PRELIMINARY GEOTECHNICAL EXPLORATION REPORT

FOR THE

WOODBURY MIDDLE
15400 S WOODLAND ROAD
CITY OF SHAKER HEIGHTS, OHIO
WGE #20241259

PREPARED FOR

GPD GROUP
520 SOUTH MAIN STREET, SUITE 2531
AKRON, OH 44311

BY

WERTZ GEOTECHNICAL ENGINEERING, INC.
400 COLLIER DRIVE
DOYLESTOWN, OHIO 44230

DRILLING | MATERIAL TESTING | ENGINEERING

December 9, 2024

GPD Group
520 South Main Street, Suite 2531
Akron, OH 44311

ATTN: **Leanne Andrysco, AIA, NCARB**

RE: **Woodbury Middle, 15400 S Woodland Road, City of Shaker Heights, Ohio; WGE #20241259**

Ms. Andrysco:

Wertz Geotechnical Engineering (WGE) has completed the requested subsurface investigation for the proposed Woodbury Middle project in City of Shaker Heights, Ohio. The purpose of this investigation is to define the subsurface conditions at the project site and to make general recommendations relative to site preparation, earthwork, pavement, construction, drainage improvements, and other pertinent geotechnical aspects of the project. These professional services have been performed, the findings obtained, and the recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices.

If you have any questions or concerns regarding the information presented in this submittal, or have need of additional services, please contact our office at (330) 991-0041.

Sincerely,

Leroy Wertz, P.E.
Senior Geotechnical Engineer

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PROJECT DESCRIPTION

SITE DESCRIPTION

The project site is located at the existing Woodbury Middle Years school at 15400 S Woodland Road in the City of Shaker Heights, Ohio. The project area consists of the existing school, grass, pavements, and a playground. The Doan Brook South Branch runs through the northeast region of the site. According to historic imagery, a building was previously razed near the northeast corner of the property. Earthwork was also performed during the construction of the school.

No project drawings were provided at the time of this report. The project is in the preliminary stages of design, which will include buildings addition(s), pavement expansion(s), and drainage improvements. The school is experiencing water issues within the existing structures. Additional investigation and geotechnical engineering may be warranted during the final design phase.

For the geotechnical analysis, the maximum foundation loadings are assumed to not exceed 150 kips for columns and 4 kips per foot for walls. The planned foundation systems will be shallow spread footings set below the frost penetration depth and built according to the Ohio Building Code.

we may be higher than this

The terrain on site generally sheds towards the north. Grades on site range from a high elevation of approximately 948 feet corner down to elevation 940 feet. A final grading plan or finished floor elevation was not provided at the time of this report.

If our project understanding or any of our project assumptions are incorrect, we should be contacted in order to determine if our recommendations remain valid.

DESCRIPTION OF REGIONAL GEOLOGICAL SETTING

The site area in Shaker Heights, Cuyahoga County, Ohio is situated within a glacial lake basin deposit of the Galion Glaciated Low Plateau Physiographic Region. This region is characterized by a rolling upland transitional area between a gently rolling till plain, including hilly glaciated plateau with thin to thick drift (Ohio Department of Natural Resources Division of Geological Survey, 1998).

According to the USDA Web Soil Survey, the site area is mapped by the local soil and water conservation district as the Loudonville-Urban land complex, a material consisting residuum weathered from sandstone and/or till, deposited on ridges. Also present on the site area is the Urban land-Mahoning complex, a material consisting of till deposited on plains and uplands (USDA, 2020). A USDA Web Soil Survey site map is presented as Figure 2.

According to publicly available mine data from ODNR, no active or inactive surface or underground sand and gravel, limestone, or coal mining activities are present within the site footprint or surrounding areas.

According to 24k Ohio Division of Geological Survey (ODNR-DGS) Bedrock Geology Maps, bedrock in the area consists of the Cuyahoga Formations, Undivided, of which major lithologies consist of shale, siltstone, and sandstone; and minor lithologies consist of conglomerate and limestone (Ohio Department of Natural Resources Division of Geological Survey, 1991). Bedrock is reported by ODNR-DGS at an elevation of 950 feet MSL at the project site. Bedrock was encountered approximately 12 to 17 feet below existing grades. A Geologic Map is presented as Figure 3.

FIELD INVESTIGATION & LABORATORY TESTING

Seven (7) soil borings were advanced at the project site on November 18th and 19th, 2024, utilizing the CME-45 all-terrain, rotary drilling rig, with 2.25" hollow stem augers, operated by WGE drilling staff. The boring locations were field marked by WGE personnel at the approximate locations shown on the attached Figure 1 Boring Location Plan.

Standard penetration testing and sampling was performed at the depth intervals shown on the attached Soil Boring Logs utilizing a 140-lb automatic hammer falling 30 inches to drive a 2-inch outer-diameter split spoon sampler over three, six-inch intervals. Collected samples were examined and visually identified by our personnel in the field based on the visual-manual procedure (ASTM D-2488). Representative samples were retained and transported to our office, for further examination and the assignment of laboratory testing.

