

July 19, 2022 (Revised October 10, 2022)

Ms. Elizabeth Most Project Manager Architectural Vision Group, LTD. 23850 Sperry Drive Westlake, Ohio 44145

Re: Report of Geotechnical Services Proposed New Westside PK-3 Elementary School Massillon Junior High School Site 250, 29<sup>th</sup> Street NW Massillon, Stark County, Ohio **PSI Project No.: 0142-2571** 

Dear Ms. Most:

Per your request, Professional Service Industries, Inc. (PSI) is pleased to submit this Geotechnical Engineering Services Report for the above referenced project. The results of this exploration, together with our recommendations, are to be found in the accompanying report.

After the plans and specifications are complete, PSI should review the final design and specifications in order to verify that the earthwork and recommendations are properly interpreted and implemented. It is considered imperative that the geotechnical engineer and/or its representative be present during earthwork operations and foundation installations to observe the field conditions with respect to the design assumptions and specifications. PSI will not be held responsible for interpretations and field quality control observations made by others.

If you have any questions pertaining to this report, please contact our office at (216) 447-1335. PSI would be pleased to continue providing geotechnical services throughout the implementation of the project, and we look forward to working with you and your organization on this and future projects.

Respectfully submitted,

**PROFESSIONAL SERVICE INDUSTRIES, INC.** 

St. aPell

Stephanie A. Pell, E.I. Geotechnical Project Engineer

Alagaiya Veeramani, P.E. Principal Consultant

Subsurface Exploration Report

For the Proposed

New Westside PK-3 Elementary School 250 29<sup>th</sup> Street NW Massillon, Ohio 44647

Prepared for

Architectural Vision Group, LTD. 23850 Sperry Drive Westlake, Ohio 44145

Prepared by

Professional Service Industries, Inc. 5555 Canal Road Cleveland, OH 44125

**PSI Project No. 0142-2571** 



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## **1 PROJECT INFORMATION**

### 1.1 **PROJECT AUTHORIZATION**

This report presents the results of a geotechnical subsurface exploration and evaluation conducted for Architectural Vision Group, LTD., in connection with the proposed New Westside PK-3 Elementary School located at 250 29<sup>th</sup> Street NW, in the City of Massillon, Stark County, Ohio. PSI's services for this project were performed in accordance with PSI Proposal No. 0142-374410, dated May 20, 2022. Authorization to perform this exploration and analysis was in the form of a Proposal Authorization Form, signed by Ms. Elizabeth Most, Project Manager, of Architectural Vision Group, LTD., dated May 23, 2022.

Additional test borings and evaluation for this project were performed in accordance with a PSI Addendum Proposal, dated September 14, 2022. Authorization to perform this exploration and analysis was in the form of a Proposal Authorization Form, signed by Mr. Murtaza Abbas, Project Manager, of Architectural Vision Group, LTD., dated September 14, 2022.

### **1.2 PROJECT DESCRIPTION**

Based on the provided information, it is understood that the proposed development will include the construction of a new elementary school building to be located northeast of the existing Massillon Junior High School. The proposed building will be a single story, slab on grade structure, measuring approximately 60,000 to 80,000 square feet in plan area. Additionally, the project includes the construction of paved parking lots and driveways. The proposed development will include the construction of an eleven (11) feet deep detention basin on the south side of the site.

Based on the structural loading information provided in the AIA Document the maximum column and wall loads for the school building will be 70 kips and 3 kips per linear foot. However, PSI assumes the following for the maximum floor load will be 100 pounds per square foot (psf), respectively.

No site grading or topographic plan was provided at the time of this report. However, based on the Stark County GIS, the overall site slopes downward from north to south, with an elevation difference of approximately 31 feet (1097' MSL to 1066' MSL). Based on the Stark County GIS, within the footprint of the proposed building there is an elevation difference of about 10 feet (1094' MSL to 1084' MSL). The maximum cut and fill operations of less than 4 feet will be required for the proposed building area, about 7 feet of cut and fill will be required for the detention pond, and some cut/fill as required will be anticipated within the proposed pavement area.

The geotechnical recommendations presented in this report are based on the available project information, the proposed building location and orientation of the building on the site, and the subsurface materials described in this report. If any of the information we have been given or have assumed is incorrect, please contact us so that we may amend the recommendations presented accordingly. PSI will not be responsible for the implementation of its recommendations when it is not notified of changes in the project.

### **1.3 PURPOSE AND SCOPE OF SERVICES**

The purpose of this study was to explore the subsurface conditions at the site and to prepare recommendations for foundations, floor slab construction, site preparation, and other construction considerations. Our scope for this



service included a project site reconnaissance, drilling and sampling twenty-four (24) test borings, completing a laboratory testing program, and submitting an engineering analysis and evaluation of the subsurface materials.

The scope of services for the geotechnical exploration did not include an environmental assessment for the presence or absence of wetlands or hazardous or toxic materials in the soil, surface water, groundwater or air, on or below or around this site. Any statements in this report or on the boring logs regarding odors, colors or unusual or suspicious items or conditions are strictly for the information of the client. PSI's scope also did not include any service to investigate or detect the presence of moisture, mold or other biological contaminants in or around any structure, or any service that was designed or intended to prevent or lower the risk of the occurrence or the amplification of the same. The Client should be aware that mold is ubiquitous to the environment with mold amplification occurring when building materials are impacted by moisture. The Client should also be aware that site conditions are outside of PSI's control, and that mold amplification will likely occur, or continue to occur, in the presence of moisture. As such, PSI cannot and shall not be held responsible for the occurrence or reoccurrence of mold amplification.

## 2 SITE AND SUBSURFACE CONDITIONS

### 2.1 SITE LOCATION AND DESCRIPTION

The site for the proposed New Elementary School project is located at 250 29<sup>th</sup> Street NW, in the City of Massillon, Ohio. Specifically, the proposed New Elementary School will be located immediately northeast of the existing Massillon Junior High School (Lat: 40.788106° & Long: -81.561072°).

The site is currently covered with grass. Based on the Stark County GID, the overall site slopes downward from north to south, with an elevation difference of approximately 31 feet (1097' MSL to 1066' MSL). Based on the Stark County GIS, within the footprint of the building there is an elevation difference of about 10 feet (1094' MSL to 1084' MSL). Surface drainage was good to fair at the time of the field drilling operations. PSI recommends that any existing utility lines be checked and marked prior to construction activities.

### 2.2 SUBSURFACE CONDITIONS

The surface and subsurface conditions at the site were explored with a total of twenty-four (24) test borings. The test borings were each drilled to a depth of approximately 10.0 to 20.0 feet below the existing surface grades. The approximate boring locations are shown on the Boring Location Plan presented in the *Appendix* of this report. The locations for the test borings were selected by PSI and located in the field relative to existing site features and based on site accessibility and the presence of below ground utilities.

The borings were advanced utilizing 3¼ inch inside diameter, hollow-stem auger drilling methods. Soil samples were routinely obtained during the drilling process. Selected soil samples were later tested in the laboratory to obtain soil material properties for the foundation, floor slabs and pavement recommendations. Drilling, sampling, and laboratory testing were accomplished in general accordance with ASTM procedures.

The types of subsurface materials encountered in the test borings have been visually classified. The results of the visual classifications, Standard Penetration tests, moisture contents and water level observations are presented on the boring logs in the *Appendix* of this report. Representative samples of the soils were placed in sample jars and are now stored in the laboratory for further analysis, if requested. Unless notified to the contrary, all samples will be disposed of after 60 days following the date of this report.



The surface of the site at test boring locations B-01 through B-18 and B-20 through B-24 was covered with a layer of topsoil measuring approximately 3.0 to 9.0 inches in thickness. The surface of the site at test boring location B-19 was covered with a layer of asphalt measuring approximately 4.0 inches in thickness and underlain by sand and gravel base measuring approximately 9.0 inches in thickness. The thickness and composition of the surface materials should be expected to be variable throughout site.

Underlying the surface material at test boring location B-11, a layer of fill material was encountered, extending to the depth of approximately 4.0 feet below the existing grade. The fill material consisted primarily of lean clay with varying amounts of gravel, roots, organics and glass fragments. The fill material exhibited moisture contents ranging from 24 to 27 percent. The cohesive fill materials exhibited a medium stiff consistency, based on the Standard Penetration tests.

The surface material or fill material at all the test boring locations B-01 through B-24, were underlain by natural soils. The natural soils at the test boring locations B-03, B-05, B-06, B-08, B-10, B-12, B-13, B-16 through B-20, B-23, and B-24 were extended to the depths of about 3.5 to 14.5 feet below the existing surface grades and the natural soils at the test boring locations B-01, B-02, B-04, B-07, B-09, B-11, B-14, B-15, B-21 and B-22 were encountered to the terminal depth of about 10.0 to 20.0 feet below the existing surface grades. The natural soils consisted primarily of lean clay, silty clay, silt, and clayey sand with varying amounts of sand, gravel and rock fragments. The natural soils exhibited moisture contents ranging from 9 to 25 percent. The natural cohesive soils exhibited a soft to hard consistency, and the natural granular soils exhibited a very loose to very dense relative density, based on the Standard Penetration tests.

The area's bottommost formation consisted of extremely soft to very soft, brown mottled gray to gray, highly weathered shale bedrock, encountered in test boring locations B-03, B-05, B-06, B-08, B-10, B-12, B-13, B-16 through B-20, and B-23. Additionally, in test boring location B-24 the area's bottommost formation consisted of extremely soft, brown, highly weathered sandstone bedrock.

The subsurface description is of a generalized nature provided to highlight the major strata encountered. The boring logs included in the *Appendix* should be reviewed for specific information at the individual boring locations. The stratifications shown on the boring logs represent the conditions only at the actual test positions. Variations may occur and should be expected between the boring locations. The stratifications represent the approximate boundary between the subsurface materials, and the transition may be gradual or not clearly defined.

### 2.3 GROUNDWATER LEVEL MEASUREMENTS

Groundwater was encountered in test boring locations B-06, B-13, B-20, B-21, B-23, and B-24 at depths ranging from 6.0 to 18.5 feet below existing surface grade during the field drilling operations, and in test boring location B-24 at a depth of 5.0 feet below existing surface grade after the field drilling operations. Note that groundwater levels fluctuate seasonally as a function of rainfall. During a time of year or weather different from the time of drilling, there may be a considerable change in the water table. Furthermore, the water levels in the boreholes often are not representative of the actual groundwater level, because the boreholes remain open for a relatively short time. Therefore, we recommend that the contractor determine the actual groundwater levels at the time of construction to evaluate groundwater impact on the construction procedures.

## **3** EVALUATION AND RECOMMENDATIONS

### 3.1 SITE PREPARATION AND EARTHWORK CONSTRUCTION

Prior to placing concrete floors or engineered fill on this site, general site area clearing should be carried out. All asphalt, base, topsoil, grass, roots, excessively wet soils, highly organic soils, and soft/loose or obviously compressible materials, should be completely removed from the proposed construction areas. <u>Additionally, the unsuitable fill</u> <u>material, as evidenced at all test boring location B-11, should be completely removed from the proposed building</u> <u>footprint and to a minimum depth of 12 inches below the proposed pavement subgrade elevations and replaced</u> <u>with compacted engineered fill</u>. The precise extent of required cut and fill should be determined in the field by a representative of PSI following observation of the exposed subgrades and proof rolling operations.

Following the site clearing, stripping and undercutting, and prior to placing engineered fill, the exposed subgrades should be critically proof rolled with a loaded 20-ton tandem-axle dump truck until the grade offers a relatively unyielding surface. Areas of excessive yielding, as observed by a geotechnical engineer's representative, should be excavated and backfilled with compacted engineered fill and/or the unstable soils can be stabilized by choking the exposed bearing surface with crushed limestone or similar coarse aggregate. After the existing subgrade materials are excavated to design grade, proper control of subgrade compaction and the placement and compaction of new fill materials should be observed and tested by a representative of PSI.

It is recommended that the site preparation, proof rolling, and earthwork activities should be performed during a period of dry weather, which can significantly reduce the required extent of soil stabilization, drainage and surface repairs.

During site preparation, fill piles, burn pits, trash pits or other isolated disposal areas may be encountered. All too frequently such buried material occurs in isolated areas outside boring locations. Any such material encountered during site work, or foundation, floor slab or pavement construction should be excavated, removed from the site, and backfilled with compacted structural fill.

### **3.2 ENGINEERED FILL**

Materials selected for use as engineered fill should not contain more than 5 percent by weight of organic matter, waste construction debris, or other deleterious materials. Fill materials should have a Standard Proctor maximum dry density (ASTM D-698) greater than 110 pounds per cubic foot (pcf), an Atterberg Liquid Limit of less than 40, a Plasticity Index of less than 15, and a maximum particle size of 3 inches or less. Engineered fill materials should consist of non-expansive materials. Pyritic and/or potentially expansive materials, such as mine tailings, shales and slag should not be used as engineered fill material.

Based on the results of the boring explorations, the on-site soils are suitable for reuse as engineered fill. If the onsite soils are used for fill, close moisture content control will be required to achieve the recommended degree of compaction. PSI anticipates that disking and aerating the soils during a warm, dry period may be necessary to lower the moisture content. If engineered fill placement must proceed during a wet or cool time of the year, it may likely be infeasible to re-use the on-site soils as engineered fill and imported fill materials would be required. If wet or cool season earthwork is necessary, we recommend the use of imported fill materials such as ODOT No. 304 or 411 crushed aggregate.



Representative samples of the proposed fill materials should be collected at least one week prior to the start of the filling operations. The samples should be tested to determine the maximum dry density, optimum moisture content, particle size distribution and plasticity characteristics. These tests are needed to determine if the material is acceptable as structural fill and for quality control during the compaction process.

Engineered fill materials should be placed and compacted in individual lifts of 8 inches or less loose measurement. Within small excavations such as in utility trenches, around manholes, or behind retaining walls, we recommend the use of smaller, hand- or remote-guided equipment. Loose lift thicknesses of 4 inches or less are recommended when using such equipment.

We recommend that structural fill be compacted to a minimum of 98 percent of the maximum dry density and within  $\pm 2\%$  of the optimum moisture content, as determined by ASTM D-698. A representative of PSI should observe fill placement operations and perform density tests concurrently to indicate if the specified compaction is being achieved.

### 3.3 FOUNDATION RECOMMENDATIONS

Based on the test boring results, laboratory test results, and the proposed construction, our analysis indicates that the proposed building structure can be supported on isolated and/or continuous spread-footing foundations, bearing on the existing natural soil or on properly compacted engineered fill, will be suitable to support the proposed building structure. An allowable bearing capacity of 2,500 psf may be utilized for the design of the spread-footing foundations.

All perimeter footings must be placed at a minimum depth of 42 inches below the finished grade in order to protect against frost action. Interior foundations in heated areas may be placed at a depth of at least 18 inches below the floor slab, provided they will be bearing on acceptable natural or compacted engineered fill soils.

Extreme care should be taken to prevent weakening of the foundation bearing materials because of prolonged atmospheric exposure, construction activity disturbance or an increase in moisture content. If an overnight delay in concrete placement is anticipated, the foundation excavations should be cut approximately 6 inches and subsequently excavated to final grade immediately before placement of concrete.

In order to reduce the effects of differential movement that may occur due to variations in the character of the supporting soil and any variations in seasonal moisture contents, it is recommended that all continuous footings be reinforced, as per structural considerations. Foundations supporting individual columns should have a minimum dimension of 24 inches, and continuous wall foundations should have a minimum width of 18 inches.

Based on the assumed structural loads, it is anticipated that total and differential foundation settlements will be less than 1.0-inch and 0.50-inch, respectively. However, actual settlements will be dependent upon the depth of the foundations, column spacing, structural loads and other related factors. The structural and architectural design should include provisions for liberally spaced, vertical control joints to minimize the effects of potential settlement.

PSI should be retained to provide observation and testing of construction activities involved in the foundation, earthwork and related activities of this project. PSI cannot accept responsibility for conditions that deviate from those described in this report, nor for the performance and testing for this project.



Based on table 1615.1.1 of the OBC Building Code, the test boring results, and review of the geology in vicinity to the project area, a **Site Classification of 'C'** can be utilized for the seismic design.

## 3.4 FLOOR SLAB DESIGN AND CONSTRUCTION

Preparation of floor slab subgrades should be in accordance with the recommendations outlined in the *Site Preparation* and *Engineered Fill* sections of the report. If subsurface materials at the finished subgrade elevations exhibit excessive moisture contents and unstable subgrade conditions, then undercutting and replacement of the objectionable soils should be performed to achieve firm subgrade support. Alternatively, the unstable soils can be stabilized by choking the exposed bearing surface with crushed limestone or similar coarse aggregate.

After the soils in the building area have been prepared as discussed, it is recommended that the subgrade surface be subjected to surface compaction to the extent that a minimum of 24 inches of materials underlying the slab subgrade elevation achieve a minimum in-place density of 98 percent of the maximum laboratory dry density and should be within  $\pm$  2 % of the optimum moisture content, as determined in general accordance with ASTM D-698.

A capillary gravel layer (such as AASHTO #57 or ODOT #304) should be provided between the floor slab and the approved subgrade materials. The gravel layer should have a minimum thickness of 6 inches and should be properly compacted. Also, a vapor barrier is recommended below the floor slab as per ACI specifications. We recommend that a subgrade modulus (k) of 80 pci be used in floor slab design calculations.

Careful field control is to be exercised in finish grading operations in order to assure that subgrade tolerances are maintained. It is particularly important that no low sectors or depressions be allowed to exist within these areas, water may accumulate and lead to serious loss of supporting capacity.

The floor slab should be suitably reinforced, as per structural considerations, to make it as rigid as practical. Proper joints should be provided at the junctions of the slab and foundation system so that a small amount of independent movement can occur without causing damage. Large floor areas should be provided with joints at frequent intervals to compensate for concrete volume changes during curing and temperature changes.

### 3.5 PAVEMENT RECOMMENDATIONS

Pavement design will include proper preparation of subgrade sectors, careful design of the pavement area drainage systems and utilization of an aggregate base course with asphalt concrete or concrete surface course. Preparation of pavement subgrades should be in accordance with the recommendations outlined in the *Site Preparation* and *Engineered Fill* sections of the report. Careful attention will be required in fine grading the subgrade surfaces in order to eliminate undulations and depressions that would tend to collect water.

