GEOTECHNICAL EVALUATION REPORT - REVISED

LUC/WOO-SIGN FY 2027
LUCAS AND WOOD COUNTIES, OHIO

SME Project Number: 099013.01
December 3, 2025

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December 3, 2025

Ms. Jorey Summersett, PE
ODOT Office of Capital Programs
317 East Poe Road
Bowling Green, Ohio 43402

Via E-mail: Jorey.Summersett@dot.ohio.gov

Re: Geotechnical Evaluation Report – Revised
LUC/WOO-Sign FY2027
Lucas and Wood Counties, Ohio
PID 107950
SME Project No.: 099013.01

Dear Ms. Summersett:

The attached report presents the results of our subsurface exploration and recommended geotechnical parameters for the overhead sign foundations planned for Lucas and Wood Counties in District 2.

If you have any questions, or wish to discuss our recommendations, please call.

Sincerely,

SME

Tom Olding

Thomas P. Olding, PE
Project Engineer

Enclosure: SME Geotechnical Evaluation Report; Dated December 3, 2025

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EXECUTIVE SUMMARY

This report presents the results of our geotechnical evaluation for the overhead sign replacements for Lucas and Wood Counties in District 2. Our geotechnical exploration involved performing two Cone Penetration Test (CPT) soundings, designated C-001 and C-002, and five Standard Penetration Tests (SPT) borings, designated B-003 through B-007. The exploration and analysis were conducted in general accordance with the current Ohio Department of Transportation (ODOT) Specifications for Geotechnical Engineering (SGE) and input from ODOT District 2.

According to the CPT data, the subsurface profile on Salisbury and West Dussel Roads near the I-475 interchange consists of stiff to very stiff silt and clay (A-6 and A-7-6) to the termination depths of about 26.5 feet. In CPT-002-0-25, east of the I-475 overpass, thin layers of sensitive fine-grained material or organic clays (A-7-5 and A-8b) were encountered below a depth of 15 feet. These sensitive fine-grained layers varied between approximately 6 inches and 12-inches-thick.

In B-003-0-25, located along Route 420 within the paved shoulder, we encountered 6 inches of asphalt over 6 inches of aggregate base. Below the aggregate base, we encountered 4.5 feet of fill consisting of very stiff silt and clay (A-6a). Below the fill, we encountered 10 feet of hard brown silt and clay (A-6a) over 1.5 feet of hard sandy silt (A-4b) to about 17 feet. From 17 to 21 feet deep, we encountered very dense gravel with sand (A-1-a), which is likely highly weathered bedrock, but there was limited recovery in the SPT samples, making the visual classification difficult. The boring was terminated upon SPT refusal at 21 feet.

In B-004-0-25, located along Route 23 outside of the paved shoulder, we encountered 7 inches of topsoil over about 2.5 feet of fill consisting of loose gravel and sand (A-1-a). Below the gravel fill we encountered fill consisting of stiff silt and clay (A-6a) to a depth of 5.5 feet. Below the fill, we encountered 9 feet of hard brown silt and clay (A-6a) over 6.5 feet of hard sandy silt (A-4a) to bedrock at about 21 feet. The bedrock consists of gray dolomite.

In the borings drilled along Route 6, we encountered 6 inches of asphalt overlying 7 inches of aggregate base within the shoulder and 5 to 7 inches of topsoil in the grass outside the shoulder. Existing fill was encountered in B-005-0-24 and consisted of stiff to very stiff silt and clay (A-6a) to a depth of about 6.5 feet and medium dense coarse and fine sand (A-3a) to a depth of 9 feet. Below the surficial materials and fill in these borings, we encountered predominately very stiff sandy silt, silt and clay, and clay (A-4a, A-6a, and A-7-6). These soils extended to bedrock which was encountered at 18.5 feet in B-005-0-25, 3 feet in B-006-0-25, and 17 feet in B-007-0-25. The bedrock consists of gray dolomite.

At each SPT boring and CPT sounding location, we developed a soil profile and determined the appropriate soil parameters for each layer. This includes undrained shear strength values for cohesive soils, internal friction angles for granular soils, and total unit weights for each layer. These parameters are shown in Table 1 through Table 7 in Section 5 of this report. We also determined rock strength parameters which are included in Table 8. Since rock coring and associated strength testing was not performed on the rock, we omitted rock parameters from this report.

We recommend using these soils and rock parameters in the design and analysis for the sign foundations. Further foundation recommendations and foundation design were not included in our scope of services for the project and are not provided in this report. The standard foundation designs can be used for the signs along SR 420, US23, and US 6. However, weaker soils encountered in the CPT soundings on Salisbury Road and Dussel Drive indicate a Special Foundation Design should be used. Refer to Sections 5.2 and 5.3 for foundation design and construction recommendations.

This summary should not be used without reading and understanding the assumptions in the entire report.

1. INTRODUCTION

This report presents the results of a subsurface exploration for the sign replacements planned for Lucas and Wood Counties in District 2 scheduled for the fiscal year 2027 (FY2027). After discussions with ODOT District 2 and ODOT Central Office, an exploration program consisting of two CPT soundings and five SPT borings was performed to provide geotechnical soil profile parameters for ODOT to use in the sign foundation design. The two CPT soundings were performed on Salisbury Road and West Dussel Drive, near the I-475 interchange. Historic boring information between the two CPT locations was also referenced in this evaluation. The SPT borings were performed along an approximately 11,000-foot-long section of Route 6 in Meadowvale, Ohio and an about 4,500-foot-long section of Route 420 in Lemoyne, Ohio.

The borings were drilled in general accordance with the current ODOT Specifications for Geotechnical Explorations (SGE). Samples from the borings were taken to our laboratory for classification and testing. The results of the field and laboratory tests were interpreted to provide foundation recommendations for the new bridge.

Each sign will be supported by foundations designed according to Chapter 12 of the ODOT Geotechnical Design Manual. This report provides soil strength parameters for ODOT to use for design of the sign foundations.

2. GEOLOGY AND OBSERVATIONS

2.1 GEOLOGY

Prior to our exploration, we performed a desktop evolution of the local geologic conditions at each of the project sites. In general, the geologic conditions from available geology maps and the historic boring information are consistent with the conditions encountered during our investigation.

2.1.1 SALISBURY AND WEST DUSSEL ROAD AT I-475

The geology in this area consists of about 20 feet of lacustrine silts and clays, with thin interlayered sand lenses. Lacustrine clays and silts are deposited from glacial lakes. The lacustrine clays overlay about 40 feet of glacial till. The glacial till consists of an unsorted mix of clay, silt, and sand. The glacial till overlies dolomite bedrock. Historic ODOT borings in this project area indicate similar conditions with the addition of some soft organic material encountered in some of the borings.

2.1.2 SR 420 AND US 23

The geology within our investigation areas along SR 420 and US 23 generally consists of lake plained moraine deposits. These deposits consist of about 30 feet of glacial till. The glacial till consists of an unsorted mix of clay, silt, and sand. The glacial till overlies of limestone and dolomite bedrock.

2.1.3 US 6 NEAR SR 25 AND I-75

The section along Route 6, located West of Route 25, where B-005 was drilled, consists of predominantly Wisconsinan glacial till. The Wisconsinan glacial till consists of an unsorted mix of silt, clay, sand, and gravel and extends to about 20 feet below ground surface. Bedrock consisting of dolomite and limestone underlies the till.

East of Route 25, the geology along Route 6 consists of lake-planed moraine deposits, consisting of an unsorted mix of clays, silts, and sands. The moraine deposits are about 20 feet deep and overlay a bedrock formation that consists of limestone and dolomite.

