Professional Service Industries, Inc.
2341 Spencerville Road, Lima, Ohio 45805
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Certification of Geotechnical Plan Review – Final Plans

September 8, 2023

Mr. Brad Warnock
Choice One Engineering
440 E. Hoewisher Rd.
Sidney, Ohio 45365

Re: Van-Leeson Avenue
Van Wert County, Ohio
PID No.: 113907

Dear Mr. Warnock:

As the Geotechnical Engineer of Record for the subject project, we certify that we have reviewed the Final Plans for the subject project, specifically the general notes pertaining to our recommendations, cross sections, showing recommended undercuts and replacement per our geotechnical report originally dated April 9, 2021, and the Geotechnical Soil Profile sheets.

Respectfully,

PROFESSIONAL SERVICE INDUSTRIES, INC. (PSI)

Raymond France
Branch Manager

John Xu, PE
Senior Project Manager
OH, PE #60483, Exp. 12/31/2023

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April 9, 2021

Mr. Matthew Hoying
Choice One Engineering
440 East Hoewisher Road
Sidney, Ohio 45365

Re: Geotechnical Engineering Services Report
Proposed Leeson Avenue Reconstruction
Van Wert, Van Wert County, Ohio

PSI Project No. 01252509

Dear Mr. Hoying:

In compliance with your instructions, we have conducted a geotechnical subsurface exploration for the above-referenced project. The results of this exploration, together with our recommendations, are to be found in the accompanying report.

After the plans and specifications are complete, PSI should review the final design drawings and specifications in order to verify that the recommendations are properly interpreted and implemented. **It is also considered imperative that the geotechnical engineer or its representative be present during earthwork operations to observe field conditions with respect to the design assumptions and specifications.**

Should you have any questions regarding the contents of this submittal, please do not hesitate to contact us at 419-999-5660.

Respectfully submitted,
PROFESSIONAL SERVICE INDUSTRIES, Inc.

Tiffani Joseph, E.I.
Staff Engineer

Alagaiya Veeramani, P.E.
Principal Consultant

Raymond France
Branch Manager

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1.0 EXECUTIVE SUMMARY

The project involves reconstruction of approximately 2,700 lineal feet of Leeson Avenue in the City of Van Wert, Van Wert County, Ohio. Specifically, the roadway reconstruction will begin east of Rose Avenue and end just west of South Fulton Street. Eight (8) test borings, B-001-0-21 to B-008-0-21, were performed for this project. The test borings were drilled to a depth of about 8.5 feet below the pavement surface grade. The following brief summary of the exploration findings and geotechnical considerations for the project are presented below:

- **Pavement and Base Materials**: The surface grade at the test boring locations is covered with a layer of asphalt pavement measuring approximately 3.5 to 5 inches in thickness. The asphalt pavement at all the test boring locations was underlain by granular base materials measuring approximately 5 to 6 inches in thickness. The thickness of the asphalt concrete and gravel base materials should be expected to vary throughout the site.

- **Subgrade Soils:** The base materials at the test boring locations were underlain by natural soils encountered to the terminal depths. The natural soils consisted of sandy silt (A-4a), silt and clay (A-6a), silty clay (A-6b) and clay (A-7-6). The soils exhibited moisture contents ranging from approximately 14 to 38 percent and a medium stiff to hard consistency based on the Standard Penetration Tests. The engineering characteristics of the material should be considered variable throughout the site.

- **Groundwater:** Groundwater was encountered during drilling at the test boring locations B-001-0-21 and B-004-0-21 at depths of approximately 6.5 and 6.3 feet, respectively, below the existing surface grades. Water was not noted upon completion of drilling at the test boring locations.

- An average **CBR value of 5** was established for the existing subgrade according to the GB-1 analysis.

The summary should be used in conjunction with the entire Subsurface Exploration Report since the summary sheet cannot include all details of the investigation's findings.

2.0 INTRODUCTION

2.1 Project Authorization

This report presents the subsurface exploration and evaluation conducted for Choice One Engineering for the proposed Leeson Avenue Reconstruction project in Van Wert, Ohio. This geotechnical engineering study was authorized by Mr. Matthew Hoying of Choice One Engineering Corporation on February 1, 2021 by issuing a Sub-Consultant Agreement, signed by Ms. Tiffani Joseph of PSI on February 2, 2021.

2.2 Project Description and Geotechnical Scope of Services

PSI understands that the project will consist of the reconstruction of approximately 2,700 lineal feet of roadway. Specifically, the roadway reconstruction will begin just east of Rose Drive and ending just west of South Fulton Street in Van Wert, Van Wert County, Ohio.

No specific grading plan is provided at the time of this report. However, it's assumed that minimal cut and fill (less than 2-foot) will be required for the proposed reconstruction. If any of the information noted above has changed or is incorrect, please inform PSI so that the recommendations presented in this report can be reviewed and amended, if appropriate.

The purpose of this exploration was to evaluate the soil and groundwater conditions at the site to provide recommendations, from a geotechnical engineering viewpoint, for construction, site preparation and other construction considerations. The scope included a reconnaissance of the project site, drilling eight (8) test borings to depths of about 8.5 feet each below the existing surface grades, a laboratory testing program, and an engineering analysis and evaluation of the subsurface materials.

The scope of services did not include an environmental assessment for the presence or absence of wetlands or hazardous or toxic materials in the soil, surface water, groundwater, or air, on or below or around this site. Any statements in this report or on the boring logs regarding odors, colors or unusual or suspicious items or conditions are strictly for the information of the client.

2.3 Site Location

The proposed project includes a portion of Leeson Avenue, between Rose Drive and South Fulton Street, in Van Wert, Van Wert County, Ohio. According to the preliminary design, work limits will be between stations 35+00 and 62+00, for a total of approximately 2,700 lineal feet.

2.4 Reconnaissance

PSI conducted a preliminary reconnaissance of the site which included discussions with Choice One Engineering. PSI has also reviewed the ODNR website, and field information collected by the drilling crew. The proposed section of roadway is in a predominately residential area along Leeson Avenue between Rose Drive and South Fulton Street, in Van Wert, Van Wert County, Ohio. The existing road is two (2) lane and covered with asphalt concrete carrying traffic in an east-west direction. Based on our visual observations, the condition of the existing roadway pavement is fair to good.

2.5 Site Geology

Based on the on-line geologic map provided by the Ohio Geological Survey, the proposed site area is located in the Central Lowland Province, Till Plains Section, Central Ohio Clayey Till Plain Region, with predominately Ground moraine topography underlain by Silurian age bedrock as part of the Wisconsinan Glaciation Period.

The Ohio Department of Natural Resources Department of Geologic Survey provides a map, "Known and Probably Karst Map of Ohio." Areas of known Karst (sinkhole) activity are plotted in red on the map. The Karst map was developed by state agencies to assist in identifying subsurface features in carbonate bedrock areas and existing sinkholes that exhibit some surface expression. Based on our review of the mapping, there are no apparent sinkholes noted within this project area. However, sinkholes may still occur in areas where there is no discernable surface expression.

2.6 Planning

Choice One Engineering and PSI selected the number and location of the test borings for this project. PSI's staff marked the test boring locations in the field which were later surveyed by Choice One Engineering. Based on the preliminary project information, the borings were advanced to depths of approximately eight (8) feet each and ODOT GB-1 was utilized in planning the sampling and laboratory testing program. The drilled test boring locations are shown on the attached figure - "Boring Location Map" in the appendix of this report.

PSI personnel contacted Ohio Utility Protection Services (OUPS) and utility companies whose names were made available to us prior to commencing test-boring operations. PSI contacted the required municipalities not notified by OUPS and Choice One Engineering, prior to field exploration. During field exploration, PSI utilized signs, cones, and flaggers, for traffic control. During the drilling operation, at least one lane of traffic remained open.

3.0 EXPLORATION

3.1 Historical Borings Referenced

No historical boring information was available within the project limits.