We recommend that the exposed surface be proof rolled, and any soft areas removed. Compaction of fill soil intended to support pavement should meet or exceed 98% of the maximum dry density as determined by ASTM D698 (Standard Proctor). The moisture content at the time of compaction should be within 2% of the optimum value. Any removed soil should be replaced by compacted structural fill to arrive at the desired grade.

The proposed pavement construction will be primarily for car and bus traffic. No traffic loading information was provided at the time of this report. However, PSI has assumed average daily traffic (ADT) of about 150 cars, 30



buses, and 2 semi-trucks. Based on the anticipated pavement design information, the following pavement design parameters may be utilized for new pavement design:

Design	Parameters	
	Flexible Pavement	<b>Rigid Pavement</b>
Light Duty design 18-kip ESAL's	50,000	50,000
Heavy Duty design 18-kip ESAL's	200,000	200,000
Reliability:	80%	80%
Overall Deviation:	0.49	0.39
Design Life (Years):	20	20
Initial Serviceability:	4.5	4.2
Terminal Serviceability:	2.5	2.5
Design CBR	3	
Subgrade Modulus (k, pci)		80

#### Flexible Pavement

The recommended pavement thickness values are shown in Tables 1 and 2. These design thicknesses assume that a properly prepared subgrade has been achieved.

Table 1. Flexible Pavement Set	Lions (20-fear Design	LITE
	Light-Duty*	Heavy Duty
Surface Course (ODOT #448 Type 1)	1.5 inches	1.5 inches
Intermediate Course (ODOT #448 Type 2)	2.5 inches	3.5 inches
Aggregate Base Course (ODOT #304)	7.0 inches	9.0 inches
*Parking spaces only		

### Table 1: Flexible Pavement Sections (20-Year Design Life)

For parking stalls that allow free movement through them (i.e., no parking block or curbs), we recommend installing the heavy-duty asphalt section. Allowances for proper drainage and proper material selection of base materials are most important for performance of asphaltic pavements. Ruts and birdbaths in asphalt pavement allow for quick deterioration of the pavement primarily due to saturation of the underlying base and subgrade.

#### <u>Rigid Pavement</u>

The use of concrete for paving has become more prevalent in recent years due to the long-term maintenance cost benefits of concrete compared to asphaltic pavements. Should concrete pavement be utilized, the concrete should be properly reinforced and jointed, and should have a 28-day flexural strength of no less than 650 psi and should be air entrained. Expansion joints should be sealed with a polyurethane sealant so that moisture infiltration into the subgrade soils and resultant concrete deterioration at the joints is reduced.

#### **Table 2: Rigid Pavement Sections**

	Light-Duty*	Heavy Duty
Reinforced Concrete	5.0 inches	7.0 inches
Aggregate Base Course (ODOT #304)	5.0 inches	6.0 inches
*Parking spaces only		



The portions of the site where rigid (concrete) pavements are recommended include the entrance/exit driveway aprons and the dumpster pad enclosure area. A heavy-duty pavement section is recommended for lanes designated for delivery trucks. Crushed aggregate base materials should be compacted to at least 98% of the standard Proctor (ASTM D 698) maximum dry density near optimum moisture content. The use of Portland cement concrete (PCC) for paving has become more prevalent in recent years based on material costs for concrete vs. bituminous and the long-term maintenance cost benefits of concrete compared to bituminous pavements. If PCC pavement is utilized, the concrete should be properly jointed, have proper load-transfer mechanisms installed, and should have a minimum 28-day compressive strength of 4,000 psi. Expansion and construction joints should be sealed with a polyurethane sealant so that moisture infiltration into the subgrade soils and resultant concrete deterioration at the joints is minimized. Concrete pavement at least 8 inches thick is recommended for the trash dumpster pad and entrance/exit aprons due to the high wheel and impact loads that these areas experience.

Design for drainage is of the utmost importance to minimize detrimental effects that may shorten the service life of the pavements. The pavement should be crowned or sloped in order to promote effective surface drainage and reduce the risk of water ponding. We recommend a minimum slope of 1.5 percent. In addition, the subgrade should be similarly sloped to promote effective subgrade drainage. We recommend "stub" or "finger" drains be provided around catch-basins and in other low areas of the proposed pavements to limit the accumulation of water on the frost susceptible subgrade soils. Subsurface edge drains should be provided at curbs. Where no curbs are proposed, ditches should be provided, and the pavement base course should be daylighted through the ditch side slope to facilitate drainage of the base course.

If fill material is needed to establish the required pavement grade, fill placement and compaction must be performed in accordance with the procedures outlined in the *Site Preparation* section of this report. The edges of compacted fill should extend a minimum 2 feet beyond the edges of the pavement, or a distance equal to the depth of fill beneath the pavement, whichever is greater.

## 3.6 DETENTION POND

The proposed detention pond that will be located on the southeastern portion of the site (borings B-23 and B-24) will be utilized to temporarily retain water for short periods of time. The test boring results indicate that the subsurface formation in this area generally consists of lean clay to depths of about 9.0 to 11.5 feet, underlain by shale (B-23) and sandstone (B-24) bedrock. The detention pond embankments should be excavated and established at a slope no steeper than 1V:3H for long term stability.

# 4 CONSTRUCTION CONSIDERATIONS

## 4.1 GROUNDWATER CONTROL AND DRAINAGE

Groundwater was encountered in test boring locations B-06, B-13, B-20, B-21, B-23, and B-24 at depths ranging from 6.0 to 18.5 feet below existing surface grade during the field drilling operations, and in test boring location B-24 at a depth of 5.0 feet below existing surface grade after the field drilling operations. Therefore, groundwater and/or seepage could be encountered during foundation excavation and construction. Accordingly, a gravity drainage system, sump pump or other conventional dewatering procedure, as deemed necessary by the field conditions, should be implemented throughout construction such that the groundwater is always controlled and maintained at an elevation of at least 2 feet below the excavation bottom. Every effort should be made to keep the excavations dry if water is encountered.



Water should not be allowed to collect near the foundation or floor slab areas of the building either during or after construction. Undercut or excavated areas should be sloped toward one corner to facilitate removal of any collected rainwater, groundwater or surface runoff. Positive site drainage should be provided to reduce infiltration of surface water around the perimeter of the building and beneath the floor slab. Overall site area drainage is to be arranged in a manner such that the possibility of water impounding below slab-on-grade areas and over the structural fill is prevented.

## 4.2 EXCAVATIONS

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

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

We are providing this information solely as a service to our client. PSI is not assuming responsibility for construction site safety or the contractor's activities; such responsibility is not being implied and should not be inferred. If the excavations are left open and exposed to the elements for a significant length of time, desiccation of the clays may create minute shrinkage cracks which could allow large pieces of clay to collapse or slide into the excavation.

Materials removed from the excavation should not be stockpiled immediately adjacent to the excavation, inasmuch as this load may cause a collapse of the embankment.

### 4.3 WEATHER CONSIDERATIONS

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



## 5 GEOTECHNICAL RISK

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

## 6 **REPORT LIMITATIONS**

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

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

After the plans and specifications are complete, it is recommended that PSI be provided the opportunity to review the final design and specifications, in order to verify that the earthwork and recommendations are properly interpreted and implemented. At that time, it may be necessary to submit supplementary recommendations. This report has been prepared for the exclusive use of Architectural Vision Group, LTD., for the specific application to the proposed New Westside PK-3 Elementary School located behind the Massillon Junior High School at 250 29<sup>th</sup> Street NW in the City of Massillon, Stark County, Ohio.

## APPENDIX

SOIL BORING LOCATION PLAN FENCE DIAGRAM BORING LOGS GRAIN SIZE GRAPH ATTERBERG LIMIT RESULTS GENERAL NOTES & USCS SOIL CLASSIFICATION CHART









DATE	STAF	RTED:				6/24/22				MPANY	': <u> </u>		PSI, Ir	10.				B	ORII	NG	B-01
			ED:	.—		6/24/2	<u>4</u>				<u> </u>			: <u>SP</u>		<u> </u>	$\nabla$	Whi	le Drillir		N/A
			PI	1_		10.0	π			: METU(	-00		JVIE-5			ate	Ť	Uno	n Com	pletion	N/A
		κη: _  ·			10	N/A 88 ft		_ DR SA		0W SIE 2_in	SS SS		Ň	Ī	Cav	ed Dept	h	5.5 feet			
	UDE:	·			40.78	8779°		- 07 HA	MMER	TYPE:	юв	A	utoma	tic		BOR		LOCA	TION:		
LONG	ITUDI	:			-81.5	63453°	)	EF	FICIENC	Y			93%			Pave	ment	t			
STAT	ION:_	N	J/A		OFF	SET:	N/A	RE	VIEWED	BY:			AV								
REMA	RKS:																				
Elevation (feet)	⊐ Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)		MATE	Eriai	L DES	CRIP	TION		USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	ST. × 0 0	AND N Mo ST	ARD P TEST I in blo isture 2 RENC 4 2	ENETR DATA wws/ft © P DATA CALL DATA CALL DATA CALL CALL CALL CALL CALL CALL CALL C	ATION PL LL 50 Qp 4.0	Additional Remarks
	U	<u>x''/z</u> . <u>x'</u>				7" Te	opsoil														
1085—			X	1	16	Medi with Sean	um Stiff to <b>Sand</b> , Trac ns	Stiff, N ce Gra	Aoist, Bro vel, Trac	own, Le ce Intert	ean CLA bedded S	A <b>Y</b> Silt		2-3-4 N=7	19	Ģ		×	*		
			X	2	16	¥.							CL	3-5-7 N=12	15			<		*	
1080-			$\mathbb{N}$	3	15									3-3-5 N=8	16	0		~	*		
				4	18	Medi <b>SILT</b> Sean	um Dense, , Trace Gra ns	Moist avel, Tr	, Reddisl race Inte	h Browr rbedde	n, <b>Sandy</b> d Clay	/	ML	4-6-8 N=14	12 9		×	)		>	€
			e	<		Pr 55 Cl Te	ofessiona 555 Cana eveland, elephone	al Se Il Roa OH : (21	ervice li ad 44125 6) 447	ndustr ; 7-1338	ries, Ind	C.		PI PI L(	roje Roje Dca <sup>.</sup>	ECT N ECT: TION:	<b>0</b> .: 	Nev	v West 250 29 ssillon, s	0142-28 Side PK Oth Stree Stark Co	571 -3 School et, NW punty, Ohio

DATE	STAF	RTED:			6	6/24/22		DRILL COMPA	ANY:	PSI, li	nc.				BORI	NG I	B-02
DATE	COM	PLETI	ED:	.—		6/24/2	2	DRILLER:	TS	LOGGED BY	: <u>SP</u>		<u> </u>	$\nabla$ v			
COMF	PLETIC	ON DE	PTI	H _		10.0	<u>It</u>	DRILL RIG:		ATV CME-5			Itel	V V	vnile Drill Inon Com	ng plotion	N/A
BENC		κ: _			10	N/A		DRILLING ME	THOD:	Hollow Ste	em Auger		Na	V C		pietion *b	N/A
		I:			10	97 TL 0744°				2-In	155						4.5 1661
	מטעב: זרוודו				-81 5	0744 62471°		FEFICIENCY	·E:	Automa 03%			Paver	ment	CATION:		
			.I/Δ						<i>.</i>	<u>5570</u>							
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											(SS		STA	ANDAR		RATION	
Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)		MATER	RIAL DESCR	RIPTION	USCS Classification	SPT Blows per 6-inch (5	Moisture, %	× 0 0	TE N in Moistu STRE Qu	ST DATA blows/ft @ ure 25 ENGTH, tsf % 2.0	PL LL 50 	Additional Remarks
	- 0 -	7/1/2 . 7/				5" To	psoil		_								
1095-			$\mathbb{N}$	1	17	Loose Grave	୬, Moist, Bro ୬, Trace Inte	wn, <b>Sandy SILT</b> erbedded Clay Se	, Trace eams	ML	3-5-5 N=10	13		ø×			
			M	2	18 \	Stiff t with Trace	o Very Stiff, <b>Sand</b> , Some Gravel, Tra	Moist, Brown, Le Interbedded Silt ce Rock Fragme	ean CLAY Seams, nts		4-5-6	14		ØX		*	
	- 5 -									CL	N=11						
1090—			Å-	3	15						3-5-7 N=12	14				>>≯	€
	 - 10 -		$\mathbb{N}$	4	1						11-12-9 N=21	13		*	8		
		Cert	e	<		Pro 55 Cle Te	ofessional 55 Canal eveland, ( lephone:	l Service Indu Road DH 44125 (216) 447-1;	ustries, Ir 335	IC.	PF PF LC	ROJE ROJE DCAT	CT N CT: FION:	:.0  !	New West 250 2 Massillon,	0142-25 Side PK 9th Stree Stark Cc	571 -3 School et, NW punty, Ohio

DATE	STAF	RTED:			6	6/24/22		DRILL CO	OMPANY	:	PSI, I	nc.			E	BORI	NG	B-03
	COM		ED:	.—		6/24/22	L		: <u>TS</u>	<u> </u>		/: <u>SP</u>		<u> </u>		hile Drilli	na .	N/A
		שט אוכ אמ	PIT	۰ -		15.01				-חר		om Augor		ate	⊻ Ur	on Com	pletion	N/A
		۲۸: _ ۱۰			10	IN/A Q8 ft				יטע: חחוי		erri Auger		Š	T Ca	aved Der	oth	11.0 feet
	UDE:	•			40 78	8735°		HAMMER		ю <b>р</b>	Automa	atic		BORIN				
LONG	ITUD	E:			-81.5	61559°		EFFICIEN			93%			Paven	ient			
STAT	ION:	N	J/A		OFFS	SET:	N/A	REVIEWE	D BY:		AV							
REMA	RKS:				_													
Elevation (feet)	o Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)		MATEI	RIAL DES	SCRIPT	ΓΙΟΝ	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	STA × 0	NDARD TES N in b Moistur STREN Qu	PENETF ST DATA blows/ft @ re 4 25 VGTH, ts: * 2.0	RATION PL LL 50 f Qp 4.0	Additional Remarks
1095—	 			1	16	5" Toj Stiff to CLAY Seams	osoil Very Stiff, , Trace Gra	Moist, Brow vel, Trace Ii	vn, <b>Sand</b> , nterbedde	<b>y Lean</b> ed Silt	CL	2-3-6 N=9	19	Ģ	$\times$	*		
	 - 5 - 			2	17	Loose	, Wet, Brow	n, Sandy S	SILT, Son	ne		4-8-9 N=17	14			•		LL = 23 PL = 15 Fines=57.6%
1090—			Å M	3	17	Mediu	m Stiff, Moi	ist, Brown, I	Lean CL	ei <b>AY</b> , Trac	ML	2-2-2 N=4	13		×			
	- 10 - 		Å.	4	16 		Trace Grav				CL	3-4-4 N=8	15		×			<b>K</b> -
1085—	  - 15 -		X	5	18	Extren Highly	nely Soft, B Weathered	rown Mottle	d Gray, <b>S</b>	SHALE,		8-26-43 N=69	8	×			>>@	⊅ -
														571				
						555 Cle Tel	55 Canal veland, ( ephone:	Road OH 4412 (216) 44	5 7-1335	5		PF LC	ROJE DCA	CT: FION:	N	ew West 250 2 lassillon,	Side PK 9th Stree Stark Co	i-3 School et, NW punty, Ohio

DATE	STAF	RTED:			(	6/21/22		DRILL COM		1 0 0 0	PSI, I	nc.				BC	DRIN	NG I	3-04
			ED: DTI			6/21/22 15.0 f	2		15			': <u>SP</u>		<u>ب</u>	$\nabla$	Whil	e Drillin	a	N/A
				' -		15.01 N/Δ	ι				LOW St	om Auger		ate	Ť	Upor	ם Comp	letion	N/A
		RK: N/A DRILLING METHOD: Hollow Stem Auger   N: 1098 ft SAMPLING METHOD: 2-in SS   : 40.788777° HAMMER TYPE: Automatic   DE: -81.560903° EFFICIENCY 93%														Cave	ed Dept	h	11.0 feet
	UDE:	• _			40.78	8777°		HAMMER T	YPE:	A	utoma	atic		BOR	ING	LOCA	TION:		
LONG	ITUD	E:			-81.5	60903°		EFFICIENC	Y		93%			Pave	men	t			
STAT	ION:	N	J/A		OFFS	SET:	N/A	REVIEWED	BY:		AV								
REMA	RKS:				_														
Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)		MATEI	RIAL DESC	CRIPTION	1	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	ST ×	AND/ N Mo ST	ARD PI TEST I in blow isture 24 27 RENG	ENETRA DATA ws/ft © 5 5 5 5 5 5 5 TH, tsf %	ATION PL LL 50 Qp	Additional Remarks
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		////				Mediu	m Stiff, Moi	st, Brown, Lea	an CLAY, TI	race									
1095-				1	15	Sand,	Trace Grav	el			CL	2-3-5 N=8	17	(	®	×	×	ŧ	
1095																$\setminus$			
						Very Sand	Stiff, Moist, I Trace Grav	Brown, <b>Lean (</b> el	CLAY, Trace	e						$\left  \right\rangle$			
			1Å	2	17						<u>.</u>	4-11-11 N=22	13		X	P		>>>	<del>K</del>
	- 5 -										CL	11-22							
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				3	18	Mediu Sand,	m Stiff, Moi Trace Grav	st, Brown, <b>Lea</b> el	an CLAY, Ti	race		2-3-3 N=6	18	¢		×	ŧ		
1090-																			
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1085—	  - 15 -		X	5	16	@ 14	ft; Gray					3-3-5 N=8	15	(	0 >	<		*	
	in	tert	e	< 🖕		Pro 554	Tessiona 55 Canal	Road	austries,	INC.		P	ROJE	ECT N	iO.:	New	( Weet 9	0142-25 Side PK	-3 School
						Cle	eveland.	DH 44125				r L		TION:			250 29	th Stree	et, NW
						Tel	ephone:	(216) 447-	-1335			_				Mas	sillon, S	Stark Co	, punty, Ohio
						-		. /											-