Moisture content testing was performed per ASTM D-2216. Thirty-four (34) moisture content tests were conducted on the retained samples. In addition, Loss on Ignition testing (LOI testing) was performed on (2) retained samples of fill material per ASTM D7348-21. The moisture content and LOI test results are included on the Boring Logs in Attachment A.

Static groundwater level observations and hole depth soundings were made upon completion of each boring. This was followed by backfilling the holes. Groundwater level observations, made during the drilling of each boring, are indicated on the attached Soil Boring Logs. It should be noted that groundwater levels and zones of saturation should be expected to fluctuate seasonally based on variation in amounts of rainfall, evapotranspiration, runoff from impervious areas, and several other factors.

SUBSURFACE CONDITIONS

Soil boring data collected at the site generally indicates the presence of fill, native clay, silt, and sandy soils, and shale bedrock. These findings can be described for engineering purposes as the following:

- Topsoil was encountered at the surface of most borings with a thickness of 4 to 5 inches. 4 inches of asphalt with a 6-inch base was encountered at the surface of Boring B-5.

- Fill material was encountered to a depth of approximately 3 feet in Borings B-3, B-4, and B-7 and to a depth of approximately 12 feet in B-6. The fill consisted of moist, soft clay.

- Natural (non-fill) clay, clay and shale fragments, silt, sand, and sand and gravel soils were encountered. The clayey soils were damp to wet with a medium stiff to hard consistency. The silt soils were in a damp and medium dense to dense condition. The sandy soils were moist with a medium dense to dense compactness.

- Shale bedrock was encountered at a depth of approximately 12 feet below the surface in Borings B-1 and B-2, and at a depth of approximately 17 feet in B-3 and B-5. The shale was dry to damp and compact.

- Groundwater was not encountered during the geotechnical investigation.

GEOTECHNICAL RECOMMENDATIONS

We offer the following for your consideration based on our analysis of the soil conditions encountered at the locations indicated; and the assumption that conditions between and away from the soil borings are similar to those that are known:

GENERAL CONSIDERATIONS

It is WGE's engineering opinion that the natural (non-fill) medium stiff clayey soils, medium dense silt and sandy soils, as well as compacted engineered fill are suitable for bearing the anticipated foundation, floor slab, and pavement loadings.

It is WGE's engineering opinion that the soft fill is not suitable to support foundation loads, floor slabs and pavements. The soft fill soils within the building pad should be undercut and backfilled with compacted engineered fill. The soft pavement subgrades will need to be undercut and backfilled with engineered fill or stabilized as directed by the field engineer.

Recommendations are provided in the Earthwork General Guidelines section below for the quality, compaction, testing and inspection of engineered fill. Care should be taken to evaluate foundation, slab, and pavement subgrades prior to stone or concrete placement. All subgrades should be observed by a qualified soils technician under the supervision of a geotechnical engineer, and field density tests should be made to ensure compaction to specification.

GROUNDWATER AND EXCAVATIONS

No groundwater was encountered during our subsurface investigation. It is our opinion that any water influx into the excavations can likely be controlled by pumping from local sumps within the excavation.

Excavations should either be sloped back or shored in accordance with Occupational Safety & Health Administration (OSHA) regulations and any other applicable local codes. Parameters for design of temporary shoring are included in those regulations. Due to the presence of uncontrolled fill material on the site, with respect to temporary excavation side slopes, the site soils should be classified as Type "C" per OSHA. Therefore, temporary excavations should be cut back to a temporary slope no steeper than a 1.5:1 (horizontal: vertical).

The soils encountered during this exploration can likely be excavated with a medium-sized hydraulic excavator with a standard bucket with earth teeth.

EARTHWORK GUIDELINES

- Prior to construction, all topsoil, vegetation, pavement, or other deleterious material should be completely stripped and grubbed from within the footprint of the proposed building and pavement areas and areas to be cut or to receive engineered fill, prior to construction.

- All surfaces cut to subgrade elevation, or subgrades to receive fill, should be proof rolled under the direction of an on-site geotechnical engineer or their direct assigns. Any areas of soft or yielding (pumping/rutting) soils, or obviously contaminated zones, should be undercut to underlying, stable soils and replaced with stable, compacted engineered fill, or stabilized in place as directed by the engineer.

- The engineered fill should be clean, inert soil which should be approved by the geotechnical engineer. The engineered fill should have a dry density greater than 100 pcf, liquid limit less than 50%, sulfate content less than 3000 ppm (per AASHTO T290), and an organic content less than 1.5%.

- Durable bedrock fragments, may be used as engineered fill or mixed into engineered fill. The durable bedrock should be crushed to a soil-like consistency, so that it has a maximum D_{50} of 4 inches, and a maximum diameter of 8 inches. All large rock pieces should be surrounded completely by soil matrix, never placed and buried in a pile. Durable bedrock is defined by the bucket test, or by ASTM D-4644 with a medium slake durability, showing a slake durability index of 80 or higher based on Gautam, 2012.

