN – SOUTHERN SECTION

N

Legend

Soil Boring:

PROJECT: TRU Greenway Ph4 Trail

PROJECT NUMBER: 2017109.00 **DATE**: 2-22-2023

LOCATION: Pine Ave SE, Warren, OH

520 S Main St, Suite 2531 Akron, Ohio 44311

OHIO DEPARTMENT OF TRANSPORTATION

OFFICE OF GEOTECHNICAL ENGINEERING

PLAN SUBGRADES
Geotechnical Bulletin GB1

Instructions: Enter data in the shaded cells only.
(Enter state route number, project description,county, consultant's name, prepared by name, and date prepared. This information will be transferred to all other sheets. The date prepared must be entered in the appropriate cell on this sheet to remove these instructions prior to printing.)

<COUNTY-ROUTE-SECTION>
<99804>

<PROJECT DESCRIPTION - Construction of new asphalt pavement biketrail, measureing approximately 1.5 miles>

<GPD Group>

Prepared By: <Amanda Idri>
Date prepared: <03/02/2023>

<Delbert Channels>
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<Suite 2531>
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NO. OF BORINGS: 10

#	Boring ID	Alignment	Station	Offset	Dir	Drill Rig	ER	Boring EL.	Proposed Subgrade EL	Cut Fill
1	B-002-0-22	Greenway Trail	149+43	12	LT	GP 6620 ATV	60	936.0	934.5	1.5 C
2	B-005-0-22	Greenway Trail	160+82	76	LT	GP 6620 ATV	60	952.0	950.5	1.5 C
3	B-006-0-22	Greenway Trail	166+45	12	LT	GP 6620 ATV	60	922.0	920.5	1.5 C
4	B-007-0-22	Greenway Trail	173+23	5	RT	GP 6620 ATV	60	920.0	918.5	1.5 C
5	B-008-0-22	Greenway Trail	180+12	5	LT	GP 6620 ATV	60	959.0	957.5	1.5 C
6	B-009-0-22	Greenway Trail	187+75	1	RT	GP 6620 ATV	60	912.0	910.5	1.5 C
7	B-010/11-0-22	Greenway Trail	197+17	5	RT	GP 6620 ATV	60	901.0	899.5	1.5 C
8	B-012-0-22	Greenway Trail	206+24	7	LT	GP 6620 ATV	60	903.0	901.5	1.5 C
9	B-013-0-22	Greenway Trail	211+84	10	LT	GP 6620 ATV	60	903.0	901.5	1.5 C
10	B-014-0-22	Greenway Trail	216+35	79	RT	GP 6620 ATV	60	934.0	932.5	1.5 C

#	Boring ID	Alignment	Station	Offset	Dir	Drill Rig	ER	Boring EL.	Proposed Subgrade EL	Cut Fill

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.5 1/18/2019

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N_{60}	N_{60L}		LL	PL	PI	% Silt	% Clay	P200	M_C	M_{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
1	B	SS-1	1.0	2.5	-0.5	1.0	6			36	19	17	54	24	78	18	14	A-4a	8	<100		N_{60} & Mc		18"	18"
	002-0	SS-2	2.5	4.0	1.0	2.5	16			30	17	13	50	28	78	16	14	A-6a	9						204 Geotextile
	22	SS-3	4.0	5.5	2.5	4.0	11										16	A-6b	16						
		SS-4	5.5	7.0	4.0	5.5	10	6									14	A-6a	10						
2	B	SS-1	1.0	2.5	-0.5	1.0	7			28	15	13	27	13	40	17	14	A-6a	2	<100		N_{60} & Mc		15"	30"
	005-0	SS-2	2.5	4.0	1.0	2.5	15			23	17	6	60	10	70	17	12	A-4b	7		A-4b	Mc	30"		204 Geotextile
	22	SS-3	4.0	5.5	2.5	4.0	10									24	14	A-6a	10						
		SS-4	5.5	7.0	4.0	5.5	17	7								17	14	A-6a	10						
3	B	SS-1	1.0	2.5	-0.5	1.0	7			25	17	8	52	4	56	24	12	A-4b	4	<100	A-4b	N_{60} & Mc	12"	15"	15"
	006-0	SS-2	2.5	4.0	1.0	2.5	17			34	16	18	42	30	72	15	16	A-6b	11						204 Geotextile
	22	SS-3	4.0	5.5	2.5	4.0	10									21	16	A-6b	16						
		SS-4	5.5	7.0	4.0	5.5	8	7								17	10	A-4b	8						
4	B	SS-1	1.0	2.5	-0.5	1.0	8			31	15	16	46	20	66	16	16	A-6b	9	<100		N_{60}		12"	12"
	007-0	SS-2	2.5	4.0	1.0	2.5	14									15	16	A-6b	16						204 Geotextile
	22	SS-3	4.0	5.5	2.5	4.0	15			27	15	12	47	18	65	14	14	A-6a	7						
		SS-4	5.5	7.0	4.0	5.5	16	8								22	16	A-6b	16						
5	B	SS-1	1.0	2.5	-0.5	1.0	3			33	23	10	55	10	65	27	18	A-4b	6	<100	A-4b	N_{60} & Mc		33"	33"
	008-0	SS-2	2.5	4.0	1.0	2.5	15			25	15	10	53	18	71	14	10	A-4b	7		A-4b	Mc	30"		204 Geotextile
	22	SS-3	4.0	5.5	2.5	4.0	11									14	10	A-4b	8						
		SS-4	5.5	7.0	4.0	5.5	13	3								19	14	A-6a	10						
6	B	SS-1	1.0	2.5	-0.5	1.0	9			32	16	16	52	28	80	16	16	A-6b	10	<100		N_{60}		12"	12"
	009-0	SS-2	2.5	4.0	1.0	2.5	17			31	18	13	61	24	85	18	14	A-6a	9			Mc			204 Geotextile
	22	SS-3	4.0	5.5	2.5	4.0	7									20	14	A-6a	10						
		SS-4	5.5	7.0	4.0	5.5	10	7								18	14	A-6a	10						
7	B	SS-1	1.0	2.5	-0.5	1.0	9			32	16	16	49	17	66	16	16	A-6b	9	<100		N_{60}		12"	12"
	010/1	SS-2	2.5	4.0	1.0	2.5	15			34	17	17	49	38	87	17	16	A-6b	11						204 Geotextile
	-0	SS-3	4.0	5.5	2.5	4.0	10									20	16	A-6b	16						
		SS-4	5.5	7.0	4.0	5.5	16	9								20	16	A-6b	16						
8	B	SS-1	1.0	2.5	-0.5	1.0	8									26	16	A-6b	16	220		N_{60} & Mc		12"	12"
	012-0	SS-2	2.5	4.0	1.0	2.5	21			37	18	19	52	44	96	20	16	A-6b	12			Mc			204 Geotextile
	22	SS-3	4.0	5.5	2.5	4.0	14			32	17	15	52	29	81	17	14	A-6a	10						
		SS-4	5.5	6.4	4.0	4.9	5/50/1"	8								15	16	A-6b	16						
9	B	SS-1	1.0	2.5	-0.5	1.0	8			32	16	16	51	19	70	17	16	A-6b	9	<100		N_{60}		12"	12"
	013-0	SS-2	2.5	4.0	1.0	2.5	20			43	19	24	35	55	90	19	18	A-7-6	14						204 Geotextile
	22	SS-3	4.0	5.5	2.5	4.0	18									23	18	A-7-6	16						