3.2 Subsurface Exploration

The subsurface conditions at the site were explored with a total of eight (8) soil test borings for the proposed roadway reconstruction and drilled to depths of about 8.5 feet each below the existing surface grades. The approximate boring locations are shown on the Boring Location Plans presented in the *Appendix* of this report. The locations of test borings were selected, and field located by PSI. The table below shows the specific test boring locations and depths:

TABLE 1- BORING LOCATION & DEPTH

Boring	Structure	Sta #	Offset & Direction	Surface Elevation (MSL)	Boring Depth (Ft)
B-001-0-21	Roadway	35+47	8’ LT	782.30	8.5
B-002-0-21	Roadway	39+32	5’ LT	781.90	8.5
B-003-0-21	Roadway	43+47	9’ LT	781.60	8.5
B-00-4-021	Roadway	47+51	8’ LT	781.10	8.5
B-005-0-21	Roadway	51+29	7’ LT	782.40	8.5
B-006-0-21	Roadway	55+49	6’ LT	782.20	8.5
B-007-0-21	Roadway	59+02	5’ LT	781.00	8.5
B-008-0-21	Roadway	62+94	10’ LT	781.10	8.5

Please note that all borings were conducted in the north lane due to significant utility interference in the south lane.

The borings were advanced utilizing 3¼ inch inside diameter, hollow-stem auger drilling methods. Soil samples were routinely obtained during the drilling process. Select soil samples were later tested in the laboratory to obtain soil material properties for the pavement recommendations. The split spoon sampling procedures used during this exploration are in basic accordance with Ohio Department of Transportation Specifications for Subsurface Exploration section 303.3.

3.3 Laboratory Testing

The soil samples obtained during the field exploration were transported to the laboratory and visually examined. The soil samples obtained from the drilling operation were tested for moisture content (AASHTO T-265), sulfates (ASTM D2974), liquid limits (AASHTO T-89), plastic limits (AASHTO T-90), grain size analyses (AASHTO T-88) and sulfate contents (TEX-145). The samples were classified in general accordance with the ODOT Specifications for Subsurface Investigations, Classification of Soil. Descriptions and lab test data of the soils encountered in the test boring is provided on the Boring Log included in the Appendix. Groundwater conditions, standard penetration resistances, and other pertinent information are also included. The remaining soil samples will be retained at our office for 60 days from the date of this report and then discarded.

4.0 FINDINGS

4.1 Subsurface Conditions

SURFACE: Asphalt surface cover was encountered at the eight (8) test boring locations ranging in thickness between approximately 3.5 to 5.0 inches underlain by granular base materials ranging in thickness between approximately 5.0 to 6.0 inches.

NATURAL SOILS: Underlying the asphalt pavement and granular base materials, natural soils were encountered extending to depths of about 8.5 feet below existing site grades. The natural soils consisted of Sandy Silt (A-4a), Silty and Clay (A-6a), Silty Clay (A-6b), and Clay (A-7-6). The natural soils exhibited moisture contents of about 14 to 38 percent. The subgrade cohesive soils exhibited a medium stiff to hard consistency based on the Standard Penetration tests.

The preceding subsurface descriptions are generalized to highlight the major soil strata encountered during the exploration. The boring logs included in the Attachments should be reviewed for specific information at individual boring locations. The strata shown on the logs represent the conditions only at the actual boring locations. Variations may occur and should be expected between boring locations. The strata represent the approximate boundaries between subsurface materials, and the actual transition may be gradual.

4.2 Groundwater Conditions

At the time of the site fieldwork (February 11, 2021 through February 12, 2021), groundwater was encountered during drilling at the test borings B-001-0-21 and B-004-0-21 at depths of approximately 6.3 to 6.5 feet beneath the existing surface grades. No water was noted upon competition of drilling at any of the test boring locations. However, free groundwater levels fluctuate seasonally as a function of rainfall and the infiltration rate of the soil. Therefore, at a time of year different from the time of drilling, there is the possibility of a considerable change in the water table, or the occurrence of water where not previously encountered. Accordingly, we recommend that the contractor measure the actual groundwater levels (if encountered) at the time of construction to assess groundwater impact on the construction procedures.

5.0 ANALYSES AND RECOMMENDATIONS

5.1 Site Preparation and Earthwork Operations

Prior to the initiation of any earthwork operations, general site area clearing should be carried out. The site work should follow the general guidelines outlined in the ODOT CMS "Clearing and Grubbing".

Areas of the site where the new pavement will be located, shall have all existing asphalt, granular base materials, highly organic soils, excessively soft/loose or wet soils, and all other deleterious materials, completely removed from the proposed construction areas.

Careful visual control of clearing and stripping operations should be maintained to assure that all deleterious materials are removed. The extent to which deleterious materials are to be removed should be determined in the field following visual observation of the exposed subgrades. Subsequent to the site area clearing and stripping, all structural subgrade sectors should be subjected to critical proof-rolling operations and careful observation of subgrade reactions. Any sectors that exhibit instability are to be undercut or stabilized to such depths as may be necessary to assure satisfactory supporting properties. The undercut areas shall be backfilled with approved fill materials, placed, and compacted under carefully controlled procedures as described below.

All areas that are to receive structural fill should be filled on a critically controlled, lift-by-lift basis, employing select, clean, non-organic materials. All structural fills should be verified and approved by the project's geotechnical engineer prior to placement. Individual fill lifts are to be of maximum 8-inch loose measure thickness and each individual lift is to be adjusted in moisture content to within plus or minus two 2 percent of the optimum moisture content, as determined in accordance with ASTM Standard Proctor Method D-698. However, for granular fill materials, the moisture-density compaction curve for the fill will not be sensitive to placement moisture. Accordingly, the density defined for an energy corresponding to ASTM D-698 should be used for control of fill placement. The fill materials are to be systematically compacted such that an in-place density of at least 98 percent of the maximum laboratory density as determined in accordance with the above-referenced ASTM method is achieved. Specifications should require that the resulting subgrade and fill materials' densities be verified by test measurements conducted by the geotechnical engineer.

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.

ODOT's guidelines for geotechnical engineering titled GB-1: Plan Subgrades dated January 15, 2021 and GB-1: Subgrade Analysis Spreadsheet dated January 22, 2019 has been utilized as a guideline for development of the recommendations included in this report. Per ODOT requirements stated above, typically materials with in-place moisture contents (Mc) exceeding the optimum moisture content by 3 percent or more, high liquid limits (>65), or materials exhibiting low SPT N-Values ("blow counts") (HP), require subgrade undercutting or stabilization to obtain adequate pavement support.

The analysis was conducted using existing grades, proposed grades, and the provided pavement section thickness of approximately 19 inches. Based upon the GB-1 analysis, these issues resulted in fourteen (14) samples classified as "unstable" with one (1) sample classified as "unsuitable" and the following two (2) options were indicated by the GB-1 analysis. Existing underground utilities were also taken into consideration when preparing the following recommendations.

Option 1 – Excavate and replace approximately 12 inches of "unstable/unsuitable" subgrade material from the top of proposed subgrade. ODOT 712.09 Geotextile Fabric Type D should be utilized at the bottom of the undercut areas for the undercut/replacement option. The undercut areas can be replaced with compacted 703.16.C granular Type B fill materials.

Option 2 – Chemical Stabilization of the subgrade with lime to a depth of 14 inches from the top of proposed subgrade. As an alternative to undercut and replacement, chemical stabilization through the addition of lime may be utilized to remediate the unstable subgrade soils. If this method of stabilization is selected, the area must have any and all existing surface materials, highly organic soils, excessively soft/loose or wet soils, and all other deleterious materials, completely removed, as stated above. After stripping and grubbing, the entire roadway should be brought to design subgrade elevation, including the placement and compaction of structural fill soils, per the previously stated ODOT specifications. The entire roadway subgrade should then be lime stabilized to a depth of 14 inches below design subgrade elevation, per ODOT Item 206.

Please refer to the Appendix, table titled Subgrade Analysis, for the exact recommended depths and approximate limits of the undercutting and stabilization.

5.2 Pavement Recommendations

Pavement design for the roadway will include proper preparation of subgrade sectors, employing procedures outlined in the previous section titled *Site Preparation and Earthwork Construction,* careful design of the pavement area drainage systems and utilization of an aggregate base course with an asphalt concrete or concrete surface course.