- All non-durable bedrock and soft rocks (non-durable shales, siltrocks, clayrocks, mudstones, siltstones, mudshales, siltshales, clayshales and argillites) should not be used for this project.

- Engineered fill material should be placed on the approved subgrade in controlled lifts. Each lift should be compacted to a stable condition at a minimum of 98% maximum dry density per ASTM D-698, with a moisture content between 2.0% below to 2.0% over optimum moisture. All filling operations should be observed by a qualified soils technician under the supervision of a geotechnical engineer. Field density tests should be made to ensure compaction to specification.

- All surfaces should be sealed and sloped after each day or prior to inclement weather to promote positive drainage of water offsite.

- Construction traffic should be kept off any wet subgrades. If site work is performed during times of drier weather, the need for additional repairs and stabilization to the

subgrade may be substantially reduced. Therefore, it is recommended that sitework be performed during these times.

BUILDING BEARING CAPACITY AND FOUNDATIONS

Conventional shallow spread and strip footings are recommended for transmitting structural loads to the subsoil. Estimated maximum total and differential settlements for footings designed in accordance with the recommendations provided in this report are approximately 1 and ½ inch, respectively.

In general, the native (non-fill) stiff clays, medium dense silts and sands, or approved compacted engineered fill materials can support a maximum net allowable bearing pressure of 2,500 psf. The following provisions for foundation design and construction should apply:

- The foundation subgrade should be evaluated and approved by a geotechnical engineer, or their representative, prior to concrete placement. Any deleterious foundation subgrade soils be undercut and backfilled with lean concrete or compacted stone as directed by our field engineer.

- Foundation subgrades should be concreted in a dry and frost-free condition as soon after exposure as possible.

- The ground surface surrounding the building should be graded to direct surface drainage of water away from all exterior foundation walls and members.

- All exterior footings should be located below the depth of potential frost penetration (42 inches).

SEISMIC SITE CLASSIFICATION

The seismic design requirements for buildings and other structures are based on Seismic Design Category. Seismic Site Classification is required to determine the Seismic Design Category for a structure. The Seismic Site Classification is based on the upper 100 feet of the site profile defined by a weighted average value of either shear wave velocity, Standard Penetration Test (SPT) resistance, or undrained shear strength in accordance with Section 20.4 of ASCE 7. Borings at this site were extended to a maximum depth of 20 feet. The site properties below the boring depths to 100 feet were estimated based on our experience and knowledge of geologic conditions of the general area.

Based upon the stratigraphy encountered in the borings and the SPT blow counts, it is the opinion of WGE that the site is best characterized as Seismic Site Class “D”. This Seismic Site Classification should be used for design of the structure, according to the Ohio Building Code and Related Codes, section 1613.5.2 "Site Class Definitions."

FLOOR SLAB AND PAVEMENT SUPPORT

Concrete floor slabs would be adequately supported on stable, approved site soils prepared according to *Earthwork Guidelines* and on stable engineered fill placed and compacted to the above-provided specifications. Any areas of soft or yielding (pumping/rutting) soils, or obviously contaminated zones, should be undercut to underlying, stable soils and replaced with stable, compacted engineered fill, or stabilized in place as directed by the engineer.

Floor slab subgrades should be evaluated prior to stone placement by our personnel. All interior floor slabs should have a minimum of 4 inches of free draining granular base (ODOT #57 limestone or an approved equivalent) with a suitable vapor barrier. All exterior concrete slabs should have a minimum of 4 inches of #304 crushed limestone base.

Asphalt and/or concrete pavement would be suitable for the pavement areas. The pavement subgrade should be proof rolled to identify areas which may be unsuitable for bearing pavement loadings. Any soft or yielding (pumping/rutting) areas should be undercut to a stable subgrade and backfilled with approved compacted engineered fill or stone in accordance with the *Earthwork Guidelines*.

Catch basins with finger drains should be provided to allow for drainage of the stone base. The pavement subgrade is not considered free draining.

STANDARD OF CARE AND LIMITATIONS

Our recommendations for this project were developed utilizing the project information provided to WGE and the soil information obtained from the test borings that were made at the project site. The test borings only depict the soil and rock conditions at the specified locations and time at which they were made. The soil conditions at other locations on the site may differ from those occurring at the boring locations. Additionally, the conclusions and recommendations have been based upon the available soil information and the design details furnished to us. We should be immediately notified if, during construction, any conditions different from those found in this investigation are evident or our project assumptions or understanding are incorrect. We will advise you of any modifications to our conclusions and recommendations deemed necessary, after observing the exposed conditions and/or changes to the project scope. The scope of our services does not include any environmental assessment or investigation for the presence or absence of hazardous or toxic materials in the soil, groundwater, or surface water within or beyond the site studied.