3. EXPLORATION

3.1 FIELD EXPLORATION

Subsurface conditions were identified by a field exploration program consisting of Standard Penetration Test borings (SPT) at five locations designated B-003-0-25 through B-007-0-25 and Cone Penetrometer Tests (CPT) at two locations designated C-001-0-25 and C-002-0-25. C-001-0-25 was performed in the grass right-of-way just south of Salisbury Road, to the west of Rosa Parks highway (I-475). CPT-002-0-25 was performed in the grass right-of-way just north of West Dussel Drive. B-003-0-25 was performed along Route 420 in Lemoyne, Ohio, and B-004-0-25 was performed near the intersection of Route 420 and Route 23 in Lemoyne, Ohio. B-005-0-25 through B-007-0-25 were performed along Route 6 in Meadowvale, Ohio.

The borings were performed from July 15 to 17, 2025, and CPTs were performed August 4, 2025. The SPT borings were drilled to the depth of spoon and/or auger refusal, which was as shallow as 4.5 feet in B-006-0-25 and as deep as 23.5 feet in B-004-0-25. Each of the borings were sampled at 2.5-foot intervals to the termination depths. The CPTs were performed to depths of about 26.5 feet. The approximate test locations are shown on the attached *Boring Location Plan* in Appendix A.

The CPT soundings were performed in general accordance with ASTM D 5778 and the SPT borings were performed in general accordance with the ODOT Specifications for Geotechnical Explorations (SGE). The CPT equipment consisted of a Vertek CPT (serial #: 4644.171) attached to the back of a CME-55 rubber-tire ATV rig. The SPT drilling equipment consisted of a CME-55 truck-mounted rig with a CME auto hammer having an energy transfer ratio of 80 percent. The field-measured blow counts are corrected to N_{60} based on the hammer system calibration. The energy-corrected blow counts are reported on the boring logs.

We checked the boreholes for the presence of groundwater during drilling. We did not encounter groundwater in any of our boring locations. Our drillers backfilled all boreholes with cement-bentonite grout in accordance with ODOT's Specifications for Geotechnical Explorations and patched paved areas with asphalt patch.

Samples were placed in clean glass jars each marked with the project, boring, depth interval, and blow-count data. Samples were taken to our laboratory after completion of the field work.

3.2 LABORATORY TESTING

Samples were classified in accordance with the ODOT-modified AASHTO procedure. Laboratory testing included water content on all SPT samples and complete mechanical classifications (water content, Atterberg Limits, and hydrometer tests) on nine representative soil samples. No soil samples were collected from the CPT locations. The results of the lab tests are presented on the boring logs in Appendix A.

4. FINDINGS

4.1 SALISBURY ROAD AND W DUSSEL DRIVE

According to the CPT data, soil conditions at CPT-001-0-25 consist of stiff to very stiff clay and silty clay (A-6 and A-7-6) to a depth of approximately 10 feet below the ground surface. Below the stiff clay, we encountered medium to stiff silty clay or silt and clay (A-6) to the termination depth of 26.5 feet.

According to the CPT data, soil conditions at CPT-002-0-25 consist of stiff clay and silty clay (A-6 and A-7-6) to a depth of about 12 feet below the ground surface. Below the clay, we encountered medium to stiff silty clay or silt and clay (A-6) to the termination depth of 26.5 feet. Thin layers of sensitive fine-grained or organic material (most likely silt seams) were present within the silty clay layer. These fine-grained layers were between approximately 6 to 12 inches thick.

4.2 ROUTE 420 (B-003-0-25)

At the boring B-003-0-25, which was drilled in the shoulder, we encountered 6 inches of asphalt overlying 6 inches aggregate base.

Medium to stiff dark brown clay (A-7-6) fill underlays the aggregate base and extends to a depth of about 5.5 feet. Very stiff to hard brown silt and clay (A-6a) underlays the fill and extends to about 15.5 feet. About 1.5 feet of very dense gray sandy silt (A-4a) was encountered 17 feet. Very dense gray gravel with sand (A-1-a) underlays the silty sand at about 17 feet deep and extends to termination depth of the boring. This gravel layer is likely a weathered zone of the dolomite bedrock, although limited recovery in the SPT samples made it difficult to define. The boring was terminated upon SPT refusal at 21 feet, which is assumed to be the top of the harder dolomite bedrock layer. Groundwater was not encountered during drilling.

4.3 ROUTE 23 (B-004-0-25)

At boring B-004-0-25, which was drilled outside the shoulder, the surficial material consists of about 7 inches of topsoil and gravel. Fill consisting of loose, gray gravel with sand (A-1-a) underlays the topsoil and extends to about 3 feet deep. Very stiff to hard, dark brown clay and silt (A-6a) underlies the fill and extends to 14.5 feet. Hard, gray, sandy silt (A-4a) underlies the clay and silt layer and extends to about 21 feet. Light gray dolomite was encountered at 21 feet, and B-004-0-25 was terminated in dolomite. Groundwater was not encountered during drilling.

4.4 ROUTE 6 (B-005-0-25 TO B-007-0-25)

The surficial material at B-005-0-25 consists of 6 inches of asphalt underlain by 6 inches of aggregate base. In borings B-006-0-25 and B-007-0-25, which were performed outside of the shoulder, the surficial material consists of about 5 to 7 inches of topsoil.

Below the surficial materials in B-005-0-25, about 6 feet of fill consisting of very stiff, dark brown silt and clay (A-6a) was encountered. Medium, dense, brown, coarse fine sand (A-3a) underlays the silt and clay layer to a depth of about 9 feet. Stiff to very stiff, black, brown, and gray, sandy silt (A-4a) was encountered to about 18.5 feet. Light gray dolomite was encountered below the sandy silt at a depth of 18.5 feet.

At B-006-0-25, a thin layer of very stiff, brown silt and clay (A-6a) was encountered above the bedrock. Gray dolomite underlies the silt and clay starting at a depth of 3 feet.

At B-007-0-25, stiff to very stiff, brown silt and clay was encountered to a depth of 11 feet. Hard, gray clay (A-7-6) was encountered below the silt and clay and extended to bedrock at a depth of about 17 feet. Gray dolomite underlies the clay layer.

Each of the borings on Route 6 were terminated in the dolomite bedrock. Groundwater was not encountered within the borings located along Route 6.

5. SIGN FOUNDATION RECOMMENDATIONS

5.1 SOIL AND ROCK DESIGN PARAMETERS

The following soil parameters were developed using the SPT and CPT data from the borings, laboratory testing, correlations from the ODOT Geotechnical Design Manual (July 2025), AASHTO LRFD Bridge Design Specifications (2020), and our engineering experience. The top and bottom elevations of the soil and rock layers were interpolated between the encountered elevations in the borings. The actual elevations of the encountered soil and rock layers during construction may vary depending on location. Recommended material properties for the geotechnical analysis are listed in Table 1 through Table 7. Since rock coring and associated strength testing was not performed on the rock, we have omitted rock properties from these tables.

TABLE 1: CPT-001-0-25 SOIL DESIGN PARAMETERS

MATERIAL DESCRIPTION	TOP ELEVATION (ft.)	BOTTOM ELEVATION (ft.)	UNIT WEIGHT (pcf)	UNDRAINED SHEAR STRENGTH (psf)	INTERNAL FRICTION ANGLE (degrees)
Stiff Clay	632.5	622.5	122	2,000	-
Medium to Stiff Silt and Clay	622.5	606.0	118	1,000	-

TABLE 2: CPT-002-0-25 SOIL DESIGN PARAMETERS

MATERIAL DESCRIPTION	TOP ELEVATION (ft.)	BOTTOM ELEVATION (ft.)	UNIT WEIGHT (pcf)	UNDRAINED SHEAR STRENGTH (psf)	INTERNAL FRICTION ANGLE (degrees)
Stiff Clay	633.0	621.0	120	1,500	-
Medium Silty Clay	621.0	606.5	118	1,000	-