Based on the subsurface formations encountered at the test boring locations, an average CBR value of five (5) can be used for the design of the proposed pavement, provided that the subgrade materials comply with ODOT CMS Item 203.

Inclusion of adequate surface and subsurface drainage systems along and below the roadway is considered imperative in order to maintain the compacted subgrades as close to optimum moisture conditions as possible. A subsurface drainage system consisting of perforated drainpipes bedded in and backfilled with suitable filter materials should be installed along either side of the trail at an elevation, such that groundwater will be maintained a minimum of 18-inches below the subgrade. 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 drainage ditches.

Pavement may be placed after the subgrade has been properly compacted, fine graded and proof rolled. The work should be done in accordance with State Department of Transportation guidelines.

5.3 Excavations

In Federal Register, Volume 54, No. 209 (October 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its "Construction Standards for Excavations, 29 CFR, Part 1926, Subpart P." This document was issued to better ensure the safety of workers entering trenches or excavations. It is mandated by this federal regulation that all excavations, whether they be utility trenches, basement excavations or foundation excavations, be constructed in accordance with the new OSHA guidelines. It is our understanding that these regulations are being strictly enforced. If they are not followed closely, the owner and the contractor could be liable for substantial penalties.

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.

We are providing this information solely as a service to our client. PSI is not assuming responsibility for construction site safety or the contractor's activities; such responsibility is not being implied and should not be inferred. 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, inasmuch as this load may cause a sudden collapse of the embankment.

5.4 Weather Considerations

The soils encountered at this site are known to be sensitive to disturbances caused by construction traffic and to changes in moisture content. During wet weather periods, increases in the moisture content of the soil can cause significant reduction in the soil strength and support capabilities. Care should be exercised during the grading operations at the site. Due to the fine-grained nature of the surficial soils, the traffic of heavy equipment, including heavy compaction equipment, may very well create pumping and a general deterioration of those soils in the presence of water. Therefore, the grading should, if at all possible, be performed during a dry season. A layer of crushed stone may be required to allow the movement of construction traffic over the site during the rainy season. The contractor should maintain positive site drainage and if wet/pumping conditions occur, the contractor will be responsible to over excavate the wet soils and replace them with a properly compacted engineered fill. During wet seasons, limestone stabilization may be required to place engineer fill.

6.0 GEOTECHNICAL RISK

The concept of risk is an important aspect of the geotechnical evaluation. The primary reason for this is that the analytical methods used to develop geotechnical recommendations do not comprise an exact science. Site exploration identifies actual subsurface conditions only at those points where samples are taken. A geotechnical report is based on conditions that existed at the time of the subsurface exploration. The analytical tools which geotechnical engineers use are generally empirical and must be used in conjunction with engineering judgment and experience. Therefore, the solutions and recommendations presented in the geotechnical evaluation should not be considered risk-free and, more importantly, are not a guarantee that the interaction between the soils and the proposed structure will perform as planned. The engineering recommendations presented in the preceding sections constitute PSI's professional estimate of those measures that are necessary for the proposed structure to perform according to the proposed design based on the information generated and referenced during this evaluation, and PSI's experience in working with these conditions.

7.0 REPORT LIMITATIONS

The recommendations submitted in this report are based on the available subsurface information developed by PSI and the design information furnished by Choice One Engineering for the proposed project. If there are any revisions to the plans for the proposed project, or if deviations from the subsurface conditions noted in this report are encountered during construction, PSI should be retained to determine if changes in the recommendations are required. If PSI is not retained to perform these functions, PSI will not be responsible for the impact of those conditions on the geotechnical recommendations for the project.

The Geotechnical Engineer warrants that the findings, recommendations, specifications, or professional advice contained herein, have been presented after being prepared in accordance with generally accepted professional engineering practice in the fields of foundation engineering, soil mechanics and engineering geology. No other warranties are implied or expressed.

After the plans and specifications are complete, it is recommended that PSI be provided the opportunity to review the final design drawings and specifications, in order to verify that the earthwork recommendations are properly interpreted and implemented. At that time, it may be necessary to submit supplementary recommendations. This report has been prepared for the exclusive use of Choice One Engineering for the specific application to the reconstruction of Leeson Avenue, between Rose Drive and South Fulton Street, in the City of Van Wert, Van Wert County, Ohio.

APPENDIX

Boring Location Plans

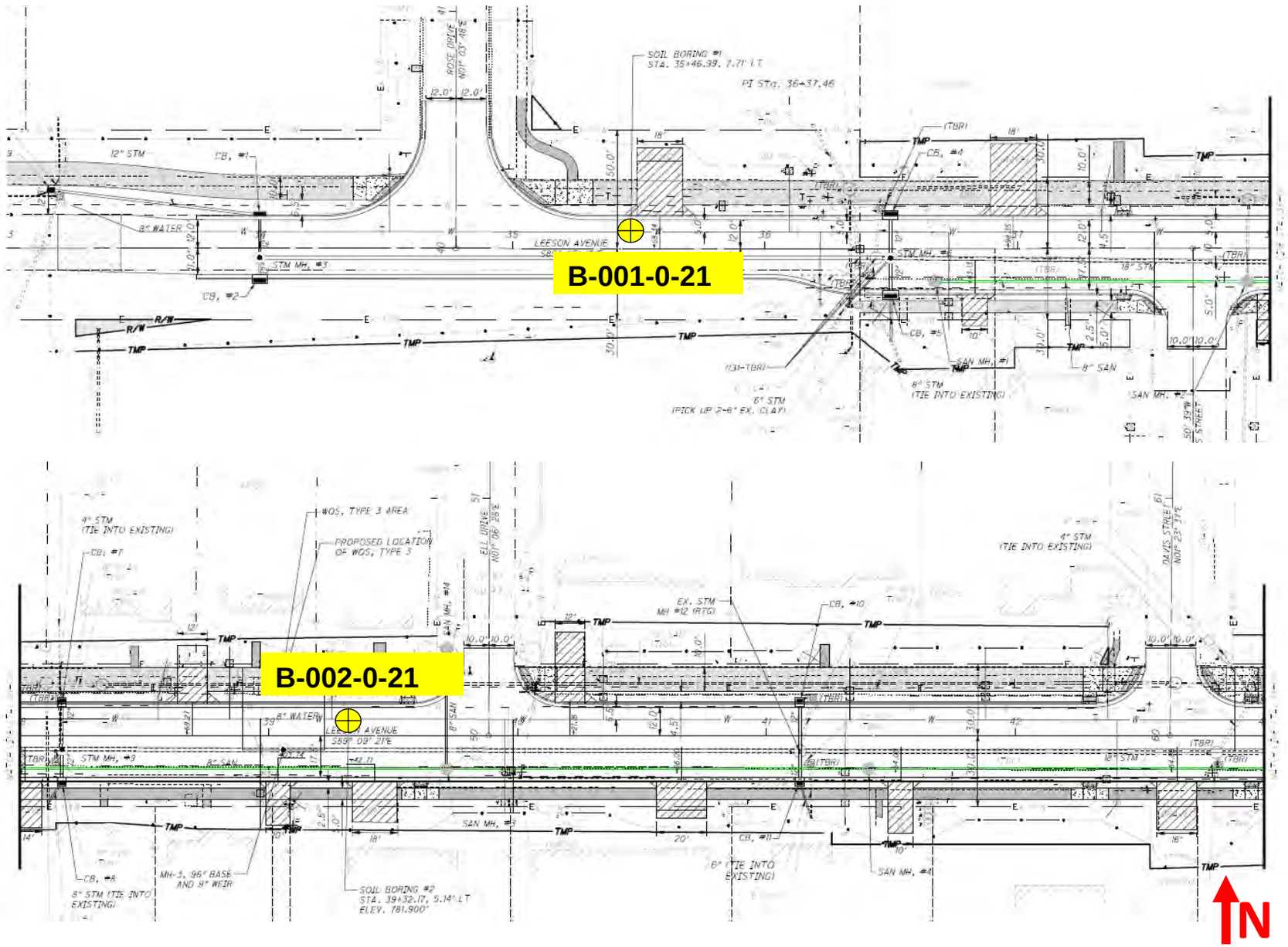
ODOT Boring Logs (B-001-0-21 thru B-008-0-21) (8)