Our professional services have been performed, our findings obtained, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. Wertz Geotechnical Engineering, Inc. is not responsible for the conclusions, opinions, or recommendation made by others based upon the data included herein.

We hope you will find this report satisfactory. Please contact our office if we can be of further service or you have questions regarding this submittal.

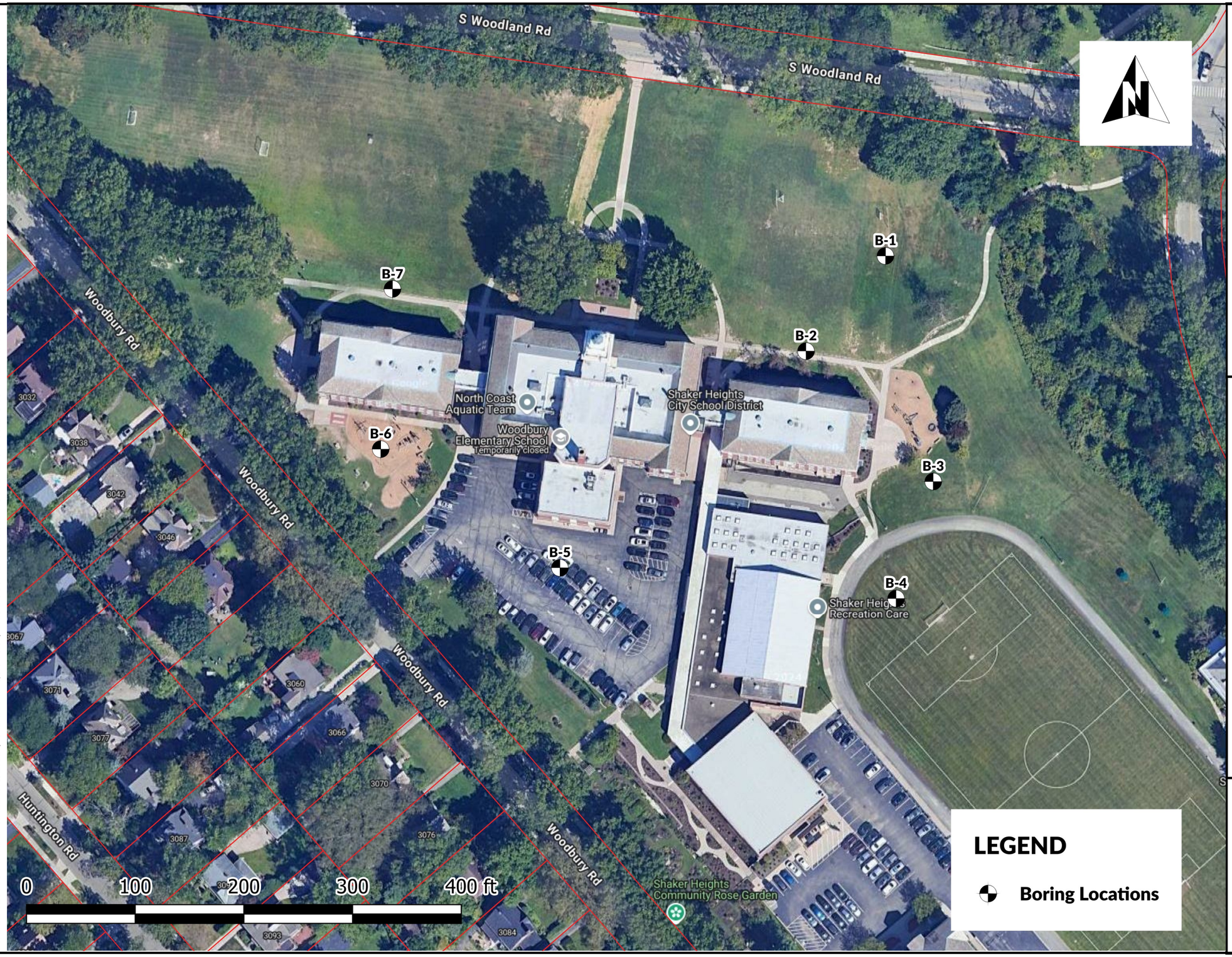
Respectfully submitted,

Rebecca Thieret
Project Engineer

Leroy Wertz, P.E.
Senior Geotechnical Engineer

FIGURE 1

Geotechnical Boring Location Map



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BORING LOCATION MAP

CLIENT
GPD GROUP
1228 EUCLID AVENUE SUITE 320, CLEVELAND OHIO 44115

SITE
15400 S WOODLAND RD, SHAKER HEIGHTS OHIO 44120

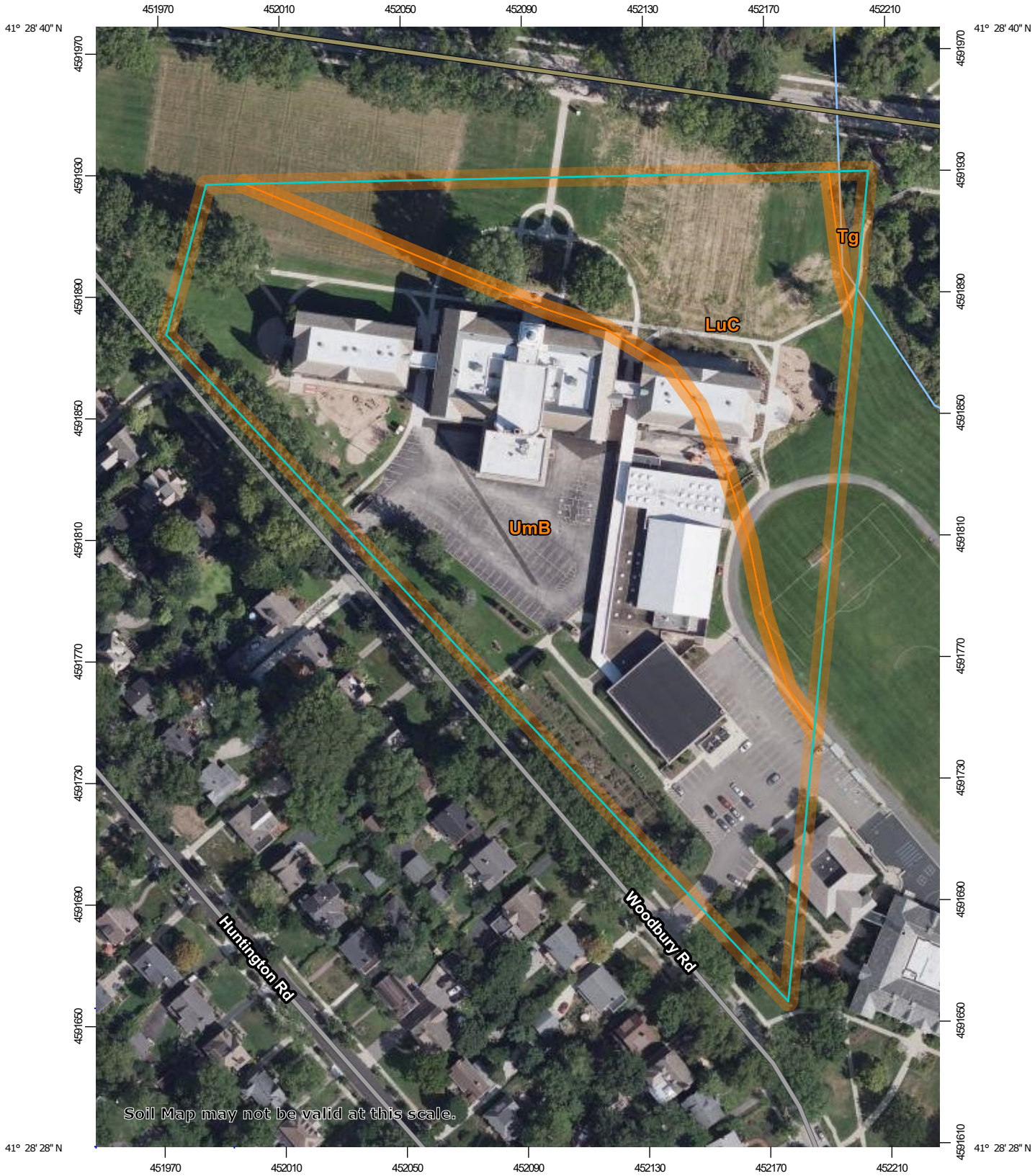
PROJECT NAME
WOODBURY MIDDLE

LAYOUT BY **GRH**	DATE: 11/14/2024
DRAWN BY **RG**	FIGURE NO. **1**
CHECKED BY **LW**	

FIGURE 2

USDA Web Soil Survey Map

Soil Map—Cuyahoga County, Ohio



Map Scale: 1:1,800 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 25 50 100 150

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Cuyahoga County, Ohio
Survey Area Data: Version 23, Aug 27, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 17, 2020—Sep 19, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
LuC	Loudonville-Urban land complex, rolling	2.8	31.1%
Tg	Tioga loam, frequently flooded	0.1	1.0%
UmB	Urban land-Mahoning complex, 2 to 6 percent slopes	6.1	67.9%
Totals for Area of Interest		**9.0**	**100.0%**

FIGURE 3

ODNR Bedrock Geology Map

WOODBURY MIDDLE PROJECT GEOLOGIC MAP

Bedrock Topography of Ohio 24K (ODNR-DGS) -Bedrock Topography 24K - Contours

Bedrock Topography Contour (50-ft Interval), data from ODNR-DGS)

Oil-and-gas well

Water well, data from Ohio Division of Water

-Bedrock Geology 24K
-Data Bedrock Geology of Ohio 24K (ODNR-DGS)

Mc - *Cuyahoga Formation*
Major: Shale, Siltstone, Sandstone
Minor: Conglomerate, Limestone

Bedrock Contours are interpolated by ODNR-DGS based on data from local water wells and oil and gas wells.