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.5 1/18/2019

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N_{60}	N_{60L}		LL	PL	PI	% Silt	% Clay	P200	M_C	M_{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
		SS-4	5.5	7.0	4.0	5.5	20	8								14	18	A-7-6	16						
10	B	SS-1	1.0	2.5	-0.5	1.0	10			38	17	21	45	25	70	17	16	A-6b	11	<100		N_{60}		12"	12"
	014-0	SS-2	2.5	4.0	1.0	2.5	29			27	16	11	40	11	51	12	14	A-6a	4						204 Geotextile
	22	SS-3	4.0	5.5	2.5	4.0	24									14	14	A-6a	10						
		SS-4	5.5	7.0	4.0	5.5	28	10								12	14	A-6a	10						

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.5 1/18/2019

PID: <99804>

County-Route-Section: <COUNTY-ROUTE-SECTION>
No. of Borings: 10

Geotechnical Consultant: <GPD Group>
Prepared By: <Amanda Idri>
Date prepared: <03/02/2023>

Chemical Stabilization Options		
320	Rubblize & Roll	No
206	Cement Stabilization	Option
	Lime Stabilization	No
206	Depth	14"

Excavate and Replace Stabilization Options	
Global Geotextile Average(N60L):	15"
Override(HP):	24"
Global Geogrid Average(N60L):	0"
Override(HP):	18"

Design CBR	6

% Samples within 6 feet of subgrade			
$N_{60} \leq 5$	3%	HP ≤ 0.5	0%
$N_{60} < 12$	48%	0.5 < HP ≤ 1	0%
$12 \leq N_{60} < 15$	8%	1 < HP ≤ 2	0%
$N_{60} \geq 20$	15%	HP > 2	0%
M+	23%		
Rock	0%		
Unsuitable	15%		

Excavate and Replace at Surface	
Average	12"
Maximum	12"
Minimum	12"

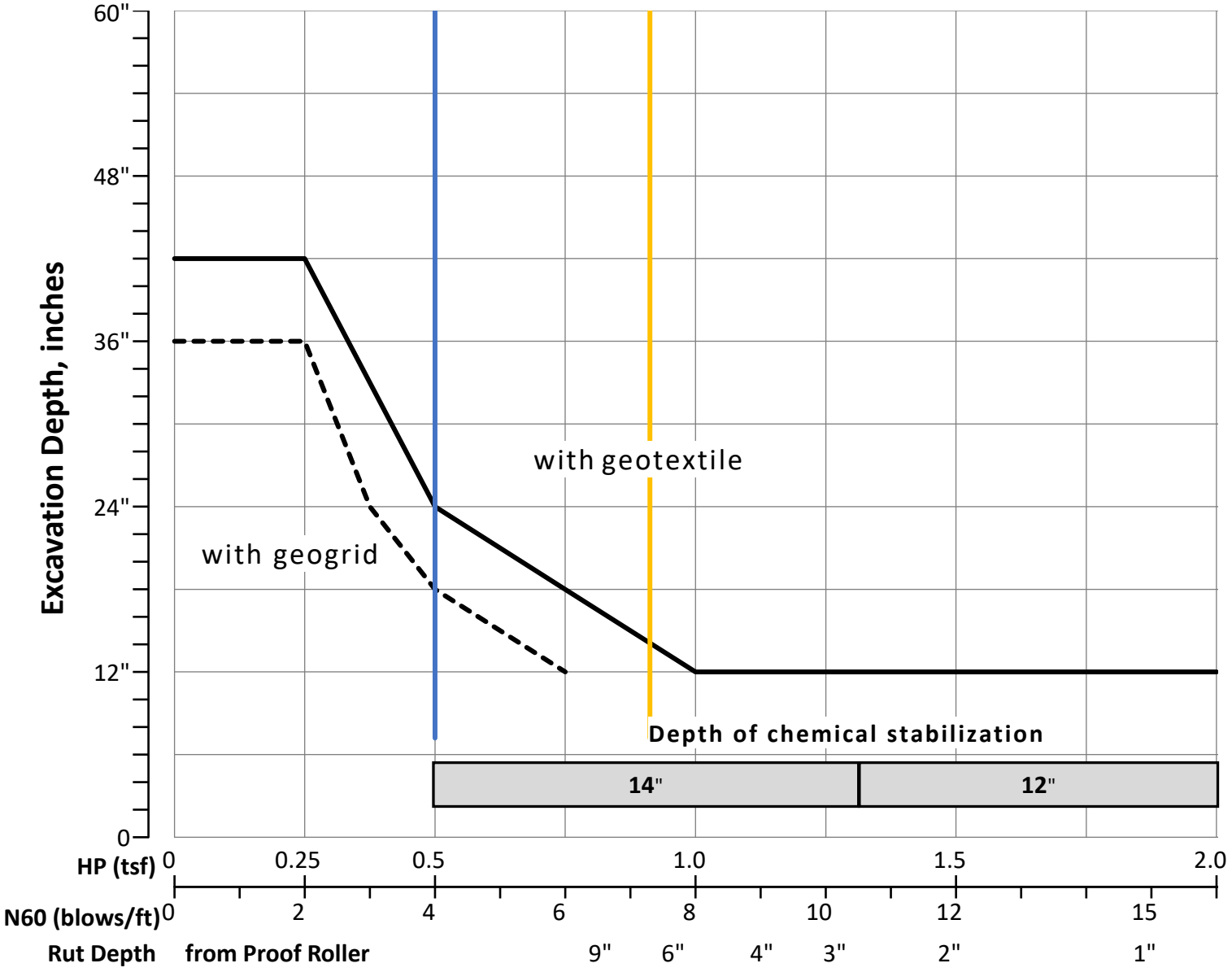
% Proposed Subgrade Surface	
Unstable & Unsuitable	60%
Unstable	47%
Unsuitable	13%

	N_{60}	N_{60L}	HP	LL	PL	PI	Silt	Clay	P 200	M_C	M_{OPT}	GI
Average	13	7		32	17	15	49	23	72	18	15	11
Maximum	29	10	0.00	43	23	24	61	55	96	27	18	16
Minimum	3	3	0.00	23	15	6	27	4	40	12	10	2