Soil Investigation Summary (GB-1 Analysis)

ODOT Quick Reference for Visual Descriptions of Soils

ODOT Classification of Soils

Professional Service Industries



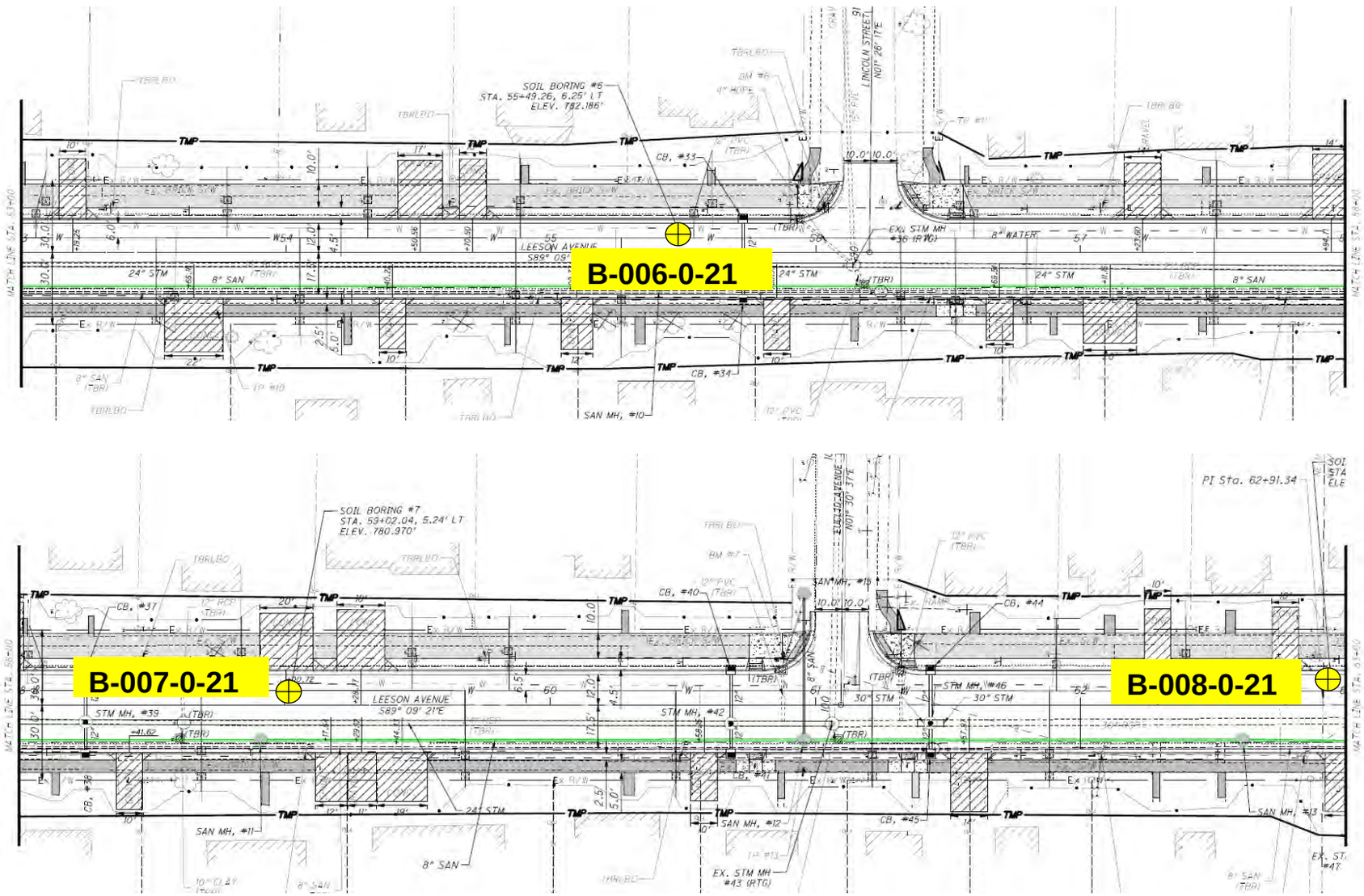
intertek psi

Boring Location Plan
VAN - Leeson Avenue
Between Rose Dr. & S. Fulton St.
Van Wert, Van Wert County, Ohio

Drawings from Choice One Engineering

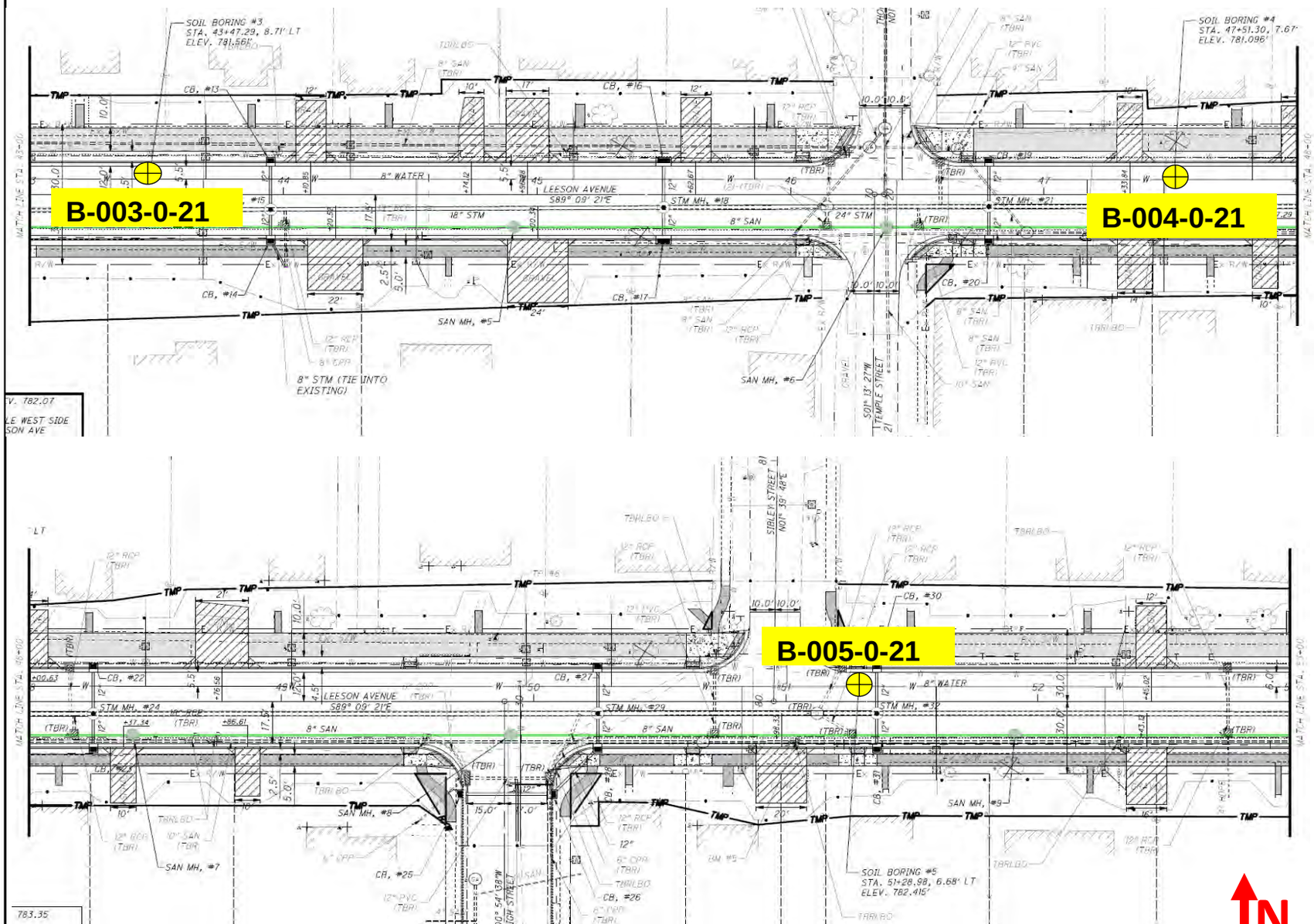
Project No. 01252509
PID No.: 113907

Professional Service Industries



intertek psi	**Boring Location Plan** VAN - Leeson Avenue Between Rose Dr. & S. Fulton St. Van Wert, Van Wert County, Ohio	Drawings from Choice One Engineering **Project No. 01252509** **PID No.: 113907**