TABLE 3: B-003-0-25 SOIL DESIGN PARAMETERS

MATERIAL DESCRIPTION	TOP ELEVATION (ft.)	BOTTOM ELEVATION (ft.)	UNIT WEIGHT (pcf)	UNDRAINED SHEAR STRENGTH (psf)	INTERNAL FRICTION ANGLE (degrees)
Very Stiff Clay (Fill)	641	636.5	117	1,000	-
Very Stiff Silt and Clay	636.5	626.5	125	3,500	-
Hard Sandy Silt	626.5	625.0	140	7,000	-
Very Dense Gravel with Sand	625.0	621.0	135	-	38

TABLE 4: B-004-0-25 SOIL DESIGN PARAMETERS

MATERIAL DESCRIPTION	TOP ELEVATION (ft.)	BOTTOM ELEVATION (ft.)	UNIT WEIGHT (pcf)	UNDRAINED SHEAR STRENGTH (psf)	INTERNAL FRICTION ANGLE (degrees)
Loose Gravel with Sand (Fill)	651.4	649.0	122	-	37
Hard Silt and Clay	649.0	646.5	128	4,000	-
Hard Sandy Silt	646.5	637.5	128	4,250	-
Dolomite	631.0	-	-	-	-

TABLE 5: B-005-0-25 SOIL DESIGN PARAMETERS

MATERIAL DESCRIPTION	TOP ELEVATION (ft.)	BOTTOM ELEVATION (ft.)	UNIT WEIGHT (pcf)	UNDRAINED SHEAR STRENGTH (psf)	INTERNAL FRICTION ANGLE (degrees)
Stiff Silt and Clay (Fill)	698.9	693.5	120	1,500	-
Medium Dense Coarse and Fine Sand	693.5	691.0	125	-	36
Very Stiff Sandy Silt	691.0	681.5	125	3,000	-
Dolomite	681.5	-	-	-	-

TABLE 6: B-006-0-25 SOIL DESIGN PARAMETERS

MATERIAL DESCRIPTION	TOP ELEVATION (ft.)	BOTTOM ELEVATION (ft.)	UNIT WEIGHT (pcf)	UNDRAINED SHEAR STRENGTH (psf)	INTERNAL FRICTION ANGLE (degrees)
Very Stiff Silt and Clay	674.9	672.5	125	3,000	-
Dolomite	672.5	-	-	-	-

TABLE 7: B-007-0-25 SOIL DESIGN PARAMETERS

MATERIAL DESCRIPTION	TOP ELEVATION (ft.)	BOTTOM ELEVATION (ft.)	UNIT WEIGHT (pcf)	UNDRAINED SHEAR STRENGTH (psf)	INTERNAL FRICTION ANGLE (degrees)
Very Stiff Silt and Clay	672.1	662.0	122	2,000	-
Very Stiff Clay	662.0	655.5	125	3,500	-
Dolomite	655.5	-	-	-	-

5.2 FOUNDATION DESIGN RECOMMENDATIONS

Section 1204 of the GDM states that a Standard Foundation Design can be used if the average shear strength of the soils over the foundation length is at least 2,000 psf for cohesive soils or have an internal friction angle of at least 30 degrees for granular soils. We assumed a shear strength of 0 psf for the upper 3 feet of the soil profile to account for weakened soils within the frost depth in accordance with Section 1201 of the GDM.

Based on the boring information, the Standard Foundation Design can be used for the sign locations at borings B-003, B-004, B-005, B-006, and B-007. For signs near locations B-006 and B-007, dolomite bedrock may be encountered above the planned deign depth of the foundation. When bedrock is encountered above the planned foundation depth, the foundation length can be shorted as necessary. However, some embedment into the bedrock may be required for lateral support.

For signs near locations CPT-001 and CPT-002 (Salisbury Rd. and Dussel Dr.), the length of the foundation should be increased or a Special Foundation Design should be completed. In both of these CPT soundings, weaker soil with a shear strength of 1,000 psf was encountered below a depth of 10 and 12 feet. These weaker soils result in an average shear strength of less than 2,000 psf across the planned foundation lengths. Thus the Standard Foundation Design cannot be used. The average shear strengths, proposed and recommended foundation lengths are shown in Tables 8 and 9.

TABLE 8: FOUNDATION LENGTHS FOR SALISBURY RD. SIGNS (BASED ON CPT-001-0-25)

SIGN REFERENCE #	STREET	PLANNED FOUNDATION LENGTH (ft)	AVG. SHEAR STRENGTH (psf)	FOUNDATION LENGTH INCREASE PERCENTAGE	ESTIMATED NEW FOUNDATION LENGTH (ft)
S-3	Salisbury Rd.	12	1,333	50 percent	18
S-6	Salisbury Rd.	18	1,222	64 percent	29.5
S-8	Salisbury Rd.	17	1,236	62 percent	27.5
S-9	Salisbury Rd.	20.9	1,191	68 percent	35.1

TABLE 9: FOUNDATION LENGTHS FOR DUSSEL DR. SIGNS (BASED ON CPT-002-0-25)

SIGN REFERENCE #	STREET	PLANNED FOUNDATION LENGTH (ft)	AVG. SHEAR STRENGTH (psf)	FOUNDATION LENGTH INCREASE PERCENTAGE	ESTIMATED NEW FOUNDATION LENGTH (ft)
D-2	Dussel Dr.	18	1,083	85 percent	33.3
D-3	Dussel Dr.	17	1,088	84 percent	31.3
D-6	Dussel Dr.	17	1,088	84 percent	31.3
D-9	Dussel Dr.	18	1,083	85 percent	33.3
D-9	Dussel Dr.	12.6	1,198	60 percent	19.2

As indicated in Tables 8 and 9, weaker soils below a depth of 10 to 12 feet result in lower average shear strengths across the foundation pile length as they increase, which results in a larger percentage increase in the foundation length. Therefore, a special foundation design will be likely more effective than simply increasing the lengths if the sign foundations. Special foundation designs should consider larger diameter shafts or additional reinforcing to shorten the foundation lengths through these weaker soils.

5.3 FOUNDATION CONSTRUCTION RECOMMENDATIONS

Temporary or permanent steel casing will be required at drilled shafts to prevent caving from sands, granular layers and seams in the clays, and/or to seal off groundwater seepage from perched conditions. For an embedded pole with aggregate backfill, permanent casings will be required in cases where excavations encounter caving soils. For drilled shafts where caving soils are encountered, a longer temporary casing or temporary larger diameter upper casing section may be required. Since the soil and groundwater conditions may vary, the use, size and depth of casing required will depend on specific conditions encountered at each drilled shaft location and the final design tip elevation of the shafts. Thus, the contractor should be prepared to use partial-length casings at any location, as required to maintain the integrity of the excavation.

Temporary casings should consist of smooth-walled steel casings. When extracting temporary casings from the excavation, maintain a head of concrete to prevent infiltration of soil and/or groundwater into the shaft excavation. The head of concrete should always be maintained a minimum of five feet above the bottom of the casing and a minimum of five feet above the head of water trapped outside the drilled shaft or tremie, considering the differences in unit weight of concrete and water.

The bottom of the drilled shafts should be free of loose or disturbed soil prior to placement of the embedded pole or concrete. Cleaning of the drilled shaft excavation bearing surface may be done mechanically with the auger or “one-eye” bucket but should be verified by a qualified geotechnical engineer prior to concrete placement.

For a drilled shaft that is constructed in the "dry" (with dry being less than 2 inches of water at the base of the excavation), the concrete may be placed by the free-fall method, using a short hopper or back-chute to direct the concrete flow out of the truck into a vertical stream of flowing concrete with a relatively small diameter. Direct the stream to avoid hitting the sides of the drilled shafts or any reinforcing cages. For the free-fall method of concrete placement, we recommend designing the concrete mix with a slump of 4 to 6 inches.