Classification Counts by Sample

ODOT Class	Rock	A-1-a	A-1-b	A-2-4	A-2-5	A-2-6	A-2-7	A-3	A-3a	A-4a	A-4b	A-5	A-6a	A-6b	A-7-5	A-7-6	A-8a	A-8b	Totals
Count	0	0	0	0	0	0	0	0	0	1	6	0	14	16	0	3	0	0	40
Percent	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	15%	0%	35%	40%	0%	8%	0%	0%	100%
% Rock|Granular|Cohesive	0%	3%									98%								100%
Surface Class Count	0	0	0	0	0	0	0	0	0	1	5	0	9	13	0	2	0	0	30
Surface Class Percent	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	17%	0%	30%	43%	0%	7%	0%	0%	100%

GB1 Figure B – Subgrade Stabilization



OVERRIDE TABLE

Calculated Average	New Values	Check to Override
	0.50	☑ HP
7.30	6.00	☐ N60L

Average HP
Average N_{60L}

STANDARD ODOT LOG W/ SULFATES (8.5 X 11) - OH DOT.GDT - 3/10/23 17:32 - F:\GPD GILCHRIST\JOBS\2022\GPD\DRILLING\20177109.00 - TRU WESTERN RESERVE GREENWAY PHASE 4 TRA

PROJECT: TRU GREENWAY PHASE 4	DRILLING FIRM / OPERATOR: GPD / P. GOPP	DRILL RIG: MANUAL DCP	STATION / OFFSET:	EXPLORATION ID B-001-0-22
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: GPD / P. GOPP	HAMMER: SAFETY HAMMER	ALIGNMENT:	
PID: 99804 SFN:	DRILLING METHOD: HAND SAMPLER	CALIBRATION DATE: N/A	ELEVATION: 891.0 (MSL) EOB: 7.0 ft.	PAGE 1 OF 1
START: 2/6/23 END: 2/6/23	SAMPLING METHOD: HAND AUGER	ENERGY RATIO (%): 60	LAT / LONG: 41.203679, -80.795936	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	ABAN-DONED
7" TOPSOIL	890.4																		
VERY LOOSE TO LOOSE, BROWN AND GRAY, **SANDY SILT**, MOIST TO WET LITTLE CLAY	889.5					1	-	0	5	31	47	17	23	15	8	23	A-4a (6)	<100	
	889.0					2	-	0	6	36	40	18	26	15	11	23	A-6a (5)	-	
MEDIUM STIFF, BROWN AND GRAY, **SILT AND CLAY**, MOIST TO WET SOME SAND																			
NOT SAMPLED; PROBABLE VERY STIFF, SILT AND CLAY, TRACE SAND.																			
	884.0	EOB — 7																	

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: NOT RECORDED

520 South Main Street, Suite 2531
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Phone: 330.572.2100
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LOG NUMBER: B-001-0-22
PAGE 1 OF 1
DATE: 2-6-2023

WILDCAT DYNAMIC CONE LOG

PROJECT: TRU Greenway Phase 4
LOCATION: Pine Ave SW, Warren, OH
WEATHER: Cloudy, 30°F
REMARKS: Dense brush and trees prevented acces with drill rig

PROJECT NUMBER: 2017109.00
GROUND ELEVATION: 891' ASL
CREW: P.G., R.S., S.Y.

DEPTH FT	DEPTH M	BLOWS PER 10 CM	RESISTANCE KG/CM^2	CONE RESISTANCE 0 50 100 150	N'	TESTED DENSITY/CONSISTENCY NON-COHESIVE	COHESIVE
	0.1	2	8.9	**	2		VERY LOOSE
	0.2	2	8.9	**	2		VERY LOOSE
1	0.3	3	13.3	***	3		VERY LOOSE
	0.4	2	8.9	**	2		VERY LOOSE
	0.5	3	13.3	***	3		SOFT
2	0.6	4	17.8	****	5		MEDIUM STIFF
	0.7	6	26.6	*****	7		MEDIUM STIFF
	0.8	6	26.6	*****	7		MEDIUM STIFF
3	0.9	9	40.0	********	11		STIFF
	1.0	15	66.6	**********	19		STIFF
	1.1	18	69.5	**********	19		VERY STIFF
4	1.2	21	81.1	**********	23		VERY STIFF
	1.3	28	108.1	**********	-		HARD
	1.4	28	108.1	**********	-		HARD
5	1.5	24	92.6	**********	-		VERY STIFF
	1.6	23	88.8	**********	25		VERY STIFF
	1.7	31	119.7	**********	-		HARD
6	1.8	24	92.6	**********	-		VERY STIFF
	1.9	18	69.5	**********	19		VERY STIFF
	2.0	20	77.2	**********	22		VERY STIFF
7	2.1						
	2.2						
	2.3						
8	2.4						
	2.5						
	2.6						
9	2.7						
	2.8						
	2.9						
10	3.0						
	3.1						
	3.2						
	3.3						
11	3.4						
	3.5						
	3.6						
12	3.7						
	3.8						
	3.9						
13	4.0						
	4.1						
	4.2						
14	4.3						
	4.4						
	4.5						
15	4.6						
	4.7						
	4.8						
16	4.9						
	5.0						
	5.1						
17	5.2						
	5.3						
	5.4						
18	5.5						

PROJECT: TRU GREENWAY PHASE 4	DRILLING FIRM / OPERATOR: GPD / J. TETER	DRILL RIG: GP 6620 ATV	STATION / OFFSET:
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: GPD / D. CAMPANA	HAMMER: GEOPROBE AUTOMATIC	ALIGNMENT:
PID: 99804 SFN:	DRILLING METHOD: 2.25" HSA	CALIBRATION DATE: N/A	ELEVATION: 936.0 (MSL) EOB: 7.0 ft.
START: 1/16/23 END: 1/16/23	SAMPLING METHOD: SPT	ENERGY RATIO (%): 60	LAT / LONG: 41.203987, -80.794837

EXPLORATION ID: B-002-0-22

PAGE: 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	ABAN-DONED
12" TOPSOIL	936.0																		
MEDIUM STIFF, BROWN AND GRAY, **SILTY CLAY**, DAMP LITTLE SAND	935.0	1	1 2 4	6	94	SS-1	-	1	5	16	54	24	36	19	17	18	A-6b (11)	<100	
VERY STIFF, BROWN AND GRAY, **SILT AND CLAY**, DAMP LITTLE SAND		2 3	6 7 9	16	100	SS-2	-	1	7	14	50	28	30	17	13	16	A-6a (9)	-	
VERY STIFF, GRAY, **SILT AND CLAY**, MOIST TRACE ORGANICS		4 5	3 5 6	11	72	SS-3	-	-	-	-	-	-	-	-	-	17	A-6a (V)	-	
STIFF, BROWN, **SILTY CLAY**, MOIST LITTLE SAND	929.0	6 EOB 7	3 5 5	10	100	SS-4	-	-	-	-	-	-	-	-	-	24	A-6b (V)	-	

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: BACKFILLED WITH SOIL CUTTINGS