Professional Service Industries



intertek psi

Boring Location Plan
VAN - Leeson Avenue
Between Rose Dr. & S. Fulton St.
Van Wert, Van Wert County, Ohio

Drawings from Choice One Engineering

Project No. 01252509
PID No.: 113907

PROJECT: VAN - LEESON AVE.	DRILLING FIRM / OPERATOR: PSI / JON	DRILL RIG: CME 45C ATV 2007	STATION / OFFSET: 35+47, 8' LT.	EXPLORATION ID B-001-0-21
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: PSI / CHAD	HAMMER: AUTOMATIC HAMMER	ALIGNMENT: C/L of Leeson Ave.	
PID: 113907	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 8/18/20	ELEVATION: 782.3 (MSL) EOB: 8.5 ft.	PAGE 1 OF 1
SFN: START: 2/11/21 2/11/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 86.8	COORD: 443983.6950 N, 1387450.6470 E	

END: *MATERIAL DESCRIPTION AND NOTES*	ELEV. 782.3	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
ASPHALT	781.9																		
AGGREGATE BASE	781.4																		
STIFF, GRAY, **CLAY**, LITTLE SAND, TRACE GRAVEL, DAMP	779.8	1	8 4 4	12	56	SS-1	4.50	1	5	13	34	47	47	20	27	18	A-7-6 (16)	-	
MEDIUM STIFF, MOTTLED BROWN AND GRAY, **CLAY**, TRACE SAND, MOIST	775.3	2 3 4 5	2 2 3	7	50	SS-2	2.00	0	1	7	27	65	59	19	40	32	A-7-6 (20)	-	
			2 2 3	7	44	SS-3	2.00	-	-	-	-	-	-	-	-	24	A-7-6 (V)	-	
		W 775.8 6	2 2 3	7	44	SS-4	1.00	-	-	-	-	-	-	-	-	29	A-7-6 (V)	-	
VERY STIFF, BROWN, **SILTY CLAY**, LITTLE SAND, TRACE GRAVEL, DAMP	773.8	7 8 EOB	2 5 8	19	56	SS-5	4.50	8	6	11	26	49	34	18	16	17	A-6b (10)	-	

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: BACKFILLED WITH SOIL CUTTINGS

STANDARD ODOT LOG W/ SULFATES (8.5 X 11) - OH DOT.GDT - 4/26/22 08:05 - 00 - ODOT V2

PROJECT: VAN - LEESON AVE.	DRILLING FIRM / OPERATOR: PSI / JON	DRILL RIG: CME 45C ATV 2007	STATION / OFFSET: 39+32, 5' LT.
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: PSI / CHAD	HAMMER: AUTOMATIC HAMMER	ALIGNMENT: C/L of Leeson Ave.
PID: 113907	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 8/18/20	ELEVATION: 781.9 (MSL) EOB: 8.5 ft.
SFN: START: 2/12/21 2/12/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 86.8	COORD: 443975.3430 N, 1387835.7360 E

EXPLORATION ID B-002-0-21

PAGE 1 OF 1

END: MATERIAL DESCRIPTION AND NOTES	ELEV. 781.9	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
ASPHALT	781.6																		
AGGREGATE BASE	781.1																		
STIFF, BROWN, **CLAY**, TRACE SAND, DAMP		1	5 4 5	13	67	SS-1	3.50	0	1	3	32	64	55	21	34	23	A-7-6 (19)	-	
		2																	
		3	3 2 4	9	50	SS-2	2.00	-	-	-	-	-	-	-	-	23	A-7-6 (V)	1068-	
	777.9	4																	
STIFF TO HARD, BROWN, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, DAMP		5	3 5 5	14	78	SS-3	4.50	4	6	11	27	52	31	19	12	17	A-6a (9)	-	
		6	4 5 7	17	89	SS-4	4.50	-	-	-	-	-	-	-	-	19	A-6a (V)	-	
		7																	
		8	5 8 14	32	94	SS-5	4.50	-	-	-	-	-	-	-	-	16	A-6a (V)	-	
	773.4	EOB																	

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: BACKFILLED WITH SOIL CUTTINGS

PROJECT: VAN - LEESON AVE.	DRILLING FIRM / OPERATOR: PSI / JON	DRILL RIG: CME 45C ATV 2007	STATION / OFFSET: 43+47, 9' LT.
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: PSI / CHAD	HAMMER: AUTOMATIC HAMMER	ALIGNMENT: C/L of Leeson Ave.
PID: 113907	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 8/18/20	ELEVATION: 781.6 (MSL) EOB: 8.5 ft.
SFN: START: 2/11/21 2/11/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 86.8	COORD: 443972.8000 N, 1388250.8620 E

EXPLORATION ID B-003-0-21

PAGE 1 OF 1

END: *MATERIAL DESCRIPTION AND NOTES*	ELEV. 781.6	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
ASPHALT	781.2																		
AGGREGATE BASE	780.8																		
STIFF, GRAY, **CLAY**, TRACE SAND, DAMP		1	5 4 5	13	78	SS-1	4.00	0	1	4	29	66	65	20	45	23	A-7-6 (20)	-	
@2.5'; MOTTLED BROWN AND GRAY	777.6	2 3	3 3 3	9	67	SS-2	3.00	-	-	-	-	-	-	-	-	30	A-7-6 (V)	1528	
STIFF, MOTTLED BROWN AND GRAY, **SILTY CLAY**, LITTLE SAND, TRACE GRAVEL, DAMP	774.6	4 5	2 4 5	13	78	SS-3	4.50	5	6	12	31	46	38	20	18	22	A-6b (11)	-	
		6	4 4 3	10	67	SS-4	4.50	-	-	-	-	-	-	-	-	21	A-6b (V)	-	
VERY STIFF, BROWN, **SILT AND CLAY**, SOME SAND, TRACE GRAVEL, DAMP	773.1	7 8 EOB	3 5 6	16	83	SS-5	4.50	2	9	13	33	43	28	16	12	18	A-6a (9)	-	

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: BACKFILLED WITH SOIL CUTTINGS

PROJECT: VAN - LEESON AVE.	DRILLING FIRM / OPERATOR: PSI / JON	DRILL RIG: CME 45C ATV 2007	STATION / OFFSET: 47+51, 8' LT.
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: PSI / CHAD	HAMMER: AUTOMATIC HAMMER	ALIGNMENT: C/L of Leeson Ave.
PID: 113907	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 8/18/20	ELEVATION: 781.1 (MSL) EOB: 8.5 ft.
SFN: START: 2/11/21 2/11/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 86.8	COORD: 443965.8010 N, 1388654.8170 E

EXPLORATION ID B-004-0-21

PAGE 1 OF 1

END: *MATERIAL DESCRIPTION AND NOTES*	ELEV. 781.1	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
ASPHALT	780.8																		
AGGREGATE BASE	780.3																		
STIFF, MOTTLED BROWN AND GRAY, **CLAY**, TRACE TO LITTLE SAND, DAMP		1	4 5 5	14	67	SS-1	3.50	0	2	8	32	58	59	22	37	22	A-7-6 (20)	-	
		2																	
		3	3 3 3	9	67	SS-2	3.00	-	-	-	-	-	-	-	-	24	A-7-6 (V)	1220	
		4																	
		5	2 3 5	12	61	SS-3	4.00	-	-	-	-	-	-	-	-	26	A-7-6 (V)	-	
	775.6																		
MEDIUM STIFF, GRAY WITH BROWN, **CLAY**, LITTLE SAND, TRACE GRAVEL, WET		6 W 774.8	2 2 2	6	67	SS-4	1.50	3	3	10	30	54	54	21	33	38	A-7-6 (19)	-	
	774.1	7																	
HARD, BROWN, **SILTY CLAY**, LITTLE SAND, TRACE GRAVEL, DAMP			7 12 16	41	89	SS-5	4.50	5	6	11	30	48	34	18	16	14	A-6b (10)	-	
	772.6	8 EOB																	