DATE	STAF	RTED:			6	6/21/22		DRILL COM	PANY:		PSI, Ir	IC.			В	ORI	NG	B-05
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		(n: _			10	N/A 03 ft					<u>10W Ste</u> 2_in	se se		Š		/ed Den	th	11.0 feet
	UDE:	•			40 78	8722°		HAMMER T	YPE:	Δ		tic		BORIN				
LONG	ITUD	E:			-81.5	60205°		EFFICIENCY	(		93%			Pavem	ent	e.u		
STAT	ION:	N	I/A		OFFS	SET:	N/A	REVIEWED	BY:		AV							
REMA	RKS:									,								
Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)		MATE	RIAL DESC	RIPTION		USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %		DARD F TEST N in blo Moisture STREN Qu	PENETR DATA ows/ft @ 25 CTH, tsf % 2.0	PL LL 50 D Qp 4.0	Additional Remarks
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1090-			<u> </u>	1	15	Mediu with	um Stiff to Si <b>Sand</b> , Trace	tiff, Moist, Brov Gravel	wn, Lean CL	AY		1-2-3 N=5	19		×	*		
				2	17							4-5-7 N=12	16		∍×	*		-
1085				3	16						CL	4-6-7 N=13	14		×	*		
			<u> </u>	4	14 	<u> </u>						3-6-7 N=13	14				*	-
1080-			X	5	17	@ 13 Extrei ∖ <mark>SHAL</mark>	ft; Gray nely Soft, Li . <b>E</b> , Highly W	ght Brown Mot /eathered	ttled Gray,			4-14-50/5" N=64	9	×	<		>>0	
	in K	tert	e	<		Pro 55 Cle Te	ofessional 55 Canal eveland, C lephone:	I Service Ind Road DH 44125 (216) 447-	dustries, Ir 1335	nc.		PR PR LC	OJE OJE DCA1	CT NO CT: TION:	: Ne	w West 250 2 assillon,	0142-25 Side Pk 9th Stree Stark C	571 -3 School et, NW punty, Ohio

DATE	STAF	RTED:			6	6/21/22		DRILL COMPA	NY:	PSI,	Inc.			В	ORI	NG E	3-06
			ED: PTI			6/21/22	<u> </u>		IS	ATV CME-	r: <u> </u>		<u> </u>		nile Drillin		6.0 feet
BENC	HMAF			' -		N/A	L	DRILLING MET		Hollow St	em Auger		ate	Up	on Com	pletion	N/A
ELEV		4: 			10	95 ft		SAMPLING ME	THOD:	2-ii	n SS		3	🗴 Ca	ved Dep	th	12.5 feet
LATIT	UDE:				40.78	3863°		HAMMER TYP	E:	Automa	atic	_	BORI	NG LOC	ATION:		
LONG	ITUDI	E:			-81.5	60907°		EFFICIENCY		93%			Buildir	ng			
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	IRNO.										ŝ		ST A		DENIETD		
Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)		MATE	RIAL DESCR	IPTION	USCS Classification	SPT Blows per 6-inch (St	Moisture, %	× 0	NDARD TES N in bl Moisture STREN Qu	T DATA lows/ft © e • 25 J JGTH, tsf %		Additional Remarks
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	S	uert	el.	ς		555	5 Canal	Road	50 103, II		PF	ROJE	CT:	Ne	ew West	Side PK-	3 School
						Cle	veland, C	DH 44125	05		LC	CAT	FION:		250 29	Oth Stree	t, NW
						ıel	epnone:	(210) 447-13	555					Ma	assillon,	Stark Co	unty, Onio

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BENC	HMAF	RK: _				N/A		DRILLING ME	Sten	n Auger		S			piecion	IN/A		
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1090-						with S	m Stiff to Si Sand. Trace	Gravel	i, Lean CL	AY								
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						Cle	veland. (	DH 44125				LO	CAI	TION:		250 2	9th Stree	t, NW
						Tel	ephone:	(216) 447-1	335						N	lassillon,	Stark Co	unty, Ohio
								-										

DATE	STAF	RTED:			f	6/23/22		DRILL COMP	ANY:	PSI, I	nc.			В	ORIN	IG I	B-08
			ED:	—		6/23/22	<u>}</u>		TS		': <u>SP</u>		<u> </u>	 ∇ Wh		<u> </u>	
COMP	LEIK		:PH	н _		<u>9.2 ft</u>				ATV CME-5			Ite			y letion	N/A
		<k: _<="" td=""><td></td><td></td><td></td><td>N/A</td><td></td><td></td><td></td><td>Hollow Ste</td><td>em Auger</td><td></td><td>Ň</td><td></td><td>ad Dent</td><td>h</td><td>6.5 feet</td></k:>				N/A				Hollow Ste	em Auger		Ň		ad Dent	h	6.5 feet
		4: <u> </u>			40.7	<u>91 π</u>				Z-Ir	1 33 tio						0.5 1661
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REMA	ARKS:		<u> </u>		_0110				····								
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Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)		MATE	RIAL DESCF	RIPTION	USCS Classification	SPT Blows per 6-inch (S	Moisture, %		TEST N in blo Moisture STRENO	DATA pws/ft @ 25 GTH, tsf 2.0	PL LL 50 Qp 4.0	Additional Remarks
	0					5" To	psoil	Moiot Prown S	Sondy Silty								
1090—				1	17	CLAY	with Grave	Moist, Brown, S el	sandy Siity		3-4-6 N=10	16	6			ж	
				2	17					CL-ML	3-9-7 N=16	17			• >	ŧ	LL = 23 PL = 19 Fines=66.3%
1085—				3	18	Mediu Interb Grave	m Dense, N edded Clay I Soft, Light E	<i>l</i> loist, Brown, <b>SII</b> Seams, Trace S Brown Mottled Gi	LT, Some Sand, Trace ray, SHALE	, ML	5-9-16 N=25	13		*			
			X	4	8			1			40-50/2"	6	×			>>@	٥
			:el	K .	<u>.</u>	Pro 558 Cle Tel	ofessiona 55 Canal eveland, ( ephone:	I Service Ind Road OH 44125 (216) 447-1	ustries, In 335	IC.	Pi Pi Li	ROJE ROJE OCAT	CT NC CT: FION:	).: Nev Ma	w West \$ 250 29 ssillon, \$	)142-25 Side PK th Stree Stark Co	571 -3 School at, NW punty, Ohio



	STAF				6	6/22/22		DRILL COMPAN	Y:	PSI, I	Inc.			B	ORIN	IG I	B-10
			ED:	.—		6/22/22			<u>S</u> LOG		Y: <u>SP</u>		<u> </u>	7 Whi	ile Drillin	a .	N/A
		שט אוכ ארי	PIT	' -		14.0 IL					om Augor	_	ate		n Comp	9 letion	N/A
		ι. Ι·			10	N/A 02 ft			טט: <u>ה</u> אחסי	<u>0110W St</u> 2_ii	em Auger		Š	Cav	ed Depti	า	10.5 feet
		·			40.78	92 IL 8321°				Automa	atic		BORIN				10.0 1000
LONGI					-81 5	61246°		EFFICIENCY		93%			Building	1			
STATIC	DN:	N	J/A		OFFS	ET:	N/A	REVIEWED BY:		AV							
REMAR	RKS:				_												
ation (feet)	pth, (feet)	aphic Log	nple Type	mple No.	/ery (inches)		MATE	RIAL DESCRIP	TION	Classification	/s per 6-inch (SS)	oisture, %	STAN ×	IDARD F TEST N in blo Moisture	PENETRA DATA ows/ft © A	PL LL 50	Additional Remarks
Elev	De De	G	Sar	Sa	Reco					nscs	SPT Blov	Ň	0	STRENO Qu	GTH, tsf #	Qp 4.0	
	0					5" Top	soil	a Sandy Silty CL	V Traco		_						
1090	-		X	1	18	Gravel			, nace		5-5-5 N=10	17	©	•		*	LL = 23 PL = 17 Fines=50.4%
-	- 5 -		X	2	17					CL-ML	- 3-5-5 N=10	15		×		*	
1085	-		X	3	18	Extrem	ely Soft, B	rown, <b>SHALE</b> , High	lly		3-4-6 N=10	15	©	×		***	÷
-	- 10 -		X	4	16 	Weath	ered				8-29-50/4" N=79	7	×			>>@	
1080	-	Ź	X	5	6						_ 55/6"	5	×			>>@	)
	in	cert	cel	<		Pro 555 Cle Tele	fessiona 5 Canal veland, ( ephone:	I Service Indust Road DH 44125 (216) 447-133	tries, Inc. 5		PF PF LC	ROJE	CT NO CT: _ FION:	: Nev	v West 5 250 29 ssillon, 5	0142-25 Side PK th Stree Stark Co	571 -3 School st, NW punty, Ohio

DATE STARTE	D:		6	6/21/22		DRILL COMPA	NY:	PSI, li	nc.			B	DRI	NG E	3-11
	TED:			6/21/22	<u>.</u>		TS L	OGGED BY	: <u>SP</u>		<b>5</b> 7	7 Whil	e Drillir		N/A
	JEPIT	<b>-</b> -		20.01						_	ate		n Comr	pletion	N/A
			10	N/A 80 ft			THOD:	TUIIUW Ste		_	N N		ed Dept	h	N/A
			40 78	8234°			F'	Automa	tic						
LONGITUDE:			-81.5	60109°		EFFICIENCY		93%		_	Building				
STATION:	N/A		OFFS	ET:	N/A	REVIEWED BY	·:	AV							
REMARKS:															
Elevation (feet) Depth, (feet) Graphic Loo	Sample Type	Sample No.	Recovery (inches)		MATE	RIAL DESCR	IPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %		DARD P TEST N in blo Moisture 2 2 3 5 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7	ENETRA DATA ws/ft @ J 5 5 TH, tsf # 0	ATION PL LL 50 Qp 4.0	Additional Remarks
	· . <u>`\</u>			5" Toj	osoil			V							
		1	17	FILL: Trace Fragm	Gravel, Tra ents, Trace	in, Moist, Brown, ce Roots, Trace ( organics	, <b>Lean CLA</b> Glass	ι <b>Υ</b> ,	2-3-2 N=5	24	Ø	* ×			
1085-	×\/			0555	Marris Offic	Maint Durant La				27			×		
		2	16	Trace	Sand, Trac	e Rock Fragment	san CLAY,		2-1-3 N=4			*			
- 5 -	V	3	18			Ĵ			5-6-8	14			*		
									N=14						
1080	X	4	18					CL	4-6-7 N=13	11	×		*		
  1075 - 15 -  	X	5	18						6-10-13 N=23	13	;	× @		>>*	
1070		6	15	Stiff, N Rock I	Noist, Gray, Fragments	Sandy Lean CL	AY, Some	CL	4-6-8 N=14	10	×	0		>>*	
inter	rtel	٢.		Pro	fessional	I Service Indu	istries, In	с.	PR	OJE	CT NO.			0142-25	71
				555	5 Canal	Road			PR	OJE	ст: _	New	West	Side PK-	3 School
				Cle	veland, (	JH 44125	225		LC	CAT	ION:	N 4	250 29	th Street	t, NW
	-			rei	epriorie:	(210) 447-13	555				-	ivias	SIIION, S		

DATE	STAF	RED:			6	3/22/22		DRILL COMP	'ANY:	F	°SI, li	nc.				BOR	RING	B-12
DATE			ED:	—		6/22/22	<u>2</u>		TS			/: <u>SP</u>		5	$\nabla$ 1		rilling	N/A
		JN DE	PIF	1_		<u>9.8 π</u>					ME-5			ate	Ť,	Upon Cc	moletion	N/A N/A
		(n.:			10	1N/A 89 ft					<u>w Sie</u> 2-ir	n SS		Ň	Ī,	Caved D	epth	6.0 feet
LATIT	UDE:	··			40.78	<u>3816°</u>		HAMMER TY	PE:	Au	toma	atic		BORIN		OCATIO	N:	
LONG	TUDE	E:			-81.5	61452°		EFFICIENCY		93	3%			Buildir	ng			
STATIC	ON:_	1	√/A		OFFS	ЗЕТ: _	N/A	REVIEWED B	iY:		AV							
REMAR	RKS:					<del></del>								1				<u> </u>
Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)		MATE	RIAL DESCF	RIPTION		USCS Classification	SPT Blows per 6-inch (SS	Moisture, %	STA × 0	NDAF TE N ir Moist	20 PENE EST DAT. 1 blows/ft ture 25 ENGTH, 20	TRATION A © PL • LL tsf # Qp 4.	Additional Remarks
<b>[</b>	U			1	[	5" To	psoil	Brown Lean Cl	ΔV with			Ī	]					T
	- · _			1	17	Sand,	Trace Grav	vel, Trace Rock I	Fragments		CL	3-13-8 N=21	13		×	©	>>	*
1085	5 -			2	17	Extren Weath	nely Soft, Bi nered	rown, <b>SHALE</b> , F	Highly			3-6-16 N=22	14		× ×		~	*
-			M	3	16							20-39-50/4' N=89	8	×			>>	<b>(</b>
1080	-			4	16							14-36-50/4 N=86	5	×			>>	
		tert	:ek	с.		Pro 555 Cle Tel	fessional 55 Canal veland, ( ephone:	I Service Ind Road OH 44125 (216) 447-1	ustries, In	1C.		PF PF LC	Roje Roje DCA <sup>-</sup>	CT NC CT: FION:	D.: _	New We 250 Massillo	0142-2 est Side Pl 29th Streen, Stark C	2571 K-3 School æt, NW County, Ohio

DATE STARTED:	6/22/22	DRILL COMPANY:	PSI, Inc.	- B	ORING B-13
	<u> </u>	DRILLER: IS LC	TV CME 55		ile Drilling 18.5 feet
	10.9 IL		Hollow Stom Augor	—   <b>g</b>   <u>▼</u> Uno	on Completion N/A
	1003 ft		2 in SS		ved Depth 16.5 feet
	40 788134°		Automatic		
LONGITUDE:	-81 560989°		93%	Building	
STATION: N/A	OFFSET: N/A	REVIEWED BY:	AV		
REMARKS:					
Elevation (feet) Depth, (feet) Graphic Log Sample Type Sample No.	Recovery (inches)	RIAL DESCRIPTION	USCS Classification SPT Blows per 6-inch (SS)	STANDARD F TEST N in blo W STRENO	PENETRATION DATA ws/ft ⊚ PL 25 LL 50 GTH, tsf ₩ Qp 20 40
$0$ $\frac{\sqrt{1}}{\sqrt{1}}$	5" Topsoil				2.0 4.0
1090	Stiff, Moist, Browr Gravel, Trace Roc	n, <b>Sandy Lean CLAY</b> , Trace k Fragments	3-4-5 N=9	17 🛛 🖉 🖬 –	LL = 33 >>XPL = 18 Fines=61.8%
2	15		3-5-5 N=10	15	
3	18		CL 3-3-5 N=8	14 © ×	*
4	15		4-4-6 N=10	15 ©×	>>*
1080 - 5 - 15 - 5	Extremely Soft, Br Weathered	own, <b>SHALE</b> , Highly	50/6"	5 ×	>>©
1075 - 6	4 ₩		50/5"	10 ×	>>@
intertek	Professional	Service Industries, Inc.	PI	OJECT NO.:	0142-2571
	5555 Canal	Road	PI	OJECT: New	w West Side PK-3 School
	Cleveland, C	DH 44125	L		250 29th Street, NW
	Telephone:	(216) 447-1335		Ma	ssillon, Stark County, Ohio

DATE	STA	RTED:			6	6/22/22		DRILL COMP	ANY:	PSI, I	nc.			В	ORI	NG	B-14
DATE			ED:	.—		6/22/22	2	DRILLER:	TS		': <u>SP</u>	_	-		ilo Drilli	20	N/A
	'LEI!		PI			20.01	t	DRILL RIG:		ATV CME-5		-		⊻ wii V Uno	n Com	nletion	N/A
		RK: _			10	N/A				Hollow St	em Auger	-	Š Š	y Opt	un Cum und Den	th	15.0 feet
		N:			10 70	91 TL 9051°					1 55 tio	L					15.0 1661
		F.			-81.5	60213°		FFFICIENCY	FC	93%		- 1	Buildin	g 2007	ATION.		
STAT			J/A		OFFS	SFT	N/A	REVIEWED B	Y	AV				0			
REMA	RKS																
Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	ecovery (inches)		MATEI	RIAL DESCF	RIPTION	2 SCS Classification	Blows per 6-inch (SS)	Moisture, %	STAI	NDARD F TEST N in blo Moisture	PENETR DATA ows/ft @ 25	PL LL 5	Additional Remarks
					۳ ۳					Š	PT I			Qu	GIH, ISI Ж	Qp	
	- 0 -					6" To	ncoil				0		0	-	2.0	4.0	
		·				Soft to	Medium S	tiff Moist Brow	n <b>Lean</b>								
1090-			X	1	13	CLAY	, Trace San	id, Trace Gravel	., _0		2-2-3 N=5	14	Ø	×			
				2	16						1-2-3 N=5	25	0		*		
1085—			X	3	17					CL	1-2-2 N=4	22	Ø	×	*		
	 - 10 -		M	4	18	Stiff to	o Very Stiff,	Moist, Brown, L	ean CLA	<b>Y</b> ,	2-2-6 N=8	25		2	× *		-
1080	  - 15 -		X	5	18 <u>\</u>		Sand, Trac	e Gravel, Trace	Rock	CL	4-6-6 N=12	16			:	*	
	 - 20 -	tert		6 <b>&lt; _</b>	5	Pro	ifessiona	I Service Ind	ustries,	Inc.	8-10-13 N=23	13 OJE			»	0142-2	571 (2 Seber
	K	)	5	j		558 Cle Tel	eveland, ( ephone:	коаа ОН 44125 (216) 447-1	335		PR LC	OJE	UT: ION:	Ne	w West 250 29 Issillon,	Side Pł 9th Stre Stark C	<-3 School et, NW ounty, Ohio