Although not anticipated based on the lack of groundwater encountered in the borings, groundwater seepage from perched conditions, rainfall, or surface runoff may be encountered during drilled shaft construction. Where heavy groundwater seepage is encountered or when drilling in wet sands and/or where the contractor is unable to seal off the excavations with casing, it will be necessary to utilize wet construction methods with the use of temporary steel casing to maintain the stability of the drilled excavation, unless the casing is extended and properly seated into an underlying less permeable stratum. If groundwater seepage cannot be controlled with temporary casings, wet methods of drilled shaft construction will be required. These methods consist of the advancement of the auger through a bentonite and/or polymer slurry mix to the design bearing elevation. Place the concrete for the drilled shafts using “tremie” methods either by gravity or pumping in which the concrete is placed from the bottom of the drilled shaft thereby displacing the slurry. While concrete is placed, the slurry is displaced from the top of the excavation and either onto the ground or into a recirculation pit/tank. If recirculation pits/tanks are not utilized, a significant volume of drilling slurry and cuttings should be expected on the ground surface in the vicinity of the excavation. Wet methods of caisson construction can be costly and time-consuming.

To reduce lateral movement of the drilled shafts and pole foundations, it is necessary to place the concrete for the drilled shafts in intimate contact with the surrounding soil. Fill any voids or enlargements in the shafts due to over-excavation or temporary casing installation with concrete at the time the shaft concrete is placed.

The predominantly cohesive soils encountered in the borings are favorable for conventional drilling methods by the local drilled shaft foundation contractors. We anticipate normal drilled shaft tools, such as auger bits and “one-eye” buckets, will be suitable for excavation through these soils. Ripping tools and core barrels will be required for excavation in the dolomite rock for the Route 6 locations as necessary.

6. SIGNATURES

PREPARED BY:

Katherine W. Potter

Katherine W. Potter, EIT
Senior Staff Engineer

REVIEWED BY:

STATE OF OHIO
THOMAS
OLDING
E-87981
REGISTERED
PROFESSIONAL ENGINEER

Tom Olding

Thomas P. Olding, PE
Project Engineer

REVIEWED BY:

Timothy H Bedenis

Timothy H. Bedenis, PE, D.GE.
Principal Consultant

APPENDIX A

BORING LOCATION PLANS
ODOT BORING LOG TERMINOLOGY
BORING LOGS
CPT DATA REPORTS

N
W E
S

0' 400' 800'

GRAPHIC SCALE: 1" = 400'

LEGEND

APPROXIMATE BORING LOCATION

LOCATION MAP
1 INCH = 1 MILES

NOTE:
1. AERIAL IMAGE TAKEN FROM GOOGLE EARTH WITH AN IMAGE DATE OF 10-21-2025.

SME

Project:

LUC/WOO-SIGN FY 2027

Project Location:

LUCAS AND WOOD COUNTIES, OHIO

Sheet Name:

BORING LOCATION DIAGRAM

No.	REVISION DATE

Date: 08-25-2025

GIS Specialist: T. MAHANY

Designer: K. POTTER

Project No.: 099013.01

Figure No.: 1A

DRAWING NOTE: SCALE IS MEANT FOR 11" X 17" AND WILL SCALE INCORRECTLY IF PRINTED ON ANY OTHER SIZE MEDIA

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User: tylor.mahany

Date Exported: 9/24/2025 5:19 PM

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0'
500'
1,000'

GRAPHIC SCALE: 1" = 500'

LEGEND

APPROXIMATE BORING LOCATION

LOCATION MAP
1 INCH = 2 MILES

NOTE:
1. AERIAL IMAGE TAKEN FROM GOOGLE EARTH WITH AN IMAGE DATE OF 06-25-2025.

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Project:
LUC/WOO-SIGN FY 2027

Project Location:
LUCAS AND WOOD COUNTIES, OHIO

Sheet Name:
BORING LOCATION DIAGRAM

No.	REVISION DATE

Date: 08-25-2025
GIS Specialist: T. MAHANY
Designer: K. POTTER
Project No.: 099013.01
Figure No.: **1B**

DRAWING NOTE: SCALE IS MEANT FOR 11" X 17" AND WILL SCALE INCORRECTLY IF PRINTED ON ANY OTHER SIZE MEDIA

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Docusign Envelope ID: 56355EEC-3F32-4893-82B4-61D20592BC31

0' 1,000' 2,000'

GRAPHIC SCALE: 1" = 1,000'

LEGEND

APPROXIMATE BORING LOCATION

LOCATION MAP
1 INCH = 2 MILES

NOTE:
1. AERIAL IMAGE TAKEN FROM GOOGLE EARTH WITH AN IMAGE DATE OF 06-25-2025.

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Project:
LUC/WOO-SIGN FY 2027

Project Location:
LUCAS AND WOOD COUNTIES, OHIO

Sheet Name:
BORING LOCATION DIAGRAM

No.	REVISION DATE

Date: 08-25-2025

GIS Specialist: T. MAHANY

Designer: K. POTTER

Project No.: 099013.01

Figure No.: **1C**

DRAWING NOTE: SCALE IS MEANT FOR 11" X 17" AND WILL SCALE INCORRECTLY IF PRINTED ON ANY OTHER SIZE MEDIA

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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 precedes 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%

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_O/LL × 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	
F S	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				35 Max.	40 Max.	10 Max.	0	
		A-2-5					41 Min.			
	Gravel and/or Stone Fragments with Sand, Silt and Clay	A-2-6				35 Max.	40 Max.	11 Min.	4	
		A-2-7					41 Min.			
	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.	≦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
- P — Peat

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

APPENDIX A.2 – ODOT Quick Reference Guide for Rock Description

1: ROCK TYPE: Common rock types are: Claystone; Coal; Dolomite; Limestone; Sandstone; Siltstone; & Shale.

2: COLOR: To be determined when rock is wet. When using the GSA Color charts use only Name, not code.

3: WEATHERING

Description	Field Parameter
Unweathered	No evidence of any chemical or mechanical alternation of the rock mass. Mineral crystals have a bright appearance with no discoloration. Fractures show little or no staining on surfaces.
Slightly weathered	Slight discoloration of the rock surface with minor alterations along discontinuities. Less than 10% of the rock volume presents alteration.
Moderately weathered	Portions of the rock mass are discolored as evident by a dull appearance. Surfaces may have a pitted appearance with weathering "halos" evident. Isolated zones of varying rock strengths due to alteration may be present. 10 to 15% of the rock volume presents alterations.
Highly weathered	Entire rock mass appears discolored and dull. Some pockets of slightly too moderately weathered rock may be present and some areas of severely weathered materials may be present.
Severely weathered	Majority of the rock mass reduced to a soil-like state with relic rock structure discernable. Zones of more resistant rock may be present, but the material can generally be molded and crumbled by hand pressures.

4: TEXTURE

Component		Grain Diameter
Boulder		>12"
Cobble		3"-12"
Gravel		0.08"-3"
Sand	Coarse	0.02"-0.08"
	Medium	0.01"-0.02"
	Fine	0.005"-0.01"
	Very Fine	0.003"-0.005"

5: RELATIVE STRENGTH

Description	Field Parameter
Very Weak	Core can be carved with a knife and scratched by fingernail. Can be excavated readily with a point of a pick. Pieces 1 inch or more in thickness can be broken by finger pressure.
Weak	Core can be grooved or gouged readily by a knife or pick. Can be excavated in small fragments by moderate blows of a pick point. Small, thin pieces can be broken by finger pressure.
Slightly Strong	Core can be grooved or gouged 0.05 inch deep by firm pressure of a knife or pick point. Can be excavated in small chips to pieces about 1-inch maximum size by hard blows of the point of a geologist's pick.
Moderately Strong	Core can be scratched with a knife or pick. Grooves or gouges to ¼" deep can be excavated by hand blows of a geologist's pick. Requires moderate hammer blows to detach hand specimen.
Strong	Core can be scratched with a knife or pick only with difficulty. Requires hard hammer blows to detach hand specimen. Sharp and resistant edges are present on hand specimen.
Very Strong	Core cannot be scratched by a knife or sharp pick. Breaking of hand specimens requires hard repeated blows of the geologist hammer.
Extremely strong	Core cannot be scratched by a knife or sharp pick. Chipping of hand specimens requires hard repeated blows of the geologist hammer.