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: BACKFILLED WITH SOIL CUTTINGS

PROJECT: VAN - LEESON AVE.	DRILLING FIRM / OPERATOR: PSI / JON	DRILL RIG: CME 45C ATV 2007	STATION / OFFSET: 51+29, 7' LT.
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: PSI / CHAD	HAMMER: AUTOMATIC HAMMER	ALIGNMENT: C/L of Leeson Ave.
PID: 113907	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 8/18/20	ELEVATION: 782.4 (MSL) EOB: 8.5 ft.
SFN: START: 2/11/21 2/11/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 86.8	COORD: 443959.2560 N, 1389032.4420 E

EXPLORATION ID B-005-0-21

PAGE 1 OF 1

END: *MATERIAL DESCRIPTION AND NOTES*	ELEV. 782.4	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
ASPHALT	782.1																		
AGGREGATE BASE	781.6																		
STIFF TO VERY STIFF, BROWN, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, DAMP		1	6 4 5	13	72	SS-1	4.50	2	5	10	35	48	31	17	14	17	A-6a (10)	-	
		2																	
		3	4 5 8	19	94	SS-2	4.50	-	-	-	-	-	-	-	-	17	A-6a (V)	1366	
		4																	
		5	5 6 7	19	78	SS-3	4.50	-	-	-	-	-	-	-	-	17	A-6a (V)	-	
	776.9																		
VERY STIFF, BROWN AND GRAY, **SANDY SILT**, LITTLE GRAVEL, MOIST		6	4 6 8	20	89	SS-4	4.50	10	8	11	33	38	27	17	10	17	A-4a (7)	-	
	775.4	7																	
VERY STIFF, BROWN, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, DAMP			5 8 10	26	94	SS-5	4.50	-	-	-	-	-	-	-	-	16	A-6a (V)	-	
	773.9	8 EOB																	

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: BACKFILLED WITH SOIL CUTTINGS

PROJECT: VAN - LEESON AVE.	DRILLING FIRM / OPERATOR: PSI / JON	DRILL RIG: CME 45C ATV 2007	STATION / OFFSET: 55+49, 6' LT.
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: PSI / CHAD	HAMMER: AUTOMATIC HAMMER	ALIGNMENT: C/L of Leeson Ave.
PID: 113907	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 8/18/20	ELEVATION: 782.2 (MSL) EOB: 8.5 ft.
SFN: START: 2/12/21 2/12/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 86.8	COORD: 443952.6290 N, 1389452.6640 E

EXPLORATION ID B-006-0-21

PAGE 1 OF 1

END: *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
ASPHALT	782.2 / 781.9																		
AGGREGATE BASE	781.4																		
STIFF, MOTTLED BROWN AND GRAY, **CLAY**, TRACE TO LITTLE SAND, TRACE GRAVEL, DAMP		1	6 4 4	12	44	SS-1	4.00	2	2	7	32	57	-	-	-	22	A-7-6 (V)	-	
		2																	
		3	3 3 5	12	72	SS-2	4.00	1	5	10	31	53	43	20	23	21	A-7-6 (14)	-	
	778.2	4																	
VERY STIFF, BROWN, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, DAMP		5	3 5 7	17	94	SS-3	4.50	6	5	10	26	53	32	18	14	18	A-6a (10)	-	
		6	5 7 9	23	94	SS-4	4.50	-	-	-	-	-	-	-	-	15	A-6a (V)	-	
		7	5 8 10	26	94	SS-5	4.50	-	-	-	-	-	-	-	-	18	A-6a (V)	-	
	773.7	8 EOB																	

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: BACKFILLED WITH SOIL CUTTINGS

PROJECT: VAN - LEESON AVE.	DRILLING FIRM / OPERATOR: PSI / JON	DRILL RIG: CME 45C ATV 2007	STATION / OFFSET: 59+02, 5' LT.
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: PSI / CHAD	HAMMER: AUTOMATIC HAMMER	ALIGNMENT: C/L of Leeson Ave.
PID: 113907	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 8/18/20	ELEVATION: 781.0 (MSL) EOB: 8.5 ft.
SFN: START: 2/12/21 2/12/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 86.8	COORD: 443946.4230 N, 1389805.3920 E

EXPLORATION ID B-007-0-21

PAGE 1 OF 1

END: *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
ASPHALT	780.7																		
AGGREGATE BASE	780.2																		
STIFF, MOTTLED BROWN AND GRAY, **CLAY**, TRACE SAND, DAMP		1	4 3 5	12	72	SS-1	3.00	0	2	8	30	60	64	18	46	23	A-7-6 (20)	-	
		2																	
		3	2 3 3	9	50	SS-2	2.50	-	-	-	-	-	-	-	-	25	A-7-6 (V)	1497	
@4.0'; MEDIUM STIFF		4																	
		5	2 2 3	7	50	SS-3	3.00	-	-	-	-	-	-	-	-	26	A-7-6 (V)	-	
	775.5																		
STIFF TO VERY STIFF, BROWN, **SILT AND CLAY**, LITTLE TO SOME SAND, TRACE GRAVEL, DAMP		6	2 4 5	13	67	SS-4	4.50	3	6	11	29	51	31	19	12	18	A-6a (9)	-	
		7																	
		8	4 6 9	22	94	SS-5	4.50	-	-	-	-	-	-	-	-	17	A-6a (V)	-	
	772.5	EOB																	

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: BACKFILLED WITH SOIL CUTTINGS

PROJECT: VAN - LEESON AVE.	DRILLING FIRM / OPERATOR: PSI / JON	DRILL RIG: CME 45C ATV 2007	STATION / OFFSET: 62+94, 10' LT.
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: PSI / CHAD	HAMMER: AUTOMATIC HAMMER	ALIGNMENT: C/L of Leeson Ave.
PID: 113907	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 8/18/20	ELEVATION: 781.1 (MSL) EOB: 8.5 ft.
SFN: START: 2/12/21 2/12/21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 86.8	COORD: 443945.3970 N, 1309197.6900 E

EXPLORATION ID B-008-0-21

END: 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
ASPHALT	780.8																		
AGGREGATE BASE	780.3																		
STIFF, BROWN, **SILTY CLAY**, SOME SAND, TRACE GRAVEL, DAMP	778.6	1 2	9 4 6	14	39	SS-1	-	1	7	15	26	51	-	-	-	18	A-6b (V)	-	
VERY STIFF, BROWN AND GRAY, **CLAY**, LITTLE SAND, TRACE GRAVEL, DAMP	777.1	3 4	5 7 9	23	78	SS-2	4.50	1	4	10	29	56	42	17	25	19	A-7-6 (14)	-	
VERY STIFF, BROWN, **SILTY CLAY**, LITTLE SAND, TRACE GRAVEL, DAMP	772.6	5 6 7 8 EOB	5 8 9	25	94	SS-3	4.50	6	6	10	30	48	32	19	13	16	A-6b (9)	-	
			5 7 9	23	100	SS-4	4.50	-	-	-	-	-	-	-	-	18	A-6b (V)	-	
			5 8 10	26	89	SS-5	4.50	-	-	-	-	-	-	-	-	18	A-6b (V)	-	

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: BACKFILLED WITH SOIL CUTTINGS

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.)