Bedrock was encountered at a depth of approximately 12 to 17 feet below existing site grades.

ATTACHMENT A

Geotechnical Boring Logs

WERTZ GEOTECHNICAL ENGINEERING, INC.
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office@wertzgeo.com

PROJECT:	Woodbury Middle School	**PROJECT NO.:** 20241259	**DRILL RIG:**	CME-45	**BORING ID:**	B-1	
LOCATION:	Shaker Heights, Ohio		**METHOD:**	Hollow Stem	**DATE STARTED:**	11/18/2024	
LOGGED BY:	AH		**AUGER SIZE:**	2.25 inches	**DATE COMPLETED:**	11/18/2024	
DRILL CREW:	JA & DK		**HAMMER:**	Auto SPT	**ELEVATION:**	941 feet MSL	
GROUNDWATER ENCOUNTER DEPTH	None	**GROUNDWATER AT COMPLETION:** None	**TOTAL DEPTH:**	15'	**CAVE DEPTH:**	9'	

DEPTH (FEET)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS (BLOWS/0.5FOOT)	RECOVERY (INCHES)	POCKET PEN (TSF)	GRAPHIC LOG	LITHOLOGY
1		AS	--	--	--		5" TOPSOIL.
2	1	1.0-2.5	5-6-7	17	1.75		Moist, stiff, brown, fine to coarse sandy CLAY, some silt, minor gravel. Wn%: 17.3
3							
4	2	3.5-5.0	4-9-5	18	5+		Damp, stiff, brown CLAY, minor silt and fine to coarse sand and gravel. Wn%: 18.9
5							
6							
7	3	6.0-7.5	4-12-17	13			Damp, medium dense, brown, fine to coarse sandy SILT, minor clay and gravel. Wn%: 11.0
8							
9	4	8.5-10.0	17-16-20	16			Damp, dense, brown, fine to coarse sandy SILT, minor clay and shale fragments. Wn%: 9.2
10							
11							
12							
13							
14	5	13.5-15.0	32-50/4"	10			Damp, compact, gray SHALE. Wn%: 6.0
15							
16							*Note: Ground surface elevations at boring locations estimated using data provided by Google Earth Pro.*
17							
18							
19							
20							
21							
22							
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25							
26							
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33							
34							
35							

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PROJECT:	Woodbury Middle School	**PROJECT NO.:** 20241259	**DRILL RIG:**	CME-45	**BORING ID:**	B-2	
LOCATION:	Shaker Heights, Ohio		**METHOD:**	Hollow Stem	**DATE STARTED:**	11/18/2024	
LOGGED BY:	AH		**AUGER SIZE:**	2.25 inches	**DATE COMPLETED:**	11/18/2024	
DRILL CREW:	JA & DK		**HAMMER:**	Auto SPT	**ELEVATION:**	939 feet MSL	
GROUNDWATER ENCOUNTER DEPTH	None	**GROUNDWATER AT COMPLETION:** None	**TOTAL DEPTH:**	15'	**CAVE DEPTH:**	9'	

DEPTH (FEET)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS (BLOWS/0.5FOOT)	RECOVERY (INCHES)	POCKET PEN (TSF)	GRAPHIC LOG	LITHOLOGY
1		AS	--	--	--		5" TOPSOIL.
2	1	1.0-2.5	8-5-6	0			No Recovery.
3							
4	2	3.5-5.0	7-10-12	10	5+		Damp, very stiff, brown CLAY, minor silt and fine to coarse sand and gravel. Wn%: 14.8
5							
6							
7	3	6.0-7.5	6-11-13	18	5+		Damp, very stiff, brown CLAY, minor silt and fine to coarse sand and gravel. Wn%: 14.0
8							
9	4	8.5-10.0	5-7-13	16	2.5		Moist, very stiff, gray CLAY, minor silt and fine to coarse sand and gravel. Note: Sand and gravel seam present. Wn%: 22.2
10							
11							
12							
13							
14	5	13.5-15.0	11-14-13	18			Damp, compact, gray SHALE. Note: Completely weathered. Wn%: 9.4
15							
16							*Note: Ground surface elevations at boring locations estimated using data provided by Google Earth Pro.*
17							
18							
19							
20							
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35							

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PROJECT:	Woodbury Middle School	**PROJECT NO.:** 20241259	**DRILL RIG:**	CME-45	**BORING ID:**	B-3	
LOCATION:	Shaker Heights, Ohio		**METHOD:**	Hollow Stem	**DATE STARTED:**	11/19/2024	
LOGGED BY:	AH		**AUGER SIZE:**	2.25 inches	**DATE COMPLETED:**	11/19/2024	
DRILL CREW:	JA & DK		**HAMMER:**	Auto SPT	**ELEVATION:**	947 feet MSL	
GROUNDWATER ENCOUNTER DEPTH	None	**GROUNDWATER AT COMPLETION:** None	**TOTAL DEPTH:**	20'	**CAVE DEPTH:**	12'	