6: BEDDING

Description	Thickness
Very Thick	>36"
Thick	18" – 36"
Medium	10" – 18"
Thin	2" – 10"
Very Thin	0.4" – 2"
Laminated	0.1" – 0.4"
Thinly Laminated	<0.1"

7: DESCRIPTORS

Arenaceous – sandy	Argillaceous - clayey	Brecciated – contains angular to subangular gravel
Calcareous - contains calcium carbonate	Carbonaceous - contains carbon	Cherty- contains chert fragments
Conglomeritic - contains rounded to subrounded gravel	Crystalline – contains crystalline structure	Dolomitic- contains calcium/magnesium carbonate
Ferriferous – contains iron	Fissile – thin planner partings	Fossiliferous – contains fossils
Friable – easily broken down	Micaceous – contains mica	Pyritic – contains pyrite
Siliceous – contains silica	Stylolitic – contain stylotites (suture like structure)	Vuggy – contains openings

APPENDIX A.2 – ODOT Quick Reference Guide for Rock Description

8: Discontinuities

a: Discontinuity Types

Type	Parameters
Fault	Fracture which expresses displacement parallel to the surface that does not result in a polished surface.
Joint	Planar fracture that does not express displacement. Generally occurs at regularly spaced intervals.
Shear	Fracture which expresses displacement parallel to the surface that results in polished surfaces or slickensides.
Bedding	A surface produced along a bedding plane.
Contact	A surface produced along a contact plane. (generally not seen in Ohio)

b: Degree of Fracturing

Description	Spacing
Unfractured	> 10 ft.
Intact	3 ft. – 10 ft.
Slightly fractured	1 ft. – 3 ft.
Moderately fractured	4 in. – 12 in.
Fractured	2 in. – 4 in.
Highly fractured	< 2 in.

c: Aperture Width

Description	Spacing
Open	> 0.2 in.
Narrow	0.05 in. - 0.2 in.
Tight	<0.05 in.

d: Surface Roughness

Description	Criteria
Very Rough	Near vertical steps and ridges occur on the discontinuity surface.
Slightly Rough	Asperities on the discontinuity surface are distinguishable and can be felt.
Slickensided	Surface has a smooth, glassy finish with visual evidence of striation.

11: Recovery

$Run\ Recovery = \left(\frac{R_R}{L_R}\right) * 100$	$Unit\ Recovery = \left(\frac{R_U}{L_U}\right) * 100$
L_R = Run Length R_R – Run Recovery	L_U = Rock Unit Length R_U – Rock Unit Recovery

9: GSI Description

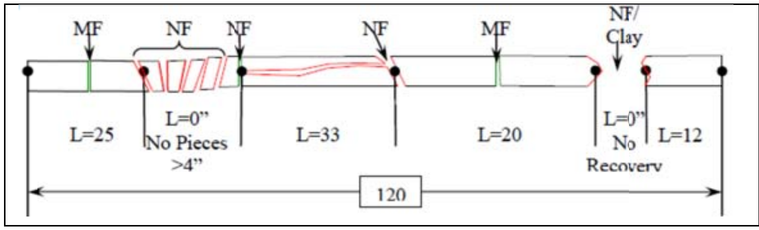
a: Structure

Description	Parameters
Intact or Massive	Intact rock with few widely spaced discontinuities
Blocky	Well interlocked undisturbed rock mass consisting of cubical blocks formed by three interesting discontinuity sets
Very Blocky	Interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets
Blocky/Disturbed/ Seamy	Angular blocks formed by many intersecting discontinuity sets, Persistence of bedding planes
Disintegrated	Poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces
Laminated/Sheared	Lack of blockiness due to close spacing of weak shear planes

b: Surface Condition

Description	Parameters
Very Good	Very rough, fresh unweathered surfaces
Good	Rough, slightly weathered, iron stained surface
Fair	Smooth, moderately weathered and altered surfaces
Poor	Slickensided, highly weathered surface with compact coatings or fillings or angular fragments
Very Poor	Slickensided, highly weathered surfaces with soft clay coating or fillings

10: RQD



$$RQD = \left(\frac{\sum Length\ \ of\ \ Pieces > 4inches}{Total\ Length\ of\ Core}\right) * 100$$

$$RQD = \left(\frac{25 + 33 + 20 + 12}{120}\right) * 100 = 75\%$$

PROJECT: LUC/WOO-SIGN FY2027	DRILLING FIRM / OPERATOR: SME / WI/ RM	DRILL RIG: CME 55 TRUCK	STATION / OFFSET:
TYPE: LIGHT TOWER	SAMPLING FIRM / LOGGER: SME / KLP	HAMMER: CME AUTOMATIC	ALIGNMENT:
PID: 107950 SFN:	DRILLING METHOD: 3.75" HSA	CALIBRATION DATE: 6/11/24	ELEVATION: 642.0 (MSL) EOB: 21.0 ft.
START: 7/15/25 END: 7/15/25	SAMPLING METHOD: SPT	ENERGY RATIO (%): 80	LAT / LONG: 41.502935, -83.463676

EXPLORATION ID B-003-0-25

MATERIAL DESCRIPTION AND NOTES	ELEV. 642.0	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	HOLE SEALED
6 inches of ASPHALT	641.5																		
6 inches of AGGREGATE	641.0																		
VERY STIFF, DARK BROWN, **CLAY**, LITTLE SAND, **FILL**, DAMP		1–2.5	2 2 2	5	56	SS-1	-	-	-	-	-	-	-	-	-	6	A-7-6 (V)	-	
	636.5	3.5–5	2 3 5	11	72	SS-2	3.75	0	4	13	24	59	45	19	26	18	A-7-6 (15)	-	
HARD, BROWN, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, DAMP		6–7.5	5 8 12	27	100	SS-3	4.50	-	-	-	-	-	-	-	-	21	A-6a (V)	-	
		8.5–10	7 11 16	36	100	SS-4	4.50	1	6	11	31	51	31	16	15	15	A-6a (10)	-	
		11–12.5	5 7 11	24	100	SS-5	4.50	-	-	-	-	-	-	-	-	14	A-6a (V)	-	
	626.5	13.5–15	5 7 9	21	100	SS-6	-	-	-	-	-	-	-	-	-	16	A-6a (V)	-	
HARD, GRAY, **SANDY SILT**, AND CLAY, TRACE GRAVEL, DAMP	625.0	16–17	5 9 50/6"	-	100	SS-7A	-	4	10	15	34	37	23	14	9	14	A-4a (7)	-	
VERY DENSE, GRAY, **GRAVEL WITH SAND**, TRACE SILT, WET						SS-7B	-	-	-	-	-	-	-	-	-	12	A-1-a (V)	-	
		18.5–19	50/6"	-	67	SS-8	-	-	-	-	-	-	-	-	-	8	A-1-a (V)	-	
	621.0	EOB 21	50/0"	-			-	-	-	-	-	-	-	-	-	-		-	
Refusal on bedrock at 21 feet.																			