Leeson Avenue Reconstruction
113907

STATION 35+00 TO STATION 62+00

INTERTEK PSI

Prepared By: Raymond France
Date prepared: Tuesday, April 26th, 2021

Raymond France
2341 Spencerville Road
Lima, Ohio 45805
<CONTACT ADDRESS>
419.999.5660
tiffani.joseph@intertek.com

NO. OF BORINGS: 8

#	Boring ID	Alignment	Station	Offset	Dir	Drill Rig	ER	Boring EL.	Proposed Subgrade EL	Cut Fill
1	B-001-0-21	Roadway	35+47	8'	LT	CME45C ATV 2007	87	782.30	779.98	2.3 C
2	B-002-0-21	Roadway	39+32	5'	LT	CME45C ATV 2007	87	781.90	780.54	1.4 C
3	B-003-0-21	Roadway	43+47	9'	LT	CME45C ATV 2007	87	781.60	779.84	1.8 C
4	B-004-0-21	Roadway	47+51	8'	LT	CME45C ATV 2007	87	781.10	779.40	1.7 C
5	B-005-0-21	Roadway	51+29	7'	LT	CME45C ATV 2007	87	782.40	781.24	1.2 C
6	B-006-0-21	Roadway	55+49	6'	LT	CME45C ATV 2007	87	782.20	780.95	1.3 C
7	B-007-0-21	Roadway	59+02	5'	LT	CME45C ATV 2007	87	781.00	779.45	1.5 C
8	B-008-0-21	Roadway	62+94	10'	LT	CME45C ATV 2007	87	781.10	779.62	1.5 C

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	1	1.0	2.5	-1.3	0.2	12		4.5	47	20	27	34	47	81	18	18	A-7-6	16						16"
	001-0	2	2.5	4.0	0.2	1.7	7		2	59	19	40	27	65	92	32	18	A-7-6	20			N_{60} & Mc		15"	204 Geotextile
	21	3	4.0	5.5	1.7	3.2	7		2							24	18	A-7-6	16			N_{60} & Mc			
		4	5.5	7.0	3.2	4.7	7	7	1							29	18	A-7-6	16						
2	B	1	1.0	2.5	-0.4	1.1	13		3.5	55	21	34	32	64	96	23	18	A-7-6	19			N_{60} & Mc		12"	12"
	002-0	2	2.5	4.0	1.1	2.6	9		2							23	18	A-7-6	16	1068		N_{60} & Mc			204 Geotextile
	21	3	4.0	5.5	2.6	4.1	14		4.5	31	19	12	27	52	79	17	14	A-6a	9						
		4	5.5	7.0	4.1	5.6	17	9	4.5							19	14	A-6a	10						
3	B	1	1.0	2.5	-0.8	0.7	13		4	65	20	45	29	66	95	23	18	A-7-6	20		High LL	N_{60} & Mc	9"	12"	12"
	003-0	2	2.5	4.0	0.7	2.2	9		3							30	18	A-7-6	16	1525		N_{60} & Mc		12"	204 Geotextile
	21	3	4.0	5.5	2.2	3.7	13		4.5	36	20	16	31	46	77	22	16	A-6b	10						
		4	5.5	7.0	3.7	5.2	10	9	4.5							21	16	A-6b	16						
4	B	1	1.0	2.5	-0.7	0.8	14		3.5	59	22	37	32	58	90	22	19	A-7-6	20			N_{60} & Mc		12"	12"
	004-0	2	2.5	4.0	0.8	2.3	9		3							24	18	A-7-6	16	1220		N_{60} & Mc		12"	204 Geotextile
	21	3	4.0	5.5	2.3	3.8	12		4							26	18	A-7-6	16						
		4	5.5	7.0	3.8	5.3	6	6	1.5	54	21	33	30	54	84	38	18	A-7-6	19						
5	B	1	1.0	2.5	-0.2	1.3	13		4.5	31	17	14	35	48	83	17	14	A-6a	10			N_{60} & Mc		12"	12"
	005-0	2	2.5	4.0	1.3	2.8	19		4.5							17	14	A-6a	10	1366		Mc			204 Geotextile
	21	3	4.0	5.5	2.8	4.3	19		4.5							17	14	A-6a	10						
		4	5.5	7.0	4.3	5.8	20	13	4.5	27	17	10	33	38	71	17	12	A-4a	7						
6	B	1	1.0	2.5	-0.3	1.3	12		4				32	57	89	22	18	A-7-6	16			N_{60} & Mc		12"	12"
	006-0	2	2.5	4.0	1.3	2.8	12		4	43	20	23	31	53	84	21	18	A-7-6	14			N_{60} & Mc			204 Geotextile
	21	3	4.0	5.5	2.8	4.3	17		4.5	32	18	14	26	53	79	18	14	A-6a	10						
		4	5.5	7.0	4.3	5.8	23	12	4.5							15	14	A-6a	10						
7	B	1	1.0	2.5	-0.5	1.0	12		3	64	18	46	30	60	90	23	18	A-7-6	20			N_{60} & Mc		12"	12"
	007-0	2	2.5	4.0	1.0	2.5	9		2.5							25	18	A-7-6	16	1497		N_{60} & Mc		12"	204 Geotextile
	21	3	4.0	5.5	2.5	4.0	7		3							26	18	A-7-6	16						
		4	5.5	7.0	4.0	5.5	13	7	4.5	31	19	12	29	51	80	18	14	A-6a	9						
8	B	1	1.0	2.5	-0.5	1.0	14						26	51	77	18	16	A-6b	16						
	008-0	2	2.5	4.0	1.0	2.5	23		4.5	42	17	25	29	56	85	19	18	A-7-6	14						
	21	3	4.0	5.5	2.5	4.0	25		4.5	32	19	13	30	48	78	16	16	A-6b	9						
		4	5.5	7.0	4.0	5.5	23	14	4.5							18	16	A-6b	16						

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.5 1/18/2019

PID: 113907

County-Route-Section: Leeson Avenue Reconstruction

No. of Borings: 8

Geotechnical Consultant: INTERTEK PSI

Prepared By: Raymond France

Date prepared: Tuesday, April 26th, 2021

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

Excavate and Replace Stabilization Options	
Global Geotextile Override(N60L):	12''
Override(HP):	0''
Global Geogrid Override(N60L):	0''
Override(HP):	0''

Design CBR	4

% Samples within 6 feet of subgrade			
$N_{60} \leq 5$	0%	HP ≤ 0.5	0%
$N_{60} < 12$	31%	0.5 < HP ≤ 1	3%
$12 \leq N_{60} < 15$	41%	1 < HP ≤ 2	13%
$N_{60} \geq 20$	16%	HP > 2	81%
M+	44%		
Rock	0%		
Unsuitable	0%		

Excavate and Replace at Surface	
Average	11''
Maximum	16''
Minimum	0''