DATE	STAF	RTED:			6	6/23/22		DRILL CON	<b>IPANY:</b>	PSI	, In	<u>.</u>			В	ORII	NG	B-15
			ED:			6/23/22	2		TS		BY:	SP		<u> </u>	Z Wh	ile Drilli	na	N/A
		שט אוכ ארי	PIT	- ۲		15.01					2-00 Ctor	~ Augor		te	⊻ Uno	n Com	oletion	N/A
		KN: _			10	N/A 02 ft				HOIION	Ster	n Auger		Š	L Cav	ed Den	th	10.5 feet
		·			40 78	92 IL 8704°			WETHOD.		nati			BORIN				10.0 1000
LONG		=: <sup></sup>			-81.5	60694°		EFFICIENC	Y	93%	nau	6		Pavem	ent			
STAT	ION:		J/A		OFFS	SET:	N/A	REVIEWED	BY:	A\	/							
REMA	RKS:													-				
Elevation (feet)	LAM Elevation (feet) Depth, (feet) Elevation (feet) Sample Type Sample Type 0 Recovery (inches) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0							RIAL DESC	CRIPTION	USCS Classification		SPT Blows per 6-inch (SS)	Moisture, %	STAN × 0	NDARD F TEST N in blo Moisture STRENO	PENETR DATA pws/ft @ 25 GTH, tsf % 2.0	PL LL 50 Qp	Additional Remarks
	- 0 -					- 3" To	osoil	tiff Maint Dra			_							
1090-			X	1	16	CLAY	n Stiff to S , Trace Sar	tiff, Molst, Bro	wn, <b>Lean</b> rel			3-2-2 N=4	23		*>			
	2 16											3-4-6 N=10	18		×	*		-
1085—			X	3	12					CL		3-5-6 N=11	15	(	×	*		
	 - 10 -		X	4	17 	2						3-4-4 N=8	15		×	*		-
1080—	  		X	5	18	Very S Sand,	Stiff, Moist, Trace Grav	Brown, <b>Lean</b> ( rel	CLAY, Trace	CL		9-9-12 N=21	11	;			*	-
						Pro	fessiona	Service In	udustries 1								0142-2	571
Intertek Professional Service Industries, Inc. PROJECT NO.: 0142-2571   5555 Canal Road PROJECT: New West Side PK-3 Sci													K-3 School					
	Cleveland, OH 44125 LOCATI												FION:		250 29	9th Stre	et, NW	
						Tel	ephone:	(216) 447	-1335						Ma	ssillon,	Stark C	ounty, Ohio

DATE	STAF	RTED:			6	3/23/22		DRILL CO	MPANY:		PSI, I	nc.			В	ORI	NG E	3-16
DATE			ED:	.—		6/23/22	2		TS			': <u>SP</u>		5	√ w		na -	N/A
			PI	1_		<u>9.3 n</u>								ate	⊻ Un		nletion	N/A
		κη: _ 			10	N/A 86 ft				HO	10W St	em Auger		Ň	⊥ Ca	ved Den	th	70 feet
		·			40 78	7864°		HAMMER				atic		BORI				1.0 1000
LONG		E:			-81.	<u>56149°</u>		EFFICIENC	X		93%			Buildir	ig Ig			
STAT	ION:	Ν	J/A		OFFS	SET:	N/A	REVIEWED	) BY:		AV							
REMA	RKS:												1	1				
Elevation (feet)	o Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	5" To	MATE	RIAL DES	CRIPTION	N	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %		NDARD TES N in b Moistur	PENETR T DATA lows/ft @ e 25 VGTH, tsf % 2.0	PL LL 50 f Qp 4.0	Additional Remarks
1085—			M	1	17	Very S Interb Grave	Stiff, Moist, I edded Silt S श	Brown, <b>Lean</b> Seams, Trace	CLAY, Som Sand, Trace	1e 2	CL	6-9-8 N=17	9	>	×		>>*	ś
1000			X	2	18	SHAL	.E, Highly W	/ Soft, Brown /eathered	Mottled Gra	у,		14-32-55 N=87	5	×			>>@	
1080—	 		X	3	11 <u>Ţ</u>	¥.						24-50/5"	5	×			>>@	)
				4	10	@ 8 f	t; Gray					26-50/4"	6	×			>>@	
	in	tert	e	< 		Pro 55! Cle Te	ofessional 55 Canal eveland, ( lephone:	l Service II Road DH 44125 (216) 447	ndustries, ; 7-1335	Inc.		Pi Pi L(	ROJE ROJE DCA1	CT NO CT: FION:	D.: M; M;	ew West 250 2 assillon,	0142-25 Side PK- 9th Stree Stark Cc	71 -3 School tt, NW unty, Ohio

DATE	STA	RTED:			(	6/23/22			PANY:	PSI, I	nc.			В	ORI	NG I	B-17
			ED: DTI			6/23/22	<u>2</u>		TS		7: <u>SP</u>		<u>ب</u>		nile Drilli	na	N/A
		טוע שב ארי		<b>-</b> -		14.3 I	<u> </u>				om Augor		; ate	⊻ Un	on Com	oletion	N/A
		κη: _ 			10	N/A 83.ft				Hollow St	em Auger		Ň	I Ca	ved Den	th	11.0 feet
		·			40 78	7741°			YPF	Automa	atic		BORIN	<u> </u>			11.0 1001
LONG		E:			-81.5	60767°		EFFICIENCY	(	93%			Buildin	g			
STAT	ION:	N	J/A		OFFS	SET:	N/A	REVIEWED	BY:	AV							
REMA	RKS:				_			-									
Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)		MATE	RIAL DESC	RIPTION	JSCS Classification	Blows per 6-inch (SS)	Moisture, %	STAI	NDARD TES N in bl Moisture STREN	PENETR T DATA lows/ft @ 25 25 IGTH, tsf	ATION PL LL 50	Additional Remarks
					<sup>w</sup>						SPT			Qu	Ж	Qp	
	- 0 -	N 1/ N				8" To	psoil						0	1	2.0	4.0	
1080-				1	16	Stiff to with S Fragn	) Very Stiff, Sand, Trace nents	Moist, Brown, e Gravel, Trace	Lean CLAY Rock		3-4-4 N=8	16	©	×	*		
	- 5 -		X	2	18					CL	3-4-5 N=9	16		×	*		
1075—			X	3	18						5-11-12 N=23	10	>			>>* /	€
	 - 10 -		M	4	18	Extrer Weat	nely Soft, B nered	rown, <b>SHALE</b> ,	Highly		16-23-42 N=65	8	×			>>@	
1070—			Х	5	10						22-50/4"	8	×			>>@	
	intertekProfessional Service Industries, Inc. 5555 Canal Road Cleveland, OH 44125 Telephone: (216) 447-1335PROJE PROJE LOCA													.: Ma	ew West 250 2 assillon,	0142-25 Side PK 9th Stree Stark Co	571 -3 School et, NW punty, Ohio

DATE	STAF	RTED:			6	6/23/22		DRILL COMP	ANY:		PSI, I	nc.				BO	RING	B B	-18
			ED:	.—		6/23/22	2	DRILLER:	TS			: <u>SP</u>		5	$\nabla$	While [	rilling		N/A
		JN DE	PI	-		14.3 T	ι		THOD					ate	Ť	Upon C	ompletic	n	N/A
		KK: _			10	N/A 91 ft				HOII	0W Ste	em Auger		Ň	Ť	Caved	Denth	511	9.5 feet
		•			40 78	7695°				Δ	utoma	tic		BORI					0.0 1000
LONG					-81.5	60547°		EFFICIENCY	<b>-</b> ··	Q	93%			Paver	nent	OUAIN			
STAT	ION:	N	J/A		OFFS	SET:	N/A	REVIEWED B	Y:		AV								
REMA	RKS:				_														
Elevation (feet)	⊃ Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)		MATE	RIAL DESCF	RIPTION		USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	STA × 0	NDA T N Mois STF Qu	RD PEN EST DA in blows/ sture 25 RENGTH 2.0	ETRATIO TA ft © I PL I, tsf X Qp	DN 50 4.0	Additional Remarks
	Ū	<u></u>				9" To	psoil												
1080-				1	14	Mediu Sand,	m Stiff, Moi Trace Grav	st, Brown, <b>Lean</b> el	CLAY, Tr	ace	CL	1-3-4 N=7	23	Q		*			
			X	2	17	Stiff to Trace	Very Stiff, Sand, Trace	Moist, Brown, <b>L</b> e Gravel	ean CLAY	,		4-8-17 N=25	13		×			>>*	
1075—			X	3	17						CL	4-6-8 N=14	14					>>*	
			M	4	17 _	Hard, Trace	Moist, Brow Rock Fragn nely Soft, Br	rn, <b>Lean CLAY</b> , nents rown, <b>SHALE</b> , ⊢	Trace San	nd,	CL	6-11-20 N=31	13		*		*		
1070-			X	5	9							22-50/3"	9		×			>>@	
	in	tert	:el	κ.		Pro 555	fessional	Service Inde	ustries, I	nc.		PR	COJE COJE		D.:	New W	014 /est Side	2-257 ≩ PK-3	1
	IntercekProcessional Gervice Industries, Inc.Processional Gervice Industries, Inc.5555 Canal RoadPROJECCleveland, OH 44125LOCATHTelephone: (216) 447-1335												rion:		25 Massill	0 29th S on, Star	street, k Cou	NW nty, Ohio	
DATE	STAF	RTED:			6	3/23/22		DRILL COMP	ANY:	PSI,	Inc.			B	ORIN	IG F	3-19		
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	DATE COMPLETED: 6/23/22 COMPLETION DEPTH 14.5 ft			2	DRILLER: TS LOGGED BY: SP				5	7 Wh			N/A						
			:P11	1 _		<u>14.5 f</u>	<u>t</u>						ate			9 Ietion	N/A		
		KK: _			10	N/A				Hollow St	tem Auger		N N	Cav	/ed Denti	h	10.5 feet		
		•			40.78	2515°		HAMMER TYPE: Automatic									10.0 1001		
LONG		E:			-81.5	60989°		EFFICIENCY	<b>L</b> .	93%	allo		Building						
STAT	ION:	1	√A		OFF	SET:	N/A	REVIEWED B	Y:	AV									
REMA	RKS:																		
Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)		MATEF	RIAL DESCF	RIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %		DARD F TEST N in blo Moisture STRENO	PENETR/ DATA pws/ft @ 25 CTH, tsf # 20	ATION PL LL 50 Qp	Additional Remarks		
	- 0 -				+	4" As	phalt				_		0			4.0			
				1	15	9" Sa Stiff to with \$ Seam	nd/Gravel E o Very Stiff, I Sand, Trace is, Trace Roi	Base Moist, Brown, L ∋ Gravel, Trace Iı ick Fragments	ean CLAY nterbedded S	silt	5-7-6 N=13	18		∍×		>>¥	÷		
1080-				2	16					CL	3-4-5 N=9	14		×	*	K			
	 			3	17	Extrei	mely Soft, Bi	rown, <b>SHALE</b> , F	lighly		5-9-12 N=21	16		×		*			
1075—			M	4	18	VVCau					15-35-54 N=89	8	×			>>@	)		
	  			5	12	@ 13.	.5 ft; Gray				25-52	8	×			>>@	)		
	in K	tert	el	< 	<u>                                      </u>	Prc 55 Cle Te	ofessional 55 Canal eveland, C lephone:	I Service Indu Road OH 44125 (216) 447-1	ustries, Ind 335	 c.	PF PF LC	ROJE ROJE DCA1	CT NO. CT: TION:	: Nev Ma	( w West 9 250 29 ssillon, 9	)142-25 Side PK- th Stree Stark Cc	71 -3 School :t, NW punty, Ohio		

The stratification lines represent approximate boundaries. The transition may be gradual.

DATE	STAF	RTED:			6	6/23/22		DRILL COMP	ANY:	PSI, I	nc.				BOR	NG	B-20
DATE	COM	PLETI	ED:	—		6/23/2	2	DRILLER:	TS	LOGGED B	1: SP			$\nabla$		line	10 5 feet
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						Te	lephone:	(216) 447-1	335		-	•			Massillon	, Stark C	ounty, Ohio
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The stratification lines represent approximate boundaries. The transition may be gradual.

DATE	STAF	RTED:			6	6/24/22		DRILL COM	PANY:	PSI,	nc.				BOR	NG	B-21
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			Ň	3	18	Soft to Lean	o Medium S <b>CLAY</b> , Trac	tiff, Moist, Brov œ Gravel	vn, <b>Sandy</b>	CL	2-2-4 N=6	15		)  ×	× *		
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	טטב. וחוודו	F.			-81 5	63747°			·E	93%			Pavem	ent	ATION.		
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1075—				2	16 	<b>7</b>					2-3-2 N=5	13		×	*		
	   			3	13	Soft, M Trace	Voist, Browr Gravel, Tra	n, Lean CLAY w ice Interbedded S	<b>rith Sand</b> , Silt Seams	CL	3-1-2 N=3	16		*×			
1070-				4	18	Hard, Trace	Moist, Brow Gravel, Tra	vn, <b>Lean CLAY</b> , ice Rock Fragme	Trace Sand	, CL	1-4-8 N=12	20 12		× × ×			
1070-	- 10 -																
			el	< 		Pro 555 Cle Tel	ofessional 55 Canal eveland, C ephone:	l Service Indu Road OH 44125 (216) 447-1	ustries, In 335	С.	PI PI L(	ROJE ROJE OCA1	CT NO CT: TION:	.:Ne Ma	w West 250 29 assillon, 9	0142-25 Side PK hth Stree Stark Co	571 -3 School et, NW punty, Ohio

DATE	STAF	RTED:			ç	9/26/22		DRILL CO	MPANY:		PSI, li	nc.			B	ORIN	IG	B-23
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	- 0 -	<u>x1 /</u>				5" To	osoil							0	1	2.0	4.0	
1070-				1	15	Mediu CLAY	m Stiff to S , Trace San	liff, Moist, B d	rown, <b>Lean</b>		CL	5-6-7 N=13	18		© × <b>-</b> -	-		LL = 36 PL = 21 Fines=95.3%
				2	13	Soft N	Agiet Gray		V with Sand	Traco		3-3-4 N=7	16		×			-
1065—			X	3	10	Grave	ioist, Gray,		r with Sand	i, Trace		1-1-2 N=3	19	Ø	×			
	 - 10 -		X	4	16	Z					CL	WT-1-2 N=3	21		×			-
1060—	  - 15 -		X	5	5	Extren Clay S	nely Soft, G Seams, High	ray, <b>SHALE</b> ly Weathere	, with Interb	edded		53	9	×	ć		>>@	• •
			X	6	3	Auger	Refusal @	17 ft				50/4"	9	×			>>@	•
	in K	tert	eł	к.		Pro 555 Cle Tel	fessional 55 Canal veland, 0 ephone:	Service Road DH 4412 (216) 44	Industries 5 7-1335	, Inc.		Pi Pi L(	ROJE ROJE DCAT	:ст NO :ст: _ ГЮN:	 Nev Ma	0 w West S 250 29t ssillon, S	142-28 iide PK h Stree tark Co	571 -3 School et, NW punty, Ohio

The stratification lines represent approximate boundaries. The transition may be gradual.

DATE	STAF	TED:			9	3/26/22		DRILL COMPA	ANY:	PS	, Inc.		_		B	ORIN	IG I	B-24
	DATE COMPLETED: 9/26/22 COMPLETION DEPTH 12.6 ft									- ۴	$\searrow$ While Drilling 8.0 feet							
		ער אר שב.		' _		12.0	<u>IL</u>				Stom A	ugor	-	∎ ate	Upor	n Comp	9 letion	5.0 feet
		۲۳.: ۲⊷			10	<u>IN/A</u> 66 ft					-in SS	uger	-	š Ī	Cave	ed Depti	า	N/A
	UDE:	··			40.78	5855°		HAMMER TYP	ETHOD	Autor	natic		_ L E	BORING	LOCA	TION:	-	
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Elevation (feet)	o Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	4" Tc	MATE	RIAL DESCR	RIPTION	USCS Classification		SPT Blows per 6-inch (SS)	Moisture, %		)ARD P TEST N in blov oisture 22 37 37 37 7 7 20 20 20 20 20 20 20 20 20 20 20 20 20	ENETRA DATA ws/ft © 5 5 5 6 TH, tsf # 0	PL LL 50 Qp 4.0	Additional Remarks
1065	· _			1	17	Stiff to	o Very Stiff, Sand, Trace	Moist, Brown, L e Rock Fragmen	. <b>ean CLAY</b> , ts			-5-6 =11	16	Q	×			
1060-	5 -			2	15 	<b>Z</b>				CL	12- N	13-12 =25	13	>		•		LL = 29 PL = 19 Fines=85.9%
-	· 10 -		A	4	10 <u>\</u> 10	Extrei Weat	mely Soft, Bi hered	rown, <b>SANDSTC</b>	<b>)NE</b> , Highly		4-{	=20 50/4"	19		×		>>@	
1055	· -			5	1	_\Auger	<u>r Refusal @</u>	<u>12.5 ft</u>			5	0/1"	13	>	<		>>@	)
		:ert	e	ς 		Pro 559 Cle Te	ofessional 55 Canal eveland, C lephone:	Service Indu Road OH 44125 (216) 447-1;	ustries, Ind 335	D.		PRC PRC LOC	OJEC DJEC CATI	CT NO.: CT: ON: 	New	( West & 250 29 sillon, \$	0142-25 Side PK th Stree Stark Co	71 -3 School <u>et</u> , NW punty, Ohio











# **GENERAL NOTES**

#### SAMPLE IDENTIFICATION

ps

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

#### DRILLING AND SAMPLING SYMBOLS

- SFA: Solid Flight Auger typically 4" diameter flights, except where noted.
- HSA: Hollow Stem Auger typically 3<sup>1</sup>/<sub>4</sub>" or 4<sup>1</sup>/<sub>4</sub> I.D. openings, except where noted.
- M.R.: Mud Rotary Uses a rotary head with Bentonite or Polymer Slurry CP
- R.C.: Diamond Bit Core Sampler
- H.A.: Hand Auger
- P.A.: Power Auger Handheld motorized auger

#### SOIL PROPERTY SYMBOLS

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

#### RELATIVE DENSITY OF COARSE-GRAINED SOILS ANGULARITY OF COARSE-GRAINED PARTICLES

Relative Density	N - Blows/foot	<b>Description</b>	Criteria
Very Loose	0 - 4	Angular:	Particles have sharp edges and relatively plane sides with unpolished surfaces
Loose Medium Dense	4 - 10 10 - 30	Subangular:	Particles are similar to angular description, but have rounded edges
Dense Very Dense	30 - 50 50 - 80	Subrounded:	Particles have nearly plane sides, but have
Extremely Dense	80+	Rounded:	Particles have smoothly curved sides and no edges

#### **GRAIN-SIZE TERMINOLOGY**

Component	Size Range	<b>Description</b>
Boulders:	Over 300 mm (>12 in.)	Flat: F
Cobbles:	75 mm to 300 mm (3 in. to 12 in.)	Elongated: F
Coarse-Grained Gravel:	19 mm to 75 mm (¾ in. to 3 in.)	Flat & Elongated: F
Fine-Grained Gravel:	4.75 mm to 19 mm (No.4 to ¾ in.)	e
Coarse-Grained Sand:	2 mm to 4.75 mm (No.10 to No.4)	
Medium-Grained Sand:	0.42 mm to 2 mm (No.40 to No.10)	RELATIVE PR
Fine-Grained Sand:	0.075 mm to 0.42 mm (No. 200 to No.4	<sup>40)</sup> Descriptive
Silt:	0.00Gmm to 0.075 mm	<u></u> .
Clay:	<0.00G{{Á¢[Á⊾€È€€ÍmmÁå^]^}åãj*Áį	} Áset ^} &^

#### PARTICLE SHAPE

Criteria
Particles with width/thickness ratio > 3
Particles with length/width ratio > 3
Particles meet criteria for both flat and elongated

#### RELATIVE PROPORTIONS OF FINES

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

SS: Split-Spoon - 1 3/8" I.D., 2" O.D., except where noted.