PROJECT: TRU GREENWAY PHASE 4	DRILLING FIRM / OPERATOR: GPD / P. GOPP	DRILL RIG: MANUAL DCP	STATION / OFFSET:
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: GPD / P. GOPP	HAMMER: SAFETY HAMMER	ALIGNMENT:
PID: 99804 SFN:	DRILLING METHOD: HAND SAMPLER	CALIBRATION DATE: N/A	ELEVATION: 895.0 (MSL) EOB: 9.0 ft.
START: 2/6/23 END: 2/6/23	SAMPLING METHOD: HAND AUGER	ENERGY RATIO (%): 60	LAT / LONG: 41.203990, -80.793717

EXPLORATION ID B-003-0-22

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	ABAN-DONED
7" TOPSOIL	895.0 894.4																		
SOFT TO MEDIUM STIFF, BROWN AND GRAY, **SILT AND CLAY**, MOIST TO WET TRACE SAND		1				1	-	1	4	11	51	33	35	20	15	28	A-6a (10)	<100	
	893.0	2				2	-	1	2	7	46	44	47	23	24	35	A-7-6 (15)	-	
STIFF, BROWN AND GRAY, **CLAY**, MOIST SOME SILT, TRACE SAND		3																	
NOT SAMPLED; PROBABLE VERY STIFF, SILT AND CLAY, TRACE SAND.		4																	
		5																	
		6																	
		7																	
		8																	
	886.0	EOB 9																	

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: NOT RECORDED

520 South Main Street, Suite 2531
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Phone: 330.572.2100
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LOG NUMBER: B-003-0-22
PAGE 1 OF 1
DATE: 2-6-2023

WILDCAT DYNAMIC CONE LOG

PROJECT: TRU Greenway Phase 4
LOCATION: Pine Ave SW, Warren, OH
WEATHER: Cloudy, 30°F
REMARKS: Dense brush and trees prevented acces with drill rig

PROJECT NUMBER: 2017109.00
GROUND ELEVATION: 895' ASL
CREW: P.G., R.S., S.Y.

DEPTH FT	DEPTH M	BLOWS PER 10 CM	RESISTANCE KG/CM^2	CONE RESISTANCE 0 50 100 150	N'	TESTED DENSITY/CONSISTENCY NON-COHESIVE	COHESIVE
	0.1	2	8.9	**	2	VERY LOOSE	
	0.2	4	17.8	****	5	LOOSE	
1	0.3	2	8.9	**	2	VERY LOOSE	
	0.4	3	13.3	***	3	VERY LOOSE	
	0.5	8	35.5	*******	10		STIFF
2	0.6	10	44.4	*********	12		STIFF
	0.7	21	93.2	*******************	-		VERY STIFF
	0.8	22	97.7	********************	-		VERY STIFF
3	0.9	20	88.8	*******************	25		VERY STIFF
	1.0	20	88.8	*******************	25		VERY STIFF
	1.1	12	46.3	*********	13		STIFF
4	1.2	18	69.5	**************	19		VERY STIFF
	1.3	18	69.5	**************	19		VERY STIFF
	1.4	18	69.5	**************	19		VERY STIFF
5	1.5	19	73.3	***************	20		VERY STIFF
	1.6	18	69.5	**************	19		VERY STIFF
	1.7	12	46.3	*********	13		STIFF
6	1.8	10	38.6	********	11		STIFF
	1.9	12	46.3	*********	13		STIFF
	2.0	10	38.6	********	11		STIFF
7	2.1	16	61.8	************	17		VERY STIFF
	2.2	19	73.3	***************	20		VERY STIFF
	2.3	16	61.8	************	17		VERY STIFF
8	2.4	23	88.8	*******************	25		VERY STIFF
	2.5	35	135.1	**************************	-		HARD
	2.6	20	77.2	***************	22		VERY STIFF
9	2.7						
	2.8						
	2.9						
10	3.0						
	3.1						
	3.2						
	3.3						
11	3.4						
	3.5						
	3.6						
12	3.7						
	3.8						
	3.9						
13	4.0						
	4.1						
	4.2						
14	4.3						
	4.4						
	4.5						
15	4.6						
	4.7						
	4.8						
16	4.9						
	5.0						
	5.1						
17	5.2						
	5.3						
	5.4						
18	5.5						

PROJECT: TRU GREENWAY PHASE 4	DRILLING FIRM / OPERATOR: GPD / P. GOPP	DRILL RIG: MANUAL DCP	STATION / OFFSET:
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: GPD / P. GOPP	HAMMER: SAFETY HAMMER	ALIGNMENT:
PID: 99804 SFN:	DRILLING METHOD: HAND SAMPLER	CALIBRATION DATE: N/A	ELEVATION: 888.0 (MSL) EOB: 5.0 ft.
START: 2/6/23 END: 2/6/23	SAMPLING METHOD: HAND AUGER	ENERGY RATIO (%): 60	LAT / LONG: 41.205242, -80.793729

EXPLORATION ID B-004-0-22

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	ABAN-DONED
	888.0																		
7" TOPSOIL	887.4																		
LITTLE SAND		1				1	-	-	-	-	-	-	-	-	-	54		<100	
MEDIUM STIFF, GRAY, **SILT AND CLAY**, WET TRACE SAND	886.0	2				2	-	20	7	23	38	12	27	16	11	20	A-6a (3)	-	
STIFF, BROWN AND GRAY, **SILT AND CLAY**, MOIST NOT SAMPLED; PROBABLE VERY STIFF TO HARD, SILT AND CLAY, TRACE SAND.	883.0	3																	
EOB		4																	
		5																	

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: NOT RECORDED

520 South Main Street, Suite 2531
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Phone: 330.572.2100
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LOG NUMBER: B-004-0-22
PAGE 1 OF 1
DATE: 2-6-2023

WILDCAT DYNAMIC CONE LOG

PROJECT: TRU Greenway Phase 4
LOCATION: Pine Ave SW, Warren, OH
WEATHER: Cloudy, 30°F
REMARKS: Dense brush and trees prevented acces with drill rig

PROJECT NUMBER: 2017109.00
GROUND ELEVATION: 896' ASL
CREW: P.G., R.S., S.Y.