DEPTH (FEET)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS (BLOWS/0.5FOOT)	RECOVERY (INCHES)	POCKET PEN (TSF)	GRAPHIC LOG	LITHOLOGY
1		AS	--	--	--		5" TOPSOIL
2	1	1.0-2.5	3-2-2	11	0.75		FILL: Moist, soft, brown CLAY, some silt, trace sand and gravel. Wn%: 13.6
3							
4	2	3.5-5.0	8-7-6	15	3		Damp, stiff, brown CLAY, some silt, minor gravel, trace sand. Wn%: 17.2
5							
6							
7	3	6.0-7.5	5-7-12	11	5+		Damp, very stiff, brown CLAY, some silt, minor gravel, trace sand. Wn%: 15.2
8							
9	4	8.5-10.0	35-35-25	0			No Recovery, drove obstruction, likely: brown CLAY.
10							
11							
12							
13							
14	5	13.5-15.0	3-4-5	17			Moist to wet, stiff, gray CLAY AND SHALE FRAGMENTS, minor silt. NOTE: Shale residuum. Wn%: 10.0
15							
16							
17							
18							
19	6	18.5-20.0	43-50/4"	16			Damp, compact, gray SHALE. Wn%: 4.0
20							*Note: Ground surface elevations at boring locations estimated using data provided by Google Earth Pro.*
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
31							
32							
33							
34							
35							

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PROJECT:	Woodbury Middle School	**PROJECT NO.:** 20241259	**DRILL RIG:**	CME-45	**BORING ID:**	B-4	
LOCATION:	Shaker Heights, Ohio		**METHOD:**	Hollow Stem	**DATE STARTED:**	11/19/2024	
LOGGED BY:	AH		**AUGER SIZE:**	2.25 inches	**DATE COMPLETED:**	11/19/2024	
DRILL CREW:	JA & DK		**HAMMER:**	Auto SPT	**ELEVATION:**	949 feet MSL	
GROUNDWATER ENCOUNTER DEPTH	None	**GROUNDWATER AT COMPLETION:** None	**TOTAL DEPTH:**	15'	**CAVE DEPTH:**	9'	

DEPTH (FEET)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS (BLOWS/0.5FOOT)	RECOVERY (INCHES)	POCKET PEN (TSF)	GRAPHIC LOG	LITHOLOGY
1		AS	--	--	--		5" TOPSOIL
2	1	1.0-2.5	2-2-2	14	0.5		FILL: Moist, soft, brown and gray CLAY, some silt, trace sand and organics. OC%: 2.2 Wn%: 23.4
3							
4	2	3.5-5.0	2-5-6	17	2.5		Moist, stiff, brown CLAY, some silt, minor gravel, trace sand. Wn%: 15.3
5							
6							
7	3	6.0-7.5	3-6-10	18	5+		Damp, stiff, brown CLAY, some silt, minor gravel, trace sand. Wn%: 17.8
8							
9	4	8.5-10.0	2-12-21	18	5+		Damp, hard, brown CLAY, some silt, minor gravel and sandstone fragments, trace sand. Wn%: 11.3
10							
11							
12							
13							
14	5	13.5-15.0	6-9-10	18			Damp, very stiff, gray CLAY AND SHALE FRAGMENTS, minor silt. NOTE: Shale residuum. Wn%: 9.7
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Note: *Ground surface elevations at boring locations estimated using data provided by Google Earth Pro.*

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PROJECT:	Woodbury Middle School	**PROJECT NO.:** 20241259	**DRILL RIG:**	CME-45	**BORING ID:**	B-5	
LOCATION:	Shaker Heights, Ohio		**METHOD:**	Hollow Stem	**DATE STARTED:**	11/18/2024	
LOGGED BY:	AH		**AUGER SIZE:**	2.25 inches	**DATE COMPLETED:**	11/18/2024	
DRILL CREW:	JA & DK		**HAMMER:**	Auto SPT	**ELEVATION:**	942 feet MSL	
GROUNDWATER ENCOUNTER DEPTH	None	**GROUNDWATER AT COMPLETION:** None	**TOTAL DEPTH:**	20'	**CAVE DEPTH:**	11.5'	