- ST: Shelby Tube 3" O.D., except where noted.
- BS: Bulk Sample
- PM: Pressuremeter
- CPT-U: Cone Penetrometer Testing with Pore-Pressure Readings



# GENERAL NOTES

#### **CONSISTENCY OF FINE-GRAINED SOILS**

<u>N - Blows/foot</u>	<u>Consistency</u>
0 - 2	Very Soft
2 - 4	Soft
4 - 8	Firm (Medium Stiff)
8 - 15	Stiff
15 - 30	Very Stiff
30 - 50	Hard
50+	Very Hard
	<u>N - Blows/foot</u> 0 - 2 2 - 4 4 - 8 8 - 15 15 - 30 30 - 50 50+

#### **MOISTURE CONDITION DESCRIPTION**

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

#### **RELATIVE PROPORTIONS OF SAND AND GRAVEL**

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

#### STRUCTURE DESCRIPTION

<b>Description</b>	Criteria	<b>Description</b>	Criteria
Stratified:	Alternating layers of varying material or color with layers at least 1/4-inch (6 mm) thick	Blocky:	Cohesive soil that can be broken down into small angular lumps which resist further breakdown
Laminated:	Alternating layers of varying material or color with layers less than 1/4-inch (6 mm) thick	Lensed: Layer:	Inclusion of small pockets of different soils Inclusion greater than 3 inches thick (75 mm)
Fissured:	Breaks along definite planes of fracture with little resistance to fracturing	Seam:	Inclusion 1/8-inch to 3 inches (3 to 75 mm) thick extending through the sample
Slickensided:	Fracture planes appear polished or glossy, sometimes striated	Parting:	Inclusion less than 1/8-inch (3 mm) thick
SCALE	OF RELATIVE ROCK HARDNESS	ROCK	BEDDING THICKNESSES

#### <u>Q<sub>U</sub> - TSF</u> <u>Consistency</u> 25-10 Extremely Soft

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

#### **ROCK VOIDS**

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

#### **ROCK QUALITY DESCRIPTION**

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

#### ROCK BEDDING THICKNESSES

<b>Description</b>	Criteria
Very Thick Bedded	Greater than 3-foot (>1.0 m)
Thick Bedded	1-foot to 3-foot (0.3 m to 1.0 m)
Medium Bedded	4-inch to 1-foot (0.1 m to 0.3 m)
Thin Bedded	1¼-inch to 4-inch (30 mm to 100 mm)
Very Thin Bedded	<sup>1</sup> / <sub>2</sub> -inch to 1 <sup>1</sup> / <sub>4</sub> -inch (10 mm to 30 mm)
Thickly Laminated	1/8-inch to 1/2-inch (3 mm to 10 mm)
Thinly Laminated	1/8-inch or less "paper thin" (<3 mm)

#### **GRAIN-SIZED TERMINOLOGY**

(Typically Sedimentary Rock)			
oomponent	OIZC Mange		
Very Coarse Grained	>4.76 mm		
Coarse Grained	2.0 mm - 4.76 mm		
Medium Grained	0.42 mm - 2.0 mm		
Fine Grained	0.075 mm - 0.42 mm		
Very Fine Grained	<0.075 mm		

#### **DEGREE OF WEATHERING**

2	Slightly Weathered:	Rock generally fresh, joints stained and discoloration extends into rock up to 25 mm (1 in), open joints may contain clay, core rings under hammer impact.
5	Weathered:	Rock mass is decomposed 50% or less, significant portions of the rock show discoloration and weathering effects, cores cannot be broken by hand or scraped by knife.
	Highly Weathered:	Rock mass is more than 50% decomposed, complete discoloration of rock fabric, core may be extremely broken and gives clunk sound when struck by hammer, may be shaved with a knife.

# SOIL CLASSIFICATION CHART

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

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





October 21, 2021

Ms. Elizabeth Most Project Manager Architectural Vision Group, LTD. 23850 Sperry Drive Westlake, Ohio 44145

Re: Draft Report of Geotechnical Services Proposed New Elementary School Washington High School Site 1 Paul E Brown Drive Southeast Massillon, Stark County, Ohio **PSI Project No.: 0142-2428** 

Dear Ms. Most:

Per your request, Professional Service Industries, Inc. (PSI) is pleased to submit this Geotechnical Engineering Services Report for the above referenced project. The results of this exploration, together with our recommendations, are to be found in the accompanying report.

After the plans and specifications are complete, PSI should review the final design and specifications in order to verify that the earthwork and recommendations are properly interpreted and implemented. It is considered imperative that the geotechnical engineer and/or its representative be present during earthwork operations and foundation installations to observe the field conditions with respect to the design assumptions and specifications. PSI will not be held responsible for interpretations and field quality control observations made by others.

If you have any questions pertaining to this report, please contact our office at (216) 447-1335. PSI would be pleased to continue providing geotechnical services throughout the implementation of the project, and we look forward to working with you and your organization on this and future projects.

Respectfully submitted,

#### **PROFESSIONAL SERVICE INDUSTRIES, INC.**

Zaineddin Obeid Project Engineer

A. Veeramani, P.E. Director/Principal Consultant

Subsurface Exploration Report



For the Proposed

New Elementary School Washington High School Site 1 Paul E Brown Drive Southeast Massillon, Stark County, Ohio

Zilozi

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Prepared for

Architectural Vision Group, LTD. 23850 Sperry Drive Westlake, Ohio 44145

Prepared by

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PSI Project No. 0142-2428

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A. Veeramani, P.E. Director/Principal Consultant

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#### **1 PROJECT INFORMATION**

#### 1.1 **PROJECT AUTHORIZATION**

This report presents the results of a geotechnical subsurface exploration and evaluation conducted for Architectural Vision Group, LTD., in connection with the proposed New Elementary School located at 1 Paul E Brown Drive Southeast, in Massillon, Stark County, Ohio. PSI's services for this project were performed in accordance with PSI Proposal No. 0142-354720, dated September 23, 2021. Authorization to perform this exploration and analysis was in the form of a proposal authorization form, signed by Ms. Elizabeth Most, Project Manager, of Architectural Vision Group, LTD., dated September 23, 2021.

#### 1.2 PROJECT DESCRIPTION

Based on the provided information, it is understood that the proposed development will include the construction of a new elementary school building to be located east of the existing Washington High School. The proposed building will be one to two-stories, measuring approximately 60,000 to 80,000 square feet in plan area. Additionally, the project includes the construction of paved parking lots and driveways.

No structural loading information was provided at the time of this report. However, PSI has made the following assumptions, the maximum column, wall, and floor loads for the school building will be 150 kips, 7 kips per linear foot, and 100 pounds per square foot (psf), respectively.

Based on the provided topographic plan, the overall site generally slopes downward from northeast to southwest with an elevation difference about 50 feet (1,090' MSL to 1,040' MSL). No grading plan is available at the time of this report. However, it is assumed that the maximum cut and fill operations of about 10 feet will be required for the proposed building area and some cut/fill as required will be anticipated within the proposed pavement area.

# It should be noted that this subsurface exploration has been conducted to provide preliminary geotechnical information relative to the general suitability of the site area for the proposed development. This preliminary exploration is not to be construed as a final definitive study; therefore, a final geotechnical study will be required prior to final design and construction, including additional test borings, laboratory tests, and analysis.

The geotechnical recommendations presented in this report are based on the available project information, the proposed building location and orientation of the building on the site, and the subsurface materials described in this report. If any of the information we have been given or have assumed is incorrect, please contact us so that we may amend the recommendations presented accordingly. PSI will not be responsible for the implementation of its recommendations when it is not notified of changes in the project.

#### 1.3 PURPOSE AND SCOPE OF SERVICES

The purpose of this study was to explore the subsurface conditions at the site and to prepare recommendations for foundations, floor slab construction, site preparation, and other construction considerations. Our scope for this service included a project site reconnaissance, drilling and sampling fifteen (15) test borings, completing a laboratory testing program, and submitting an engineering analysis and evaluation of the subsurface materials.



The scope of services for the geotechnical exploration did not include an environmental assessment for the presence or absence of wetlands or hazardous or toxic materials in the soil, surface water, groundwater or air, on or below or around this site. Any statements in this report or on the boring logs regarding odors, colors or unusual or suspicious items or conditions are strictly for the information of the client. PSI's scope also did not include any service to investigate or detect the presence of moisture, mold or other biological contaminants in or around any structure, or any service that was designed or intended to prevent or lower the risk of the occurrence or the amplification of the same. The Client should be aware that mold is ubiquitous to the environment with mold amplification occurring when building materials are impacted by moisture. The Client should also be aware that site conditions are outside of PSI's control, and that mold amplification will likely occur, or continue to occur, in the presence of moisture. As such, PSI cannot and shall not be held responsible for the occurrence or reoccurrence of mold amplification.

## 2 SITE AND SUBSURFACE CONDITIONS

#### 2.1 SITE LOCATION AND DESCRIPTION

The site for the proposed New Elementary School project is located at located at 1 Paul E Brown Drive Southeast, in Massillon, Stark County, Ohio. Specifically, the proposed New Elementary School will be located immediately east of the existing Washington High School football stadium and baseball field (Lat: 40.792998° & Long: -81.497825°).

The site is currently predominantly covered with an asphalt paved football practice field and school bus parking facility with associated building structure. The rest of the site area is undeveloped, covered with some light brush and gravel. Based on the provided topographic plan, the overall site generally slopes downward from northeast to southwest with an elevation difference about 50 feet (1,090' MSL to 1,040' MSL). Surface drainage was good to fair at the time of the field drilling operations. PSI recommends that any existing utility lines be checked and marked prior to construction activities.

#### 2.2 SUBSURFACE CONDITIONS

The surface and subsurface conditions at the site were explored with a total of eighteen (18) test borings. The test borings were each drilled to a depth of approximately 10 to 20 feet below the existing surface grades. The approximate boring locations are shown on the Boring Location Plan presented in the *Appendix* of this report. The locations for the test borings were selected by PSI and located in the field relative to existing site features and based on site accessibility and the presence of below ground utilities.

The borings were advanced utilizing 3¼ inch inside diameter, hollow-stem auger drilling methods. Soil samples were routinely obtained during the drilling process. Selected soil samples were later tested in the laboratory to obtain soil material properties for the foundation, floor slabs and pavement recommendations. Drilling, sampling, and laboratory testing were accomplished in general accordance with ASTM procedures.

The types of subsurface materials encountered in the test borings have been visually classified. The results of the visual classifications, Standard Penetration tests, moisture contents and water level observations are presented on the boring logs in the *Appendix* of this report. Representative samples of the soils were placed in sample jars and are now stored in the laboratory for further analysis, if requested. Unless notified to the contrary, all samples will be disposed of after 60 days following the date of this report.



The surface of the site at test boring locations B-01, B-03, B-04, B-07, B-10, B-16 and B-17 was covered with a layer of topsoil measuring approximately 1 to 12 inches in thickness. Boring Locations B-02, B-05, B-08, B-11, B-14 and B-15 were covered with a layer of gravel measuring approximately 1 to 2 inches in thickness. Boring locations B-06 and B-13 were covered with a layer of asphalt measuring approximately 2 to 3 inches in thickness, of which B-6 was underlain with a layer of sand and gravel measuring approximately 21 inches in thickness. Boring location B-18 was covered with a layer of sand and gravel measuring approximately 12 inches in thickness. Boring location B-18 was covered with a layer of sand and gravel measuring approximately 12 inches in thickness. The thickness and composition of the surface and base materials should be expected to be variable throughout site.

Underlying the surface material at test boring locations B-04, B-11, B-15 and B-18, a layer of fill material was encountered, extending to the depths of about 3 to 6 feet below the existing grade. The fill material consisted primarily of sandy silt and lean clay with varying amounts of gravel, cinders, slag, and cobbles. The fill material exhibited moisture contents ranging from 9 to 19 percent. The cohesive fill materials exhibited a soft to stiff consistency, based on the Standard Penetration tests.

The surface and fill materials at all the test boring locations B-01 through B-18 were underlain by natural soils. The natural soils at the test borings location B-16 was extended to the depths about 13.3 feet below the existing surface grades and the natural soils at the test boring locations B-01 through B-15, B-17, and B-18 were encountered to the terminal depth of about 10 to 20 feet below the existing surface grades. The natural soils consisted primarily of lean clay, sandy silt and silty sand with varying amounts of gravel and rock fragments. The natural soils exhibited moisture contents ranging from 5 to 27 percent. The natural cohesive soils exhibited a medium stiff to hard consistency, and the natural granular soils exhibited a loose to medium dense relative density, based on the Standard Penetration tests.

The area's bottommost formation consisted of gray, weathered sandstone bedrock, encountered in test boring B-16.

The subsurface description is of a generalized nature provided to highlight the major strata encountered. The boring logs included in the Appendix should be reviewed for specific information at the individual boring locations. The stratifications shown on the boring logs represent the conditions only at the actual test positions. Variations may occur and should be expected between the boring locations. The stratifications represent the approximate boundary between the subsurface materials, and the transition may be gradual or not clearly defined.

#### 2.3 GROUNDWATER LEVEL MEASUREMENTS

Groundwater was encountered in test boring locations B-16 and B-18 at a depth of 9.5 to 13 feet below existing surface grade during the field drilling operations. Note that groundwater levels fluctuate seasonally as a function of rainfall. During a time of year or weather different from the time of drilling, there may be a considerable change in the water table. Furthermore, the water levels in the boreholes often are not representative of the actual groundwater level, because the boreholes remain open for a relatively short time. Therefore, we recommend that the contractor determine the actual groundwater levels at the time of construction to evaluate groundwater impact on the construction procedures.

### **3** EVALUATION AND RECOMMENDATIONS

#### 3.1 SITE PREPARATION AND EARTHWORK CONSTRUCTION

Prior to placing concrete floors or engineered fill on this site, general site area clearing should be carried out. All base, topsoil, grass, roots, excessively wet soils, highly organic soils, and soft/loose or obviously compressible materials, should be completely removed from the proposed construction areas. Depending up on the final grades, the unsuitable fill material, as evidenced at all test boring locations B-04, B-11, B-15 and B-18 should be completely removed from below the proposed building foundation footprint, and to a minimum depth of 12 inches below the proposed pavement subgrade elevations and replaced with compacted engineered fill. The precise extent of required cut and fill should be determined in the field by a representative of PSI following observation of the exposed subgrades and proof rolling operations.

Following the site clearing, stripping and undercutting, and prior to placing engineered fill, the exposed subgrades should be critically proof rolled with a loaded 20-ton tandem-axle dump truck until the grade offers a relatively unyielding surface. Areas of excessive yielding, as observed by a geotechnical engineer's representative, should be excavated and backfilled with compacted engineered fill and/or the unstable soils can be stabilized by choking the exposed bearing surface with crushed limestone or similar coarse aggregate. After the existing subgrade materials are excavated to design grade, proper control of subgrade compaction and the placement and compaction of new fill materials should be observed and tested by a representative of PSI.

It is recommended that the site preparation, proof rolling, and earthwork activities should be performed during a period of dry weather, which can significantly reduce the required extent of soil stabilization, drainage and surface repairs.

During site preparation, fill piles, burn pits, trash pits or other isolated disposal areas may be encountered. All too frequently such buried material occurs in isolated areas outside boring locations. Any such material encountered during site work, or foundation, floor slab or pavement construction should be excavated, removed from the site, and backfilled with compacted structural fill.

#### 3.2 ENGINEERED FILL

Materials selected for use as engineered fill should not contain more than 5 percent by weight of organic matter, waste construction debris, or other deleterious materials. Fill materials should have a Standard Proctor maximum dry density (ASTM D-698) greater than 110 pounds per cubic foot (pcf), an Atterberg Liquid Limit of less than 40, a Plasticity Index of less than 15, and a maximum particle size of 3 inches or less. Engineered fill materials should consist of non-expansive materials. Pyritic and/or potentially expansive materials, such as mine tailings, shales and slag should not be used as engineered fill material.

Based on the results of the boring explorations, the on-site soils not suitable for reuse as engineered fill. If the onsite soils are used for fill, close moisture content control will be required to achieve the recommended degree of compaction. PSI anticipates that disking and aerating the soils during a warm, dry period may be necessary to lower the moisture content. If engineered fill placement must proceed during a wet or cool time of the year, it may likely be infeasible to re-use the on-site soils as engineered fill and imported fill materials would be required. If wet or cool season earthwork is necessary, we recommend the use of imported fill materials such as ODOT No. 304 or 411 crushed aggregate.



Representative samples of the proposed fill materials should be collected at least one week prior to the start of the filling operations. The samples should be tested to determine the maximum dry density, optimum moisture content, particle size distribution and plasticity characteristics. These tests are needed to determine if the material is acceptable as structural fill and for quality control during the compaction process.

Engineered fill materials should be placed and compacted in individual lifts of 8 inches or less loose measurement. Within small excavations such as in utility trenches, around manholes, or behind retaining walls, we recommend the use of smaller, hand- or remote-guided equipment. Loose lift thicknesses of 4 inches or less are recommended when using such equipment.

We recommend that structural fill be compacted to a minimum of 98 percent of the maximum dry density and within  $\pm 2\%$  of the optimum moisture content, as determined by ASTM D-698. A representative of PSI should observe fill placement operations and perform density tests concurrently to indicate if the specified compaction is being achieved.

#### 3.3 FOUNDATION RECOMMENDATIONS

Based on the test boring results, laboratory test results, and the proposed construction, our analysis indicates that the proposed building structure can be supported on isolated and/or continuous spread-footing foundations, bearing on the existing natural soil or on properly compacted engineered fill, will be suitable to support the proposed building structure. An allowable bearing capacity of 2,500 psf may be utilized for the design of the spread-footing foundations.