DEPTH FT	DEPTH M	BLOWS PER 10 CM	RESISTANCE KG/CM^2	CONE RESISTANCE 0 50 100 150	N'	TESTED DENSITY/CONSISTENCY NON-COHESIVE	COHESIVE
	0.1	1	4.4	*	1		VERY SOFT
	0.2	0	0.0		0		VERY SOFT
1	0.3	6	26.6	*****	7		MEDIUM STIFF
	0.4	12	53.3	**********	15		VERY STIFF
	0.5	8	35.5	*******	10		STIFF
2	0.6	6	26.6	*****	7		MEDIUM STIFF
	0.7	12	53.3	**********	15		VERY STIFF
	0.8	13	57.7	**********	16		VERY STIFF
3	0.9	13	57.7	**********	16		VERY STIFF
	1.0	22	97.7	**********	-		VERY STIFF
	1.1	30	115.8	**********	-		HARD
4	1.2	48	185.3	**********	-		HARD
	1.3	42	162.1	**********	-		HARD
	1.4	49	189.1	**********	-		HARD
5	1.5						
	1.6						
	1.7						
6	1.8						
	1.9						
	2.0						
7	2.1						
	2.2						
	2.3						
8	2.4						
	2.5						
	2.6						
9	2.7						
	2.8						
	2.9						
10	3.0						
	3.1						
	3.2						
	3.3						
11	3.4						
	3.5						
	3.6						
12	3.7						
	3.8						
	3.9						
13	4.0						
	4.1						
	4.2						
14	4.3						
	4.4						
	4.5						
15	4.6						
	4.7						
	4.8						
16	4.9						
	5.0						
	5.1						
17	5.2						
	5.3						
	5.4						
18	5.5						

PROJECT: TRU GREENWAY PHASE 4	DRILLING FIRM / OPERATOR: GPD / J. TETER	DRILL RIG: GP 6620 ATV	STATION / OFFSET:	EXPLORATION ID B-005-0-22
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: GPD / D. CAMPANA	HAMMER: GEOPROBE AUTOMATIC	ALIGNMENT:	
PID: 99804 SFN:	DRILLING METHOD: 2.25" HSA	CALIBRATION DATE: N/A	ELEVATION: 952.0 (MSL) EOB: 7.0 ft.	PAGE 1 OF 1
START: 1/13/23 END: 1/13/23	SAMPLING METHOD: SPT	ENERGY RATIO (%): 60	LAT / LONG: 41.206385, -80.793717	

MATERIAL DESCRIPTION AND NOTES	ELEV. 952.0	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	ABAN-DONED
10" TOPSOIL	951.2																		
STIFF, BROWN AND GRAY, **SILT AND CLAY**, DAMP SOME SAND, TRACE GRAVEL	949.5	1	3 3 4	7	89	1	-	5	10	45	27	13	28	15	13	17	A-6a (2)	<100	
MEDIUM DENSE, BROWN, **SILT**, MOIST LITTLE SAND, TRACE CLAY AND GRAVEL	948.0	2	5 8 7	15	89	2	-	10	8	12	60	10	23	17	6	17	A-4b (7)	-	
MEDIUM DENSE, BROWN AND GRAY, **SILT AND CLAY**, DAMP TRACE SAND		3	2 3 7	10	78	3	-	-	-	-	-	-	-	-	-	24	A-6a (V)	-	
VERY STIFF, GRAY, **SILT AND CLAY**, DAMP LITTLE SAND	945.0	4	4 6 11	17	100	4	-	-	-	-	-	-	-	-	-	17	A-6a (V)	-	
		EOB 7																	

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: BACKFILLED WITH SOIL CUTTINGS

PROJECT: TRU GREENWAY PHASE 4	DRILLING FIRM / OPERATOR: GPD / J. TETER	DRILL RIG: GP 6620 ATV	STATION / OFFSET:	EXPLORATION ID B-006-0-22
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: GPD / D. CAMPANA	HAMMER: GEOPROBE AUTOMATIC	ALIGNMENT:	
PID: 99804 SFN:	DRILLING METHOD: 2.25" HSA	CALIBRATION DATE: N/A	ELEVATION: 922.0 (MSL) EOB: 7.0 ft.	PAGE 1 OF 1
START: 1/13/23 END: 1/13/23	SAMPLING METHOD: SPT	ENERGY RATIO (%): 60	LAT / LONG: 41.206446, -80.791729	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	ABAN-DONED
	922.0																		
8" TOPSOIL	921.3																		
MEDIUM DENSE, BROWN AND GRAY, **SILT**, MOIST SOME SAND	919.5	1 2 3 4	2 3 4	7	39	SS-1	-	4	8	32	52	4	25	17	8	24	A-4b (4)	<100	
VERY STIFF, BROWN AND GRAY, **SILTY CLAY**, DAMP TO MOIST LITTLE SAND AND GRAVEL		5 6 7	6 7 10	17	75	SS-2	-	13	7	8	42	30	34	16	18	15	A-6b (11)	-	
STIFF, BROWN, **SILTY CLAY**, DAMP TRACE SAND	916.5		3 4 6	10	89	SS-3	-	-	-	-	-	-	-	-	-	21	A-6b (V)	-	
MEDIUM DENSE, BROWN, **SILT**, MOIST LITTLE SAND	915.0	EOB	3 4 4	8	89	SS-4	-	-	-	-	-	-	-	-	-	17	A-4b (V)	-	

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: BACKFILLED WITH SOIL CUTTINGS

PROJECT: TRU GREENWAY PHASE 4	DRILLING FIRM / OPERATOR: GPD / J. TETER	DRILL RIG: GP 6620 ATV	STATION / OFFSET:	EXPLORATION ID B-007-0-22
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: GPD / D. CAMPANA	HAMMER: GEOPROBE AUTOMATIC	ALIGNMENT:	
PID: 99804 SFN:	DRILLING METHOD: 2.25" HSA	CALIBRATION DATE: N/A	ELEVATION: 920.0 (MSL) EOB: 7.0 ft.	PAGE 1 OF 1
START: 1/13/23 END: 1/13/23	SAMPLING METHOD: SPT	ENERGY RATIO (%): 60	LAT / LONG: 41.208095, -80.792845	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	ABAN-DONED
10" TOPSOIL	920.0 919.2																		
STIFF TO VERY STIFF, BROWN AND GRAY, **SILTY CLAY**, MOIST TO DAMP LITTLE SAND, TRACE GRAVEL		1 2 3	WOH 3 5	8	94	1	-	7	7	20	46	20	31	15	16	16	A-6b (9)	<100	
		4 5	5 6 8	14	89	SS-2	-	-	-	-	-	-	-	-	-	15	A-6b (V)	-	
VERY STIFF, BROWN, **SILTY CLAY**, DAMP LITTLE SAND AND GRAVEL		6	3 5 10	15	78	SS-3	-	15	6	14	47	18	27	15	12	14	A-6a (7)	-	
VERY STIFF, BROWN AND GRAY, **SILTY CLAY**, DAMP TRACE SAND	913.0	EOB 7	4 7 9	16	89	SS-4	-	-	-	-	-	-	-	-	-	22	A-6b (V)	-	

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: BACKFILLED WITH SOIL CUTTINGS

PROJECT: TRU GREENWAY PHASE 4	DRILLING FIRM / OPERATOR: GPD / J. TETER	DRILL RIG: GP 6620 ATV	STATION / OFFSET:	EXPLORATION ID B-008-0-22	
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: GPD / D. CAMPANA	HAMMER: GEOPROBE AUTOMATIC	ALIGNMENT:		
PID: 99804 SFN:	DRILLING METHOD: 2.25" HSA	CALIBRATION DATE: N/A	ELEVATION: 959.0 (MSL) EOB: 7.0 ft.		PAGE 1 OF 1
START: 1/12/23 END: 1/12/23	SAMPLING METHOD: SPT	ENERGY RATIO (%): 60	LAT / LONG: 41.209739, -80.794079		