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: ASPHALT PATCH; CEMENT GROUT; HOLE PLUG

PROJECT: LUC/WOO-SIGN FY2027	DRILLING FIRM / OPERATOR: SME / WI/ RM	DRILL RIG: CME 55 TRUCK	STATION / OFFSET:
TYPE: LIGHT TOWER	SAMPLING FIRM / LOGGER: SME / KLP	HAMMER: CME AUTOMATIC	ALIGNMENT:
PID: 107950 SFN:	DRILLING METHOD: 3.75" HSA	CALIBRATION DATE: 6/11/24	ELEVATION: 652.0 (MSL) EOB: 23.6 ft.
START: 7/15/25 END: 7/15/25	SAMPLING METHOD: SPT	ENERGY RATIO (%): 80	LAT / LONG: 41.490753, -83.461693

EXPLORATION ID B-004-0-25

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 652.0	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GR	CS	FS	SI	CL	LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	HOLE SEALED
7 inches of TOPSOIL and GRAVEL	651.4																	
LOOSE, GRAY, **GRAVEL WITH SAND**, LITTLE SILT, **FILL**, DAMP	649.0	7 3 4	9	72	SS-1	-	-	-	-	-	-	-	-	-	7	A-1-a (V)	-	
STIFF, DARK BROWN, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, **FILL**, MOIST	646.5	4 5 6	15	72	SS-2	2.00	-	-	-	-	-	-	-	-	21	A-6a (V)	-	
HARD, BROWN, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, DAMP		4 6 8	19	100	SS-3	4.50	-	-	-	-	-	-	-	-	15	A-6a (V)	-	
		6 9 12	28	100	SS-4	4.50	1	5	12	32	50	31	17	14	14	A-6a (10)	-	
		12 15 20	47	100	SS-5	4.50	-	-	-	-	-	-	-	-	12	A-6a (V)	-	
	637.5	16 18 21	52	89	SS-6A	-	-	-	-	-	-	-	-	-	11	A-6a (V)	-	
HARD, GRAY, **SANDY SILT**, AND CLAY, TRACE GRAVEL, DAMP					SS-6B	-	-	-	-	-	-	-	-	-	-	A-4a (V)	-	
		9 11 12	31	100	SS-7	4.50	-	-	-	-	-	-	-	-	8	A-4a (V)	-	
	631.0	9 13 15	37	100	SS-8	-	4	9	15	34	38	24	14	10	11	A-4a (7)	-	
DOLOMITE, LIGHT GRAY.		50/2"	-	100	SS-9	-	-	-	-	-	-	-	-	-	5	Rock (V)	-	
	628.4 (EOB)	50/1"	-	100	SS-10	-	-	-	-	-	-	-	-	-	6	Rock (V)	-	

Refusal on bedrock at 23.6 feet.

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: CEMENT GROUT; HOLE PLUG

PROJECT: LUC/WOO-SIGN FY2027	DRILLING FIRM / OPERATOR: SME / WI/ RM	DRILL RIG: CME 55 TRUCK	STATION / OFFSET:	EXPLORATION ID B-005-0-25
TYPE: LIGHT TOWER	SAMPLING FIRM / LOGGER: SME / KLP	HAMMER: CME AUTOMATIC	ALIGNMENT:	
PID: 107950 SFN:	DRILLING METHOD: 3.75" HSA	CALIBRATION DATE: 6/11/24	ELEVATION: 700.0 (MSL) EOB: 21.0 ft.	PAGE 1 OF 1
START: 7/17/25 END: 7/17/25	SAMPLING METHOD: SPT	ENERGY RATIO (%): 80	LAT / LONG: 41.348864, -83.654951	

MATERIAL DESCRIPTION AND NOTES	ELEV. 700.0	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	HOLE SEALED
6 inches of ASPHALT	699.5																		
7 inches of AGGREGATE BASE	698.9																		
STIFF TO VERY STIFF, DARK BROWN, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, **FILL**, DAMP		1–2	3 4 4	11	67	SS-1	3.25	-	-	-	-	-	-	-	-	13	A-6a (V)	-	
		4–5	3 6 9	20	72	SS-2	-	-	-	-	-	-	-	-	-	13	A-6a (V)	-	
	693.5	6	5 5 7	16	100	SS-3A	4.50	-	-	-	-	-	-	-	-	-	A-6a (V)	-	
MEDIUM DENSE, BROWN, **COARSE AND FINE SAND**, LITTLE CLAY, TRACE GRAVEL, **FILL**, MOIST		7				SS-3B	-	-	-	-	-	-	-	-	-	9	A-3a (V)	-	
	691.0	9	4 5 5	13	100	SS-4A	-	-	-	-	-	-	-	-	-	-	A-3a (V)	-	
STIFF, BLACK, **SANDY SILT**, LITTLE CLAY, TRACE GRAVEL, **FILL**, DAMP	690.5					SS-4B	-	-	-	-	-	-	-	-	-	19	A-4a (V)	-	
STIFF TO VERY STIFF, BROWN, **SANDY SILT**, SOME CLAY, TRACE GRAVEL, DAMP		10				SS-4C	-	-	-	-	-	-	-	-	-	19	A-4a (V)	-	
		11–12	3 5 8	17	100	SS-5	-	-	-	-	-	-	-	-	-	11	A-4a (V)	-	
	684.5	14–15	10 11 13	32	100	SS-6	-	3	13	22	33	29	20	15	5	12	A-4a (5)	-	
VERY STIFF, GRAY, **SANDY SILT**, AND CLAY, TRACE GRAVEL, DAMP		16–17	7 9 15	32	100	SS-7	2.25	4	9	18	34	35	23	14	9	8	A-4a (7)	-	
	681.5																		
DOLOMITE, LIGHT GRAY.		19–20	25 45 50/6"	-	100	SS-8	-	-	-	-	-	-	-	-	-	5	Rock (V)	-	
	679.0	EOB 21	50/0"	-			-	-	-	-	-	-	-	-	-	-		-	
Refusal on bedrock at 21 feet.																			

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: ASPHALT PATCH; CEMENT GROUT; HOLE PLUG

PROJECT: LUC/WOO-SIGN FY2027	DRILLING FIRM / OPERATOR: SME / WI/ RM	DRILL RIG: CME 55 TRUCK	STATION / OFFSET:	EXPLORATION ID B-006-0-25
TYPE: LIGHT TOWER	SAMPLING FIRM / LOGGER: SME / KLP	HAMMER: CME AUTOMATIC	ALIGNMENT:	
PID: 107950 SFN:	DRILLING METHOD: 3.75" HSA	CALIBRATION DATE: 6/11/24	ELEVATION: 675.5 (MSL) EOB: 4.7 ft.	PAGE 1 OF 1
START: 7/17/25 END: 7/17/25	SAMPLING METHOD: SPT	ENERGY RATIO (%): 80	LAT / LONG: 41.349930, -83.628450	

MATERIAL DESCRIPTION AND NOTES	ELEV. 675.5	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	HOLE SEALED
7 inches of TOPSOIL	674.9																		
VERY STIFF, BROWN, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, TRACE ROOTS, MOIST	672.5	1 2	3 8 9	23	56	SS-1	-	-	-	-	-	-	-	-	-	-	A-6a (V)	-	
DOLOMITE, GRAY AND LIGHT BROWN.	670.8	3 4 EOB	18 27 50/2"	-	86	SS-2	-	-	-	-	-	-	-	-	-	-	Rock (V)	-	

Refusal on bedrock at 4.7 feet.