All perimeter footings must be placed at a minimum depth of 42 inches below the finished grade in order to protect against frost action. Interior foundations in heated areas may be placed at a depth of at least 18 inches below the floor slab, provided they will be bearing on acceptable natural or compacted engineered fill soils.

Extreme care should be taken to prevent weakening of the foundation bearing materials because of prolonged atmospheric exposure, construction activity disturbance or an increase in moisture content. If an overnight delay in concrete placement is anticipated, the foundation excavations should be cut approximately 6 inches and subsequently excavated to final grade immediately before placement of concrete.

In order to reduce the effects of differential movement that may occur due to variations in the character of the supporting soil and any variations in seasonal moisture contents, it is recommended that all continuous footings be reinforced, as per structural considerations. Foundations supporting individual columns should have a minimum dimension of 24 inches, and continuous wall foundations should have a minimum width of 18 inches.

Based on the assumed structural loads, it is anticipated that total and differential foundation settlements will be less than 1.0-inch and 0.50-inch, respectively. However, actual settlements will be dependent upon the depth of the foundations, column spacing, structural loads and other related factors. The structural and architectural design should include provisions for liberally spaced, vertical control joints to minimize the effects of potential settlement.

Control points should be established within the anticipated fill areas (more than 4 feet) to monitor, during and subsequent to the completion of the fill operations, any and all settlements of the final grade resulting from

consolidation of the area's subsurface materials under the weight of the engineered fill, and from the engineered fill under their own weight. Settlement-time data, thus developed, should be employed to establish the time of placement of the building structure and pavement areas.

PSI should be retained to provide observation and testing of construction activities involved in the foundation, earthwork and related activities of this project. PSI cannot accept responsibility for conditions that deviate from those described in this report, nor for the performance and testing for this project.

Based on table 1615.1.1 of the OBC Building Code, the test boring results, and review of the geology in vicinity to the project area, a **Site Classification of 'C'** can be utilized for the seismic design.

#### 3.4 FLOOR SLAB DESIGN AND CONSTRUCTION

Preparation of floor slab subgrades should be in accordance with the recommendations outlined in the *Site Preparation* and *Engineered Fill* sections of the report. If subsurface materials at the finished subgrade elevations exhibit excessive moisture contents and unstable subgrade conditions, then undercutting and replacement of the objectionable soils should be performed to achieve firm subgrade support. Alternatively, the unstable soils can be stabilized by choking the exposed bearing surface with crushed limestone or similar coarse aggregate.

After the soils in the building area have been prepared as discussed, it is recommended that the subgrade surface be subjected to surface compaction to the extent that a minimum of 24 inches of materials underlying the slab subgrade elevation achieve a minimum in-place density of 98 percent of the maximum laboratory dry density and should be within  $\pm$  2 % of the optimum moisture content, as determined in general accordance with ASTM D-698.

A capillary gravel layer (such as AASHTO #57 or ODOT #304) should be provided between the floor slab and the approved subgrade materials. The gravel layer should have a minimum thickness of 6 inches and should be properly compacted. Also, a vapor barrier is recommended below the floor slab as per ACI specifications. We recommend that a subgrade modulus (k) of 80 pci be used in floor slab design calculations.

Careful field control is to be exercised in finish grading operations in order to assure that subgrade tolerances are maintained. It is particularly important that no low sectors or depressions be allowed to exist within these areas, water may accumulate and lead to serious loss of supporting capacity.

The floor slab should be suitably reinforced, as per structural considerations, to make it as rigid as practical. Proper joints should be provided at the junctions of the slab and foundation system so that a small amount of independent movement can occur without causing damage. Large floor areas should be provided with joints at frequent intervals to compensate for concrete volume changes during curing and temperature changes.

#### 3.5 PAVEMENT RECOMMENDATIONS

Pavement design will include proper preparation of subgrade sectors, careful design of the pavement area drainage systems and utilization of an aggregate base course with asphalt concrete or concrete surface course. Preparation of pavement subgrades should be in accordance with the recommendations outlined in the *Site Preparation* and *Engineered Fill* sections of the report. Careful attention will be required in fine grading the subgrade surfaces in order to eliminate undulations and depressions that would tend to collect water.



We recommend that the exposed surface be proof rolled, and any soft areas removed. Compaction of fill soil intended to support pavement should meet or exceed 98% of the maximum dry density as determined by ASTM D698 (Standard Proctor). The moisture content at the time of compaction should be within 2% of the optimum value. Any removed soil should be replaced by compacted structural fill to arrive at the desired grade.

The proposed pavement construction will be primarily for car and bus traffic. No traffic loading information was provided at the time of this report. However, PSI has assumed average daily traffic (ADT) of about 150 cars, 30 buses, and 2 semi-trucks. Based on the anticipated pavement design information, the following pavement design parameters may be utilized for new pavement design:

Design Parameters					
Flexible Pavement Rigid Pavement					
Light Duty design 18-kip ESAL's	50,000	50,000			
Heavy Duty design 18-kip ESAL's	200,000	200,000			
Reliability:	80%	80%			
Overall Deviation:	0.49	0.39			
Design Life (Years):	20	20			
Initial Serviceability:	4.5	4.2			
Terminal Serviceability:	2.5	2.5			
Design CBR	4				
Subgrade Modulus (k, pci)		80			

#### Flexible Pavement

The recommended pavement thickness values are shown in Tables 1 and 2. These design thicknesses assume that a properly prepared subgrade has been achieved.

Table 1. Hexible Favement Sections (20-fear Design Life)				
	Light-Duty*	Heavy Duty		
Surface Course (ODOT #448 Type 1)	1.5 inches	1.5 inches		
Intermediate Course (ODOT #448 Type 2)	2.0 inches	3.0 inches		
Aggregate Base Course (ODOT #304)	6.0 inches	8.0 inches		
*Parking spaces only				

#### Table 1: Flexible Pavement Sections (20-Year Design Life)

For parking stalls that allow free movement through them (i.e., no parking block or curbs), we recommend installing the heavy-duty asphalt section. Allowances for proper drainage and proper material selection of base materials are most important for performance of asphaltic pavements. Ruts and birdbaths in asphalt pavement allow for quick deterioration of the pavement primarily due to saturation of the underlying base and subgrade.

#### <u>Rigid Pavement</u>

The use of concrete for paving has become more prevalent in recent years due to the long-term maintenance cost benefits of concrete compared to asphaltic pavements. Should concrete pavement be utilized, the concrete should be properly reinforced and jointed, and should have a 28-day flexural strength of no less than 650 psi and should be air entrained. Expansion joints should be sealed with a polyurethane sealant so that moisture infiltration into the subgrade soils and resultant concrete deterioration at the joints is reduced.

#### **Table 2: Rigid Pavement Sections**

	Light-Duty*	Heavy Duty
Reinforced Concrete	5.0 inches	7.0 inches
Aggregate Base Course (ODOT #304)	6.0 inches	6.0 inches
*Parking spaces only		

The portions of the site where rigid (concrete) pavements are recommended include the entrance/exit driveway aprons and the dumpster pad enclosure area. A heavy-duty pavement section is recommended for lanes designated for delivery trucks. Crushed aggregate base materials should be compacted to at least 98% of the standard Proctor (ASTM D 698) maximum dry density near optimum moisture content. The use of Portland cement concrete (PCC) for paving has become more prevalent in recent years based on material costs for concrete vs. bituminous and the long-term maintenance cost benefits of concrete compared to bituminous pavements. If PCC pavement is utilized, the concrete should be properly jointed, have proper load-transfer mechanisms installed, and should have a minimum 28-day compressive strength of 4,000 psi. Expansion and construction joints should be sealed with a polyurethane sealant so that moisture infiltration into the subgrade soils and resultant concrete deterioration at the joints is minimized. Concrete pavement at least 8 inches thick is recommended for the trash dumpster pad and entrance/exit aprons due to the high wheel and impact loads that these areas experience.

Design for drainage is of the utmost importance to minimize detrimental effects that may shorten the service life of the pavements. The pavement should be crowned or sloped in order to promote effective surface drainage and reduce the risk of water ponding. We recommend a minimum slope of 1.5 percent. In addition, the subgrade should be similarly sloped to promote effective subgrade drainage. We recommend "stub" or "finger" drains be provided around catch-basins and in other low areas of the proposed pavements to limit the accumulation of water on the frost susceptible subgrade soils. Subsurface edge drains should be provided at curbs. Where no curbs are proposed, ditches should be provided, and the pavement base course should be daylighted through the ditch side slope to facilitate drainage of the base course.

If fill material is needed to establish the required pavement grade, fill placement and compaction must be performed in accordance with the procedures outlined in the *Site Preparation* section of this report. The edges of compacted fill should extend a minimum 2 feet beyond the edges of the pavement, or a distance equal to the depth of fill beneath the pavement, whichever is greater.

All materials to be employed and field operations required in connection with the contemplated pavement structures should follow recommendations and procedural details as per the Ohio Department of Transportation, Asphalt Institute, and/or American Concrete Institute.

### 4 CONSTRUCTION CONSIDERATIONS

#### 4.1 GROUNDWATER CONTROL AND DRAINAGE

Free groundwater was encountered in test boring locations B-16 and B-18 at a depth of 9.5 to 13 feet below existing surface grade during the field drilling operations. However, groundwater and/or seepage could be encountered during foundation excavation and construction. Accordingly, a gravity drainage system, sump pump or other conventional dewatering procedure, as deemed necessary by the field conditions, should be implemented throughout construction such that the groundwater is always controlled and maintained at an elevation of at least 2 feet below the excavation bottom. Every effort should be made to keep the excavations dry if water is encountered.

Water should not be allowed to collect near the foundation or floor slab areas of the building either during or after construction. Undercut or excavated areas should be sloped toward one corner to facilitate removal of any collected rainwater, groundwater or surface runoff. Positive site drainage should be provided to reduce infiltration of surface water around the perimeter of the building and beneath the floor slab. Overall site area drainage is to be arranged in a manner such that the possibility of water impounding below slab-on-grade areas and over the structural fill is prevented.

#### 4.2 EXCAVATIONS

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

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

We are providing this information solely as a service to our client. PSI is not assuming responsibility for construction site safety or the contractor's activities; such responsibility is not being implied and should not be inferred. If the excavations are left open and exposed to the elements for a significant length of time, desiccation of the clays may create minute shrinkage cracks which could allow large pieces of clay to collapse or slide into the excavation.

Materials removed from the excavation should not be stockpiled immediately adjacent to the excavation, inasmuch as this load may cause a collapse of the embankment.



#### 4.3 WEATHER CONSIDERATIONS

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

#### 5 GEOTECHNICAL RISK

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

#### 6 **REPORT LIMITATIONS**

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

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

After the plans and specifications are complete, it is recommended that PSI be provided the opportunity to review the final design and specifications, in order to verify that the earthwork and recommendations are properly interpreted and implemented. At that time, it may be necessary to submit supplementary recommendations. This report has been prepared for the exclusive use of Architectural Vision Group, LTD., for the specific application to the proposed New Elementary School located at 1 Paul E Brown Drive Southeast, in Massillon, Stark County, Ohio.

# APPENDIX

SOIL BORING LOCATION PLAN FENCE DIAGRAM BORING LOGS GRAIN SIZE GRAPH GENERAL NOTES & USCS SOIL CLASSIFICATION CHART

# **Boring Location Plan**





DATE	STAF	RTED:			1	0/4/21		DRILL COM	PANY:		PSI, Ir	nc.			BORING B-01								
			ED: DT	u—		<u>10/4/21</u> 20.0 f	+	DRILLER:	TS	_ LOGG		: <u>ZO</u>		<b>-</b> 7	V Whi	ile Drilli	na	N/A					
BENC				п –		 N/A	<u> </u>	DRILL NG N		Hol	low Ste	om Auger		ate		on Com	oletion	N/A					
ELEV		۹: ۱:			10	58 ft		SAMPLING	METHOD:		2-in	SS		Š	Z Cav	ed Dep	th	18 feet					
LATIT	UDE:							HAMMER T	YPE:	A	utoma	tic		BORIN	- IG LOC/	ATION:							
LONGITUDE:								EFFICIENC	(		93%												
STAT	ION:_	Ν	I/A		OFFS	;ет: _	N/A	REVIEWED BY:AV															
REMA	RKS:				<del></del>								<u> </u>	1									
Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)		MATEF	RIAL DESC	RIPTIO	N	USCS Classification	SPT Blows per 6-inch (SS	Moisture, %		NDARD F TEST N in blo Moisture	PENETRA DATA wws/ft @ 25 CTH, tsf X	PL LL 50 Qp	Additional Remarks					
	- 0 -	<u>71 1</u> 7 . 71				12" To	opsoil							0	2	2.0	4.0						
				1	16	Stiff to	Medium S	Stiff to Stiff, Mo Silt, Trace to	oist, Gray Little Grave	el,	lopsoil	3-6-6	14		®×								
1055-			Δ-			Trace	Organics					N=12											
			M	2	15							3-4-3 N=7	22		×								
			X	3	17						CL	2-2-3 N=5	24	Ø	>	<							
1050—	  - 10 -		X	4	11							4-5-6 N=11	21		> ×								
1045—			M	5	16	Stiff to Trace	Very Stiff, Gravel	, Moist, Brown	Lean CLA	AY,		3-5-7	22		• ×								
1040	- 15 -  		∕∖-		Z	7					CL	N=12											
	 - 20 -			6	17							4-6-18 N=24	21			»)							
intertekProfessional Service Industries, Inc. 5555 Canal Road Cleveland, OH 44125 Telephone: (216) 447-1335												PF PF LC	ROJE ROJE DCAT	:CT NC :CT: <u> </u> 'ION:	D.: Propose 1 Pau Mas	d Elem Il E Bro sillon, \$	0142-24 School wn Drive Stark Co	28 - Washington e, Southeast punty, Ohio					

DATE	STAF	RTED:			1	0/1/21		DRILL	COMP	ANY:		PSI, I	nc.				BO	RIN	NG B-02						
			ED: DT	u—		10/1/2	1 ft		ER:	JJ			': <u>ZO</u>		<u>ب</u>	$\nabla$	While	Drillir	na	N/A					
BENC				'' -		N/A		DRILLI				llow St	em Auger		ate	Ī	Upon	Com	oletion	N/A					
ELEVATION: 1070 ft										ETHOD:		2-ir	n SS		Š	Ī	Caveo	d Dep	th	11.5 feet					
LATIT	UDE:				-			HAMM	ER TYP	E:		Automa	atic		BOR	ING L	OCAT	ION:							
LONG	ITUD	E:						EFFICI	ENCY			93%													
STATI	ION:	Ν	I/A		OFFS	SET: _	N/A	REVIEW	NED B	Y:		AV													
	RKS:																								
Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)		MATEF	rial di	ESCR	RIPTIO	N	USCS Classification	<sup>7</sup> T Blows per 6-inch (S	Moisture, %	× 0	ANDA T Ni Mois	RD PEI TEST D in blows sture 25 25 25 RENGT	NETRA ATA s/ft ⊚ ■ ■ TH, tsf	PL LL 50	Additional Remarks					
	_ 0 _												SF		0	Qu	2.0	*	Qp 4.0						
	- 0 -					- <b>2" Gr</b> Stiff t	avel	to Stiff N	Moiet E	Brown to		Base													
-			X	1	17	Gray Silt	Lean CLAY	with Gra	avel, Lit	tle to So	ome		6-7-9 N=16	13		×¢	)								
1065—				2	18								4-7-7 N=14	14											
-			$\mathbb{N}$	3	5							CL	5-6-7 N=13	14		×									
1060-	 - 10 -			4	18								10-11-14 N=25	11		×									
1055	  - 15 -			5	18	<u>_</u>							4-6-8 N=14	13		¢									
	in	cert		<.		Pro 55 Cle Te	ofessiona 55 Canal eveland, ( lephone:	I Servic Road DH 44 (216)	ce Ind 125 447-1	ustries 335	a, Inc.		PF PF LC	ROJE	CT N CT:	<b>IO</b> .: Prop	oosed Paul I Massi	Elem E Brov Ilon, S	0142-24 School wn Driv Stark Co	428 - Washington e, Southeast punty, Ohio					

DATE	STAF	RTED:			ę	9/30/21		DRILL	COMP	ANY:		PSI, li	SI, Inc. BORING B-03							
DATE	COM		ED:	—		9/30/2	1	DRILLI	ER:	TS	LOGG	ED BY	: <u> </u>		<u> </u>				N/A	
COMPLETION DEPTH 20.0 π   BENCHMARK: N/A									RIG:	TUOD		CIVIE-5	05		ate	⊻ Wi ▼ Un		nletion	N/A	
BENCHWARK: N/A D   ELEVATION: 1082 ft S											HO	10W Ste 2_in			Ň	⊥ Ca	ved Der	oth	18 feet	
										PF.		Automa	tic	_	BORI				10 1001	
LONGITUDE:								EFFICI	IENCY			93%			2014		/			
STATION: N/A OFFSET: N/A I									WED B	Y:		AV								
REMA	RKS:							-												
(feet)	feet)	Log	ype No. nches)								_	sification	6-inch (SS)	e, %	ST/	ANDARD TES <sup>-</sup> N in bl	PENETR/ ΓDATA ows/ft ⊚	ATION PL		
Elevation	Depth, (	Graphic	Sample <sup>.</sup>	Sample	ecovery (		MATEI	RIAL DESCRIPTION			1	JSCS Class	Blows per	Moisture	0	STREN	25 ↓ GTH, tsf	LL 50	Additional Remarks	
													SPT			Qu	*	Qp		
	- 0 -					_ <b>∖1" Tc</b>	psoil					Fopsoil			0		2.0	4.0		
						Stiff t	o Medium	Stiff, Mois	st, Brov	vn Lean										
			$\mathbf{M}$				with Sanu	anu Gra	ivei											
1080-			Ň	1	17								5-5-4	15	0					
			$\square$										N=9							
			$\overline{\Lambda}$																	
			X	2	14							CL	8-6-4	12		∮<				
	- 5 -		$\square$										N=10			Ц				
	Ũ																			
			Y	3	16								2-3-3	13		×				
1075-			$\wedge$	U									N=6		Ĭ	1				
						01:6	Maint Dave		- OU T	<b>T</b>										
			M		10	Grav	el, Some C	vn <b>Sandy</b> lay	/SILI,	Trace			0.4.0	10						
			$\wedge$	4	16								3-4-6 N=10	12		Ŭ,				
	- 10 -											ML								
1070-						Modi	Im Dongo	Moiot D												
						with (	Gravel, Tra	ce Clay	10wii <b>3</b> 1	ILY SAND										
			$\overline{\Lambda}$																	
			ХH	5	11							SM	3-5-6	13		¢×				
	- 15 -		$\square$									OW	N=11							
1065-						Very	Stiff, Moist,	Brown S	Sandy S	<b>SILT</b> , Trac	е									
					Z		el													
												ML								
			γI	6	12								5-7 10	17						
			$\mathbb{N}$	U	12								N=19							
	- 20 -																			
	intertek Professional Service Industries, Inc. PROJECT NO.: 0142-2428																			
			.~ T			55	55 Canal	Road	405				PF	ROJE	CT:	Propos	ed Elem	School	- Washington	
							eveland,	UH 44	125	225			LC	CAI	ION:	<u>1 Pa</u>	ul E Bro	wn Drive	e, Southeast	
	ſ					re	iephone.	(210)		000						IVId	5511011, 3			