MATERIAL DESCRIPTION AND NOTES	ELEV. 959.0	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	ABAN-DONED
12" TOPSOIL	958.0																		
LOOSE, DARK BROWN, **SILT**, DAMP LITTLE SAND, TRACE CLAY AND ORGANICS		1	WOH WOH 3	3	11	SS-1	-	6	9	20	55	10	33	23	10	27	A-4b (6)	<100	
MEDIUM DENSE, BROWN, **SILT**, DAMP LITTLE CLAY AND SAND		2 3	7 6 9	15	94	SS-2	-	5	7	17	53	18	25	15	10	14	A-4b (7)	-	
MEDIUM DENSE, BROWN, **SILT**, DAMP LITTLE CLAY, TRACE SAND	953.5	4 5	3 4 7	11	89	SS-3	-	-	-	-	-	-	-	-	-	14	A-4b (V)	-	
VERY STIFF, BROWN AND GRAY, **SILT AND CLAY**, DAMP TRACE SAND	952.0	6 EOB 7	3 6 7	13	100	SS-4	-	-	-	-	-	-	-	-	-	19	A-6a (V)	-	

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: BACKFILLED WITH SOIL CUTTINGS

PROJECT: TRU GREENWAY PHASE 4	DRILLING FIRM / OPERATOR: GPD / J. TETER	DRILL RIG: GP 6620 ATV	STATION / OFFSET:	EXPLORATION ID B-009-0-22
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: GPD / D. CAMPANA	HAMMER: GEOPROBE AUTOMATIC	ALIGNMENT:	
PID: 99804 SFN:	DRILLING METHOD: 2.25" HSA	CALIBRATION DATE: N/A	ELEVATION: 912.0 (MSL) EOB: 7.0 ft.	PAGE 1 OF 1
START: 1/12/23 END: 1/12/23	SAMPLING METHOD: SPT	ENERGY RATIO (%): 60	LAT / LONG: 41.211585, -80.795392	

MATERIAL DESCRIPTION AND NOTES	ELEV. 912.0	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	ABAN-DONED
10" TOPSOIL	911.2																		
STIFF, BROWN AND GRAY, **SILTY CLAY**, DAMP LITTLE SAND		1	WOH 4 5	9	100	SS-1	-	2	5	13	52	28	32	16	16	16	A-6b (10)	<100	
VERY STIFF, BROWN AND GRAY, **SILTY CLAY**, DAMP TRACE SAND AND GRAVEL		2 3 4 5	6 8 9	17	94	SS-2	-	7	3	5	61	24	31	18	13	18	A-6a (9)	-	
STIFF, BROWN, **SILT AND CLAY**, MOIST TRACE SAND AND ORGANICS		6	2 3 4	7	100	SS-3	-	-	-	-	-	-	-	-	-	20	A-6a (V)	-	
STIFF, BROWN, **SILT AND CLAY**, MOIST LITTLE SAND	905.0	EOB 7	3 4 6	10	89	SS-4	-	-	-	-	-	-	-	-	-	18	A-6a (V)	-	

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: BACKFILLED WITH SOIL CUTTINGS

PROJECT: TRU GREENWAY PHASE 4	DRILLING FIRM / OPERATOR: GPD / J. TETER	DRILL RIG: GP 6620 ATV	STATION / OFFSET:	EXPLORATION ID B-010/11-0-22
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: GPD / D. CAMPANA	HAMMER: GEOPROBE AUTOMATIC	ALIGNMENT:	
PID: 99804 SFN:	DRILLING METHOD: 2.25" HSA	CALIBRATION DATE: N/A	ELEVATION: 901.0 (MSL) EOB: 7.0 ft.	PAGE 1 OF 1
START: 1/12/23 END: 1/12/23	SAMPLING METHOD: SPT	ENERGY RATIO (%): 60	LAT / LONG: 41.213859, -80.797021	

MATERIAL DESCRIPTION AND NOTES	ELEV. 901.0	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	ABAN-DONED
10" TOPSOIL	900.2																		
STIFF, BROWN AND GRAY, **SILTY CLAY**, DAMP LITTLE SAND		1	1 3 6	9	83	SS-1	-	8	7	19	49	17	32	16	16	16	A-6b (9)	<100	
VERY STIFF, BROWN AND GRAY, **SILTY CLAY**, DAMP LITTLE SAND, TRACE GRAVEL		2	6 7 8	15	100	SS-2	-	2	5	6	49	38	34	17	17	17	A-6b (11)	-	
STIFF, BROWN, **SILTY CLAY**, MOIST TRACE SAND		3	4 4 6	10	83	SS-3	-	-	-	-	-	-	-	-	-	20	A-6b (V)	-	
VERY STIFF, BROWN, **SILTY CLAY**, MOIST TRACE SAND	894.0	4	5 7 9	16	83	SS-4	-	-	-	-	-	-	-	-	-	20	A-6b (V)	-	
		EOB 5																	
		6																	
		7																	

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: BACKFILLED WITH SOIL CUTTINGS

PROJECT: TRU GREENWAY PHASE 4	DRILLING FIRM / OPERATOR: GPD / J. TETER	DRILL RIG: GP 6620 ATV	STATION / OFFSET:
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: GPD / D. CAMPANA	HAMMER: GEOPROBE AUTOMATIC	ALIGNMENT:
PID: 99804 SFN:	DRILLING METHOD: 2.25" HSA	CALIBRATION DATE: N/A	ELEVATION: 903.0 (MSL) EOB: 6.42 ft.
START: 1/16/23 END: 1/16/23	SAMPLING METHOD: SPT	ENERGY RATIO (%): 60	LAT / LONG: 41.216028, -80.798641

EXPLORATION ID B-012-0-22

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 903.0	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	ABAN-DONED
10" TOPSOIL	902.2																		
STIFF, BROWN, **SILTY CLAY**, MOIST		1	3 3 5	8	89	SS-1	-	-	-	-	-	-	-	-	-	26	A-6b (V)	220	
HARD, BROWN, **SILTY CLAY**, DAMP TRACE SAND		2 3 4	9 9 12	21	72	SS-2	-	0	2	2	52	44	37	18	19	20	A-6b (12)	-	
VERY STIFF, BROWN, **SILT AND CLAY**, DAMP TRACE SAND AND GRAVEL		5	4 6 8	14	83	SS-3	-	9	5	5	52	29	32	17	15	17	A-6a (10)	-	
HARD, BROWN, **SILTY CLAY**, DAMP	896.6	6 EOB	5 50/1"	-	100	SS-4	-	-	-	-	-	-	-	-	-	15	A-6b (V)	-	

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: BACKFILLED WITH SOIL CUTTINGS