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: CEMENT GROUT

PROJECT: LUC/WOO-SIGN FY2027	DRILLING FIRM / OPERATOR: SME / WI/ RM	DRILL RIG: CME 55 TRUCK	STATION / OFFSET:	EXPLORATION ID B-007-0-25
TYPE: LIGHT TOWER	SAMPLING FIRM / LOGGER: SME / KLP	HAMMER: CME AUTOMATIC	ALIGNMENT:	
PID: 107950 SFN:	DRILLING METHOD: 3.75" HSA	CALIBRATION DATE: 6/11/24	ELEVATION: 672.5 (MSL) EOB: 18.0 ft.	PAGE 1 OF 1
START: 7/17/25 END: 7/17/25	SAMPLING METHOD: SPT	ENERGY RATIO (%): 80	LAT / LONG: 41.352294, -83.617419	

MATERIAL DESCRIPTION AND NOTES	ELEV. 672.5
5 inches of TOPSOIL	672.1
STIFF, DARK BROWN, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, MOIST	666.5
VERY STIFF, BROWN, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, DAMP	662.0
HARD, GRAY, **CLAY**, LITTLE SILT, TRACE SAND, MOIST	655.5
DOLOMITE, GRAY.	654.5
Refusal on bedrock at 18 feet.	EOB 18

SPT/RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GR	CS	FS	SI	CL	LL	PL	PI	WC	ODOT CLASS (GI)	SO4 ppm	HOLE SEALED
4 5 8	17	100	SS-1	4.00	-	-	-	-	-	-	-	-	23	A-6a (V)	-	
6 6 8	19	100	SS-2	4.50	-	-	-	-	-	-	-	-	17	A-6a (V)	-	
6 10 13	31	100	SS-3	-	2	7	13	31	47	30	16	14	13	A-6a (10)	-	
10 14 23	49	100	SS-4	4.50	-	-	-	-	-	-	-	-	15	A-6a (V)	-	
4 6 8	19	100	SS-5	4.50	0	1	1	11	87	48	23	25	24	A-7-6 (16)	-	
4 4 7	15	100	SS-6	-	-	-	-	-	-	-	-	-	14	A-7-6 (V)	-	
10 50/6"	-	100	SS-7	-	-	-	-	-	-	-	-	-	13	A-7-6 (V)	-	
50/0"	-			-	-	-	-	-	-	-	-	-	-		-	

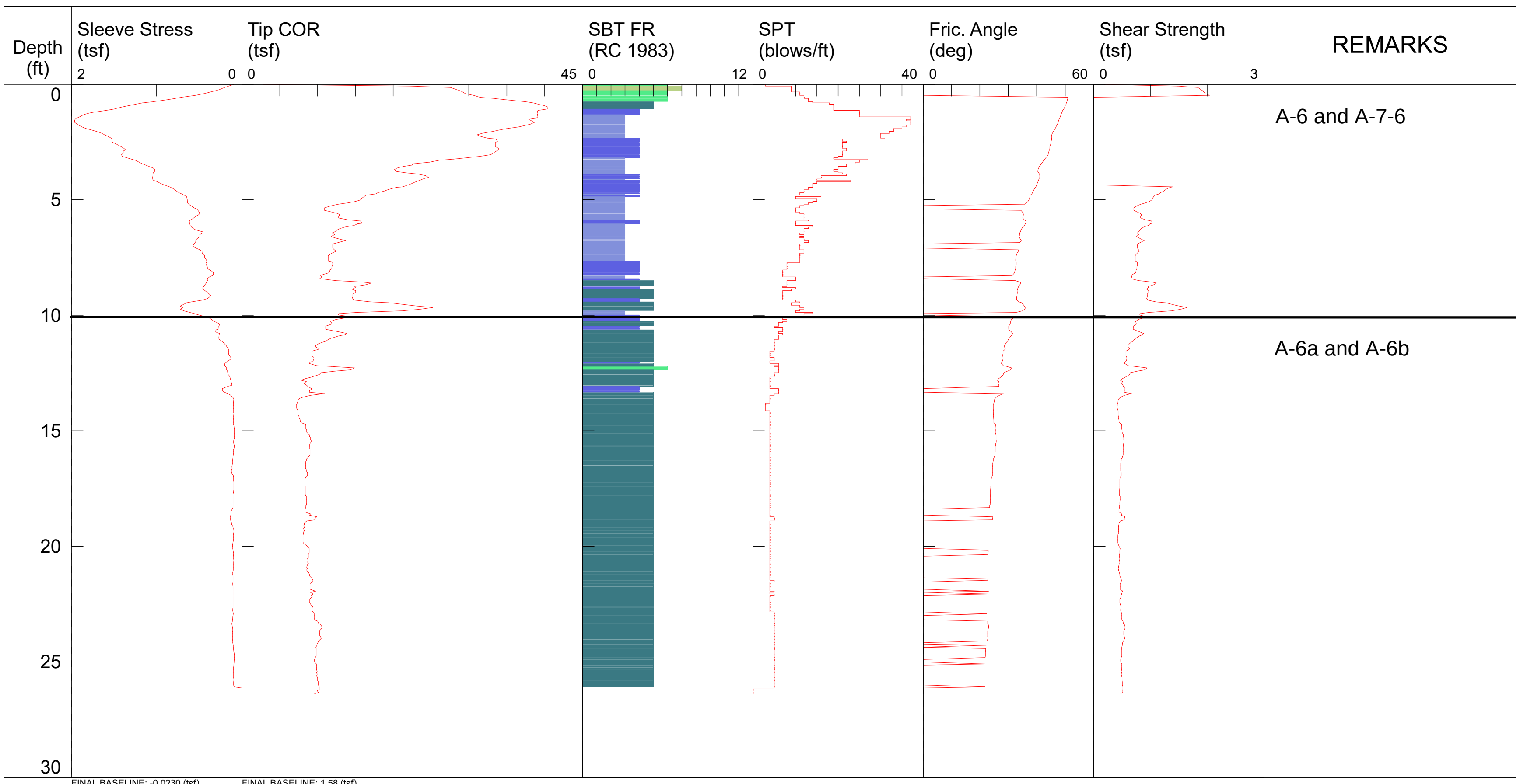
NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: CEMENT GROUT