DATES	STAF	RTED:	_		1	0/4/21		DRILL COM	IPANY:		PSI, Ir	IC.			BORING B-04							
DATE	COM	PLETE	ED:	—		10/4/2	1	DRILLER:	TS	LOGG	ED BY:	<u>ZO</u>		5			ing					
		ON DE	PT	н _		15.01	t	DRILL RIG:		AIV	CME-5	5		Itel	⊻ vvi ▼ Lin		Ing	N/A				
		κ: _			10	N/A			METHOD:	Hol	low Ste	m Auger		Na l	ν Γ Ω		oth	12 feet				
					10	30 11					Z-III	<u> </u>					5011	12 1001				
								FFFICIENC	Y		93%			DOIM								
STATIO	DN:		I/A		OFFS	SET:	N/A	REVIEWED	BY:		AV											
REMAR	RKS:				-																	
Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)		MATEF	RIAL DESC	CRIPTION	1	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	STA ×	NDARD TES N in b Moisture STREN Qu	PENETR T DATA lows/ft @ 25 25 25 1 20	ATION PL LL 50 Qp	Additional Remarks				
	0 -					2" To	psoil				opsoil											
1055			<u> </u>	1	13	Soft, I Grave	Moist, Blacl I, Some Sla	ag, Little Cinc	<b>ly SILT</b> with lers		Fill	5-2-1 N=3	10	© >	<							
1050-	5 -		M	2	11							3-2-2 N=4	16		×							
-	_		$\mathbb{X}$	3	18	Mediu with L	im Dense, l ittle Clay	Moist, Brown	Silty SAND			7-7-7 N=14	14		Ø							
-	- 10		X	4	16						SM	6-7-7 N=14	19									
1045— - - -	- - 15 -		X	5	18	Mediu	ım Stiff, Mo	ist, Brown <b>Sa</b>	Indy SILT		ML	4-3-3 N=6	23	6		×						
	int K	ert	e	¢.		Prc 555 Cle Tel	fessiona 55 Canal veland, ( ephone:	l Service Ir Road DH 44125 (216) 447	ndustries, -1335	Inc.		PI PI L(	ROJE	CT NO CT: ION:	D.: Propos 1 Pa Ma	ed Elen ul E Bro ssillon,	0142-24 1 School own Drive Stark Co	128 - Washington e, Southeast punty, Ohio				



DATE	STAF	RTED:			ç	9/30/21		DRILL CO	MPANY:		PSI, Ir	1C.			BORING B-06							
			ED: DT	u		9/30/21	+		: <u>TS</u>			: <u>ZO</u> 5		<b>L</b>	∇ wr	ile Drilli	ina	N/A				
BENC		RK:		·· -		N/A	<u> </u>	DRILLING	S. METHOD:	Hc	llow Ste	em Auger	_	ate	Up	on Com	pletion	N/A				
ELEV		- ۱:			10	80 ft		SAMPLIN	G METHOD	):	2-in	SS		3	🖞 Ca	ved Dep	oth	8 feet				
LATIT	UDE:							HAMMER	TYPE:		Automat	tic		BORI	NG LOC	ATION:						
		E:	1/A		OEEG	ет.	NI/A	EFFICIEN			93%											
REMA	RKS:				_0110	<u> </u>					Λv											
Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)		MATEF	RIAL DES	SCRIPTIC	DN	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %		ANDARD TES N in bl Moisture STREN	PENETR. T DATA ows/ft @ 25 	ATION PL LL 50 Qp	Additional Remarks				
	- 0 -	~ <u>~</u> 0~~				3" As	ohalt over 2	21" Black S	and and G	ravel	Asphalt					2.0	4.0					
			X	1	15	Mediu CLAY	m Stiff to S with Sand	Stiff, Moist, I and Gravel	Brown <b>Lear</b>	1	Base	4-4-2 N=6	10 14		×							
1075—			X	2	12							3-8-6 N=14	13									
			X	3	7 	<u>_</u>					CL	4-5-5 N=10	7	×	0							
1070-	 - 10 -		X	4	13							3-5-7 N=12	17		©×							
						Pro	fessiona	I Service	Industrie			Pi			0.		0142-24	.28				
intertekProfessional Service Industries, Inc.PROJECT NO5555 Canal RoadPROJECT:PROJECT:Cleveland, OH 44125LOCATION:Telephone: (216) 447-1335													0.: <u>Propose</u> <u>1 Pa</u> <u>Ma</u>	ed Elem ul E Bro ssillon, S	0142-24 n School own Drive Stark Co	- Washington e, Southeast punty, Ohio						
DATE	STAF	RTED:				0/4/21		DRILL COM	/IPANY: _		PSI, Ir	IC.				BOF	RIN	IG F	3-07			
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DATE			ED:	u—		10/4/21	<u> </u>	DRILLER:	TS		SED BY	: <u>ZO</u>		<b>_</b>	$\nabla$	While C	Drillin		5 01	NI/A		
			:P1	п _		10.01 N/A							-	ate	Ťι	Jpon C	Comp	9 letion		N/A		
ELEV		۰۰۰. ۱:			10	56 ft		SAMPLING			2-in	SS	-	Š	Ī	Caved	Dept	h	8	feet		
LATIT	UDE:							HAMMER 1	YPE:	-	Automa	tic		BOR	ING LO	CATIO	ON:					
LONG	ITUD	E:						EFFICIENC	Y		93%											
STAT RFMA	ON:_	N	I/A		OFFS	SET:	N/A	REVIEWED	BY:		AV											
												(Si		ST			FTRA					
Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	(ecovery (inches)		MATEF	RIAL DESO	CRIPTIO	N	JSCS Classification	Blows per 6-inch (9	Moisture, %	× 0	TE N ir Moisti	EST DA <sup>-</sup> blows/f ure 25 ENGTH	TA ft ⊚ ∎ ∎	PL LL 50	Additiona Remarks	al S		
												SPT			Qu		Ж	Qp				
	- 0 -	////				_∖ <b>1" To</b> p	soil				Topsoil			0		2.0		4.0				
1055—			X	1	11	Mediu Grave	m Stiff, Mo and Rock	ist, Brown <b>Le</b> Fragments (	e <b>an CLAY</b> w (Clean Fill)	vith		3-2-2 N=4		Ø								
			X	2	12						CL	1-2-3 N=5	14		$\times$							
1050—			X	3	18 	Stiff, N and R	loist, Brow ock Fragm	rn <b>Lean CLA`</b> ents	<b>Y</b> with Grave	el	CL	5-6-7 N=13										
			X	4	18							3-4-5 N=9	23		 	×						
						Pro	fessiona	I Service I	ndustries			PF						142-24	28			
	S		e	<		555 Cle Tele	veland, ( phone:	Road DH 44125 (216) 447	ridustries 7-1335	s, INC.		PF PF LC	ROJE ROJE DCAT	CT: TON:	<u>Propo</u> <u>1 F</u>	osed E Paul E Aassillo	0 Elem S Brow on, S	School /n Drive tark Cc	- Washingto - Washingto e, Southeast punty, Ohio	<u>n</u> —		

DATE	STAF	RTED:			1	0/1/21		DRILL	COMPA	NY:		PSI, I	nc.				BOR	NG	B-08	
DATE	COM	PLET	ED:	—		10/1/2	1	DRILLE	ER:	JJ	LOGG	ED BY	: <u>ZO</u>		<u>د</u>	$\nabla$		ling	<b>D</b> -00	NI/A
COMP	PLETIC	ON DE	PT	н_		15.0	ft		RIG:		<u> </u>	CME-5	.5		Itel	Ť	Upon Co	nng molotior	<b>`</b>	N/A
		KK: _			10	N/A					HO	low Ste	em Auger		Š	Ť	Caved De	npielioi	I	13 feet
		·			10	02 IL				1HOD. :-			tic		BOR			I•		10 1000
		=:						EFFICI	ENCY		/	93%			DOIN					
STAT	ION:	 N	J/A		OFFS	SET:	N/A	REVIE	WED BY:	:		AV								
REMA	RKS:				_															
Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)		MATE	RIAL D	ESCRI	PTION		USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	ST × 0	ANDA T N Mois STF Qu	RD PENET TEST DATA in blows/ft of sture	RATION	Addit 50 Rem .0	ional arks
	U						avel Stiff Moist	Brown	oan CL /	V with		Base								
1060—			X	1	8	Sand	and Grave	I				CL	4-14-14 N=28	11		×	ø			
	 - 5 -		N-	2	14	Stiff f Sand	o Medium S <b>y SILT</b> , Tra	Stiff, Mois ce to Litt	st, Browr le Grave	n/Gray I			3-4-5 N=9	23		ø	×			
1055—			X	3	16								3-3-3 N=6	25	Ø		×			
			X	4	18							ML	2-2-2 N=4	22	0		×		_	
1050—	  		X	5	<u>7</u> 18	<u></u>							2-2-3 N=5	26	0		×			
		Cert	e	к.		Pro 55 Cle Te	ofessiona 55 Canal eveland, lephone:	I Servio Road OH 44 (216)	ce Indu 125 447-13	istries, 35	Inc.		PF PF LC	ROJE ROJE DCA1	CT N CT: ION:	IO.: Prop 1	oosed Ele Paul E Bi Massillon	0142- m Scho rown Dr , Stark (	2428 ol - Washir ive, Southe County, Oh	igton ast io



DATE	STAF	RTED:	_		1	0/4/21		DRILL	COMP	ANY:		PSI, I	nc.				R(		JG F	3-10	
DATE			ED:	—		10/4/2	1		ER:	TS	LOGG	ED BY	: <u> </u>		5	$\nabla$	Whi				NI/A
	PLETI		PT	н _		15.0	ft		RIG:	TUOD	AIV	CME-5			Ite	Ť		n Com	nletion		N/A
		KK: _			10	N/A 56.ft					Holl	ow Ste	em Auger		Na	Ī	Cav	ed Der	th	13	feet
		·			10	50 IL					Δ		tic		BOR					10	1001
		E:						EFFICI	ENCY	L		93%			DOI		2007				
STAT	ION:		I/A		OFFS	SET:	N/A	REVIE	WED B	Y:		AV									
REM/	ARKS:	-			-			-													
Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	ecovery (inches)		MATE	RIAL D	ESCF	RIPTION	J	JSCS Classification	Blows per 6-inch (SS)	Moisture, %	S1 ×	FANDA N Moi	ARD P TEST I in blo isture 2 RENG	ENETR/ DATA ws/ft @ 4 5 5 6TH, tsf	PL LL 50	Additiona Remarks	al S
					L CE							_	SPT			A Qu	ı	Ж	Qp		
	- 0 -	<i></i>				2" To	neoil					onsoil			0		2	.0	4.0		
1055–				1	18	Very with	Stiff to Stiff Gravel and	f, Moist, E Rock Fra	Brown <b>S</b> agments	Sandy SIL	T	Upson	8-11-6 N=17	12		×	0				
1050-			X	2	12							ML	9-8-7 N=15	8	;	× ¢	) 				
			X	3	8								5-5-4 N=9	10							
1045-	 - 10 -			4	11	Medi Grav	um Stiff, Mo el and Shal	oist, Brow e Fragme	vn <b>Lear</b> ents	I CLAY wi	ith		2-3-2 N=5	20			×				
	5 14 Medium Stiff, Mo Gravel and Shal											CL	2-2-2 N=4	12	0	*					
	in	tert		<.		Pri 55 Cli Te	ofessiona 55 Canal eveland, lephone:	al Servio Road OH 44 (216)	ce Ind 125 447-1	lustries, 335	Inc.		PF PF LC	ROJE ROJE DCAT		<b>10</b> .: Pro: 1	ppose 1 Pau Mas	d Elem I E Bro sillon, {	0142-24 School wn Drivv Stark Co	28 - Washington e, Southeast punty, Ohio	

DATE	STAF	RTED	: _			10/1/21		DRILL COMP	PANY:		PSI, Ir	IC.			E	ORI	NG E	3-11
			ED:	u—		10/1/21	+	DRILLER:	JJ			<u>ZO</u>		<u>ب</u>	√ w	hile Drilli	ina	N/A
		SK.	CPI	п _		10.0 Π N/Δ						o m Auger		ate	Ur Ur	on Com	pletion	N/A
ELEV	ATIO	N:			10	62 ft		SAMPLING N	IETHOD:	1101	2-in	SS		Š	Ū Ca	ved Dep	oth	7 feet
LATIT	UDE:							HAMMER TY	PE:	A	utoma	tic	_	BOR	NG LOO	CATION:		
		E: _			0550	<b>.</b>	N1/A	EFFICIENCY		9	93%							
REMA	ARKS:	I	N/A		_0663	DEI:	IN/A	REVIEWEDE	ST:		AV							
Elevation (feet)	o Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)		MATEF	RIAL DESCI	RIPTION	I	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	ST × 0	ANDARD TES N in t Moistur STREI	PENETR T DATA lows/ft © e 25 VGTH, tsf % 2.0	ATION PL LL 50 Qp 4.0	Additional Remarks
	- 0 -		Š			- 2" Gra	vel loist Brow	n/Black Loan (			Base							
1060—				1	13	Silt, G	ravel and (	Cobbles, Trace	e Slag		Fill	4-7-7 N=14	9		×ø			
	 - 5 -			2	13	Mediu SILT,	m Stiff to S Trace Grav	stiff, Moist, Bro vel, Trace Clay	wn <b>Sandy</b>			4-3-3 N=6	17	6	/ ×			
1055—			X	3	18 <u>7</u>	<b>Z</b>					ML	6-4-4 N=8	23		>	×		
	 - 10 -		X	4	18							3-3-5 N=8	21	(	>	<		
						Pro	fessiona	I Service In	dustries	Inc				CT N	0.		0142.24	28
			tel	<		Pro 555 Cle Tele	fessiona 5 Canal veland, ( ephone:	I Service In Road DH 44125 (216) 447-	dustries, 1335	Inc.		PF PF LC	ROJE ROJE DCAT	CT N CT: ION:	0.: Propos 1 Pa Ma	ed Elem Iul E Bro Issillon,	0142-24 n School own Drive Stark Cc	28 - Washington e, Southeast punty, Ohio

DATE	STAF	RTED:			ç	9/30/21		DRILL COM	MPANY: _		PSI, I	nc.			B	ORII	NG F	3-12
DATE	COM		ED:			9/30/21	<u> </u>	DRILLER:	TS		SED BY	': <u>ZO</u>		<b>_</b>				
			:P1	Η		10.0 T N/Δ	ι					on Auger		ate	▼ Up	on Com	pletion	N/A
ELEV		l:			10	78 ft		SAMPLING	METHOD:	:	2-ir	ISS	_	ŝ	🗴 Ca	ved Dep	oth	8 feet
LATIT	UDE:							HAMMER T	YPE:		Automa	ntic		BORI	NG LOC	ATION:		
LONG	ITUD	E:						EFFICIENC	Y		93%							
REMA	ION:_ ARKS:	N	I/A		OFFS	SET:	N/A	REVIEWED	) BY:		AV							
feet)	eet)	bo-	ype	No.	iches)						fication	3-inch (SS)	%	ST	ANDARD TES <sup>-</sup> N in bl	PENETR T DATA ows/ft ©	ATION	
Elevation (	Depth, (fe	Graphic I	Sample T	Sample 1	ecovery (ir		MATEF	RIAL DESC	CRIPTIO	N	JSCS Classi	Blows per 6	Moisture,	 ₀	Moisture STREN	e 4 25 GTH. tsf	LL 50	Additional Remarks
					L 52						L	SPT			Qu	*	Qp	
	- 0 -					Loose SAND	to Medium with Grave	n Dense, Moi el	st, Brown <b>\$</b>	Silty				0		2.0	4.0	
1075			X	1	17							3-3-3 N=6	6					
1075-			$\mathbb{N}$	2	13						SM	3-4-5 N=9	5	×0				
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						Tel	ephone:	(216) 447	-1335					Ma	assillon,	Stark Co	ounty, Ohio

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# **GENERAL NOTES**

#### SAMPLE IDENTIFICATION

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

#### DRILLING AND SAMPLING SYMBOLS

- SFA: Solid Flight Auger typically 4" diameter flights, except where noted.
- HSA: Hollow Stem Auger typically 3<sup>1</sup>/<sub>4</sub>" or 4<sup>1</sup>/<sub>4</sub> I.D. openings, except where noted.
- M.R.: Mud Rotary Uses a rotary head with Bentonite or Polymer Slurry CP
- R.C.: Diamond Bit Core Sampler
- H.A.: Hand Auger
- P.A.: Power Auger Handheld motorized auger

#### SOIL PROPERTY SYMBOLS

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

#### RELATIVE DENSITY OF COARSE-GRAINED SOILS ANGULARITY OF COARSE-GRAINED PARTICLES

Relative Density	N - Blows/foot	<b>Description</b>	Criteria
Very Loose	0 - 4	Angular:	Particles have sharp edges and relatively plane sides with unpolished surfaces
Loose Medium Dense	4 - 10 10 - 30	Subangular:	Particles are similar to angular description, but have rounded edges
Dense Very Dense	30 - 50 50 - 80	Subrounded:	Particles have nearly plane sides, but have
Extremely Dense	80+	Rounded:	Particles have smoothly curved sides and no edges

#### **GRAIN-SIZE TERMINOLOGY**

Component	Size Range	<b>Description</b>
Boulders:	Over 300 mm (>12 in.)	Flat: F
Cobbles:	75 mm to 300 mm (3 in. to 12 in.)	Elongated: F
Coarse-Grained Gravel:	19 mm to 75 mm (¾ in. to 3 in.)	Flat & Elongated: F
Fine-Grained Gravel:	4.75 mm to 19 mm (No.4 to ¾ in.)	e
Coarse-Grained Sand:	2 mm to 4.75 mm (No.10 to No.4)	
Medium-Grained Sand:	0.42 mm to 2 mm (No.40 to No.10)	RELATIVE PR
Fine-Grained Sand:	0.075 mm to 0.42 mm (No. 200 to No.4	<sup>40)</sup> Descriptive
Silt:	0.00Gmm to 0.075 mm	<u></u> .
Clay:	<0.00G{{Á¢[Á⊾€È€€ÍmmÁå^]^}åãj*Áį	} Áset ^} &^

#### PARTICLE SHAPE

Criteria
Particles with width/thickness ratio > 3
Particles with length/width ratio > 3
Particles meet criteria for both flat and elongated

#### RELATIVE PROPORTIONS OF FINES

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

SS: Split-Spoon - 1 3/8" I.D., 2" O.D., except where noted.