DEPTH (FEET)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS (BLOWS/0.5FOOT)	RECOVERY (INCHES)	POCKET PEN (TSF)	GRAPHIC LOG	LITHOLOGY
1		AS	--	--	--		4" ASPHALT and 6" SUBBASE.
2	1	1.0-2.5	4-5-3	12	4		Damp to moist, medium stiff, brown CLAY, minor silt and fine to coarse sand and gravel. Wn%: 16.2
3							
4	2	3.5-5.0	6-10-13	18	4.5		Damp, very stiff, brown CLAY, minor silt and fine to coarse sand and gravel. Wn%: 16.8
5							
6							
7	3	6.0-7.5	5-9-12	15			Moist, medium dense, brown, fine to coarse SAND AND GRAVEL, some clay and silt. Wn%: 9.9
8							
9	4	8.5-10.0	50/3"	2			Poor recovery, drove gravel obstruction. Likely: Mois, brown SAND AND GRAVEL. Wn%: 8.0
10							
11							
12							
13							
14	5	13.5-15.0	10-20-28	18			Moist, dense, gray, fine to coarse SAND, minor clay and silt and shale fragments. Wn%: 8.4
15							
16							
17							
18							
19	6	18.5-20.0	48-25-21	18			Dry, compact, gray SILTSTONE. Wn%: 25.7
20							*Note: Ground surface elevations at boring locations estimated using data provided by Google Earth Pro.*
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PROJECT:	Woodbury Middle School	**PROJECT NO.:** 20241259	**DRILL RIG:**	CME-45	**BORING ID:**	B-6	
LOCATION:	Shaker Heights, Ohio		**METHOD:**	Hollow Stem	**DATE STARTED:**	11/19/2024	
LOGGED BY:	AH		**AUGER SIZE:**	2.25 inches	**DATE COMPLETED:**	11/19/2024	
DRILL CREW:	JA & DK		**HAMMER:**	Auto SPT	**ELEVATION:**	941 feet MSL	
GROUNDWATER ENCOUNTER DEPTH	None	**GROUNDWATER AT COMPLETION:** None	**TOTAL DEPTH:**	15'	**CAVE DEPTH:**	9'	

DEPTH (FEET)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS (BLOWS/0.5FOOT)	RECOVERY (INCHES)	POCKET PEN (TSF)	GRAPHIC LOG	LITHOLOGY
1		AS	--	--	--		12" MULCH FILL
2	1	1.0-2.5	3-1-2	10	0.5		FILL: Moist, soft, brown CLAY, some silt, minor gravel, trace sand and organics. Wn%: 15.0
3							
4	2	3.5-5.0	3-2-1	8	0.5		FILL: Moist, soft, brown CLAY, some silt, minor gravel, trace sand and organics. OC%: 1.7 Wn%: 9.0
5							
6							
7	3	6.0-7.5	2-1-2	10	0.25		FILL: Moist, soft, gray CLAY, some silt, trace sand and organics. Wn%: 14.7
8							
9	4	8.5-10.0	0-8-9	12	0.25		FILL: Moist, soft, gray, silty CLAY, trace sand and organics. NOTE: Spoon damaged, blow counts incorrect. Wn%: 28.8
10							
11							
12							
13							
14	5	13.5-15.0	6-11-14	18	5+		Damp, very stiff, gray CLAY AND SHALE FRAGMENTS, minor silt. NOTE: Shale residuum. Wn%: 8.2
15							
16							
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Note: *Ground surface elevations at boring locations estimated using data provided by Google Earth Pro.*

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PROJECT:	Woodbury Middle School	**PROJECT NO.:** 20241259	**DRILL RIG:**	CME-45	**BORING ID:**	B-7	
LOCATION:	Shaker Heights, Ohio		**METHOD:**	Hollow Stem	**DATE STARTED:**	11/18/2024	
LOGGED BY:	AH		**AUGER SIZE:**	2.25 inches	**DATE COMPLETED:**	11/18/2024	
DRILL CREW:	JA & DK		**HAMMER:**	Auto SPT	**ELEVATION:**	941 feet MSL	
GROUNDWATER ENCOUNTER DEPTH	None	**GROUNDWATER AT COMPLETION:** None	**TOTAL DEPTH:**	15'	**CAVE DEPTH:**	9'	

DEPTH (FEET)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS (BLOWS/0.5FOOT)	RECOVERY (INCHES)	POCKET PEN (TSF)	GRAPHIC LOG	LITHOLOGY
1		AS	--	--	--		4" TOPSOIL.
2	1	1.0-2.5	2-1-1	16	1		FILL: Moist, soft, brown CLAY, minor silt and fine to coarse sand, trace gravel and organics. OC%: 2.2 Wn%: 25.7
3							
4	2	3.5-5.0	3-7-6	18	5+		Moist, stiff, brown CLAY, minor silt and fine to coarse sand and gravel. Wn%: 15.2
5							
6							
7	3	6.0-7.5	4-8-13	18	5+		Damp, very stiff, brown CLAY, minor silt and fine to coarse sand and gravel. Wn%: 15.6
8							
9	4	8.5-10.0	6-10-13	18	5+		Damp very stiff, brown and gray CLAY, some silt, minor fine to coarse sand and gravel. Wn%: 14.4
10							
11							
12							
13							
14	5	13.5-15.0	10-19-15	18	5+		Damp, hard, gray CLAY AND SHALE FRAGMENTS. Note: Shale residuum. Wn%: 8.0
15							
16							
17							*Note: Ground surface elevations at boring locations estimated using data provided by Google Earth Pro.*
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ATTACHMENT D

Site Photos

Image 1

Image 2

Image 3

Image 4

Image 5