SOUNDING

TOTAL DEPTH: 26.385 ft
SITE: LUC/WOO Overhead Signs
SOUNDING
COMPANY: SME
FILENAME: CPT#001(002).DAT

PROBE ID: 4644.171XX
TEST ID: CPT-001
PROJECT: 099013.01
LOCATION: Maumee Ohio



NOTES:: Example of notes

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

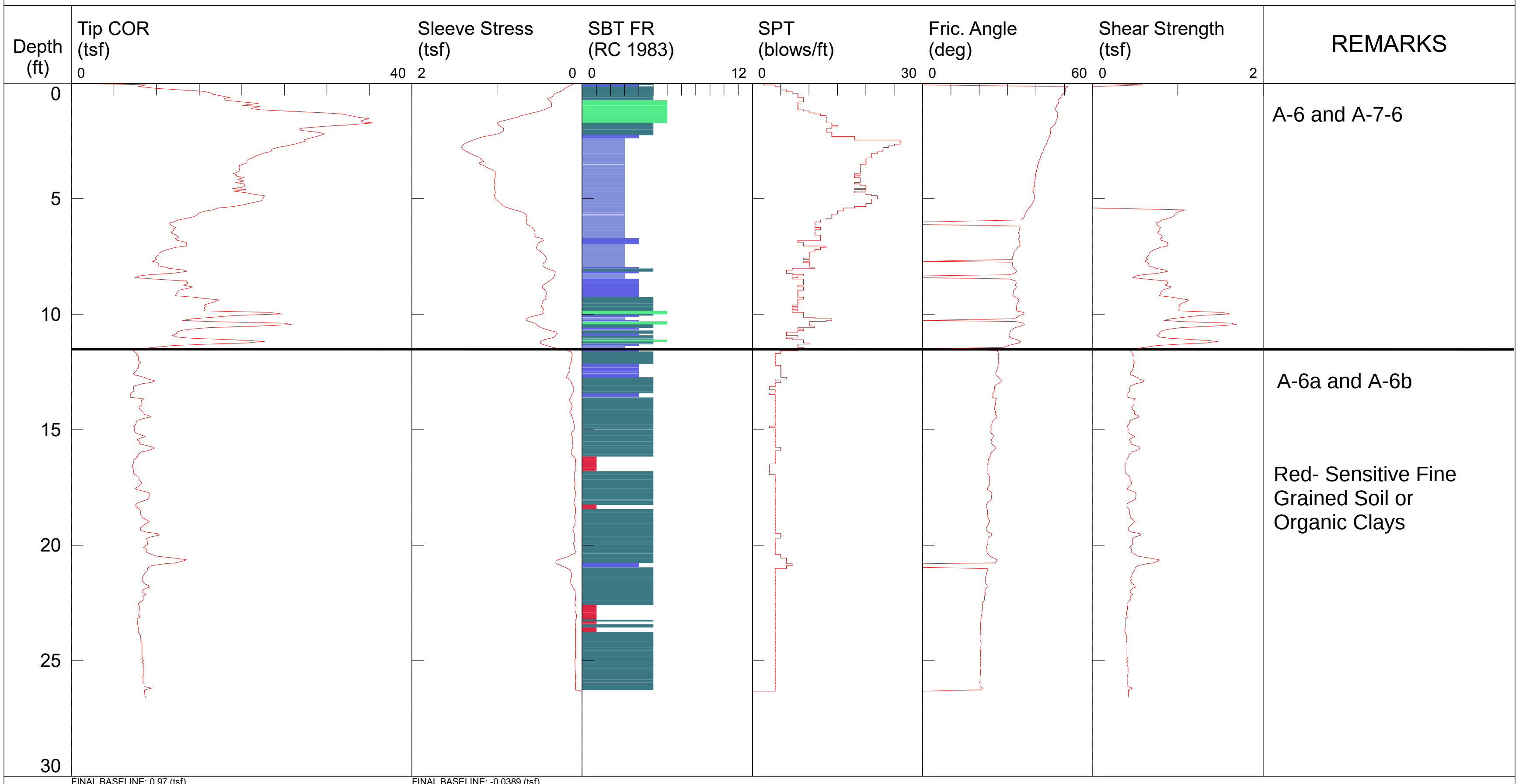
*SBT/SPT CORRELATION: UBC-1983

Docusign Envelope ID: 56355EEC-3F32-4893-82B4-61D20592BC31

SOUNDING

TOTAL DEPTH: 26.585 ft
SITE: LUC/WOO Overhead Signs
SOUNDING
COMPANY: SME
FILENAME: CPT#002(001).DAT

PROBE ID: 4644.171XX
TEST ID: CPT-002
PROJECT: 099013.01
LOCATION: Maumee Ohio



NOTES:: Example of notes

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

*SBT/SPT CORRELATION: UBC-1983

APPENDIX B
LIMITATIONS PERTAINING TO SUBSURFACE CONDITIONS

LIMITATIONS PERTAINING TO SUBSURFACE CONDITIONS

EXISTING FILL

It is sometimes difficult to distinguish between existing fill present at a site and natural soils based on samples and cuttings from small-diameter boreholes, especially if portions of the fill do not contain man-made materials, debris, topsoil, or organic layers, and when the fill appears similar in composition to the local natural soils. Therefore, consider the delineation of fill described on the logs, if encountered, to be approximate.

The composition of existing site fill, if encountered, may change abruptly over short distances and will vary from what is reported on the logs. The descriptions of debris within fill may not accurately indicate the quantity, composition, or size of the debris, and may not fully include the types of debris existing within the site fills. Perform test pits if existing fill is encountered to further evaluate the condition of the fill, particularly if the fill will be utilized for support of overlying structures and/or other improvements.

GROUNDWATER

Hydrostatic groundwater levels, and perched groundwater conditions, will fluctuate throughout the year, based on variations in precipitation, evaporation, run-off, and other factors. The groundwater information reported on the logs represent conditions at the time the readings were taken and may vary from the groundwater conditions encountered at other times.

SUBSURFACE PROFILE

The profile described in this report and included on the logs is a generalized description of the conditions observed. The stratification depths described in this report and shown on the logs indicate a zone of transition from one soil type to another. They are not meant to delineate exact depths of change between soil types. Soil conditions may vary between or away from the exploration locations. Refer to the logs for the soil descriptions, rock descriptions (when applicable), and results of the field and laboratory tests at the specific exploration locations.

If only borings with hollow-stem or solid-stem augers are performed, consider thickness measurements of surficial materials reported on the logs (e.g., gravel, asphalt, concrete, aggregate base) to be approximate since mixing of the surface materials with the underlying subgrade can occur while advancing the augers, and it is difficult to measure the thickness of surface materials in small-diameter boreholes. Perform additional evaluations for more accurate measurements of surface materials, such as test pits for topsoil and gravel thicknesses, coring for pavement thicknesses, and hand sampling for aggregate thickness.

APPENDIX C

IMPORTANT INFORMATION ABOUT THIS GEOTECHNICAL-ENGINEERING REPORT
GENERAL COMMENTS

Important Information about This Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled.* No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be*, and, in general, *if you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying it. A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.*

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration.*** Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

Telephone: 301/565-2733
e-mail: info@geoprofessional.org www.geoprofessional.org

GENERAL COMMENTS

BASIS OF GEOTECHNICAL REPORT

This report has been prepared in accordance with generally accepted geotechnical engineering practices to assist in the design and/or evaluation of this project. If the project plans, design criteria, and/or other project information referenced in this report and utilized by SME to prepare our recommendations are changed, the conclusions and recommendations contained in this report are not considered valid unless the changes are reviewed, and the conclusions and recommendations of this report are modified or approved in writing.

The discussions and recommendations contained in this report are based on the available project information, described in this report, and the geotechnical data obtained from the field exploration at the locations indicated in the report. Variations in soil and groundwater conditions commonly occur between or away from sampling locations. The nature and extent of the variations may not become evident until the time of construction. If significant variations are observed during construction, SME must be contacted to reevaluate the recommendations of this report.

In the process of obtaining and testing samples and preparing this report, procedures are followed that represent reasonable and accepted practice in the field of geotechnical engineering. Specifically, field logs are prepared during the field exploration that describe field occurrences, sampling locations, and other information. Samples obtained in the field are frequently subjected to additional testing and reclassification in the laboratory and differences may exist between the field logs and the report logs.

The engineer preparing the report reviews the field logs, laboratory classifications, and test data and then prepares the report logs. Our recommendations are based on the contents of the report logs and the information contained therein.

REVIEW OF DESIGN DETAILS, PLANS, AND SPECIFICATIONS

Retain SME to review the design details, project plans, and specifications to verify those documents are consistent with the recommendations contained in this report.

REVIEW OF REPORT INFORMATION WITH PROJECT TEAM

Implementation of our recommendations may affect the design, construction, and performance of the proposed improvements, along with the potential inherent risks involved with the proposed construction. The client and key members of the design team, including SME, should discuss the issues covered in this report so the issues are understood and applied in a manner consistent with the owner’s budget, tolerance of risk, and expectations for performance and maintenance.

FIELD VERIFICATION OF GEOTECHNICAL CONDITIONS

SME needs to be retained to continue our services through construction so we may observe and evaluate the actual subsurface conditions relative to the recommendations made in this report, and so we can verify the recommendations of this report are properly implemented during construction. This may avoid misinterpretation of our recommendations by other parties and will allow us to review and modify our recommendations if variations in the site subsurface conditions are encountered.

PROJECT INFORMATION FOR CONTRACTOR

This report and any future addenda or other reports regarding this site needs to be made available to prospective contractors prior to submitting their proposals for their information only and to supply them with facts relative to the subsurface evaluation and laboratory test results. If the selected contractor encounters subsurface conditions during construction, which differ from those presented in this report, the contractor needs to promptly describe the nature and extent of the differing conditions in writing and SME needs to be notified so we can verify those conditions. The construction contract needs to include provisions for dealing with differing conditions, and contingency funds for potential problems during earthwork and foundation construction. We would be pleased to assist with the development of contract provisions based on our experience.

The contractor needs to be prepared to handle environmental conditions encountered at this site, which may affect the excavation, removal, or disposal of soil; dewatering of excavations; and health and safety of workers. Any Environmental Assessment reports prepared for this site need to be made available for review by bidders and the successful contractor.

THIRD PARTY RELIANCE/REUSE OF THIS REPORT

This report has been prepared solely for the use of our Client for the project specifically described in this report. This report cannot be relied upon by other parties not involved in the project, unless specifically allowed by SME in writing. SME also is not responsible for the interpretation by other parties of the geotechnical data and the recommendations provided herein.

Passionate People Building and Revitalizing our World

SME®