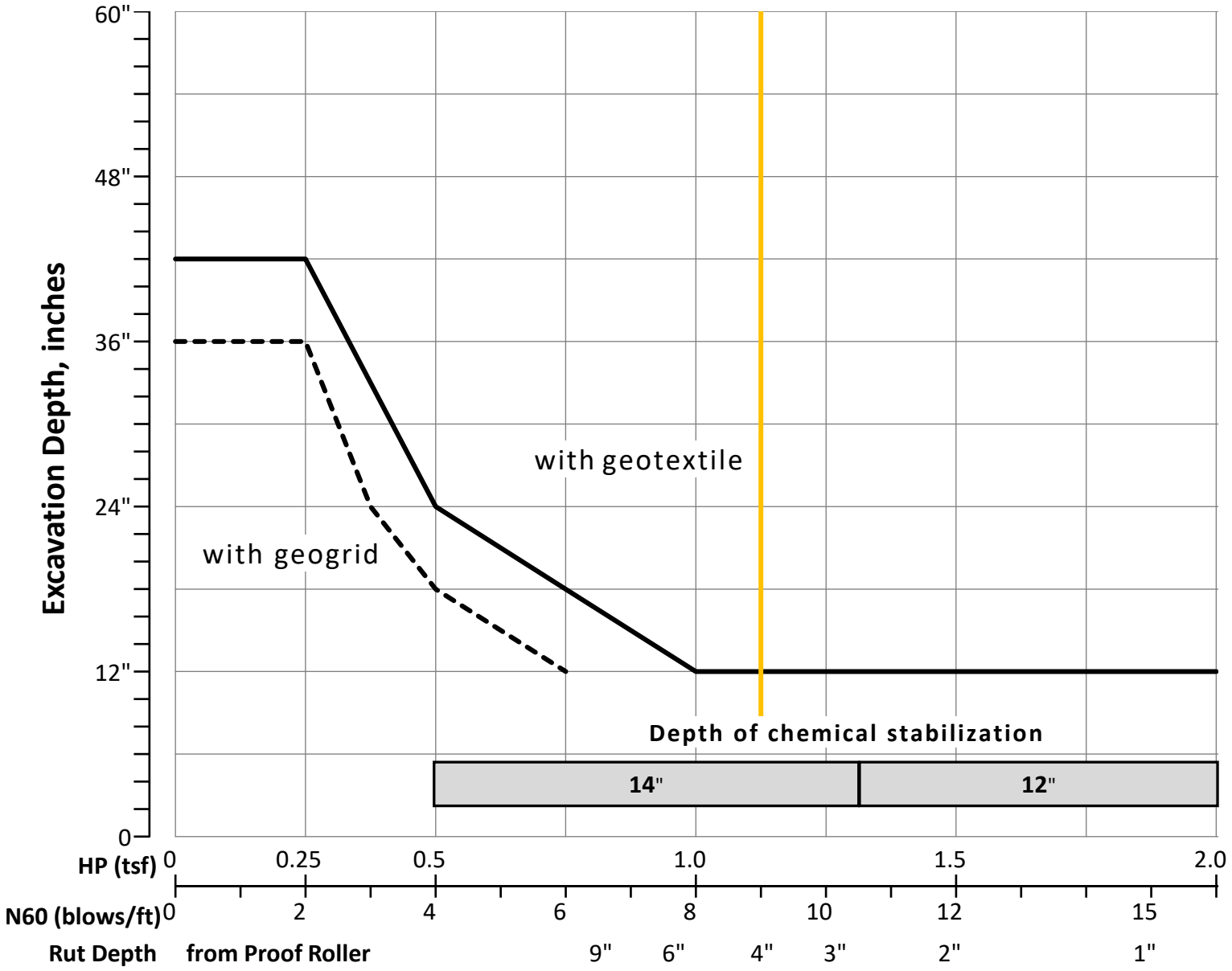
% Proposed Subgrade Surface	
Unstable & Unsuitable	65%
Unstable	61%
Unsuitable	4%

	N_{60}	N_{60L}	HP	LL	PL	PI	Silt	Clay	P 200	M_C	M_{OPT}	GI
Average	14	10	3.66	44	19	25	30	54	84	22	17	14
Maximum	25	14	4.50	65	22	46	35	66	96	38	19	20
Minimum	6	6	1.00	27	17	10	26	38	71	15	12	7

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	0	0	8	5	0	18	0	0	32
Percent	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%	25%	16%	0%	56%	0%	0%	100%
% Rock|Granular|Cohesive	0%	3%									97%								100%
Surface Class Count	0	0	0	0	0	0	0	0	0	0	0	0	4	3	0	16	0	0	23
Surface Class Percent	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	17%	13%	0%	70%	0%	0%	100%

GB1 Figure B – Subgrade Stabilization



OVERRIDE TABLE

Calculated Average	New Values	Check to Override
3.66	3.50	☑ HP

Average HP
Average N_{60}

APPENDIX A.1 - ODOT Quick Reference for Visual Description of Soils

1) STRENGTH OF SOIL:

Non-Cohesive (granular) Soils - Compactness	
Description	**Blows Per Ft.**
Very Loose	≤ 4
Loose	5 – 10
Medium Dense	11 – 30
Dense	31 – 50
Very Dense	> 50

2) COLOR :

If a color is a uniform color throughout, the term is single, modified by an adjective such as light or dark. If the predominate color is shaded by a secondary color, the secondary color procedes the primary color. If two major and distinct colors are swirled throughout the soil, the colors are modified by the term "mottled"

3) PRIMARY COMPONENT

Use **DESCRIPTION** from ODOT Soil Classification Chart on Back

Cohesive (fine grained) Soils - Consistency

Description	Qu (TSF)	Blows Per Ft.	Hand Manipulation
Very Soft	<0.25	<2	Easily penetrates 2" by fist
Soft	0.25-0.5	2 - 4	Easily penetrates 2" by thumb
Medium Stiff	0.5-1.0	5 - 8	Penetrates by thumb with moderate effort
Stiff	1.0-2.0	9 - 15	Readily indents by thumb, but not penetrate
Very Stiff	2.0-4.0	16 - 30	Readily indents by thumbnail
Hard	>4.0	>30	Indent with difficulty by thumbnail

4) COMPONENT MODIFIERS:

Description	Percentage By Weight
Trace	0% - 10%
Little	10% - 20%
Some	20% - 35%
"And"	35% -50%

5) Soil Organic Content

Description	% by Weight
Slightly Organic	2% - 4%
Moderately Organic	4% - 10%
Highly Organic	> 10%

6) Relative Visual Moisture

Description	Criteria	
	Cohesive Soil	**Non-cohesive Soils**
Dry	Powdery; Cannot be rolled; Water content well below the plastic limit	No moisture present
Damp	Leaves very little moisture when pressed between fingers; Crumbles at or before rolled to $^1/_8$"; Water content below plastic limit	Internal moisture, but no to little surface moisture
Moist	Leaves small amounts of moisture when pressed between fingers; Rolled to $^1/_8$" or smaller before crumbling; Water content above plastic limit to -3% of the liquid limit	Free water on surface, moist (shiny) appearance
Wet	Very mushy; Rolled multiple times to $^1/_8$" or smaller before crumbles; Near or above the liquid limit	Voids filled with free water, can be poured from split spoon.

CLASSIFICATION OF SOILS

Ohio Department of Transportation

(The classification of a soil is found by proceeding from top to bottom of the chart.
The first classification that the test data fits is the correct classification.)

SYMBOL	DESCRIPTION	Classifcation AASHTO	Classifcation OHIO	$LL_0/LL \times 100$*	% Pass #40	% Pass #200	Liquid Limit (LL)	Plastic Index (PI)	Group Index Max.	REMARKS
	Gravel and/or Stone Fragments	A-1-a			30 Max.	15 Max.		6 Max.	0	Min. of 50% combined gravel, cobble and boulder sizes
	Gravel and/or Stone Fragments with Sand	A-1-b			50 Max.	25 Max.		6 Max.	0	
	Fine Sand	A-3			51 Min.	10 Max.	NON-PLASTIC		0	
	Coarse and Fine Sand	--	A-3a			35 Max.		6 Max.	0	Min. of 50% combined coarse and fine sand sizes
	Gravel and/or Stone Fragments with Sand and Silt	A-2-4 A-2-5				35 Max.	40 Max. 41 Min.	10 Max.	0	
	Gravel and/or Stone Fragments with Sand, Silt and Clay	A-2-6 A-2-7				35 Max.	40 Max. 41 Min.	11 Min.	4	
	Sandy Silt	A-4	A-4a	76 Min.		36 Min.	40 Max.	10 Max.	8	Less than 50% silt sizes
	Silt	A-4	A-4b	76 Min.		50 Min.	40 Max.	10 Max.	8	50% or more silt sizes
	Elastic Silt and Clay	A-5		76 Min.		36 Min.	41 Min.	10 Max.	12	
	Silt and Clay	A-6	A-6a	76 Min.		36 Min.	40 Max.	11 - 15	10	
	Silty Clay	A-6	A-6b	76 Min.		36 Min.	40 Max.	16 Min.	16	
	Elastic Clay	A-7-5		76 Min.		36 Min.	41 Min.	$\leq$LL-30	20	
	Clay	A-7-6		76 Min.		36 Min.	41 Min.	>LL-30	20	
	Organic Silt	A-8	A-8a	75 Max.		36 Min.				W/o organics would classify as A-4a or A-4b
	Organic Clay	A-8	A-8b	75 Max.		36 Min.				W/o organics would classify as A-5, A-6a, A-6b, A-7-5 or A-7-6

MATERIAL CLASSIFIED BY VISUAL INSPECTION

 Sod and Topsoil

 Pavement or Base

 Uncontrolled Fill (Describe)

 Bouldery Zone

 Peat, S-Sedimentary W-Woody F-Fibrous L-Loamy & etc

* Only perform the oven-dried liquid limit test and this calculation if organic material is present in the sample.