PROJECT: TRU GREENWAY PHASE 4	DRILLING FIRM / OPERATOR: GPD / J. TETER	DRILL RIG: GP 6620 ATV	STATION / OFFSET:
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: GPD / D. CAMPANA	HAMMER: GEOPROBE AUTOMATIC	ALIGNMENT:
PID: 99804 SFN:	DRILLING METHOD: 2.25" HSA	CALIBRATION DATE: N/A	ELEVATION: 903.0 (MSL) EOB: 7.0 ft.
START: 1/16/23 END: 1/16/23	SAMPLING METHOD: SPT	ENERGY RATIO (%): 60	LAT / LONG: 41.217370, -80.799628

EXPLORATION ID B-013-0-22

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 903.0	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	ABAN-DONED
12" TOPSOIL	902.0																		
STIFF, BROWN AND GRAY, **SILTY CLAY**, DAMP LITTLE SAND, TRACE GRAVEL		1 2	2 3 5	8	89	SS-1	-	8	8	14	51	19	32	16	16	17	A-6b (9)	<100	
VERY STIFF, BROWN AND GRAY, **CLAY**, DAMP SOME SILT, TRACE SAND AND GRAVEL		3 4	6 10 10	20	100	SS-2	-	3	2	5	35	55	43	19	24	19	A-7-6 (14)	-	
VERY STIFF, BROWN AND GRAY, **CLAY**, DAMP LITTLE SILT, TRACE SAND		5	4 8 10	18	100	SS-3	-	-	-	-	-	-	-	-	-	23	A-7-6 (V)	-	
VERY STIFF, BROWN AND GRAY, **CLAY**, DAMP LITTLE SILT, TRACE SAND	896.0	6 EOB 7	6 8 12	20	78	SS-4	-	-	-	-	-	-	-	-	-	14	A-7-6 (V)	-	

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: BACKFILLED WITH SOIL CUTTINGS

STANDARD ODOT LOG W/ SULFATES (8.5 X 11) - OH DOT.GDT - 3/10/23 17:32 - F:\GPD GILCHRIST\JOBS\2022\GPD\DRILLING\20177109.00 - TRU WESTERN RESERVE GREENWAY PHASE 4 TRA

PROJECT: TRU GREENWAY PHASE 4	DRILLING FIRM / OPERATOR: GPD / J. TETER	DRILL RIG: GP 6620 ATV	STATION / OFFSET:	EXPLORATION ID B-014-0-22
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: GPD / D. CAMPANA	HAMMER: GEOPROBE AUTOMATIC	ALIGNMENT:	
PID: 99804 SFN:	DRILLING METHOD: 2.25" HSA	CALIBRATION DATE: N/A	ELEVATION: 934.0 (MSL) EOB: 7.0 ft.	PAGE 1 OF 1
START: 1/16/23 END: 1/16/23	SAMPLING METHOD: SPT	ENERGY RATIO (%): 60	LAT / LONG: 41.217926, -80.800996	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	ABAN-DONED
8" TOPSOIL	934.0 933.3																		
STIFF, BROWN, **SILTY CLAY**, MOIST LITTLE SAND AND GRAVEL		1 2	3 5 5	10	100	SS-1	-	14	6	10	45	25	38	17	21	17	A-6b (11)	<100	
VERY STIFF, BROWN, **SILT AND CLAY**, DAMP SOME GRAVEL, LITTLE SAND		3 4	7 12 17	29	72	SS-2	-	29	12	8	40	11	27	16	11	12	A-6a (4)	-	
VERY STIFF BROWN, **SILT AND CLAY**, MOIST LITTLE SAND, TRACE GRAVEL		5	5 10 14	24	100	SS-3	-	-	-	-	-	-	-	-	-	14	A-6a (V)	-	
VERY STIFF, BROWN, **SILT AND CLAY**, DAMP TRACE SAND AND GRAVEL	927.0	6 EOB 7	12 15 13	28	100	SS-4	-	-	-	-	-	-	-	-	-	12	A-6a (V)	-	

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: BACKFILLED WITH SOIL CUTTINGS

GENERAL NOTES

SAMPLE IDENTIFICATION

The Unified Soil Classification System (USCS), AASHTO 1988 and ASTM designations D2487 and D-2488 are used to identify the encountered materials unless otherwise noted. Coarse-grained soils are defined as having more than 50% of their dry weight retained on a #200 sieve (0.075mm); they are described as: boulders, cobbles, gravel or sand. Fine-grained soils have less than 50% of their dry weight retained on a #200 sieve; they are defined as silts or clay depending on their Atterberg Limit attributes. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size.

DRILLING AND SAMPLING SYMBOLS

SFA: Solid Flight Auger - typically 4" diameter flights, except where noted.
HSA: Hollow Stem Auger - typically 3¼" or 4¼ I.D. openings, except where noted.
M.R.: Mud Rotary - Uses a rotary head with Bentonite or Polymer Slurry
R.C.: Diamond Bit Core Sampler
H.A.: Hand Auger
P.A.: Power Auger - Handheld motorized auger

SS: Split-Spoon - 1 3/8" I.D., 2" O.D., except where noted.
ST: Shelby Tube - 3" O.D., except where noted.
BS: Bulk Sample
PM: Pressuremeter
CPT-U: Cone Penetrometer Testing with Pore-Pressure Readings

SOIL PROPERTY SYMBOLS

N: Standard "N" penetration: Blows per foot of a 140 pound hammer falling 30 inches on a 2-inch O.D. Split-Spoon.
N_{60}: A "N" penetration value corrected to an equivalent 60% hammer energy transfer efficiency (ETR)
Q_u: Unconfined compressive strength, TSF
Q_p: Pocket penetrometer value, unconfined compressive strength, TSF
w%: Moisture/water content, %
LL: Liquid Limit, %
PL: Plastic Limit, %
PI: Plasticity Index = (LL-PL),%
DD: Dry unit weight, pcf
▼,▽,▼ Apparent groundwater level at time noted

RELATIVE DENSITY OF COARSE-GRAINED SOILS

Relative Density	N - Blows/foot
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	50 - 80
Extremely Dense	80+

ANGULARITY OF COARSE-GRAINED PARTICLES

Description	Criteria
Angular:	Particles have sharp edges and relatively plane sides with unpolished surfaces
Subangular:	Particles are similar to angular description, but have rounded edges
Subrounded:	Particles have nearly plane sides, but have well-rounded corners and edges
Rounded:	Particles have smoothly curved sides and no edges

GRAIN-SIZE TERMINOLOGY

Component	Size Range
Boulders:	Over 300 mm (>12 in.)
Cobbles:	75 mm to 300 mm (3 in. to 12 in.)
Coarse-Grained Gravel:	19 mm to 75 mm (¾ in. to 3 in.)
Fine-Grained Gravel:	4.75 mm to 19 mm (No.4 to ¾ in.)
Coarse-Grained Sand:	2 mm to 4.75 mm (No.10 to No.4)
Medium-Grained Sand:	0.42 mm to 2 mm (No.40 to No.10)
Fine-Grained Sand:	0.075 mm to 0.42 mm (No. 200 to No.40)
Silt:	0.005 mm to 0.075 mm
Clay:	<0.005 mm

PARTICLE SHAPE

Description	Criteria
Flat:	Particles with width/thickness ratio > 3
Elongated:	Particles with length/width ratio > 3
Flat & Elongated:	Particles meet criteria for both flat and elongated

RELATIVE PROPORTIONS OF FINES

Descriptive Term	% Dry Weight
Trace:	< 5%
With:	5% to 12%
Modifier:	>12%

GENERAL NOTES

(Continued)

CONSISTENCY OF FINE-GRAINED SOILS

Q_U - TSF	N - Blows/foot	Consistency
0 - 0.25	0 - 2	Very Soft
0.25 - 0.50	2 - 4	Soft
0.50 - 1.00	4 - 8	Firm (Medium Stiff)
1.00 - 2.00	8 - 15	Stiff
2.00 - 4.00	15 - 30	Very Stiff
4.00 - 8.00	30 - 50	Hard
8.00+	50+	Very Hard

MOISTURE CONDITION DESCRIPTION

Description	Criteria
Dry:	Absence of moisture, dusty, dry to the touch
Moist:	Damp but no visible water
Wet:	Visible free water, usually soil is below water table

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term	% Dry Weight
Trace:	< 15%
With:	15% to 30%
Modifier:	>30%

STRUCTURE DESCRIPTION

Description	Criteria
Stratified:	Alternating layers of varying material or color with layers at least ¼-inch (6 mm) thick
Laminated:	Alternating layers of varying material or color with layers less than ¼-inch (6 mm) thick
Fissured:	Breaks along definite planes of fracture with little resistance to fracturing
Slickensided:	Fracture planes appear polished or glossy, sometimes striated
Blocky:	Cohesive soil that can be broken down into small angular lumps which resist further breakdown
Lensed:	Inclusion of small pockets of different soils
Layer:	Inclusion greater than 3 inches thick (75 mm)
Seam:	Inclusion 1/8-inch to 3 inches (3 to 75 mm) thick extending through the sample
Parting:	Inclusion less than 1/8-inch (3 mm) thick

SCALE OF RELATIVE ROCK HARDNESS

Q_U - TSF	Consistency
2.5 - 10	Extremely Soft
10 - 50	Very Soft
50 - 250	Soft
250 - 525	Medium Hard
525 - 1,050	Moderately Hard
1,050 - 2,600	Hard
>2,600	Very Hard

ROCK BEDDING THICKNESSES

Description	Criteria
Very Thick Bedded	Greater than 3-foot (>1.0 m)
Thick Bedded	1-foot to 3-foot (0.3 m to 1.0 m)
Medium Bedded	4-inch to 1-foot (0.1 m to 0.3 m)
Thin Bedded	1¼-inch to 4-inch (30 mm to 100 mm)
Very Thin Bedded	½-inch to 1¼-inch (10 mm to 30 mm)
Thickly Laminated	1/8-inch to ½-inch (3 mm to 10 mm)
Thinly Laminated	1/8-inch or less "paper thin" (<3 mm)

ROCK VOIDS

Voids	Void Diameter
Pit	<6 mm (<0.25 in)
Vug	6 mm to 50 mm (0.25 in to 2 in)
Cavity	50 mm to 600 mm (2 in to 24 in)
Cave	>600 mm (>24 in)

GRAIN-SIZED TERMINOLOGY

(Typically Sedimentary Rock)

Component	Size Range
Very Coarse Grained	>4.76 mm
Coarse Grained	2.0 mm - 4.76 mm
Medium Grained	0.42 mm - 2.0 mm
Fine Grained	0.075 mm - 0.42 mm
Very Fine Grained	<0.075 mm

ROCK QUALITY DESCRIPTION

Rock Mass Description	RQD Value
Excellent	90 -100
Good	75 - 90
Fair	50 - 75
Poor	25 -50
Very Poor	Less than 25

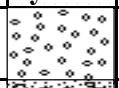
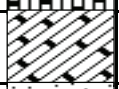
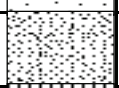
DEGREE OF WEATHERING

Slightly Weathered: Rock generally fresh, joints stained and discoloration extends into rock up to 25 mm (1 in), open joints may contain clay, core rings under hammer impact.

Weathered: Rock mass is decomposed 50% or less, significant portions of the rock show discoloration and weathering effects, cores cannot be broken by hand or scraped by knife.

Highly Weathered: Rock mass is more than 50% decomposed, complete discoloration of rock fabric, core may be extremely broken and gives clunk sound when struck by hammer, may be shaved with a knife.

Unified Soil Classification System

Major Divisions			Letter	Symbol	Description
Coarse-grained Soils More than ½ retained on the No. 200 Sieve	**Gravels** More than ½ coarse fraction retained on the No. 4 sieve	Clean Gravels	GW		Well-graded gravels and gravel-sand mixtures, little or no fines.
			GP		Poorly-graded gravels and gravel-sand mixtures, little or no fines.
		Gravels With Fines	GM		Silty gravels, gravel-sand-silt mixtures.
			GC		Clayey gravels, gravel-sand-clay mixtures.
	Sands More than ½ passing through the No. 200 sieve	Clean Sands	SW		Well-graded sands and gravelly sands, little or no fines.
			SP		Poorly-graded sands and gravelly sands, little or no fines.
		Sands With Fines	SM		Silty sands, sand-silt mixtures
			SC		Clayey sands, sandy-clay mixtures.
Fine-grained Soils More than ½ passing through the No. 200 Sieve	**Silts and Clays** Liquid Limit less than 50%		ML		Inorganic silts, very fine sands, rock flour, silty or clayey fine sands.
			CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL		Organic clays of medium to high plasticity.
	Silts and Clays Liquid Limit greater than 50%		MH		Inorganic silts, micaceous or diatomaceous fines sands or silts, elastic silts.
			CH		Inorganic clays of high plasticity, fat clays.
			OH		Organic clays of medium to high plasticity.
Highly Organic Soils			PT		Peat, muck, and other highly organic soils.

Consistency Classification

Granular Soils			*Cohesive Soils*		
Description - Blows Per Foot (Corrected)			Description - Blows Per Foot (Corrected)		
	MCS	SPT		MCS	SPT
Very loose	<5	<4	Very soft	<3	<2
Loose	5 - 15	4 - 10	Soft	3 - 5	2 - 4
Medium dense	16 - 40	11 - 30	Firm	6 - 10	5 - 8
Dense	41 - 65	31 - 50	Stiff	11 - 20	9 - 15
Very dense	>65	>50	Very Stiff	21 - 40	16 - 30
			Hard	>40	>30

MCS = Modified California Sampler SPT = Standard Penetration Test Sampler