- ST: Shelby Tube 3" O.D., except where noted.
- BS: Bulk Sample
- PM: Pressuremeter
- CPT-U: Cone Penetrometer Testing with Pore-Pressure Readings



# GENERAL NOTES

#### **CONSISTENCY OF FINE-GRAINED SOILS**

<u>N - Blows/foot</u>	<u>Consistency</u>
0 - 2	Very Soft
2 - 4	Soft
4 - 8	Firm (Medium Stiff)
8 - 15	Stiff
15 - 30	Very Stiff
30 - 50	Hard
50+	Very Hard
	<u>N - Blows/foot</u> 0 - 2 2 - 4 4 - 8 8 - 15 15 - 30 30 - 50 50+

#### **MOISTURE CONDITION DESCRIPTION**

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

#### **RELATIVE PROPORTIONS OF SAND AND GRAVEL**

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

#### STRUCTURE DESCRIPTION

<b>Description</b>	Criteria	<b>Description</b>	Criteria
Stratified:	Alternating layers of varying material or color with layers at least 1/4-inch (6 mm) thick	Blocky:	Cohesive soil that can be broken down into small angular lumps which resist further breakdown
Laminated:	Alternating layers of varying material or color with layers less than 1/4-inch (6 mm) thick	Lensed: Layer:	Inclusion of small pockets of different soils Inclusion greater than 3 inches thick (75 mm)
Fissured:	Breaks along definite planes of fracture with little resistance to fracturing	Seam:	Inclusion 1/8-inch to 3 inches (3 to 75 mm) thick extending through the sample
Slickensided:	Fracture planes appear polished or glossy, sometimes striated	Parting:	Inclusion less than 1/8-inch (3 mm) thick
SCALE	OF RELATIVE ROCK HARDNESS	ROCK	BEDDING THICKNESSES

#### <u>Q<sub>U</sub> - TSF</u> <u>Consistency</u> 25-10 Extremely Soft

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

#### **ROCK VOIDS**

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

#### **ROCK QUALITY DESCRIPTION**

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

#### ROCK BEDDING THICKNESSES

<b>Description</b>	Criteria
Very Thick Bedded	Greater than 3-foot (>1.0 m)
Thick Bedded	1-foot to 3-foot (0.3 m to 1.0 m)
Medium Bedded	4-inch to 1-foot (0.1 m to 0.3 m)
Thin Bedded	1¼-inch to 4-inch (30 mm to 100 mm)
Very Thin Bedded	<sup>1</sup> / <sub>2</sub> -inch to 1 <sup>1</sup> / <sub>4</sub> -inch (10 mm to 30 mm)
Thickly Laminated	1/8-inch to 1/2-inch (3 mm to 10 mm)
Thinly Laminated	1/8-inch or less "paper thin" (<3 mm)

#### **GRAIN-SIZED TERMINOLOGY**

(Typically Sedi	mentary Rock) Size Bange
oomponent	OIZC Mange
Very Coarse Grained	>4.76 mm
Coarse Grained	2.0 mm - 4.76 mm
Medium Grained	0.42 mm - 2.0 mm
Fine Grained	0.075 mm - 0.42 mm
Very Fine Grained	<0.075 mm

#### **DEGREE OF WEATHERING**

2	Slightly Weathered:	Rock generally fresh, joints stained and discoloration extends into rock up to 25 mm (1 in), open joints may contain clay, core rings under hammer impact.
5	Weathered:	Rock mass is decomposed 50% or less, significant portions of the rock show discoloration and weathering effects, cores cannot be broken by hand or scraped by knife.
	Highly Weathered:	Rock mass is more than 50% decomposed, complete discoloration of rock fabric, core may be extremely broken and gives clunk sound when struck by hammer, may be shaved with a knife.

# SOIL CLASSIFICATION CHART

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

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





October 21, 2021 (Revised: July 29, 2022)

Ms. Elizabeth Most Project Manager Architectural Vision Group, LTD. 23850 Sperry Drive Westlake, Ohio 44145

Re: Report of Supplemental Geotechnical Services Proposed New Elementary School Washington High School Site 1 Paul E Brown Drive Southeast Massillon, Stark County, Ohio **PSI Project No.: 0142-2590** 

Dear Ms. Most:

Per your request, Professional Service Industries, Inc. (PSI) is pleased to submit this Geotechnical Engineering Services Report for the above referenced project. The results of this exploration, together with our recommendations, are to be found in the accompanying report.

After the plans and specifications are complete, PSI should review the final design and specifications in order to verify that the earthwork and recommendations are properly interpreted and implemented. It is considered imperative that the geotechnical engineer and/or its representative be present during earthwork operations and foundation installations to observe the field conditions with respect to the design assumptions and specifications. PSI will not be held responsible for interpretations and field quality control observations made by others.

If you have any questions pertaining to this report, please contact our office at (216) 447-1335. PSI would be pleased to continue providing geotechnical services throughout the implementation of the project, and we look forward to working with you and your organization on this and future projects.

Respectfully submitted,

#### **PROFESSIONAL SERVICE INDUSTRIES, INC.**

Stephanie A. Pell, E.I. Geotechnical Project Engineer

Alagaiya Veeramani, P.E. Principal Consultant

Subsurface Exploration Report

For the Proposed

New Elementary School Washington High School Site 1 Paul E Brown Drive Southeast Massillon, Stark County, Ohio



St. aPell

Stephanie A. Pell, E.I. Geotechnical Project Engineer

**Prepared for** 

Architectural Vision Group, LTD. 23850 Sperry Drive Westlake, Ohio 44145

Prepared by

Professional Service Industries, Inc. 5555 Canal Road Cleveland, OH 44125

PSI Project No. 0142-2590

Alagaiya Veeramani, P.E. Principal Consultant

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#### **1 PROJECT INFORMATION**

#### 1.1 **PROJECT AUTHORIZATION**

This report presents the results of a geotechnical subsurface exploration and evaluation conducted for Architectural Vision Group, LTD., in connection with the proposed New Elementary School located at 1 Paul E Brown Drive Southeast, in Massillon, Stark County, Ohio. PSI's services for this project were performed in accordance with PSI Proposal No. 0142-377342, dated June 29, 2022. Authorization to perform this exploration and analysis was in the form of a proposal authorization form, signed by Ms. Elizabeth Most, Project Manager, of Architectural Vision Group, LTD., dated June 30, 2022.

#### **1.2 PROJECT DESCRIPTION**

Based on the provided information, it is understood that the proposed development will include the construction of a new elementary school building to be located east of the existing Washington High School. The proposed building will be one to two-stories, measuring approximately 62,600 square feet in plan area. Additionally, the project includes the construction of paved parking lots and driveways.

No structural loading information was provided at the time of this report. However, PSI has made the following assumptions for the proposed construction.

The maximum column, wall, and floor loads for the school building will be 100 kips, 5 kips per linear foot, and 100 pounds per square foot (psf), respectively.

Based on the provided topographic plan, the overall site generally slopes downward from northeast to southwest with an elevation difference about 42 feet (1,084' MSL to 1,042' MSL) and about 16 feet within the proposed building footprint. No grading plan is available at the time of this report. However, it is assumed that the maximum cut and fill operations of less than 8 feet will be required for the proposed building area and some cut/fill as required will be anticipated within the proposed pavement area.

The geotechnical recommendations presented in this report are based on the available project information, the proposed building location and orientation of the building on the site, and the subsurface materials described in this report. If any of the information we have been given or have assumed is incorrect, please contact us so that we may amend the recommendations presented accordingly. PSI will not be responsible for the implementation of its recommendations when it is not notified of changes in the project.

#### **1.3 PURPOSE AND SCOPE OF SERVICES**

The purpose of this study was to explore the subsurface conditions at the site and to prepare recommendations for foundations, floor slab construction, site preparation, and other construction considerations. Our scope for this service included a project site reconnaissance, drilling and sampling eighteen preliminary (18) and six supplemental (6) test borings, completing a laboratory testing program, and submitting an engineering analysis and evaluation of the subsurface materials.

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



items or conditions are strictly for the information of the client. PSI's scope also did not include any service to investigate or detect the presence of moisture, mold or other biological contaminants in or around any structure, or any service that was designed or intended to prevent or lower the risk of the occurrence or the amplification of the same. The Client should be aware that mold is ubiquitous to the environment with mold amplification occurring when building materials are impacted by moisture. The Client should also be aware that site conditions are outside of PSI's control, and that mold amplification will likely occur, or continue to occur, in the presence of moisture. As such, PSI cannot and shall not be held responsible for the occurrence or reoccurrence of mold amplification.

# 2 SITE AND SUBSURFACE CONDITIONS

#### 2.1 SITE LOCATION AND DESCRIPTION

The site for the proposed New Elementary School project is located at located at 1 Paul E Brown Drive Southeast, in Massillon, Stark County, Ohio. Specifically, the proposed New Elementary School will be located immediately east of the existing Washington High School football stadium and baseball field (Lat: 40.792998° & Long: - 81.497825°).

The site is currently predominantly covered with an asphalt paved football practice field and school bus parking facility with associated building structure. The rest of the site area is undeveloped, covered with some light brush and gravel. Based on the provided topographic plan, the overall site generally slopes downward from northeast to southwest with an elevation difference about 42 feet (1,084' MSL to 1,042' MSL). Surface drainage was good to fair at the time of the field drilling operations. PSI recommends that any existing utility lines be checked and marked prior to construction activities.

#### 2.2 SUBSURFACE CONDITIONS

The surface and subsurface conditions at the site were explored with a total of eighteen preliminary (18) and six supplemental (6) test borings. The test borings were each drilled to a depth of approximately 10 to 20 feet below the existing surface grades. The approximate boring locations are shown on the Boring Location Plan presented in the *Appendix* of this report. The locations for the test borings were selected by PSI and located in the field relative to existing site features and based on site accessibility and the presence of below ground utilities.

The borings were advanced utilizing 3¼ inch inside diameter, hollow-stem auger drilling methods. Soil samples were routinely obtained during the drilling process. Selected soil samples were later tested in the laboratory to obtain soil material properties for the foundation, floor slabs and pavement recommendations. Drilling, sampling, and laboratory testing were accomplished in general accordance with ASTM procedures.

The types of subsurface materials encountered in the test borings have been visually classified. The results of the visual classifications, Standard Penetration tests, moisture contents and water level observations are presented on the boring logs in the *Appendix* of this report. Representative samples of the soils were placed in sample jars and are now stored in the laboratory for further analysis, if requested. Unless notified to the contrary, all samples will be disposed of after 60 days following the date of this report.

The surface of the site at test boring locations B-01, B-03, B-04, B-07, B-10, B-16, B-17, and B-22 was covered with a layer of topsoil measuring approximately 1 to 12 inches in thickness. Boring Locations B-02, B-05, B-08, B-11, B-14, B-15, and B-24 were covered with a layer of gravel measuring approximately 1 to 4 inches in thickness. Boring



locations B-06, B-13, B-19 through B-21, and B-23 were covered with a layer of asphalt measuring approximately 1 to 6 inches in thickness, of which B-6, B-20 and B-23 was underlain with a layer of sand and gravel measuring approximately 2 to 21 inches in thickness. Boring location B-18 was covered with a layer of sand and gravel measuring approximately 12 inches in thickness. The thickness and composition of the surface and base materials should be expected to be variable throughout site.

Underlying the surface material at test boring locations B-04, B-11, B-15, B-18, B-19, and B-23 a layer of fill material was encountered, extending to the depths of about 3 to 6 feet below the existing grade. The fill material consisted primarily of sandy silt and lean clay with varying amounts of gravel, cinders, slag, and cobbles. The fill material exhibited moisture contents ranging from 9 to 19 percent. The cohesive fill materials exhibited a soft to stiff consistency, based on the Standard Penetration tests.

The surface and fill materials at all the test boring locations B-01 through B-24 were underlain by natural soils. The natural soils at the test borings location B-16 was extended to the depths about 13.3 feet below the existing surface grades and the natural soils at the test boring locations B-01 through B-15, and B-17 through B-24 were encountered to the terminal depth of about 10 to 20 feet below the existing surface grades. The natural soils consisted primarily of lean clay, sandy silt and silty sand with varying amounts of gravel and rock fragments. The natural soils exhibited moisture contents ranging from 5 to 27 percent. The natural cohesive soils exhibited a medium stiff to hard consistency, and the natural granular soils exhibited a loose to medium dense relative density, based on the Standard Penetration tests.

The area's bottommost formation consisted of gray, weathered sandstone bedrock, encountered in test boring B-16.

The subsurface description is of a generalized nature provided to highlight the major strata encountered. The boring logs included in the *Appendix* should be reviewed for specific information at the individual boring locations. The stratifications shown on the boring logs represent the conditions only at the actual test positions. Variations may occur and should be expected between the boring locations. The stratifications represent the approximate boundary between the subsurface materials, and the transition may be gradual or not clearly defined.

#### 2.3 GROUNDWATER LEVEL MEASUREMENTS

Groundwater was encountered in test boring locations B-16 and B-18 at a depth of 9.5 to 13 feet below existing surface grade during the field drilling operations. Note that groundwater levels fluctuate seasonally as a function of rainfall. During a time of year or weather different from the time of drilling, there may be a considerable change in the water table. Furthermore, the water levels in the boreholes often are not representative of the actual groundwater level, because the boreholes remain open for a relatively short time. Therefore, we recommend that the contractor determine the actual groundwater levels at the time of construction to evaluate groundwater impact on the construction procedures.

## **3** EVALUATION AND RECOMMENDATIONS

#### 3.1 SITE PREPARATION AND EARTHWORK CONSTRUCTION

Prior to placing concrete floors or engineered fill on this site, general site area clearing should be carried out. All base, topsoil, grass, roots, excessively wet soils, highly organic soils, and soft/loose or obviously compressible materials, should be completely removed from the proposed construction areas. Depending up on the final grades, the unsuitable fill material, as evidenced at all test boring locations B-04, B-11, B-15, B-18, B-19, and B-23 should be completely removed from below the proposed building foundation footprint, and to a minimum depth of 12 inches below the proposed pavement subgrade elevations and replaced with compacted engineered fill. The precise extent of required cut and fill should be determined in the field by a representative of PSI following observation of the exposed subgrades and proof rolling operations.

Following the site clearing, stripping and undercutting, and prior to placing engineered fill, the exposed subgrades should be critically proof rolled with a loaded 20-ton tandem-axle dump truck until the grade offers a relatively unyielding surface. Areas of excessive yielding, as observed by a geotechnical engineer's representative, should be excavated and backfilled with compacted engineered fill and/or the unstable soils can be stabilized by choking the exposed bearing surface with crushed limestone or similar coarse aggregate. After the existing subgrade materials are excavated to design grade, proper control of subgrade compaction and the placement and compaction of new fill materials should be observed and tested by a representative of PSI.

It is recommended that the site preparation, proof rolling, and earthwork activities should be performed during a period of dry weather, which can significantly reduce the required extent of soil stabilization, drainage and surface repairs.

During site preparation, fill piles, burn pits, trash pits or other isolated disposal areas may be encountered. All too frequently such buried material occurs in isolated areas outside boring locations. Any such material encountered during site work, or foundation, floor slab or pavement construction should be excavated, removed from the site, and backfilled with compacted structural fill.

#### 3.2 ENGINEERED FILL

Materials selected for use as engineered fill should not contain more than 5 percent by weight of organic matter, waste construction debris, or other deleterious materials. Fill materials should have a Standard Proctor maximum dry density (ASTM D-698) greater than 110 pounds per cubic foot (pcf), an Atterberg Liquid Limit of less than 40, a Plasticity Index of less than 15, and a maximum particle size of 3 inches or less. Engineered fill materials should consist of non-expansive materials. Pyritic and/or potentially expansive materials, such as mine tailings, shales and slag should not be used as engineered fill material.

Based on the results of the boring explorations, the on-site soils not suitable for reuse as engineered fill. If the onsite soils are used for fill, close moisture content control will be required to achieve the recommended degree of compaction. PSI anticipates that disking and aerating the soils during a warm, dry period may be necessary to lower the moisture content. If engineered fill placement must proceed during a wet or cool time of the year, it may likely be infeasible to re-use the on-site soils as engineered fill and imported fill materials would be required. If wet or cool season earthwork is necessary, we recommend the use of imported fill materials such as ODOT No. 304 or 411 crushed aggregate.



Representative samples of the proposed fill materials should be collected at least one week prior to the start of the filling operations. The samples should be tested to determine the maximum dry density, optimum moisture content, particle size distribution and plasticity characteristics. These tests are needed to determine if the material is acceptable as structural fill and for quality control during the compaction process.

Engineered fill materials should be placed and compacted in individual lifts of 8 inches or less loose measurement. Within small excavations such as in utility trenches, around manholes, or behind retaining walls, we recommend the use of smaller, hand- or remote-guided equipment. Loose lift thicknesses of 4 inches or less are recommended when using such equipment.

We recommend that structural fill be compacted to a minimum of 98 percent of the maximum dry density and within  $\pm 2\%$  of the optimum moisture content, as determined by ASTM D-698. A representative of PSI should observe fill placement operations and perform density tests concurrently to indicate if the specified compaction is being achieved.

#### 3.3 FOUNDATION RECOMMENDATIONS

Based on the test boring results, laboratory test results, and the proposed construction, our analysis indicates that the proposed building structure can be supported on isolated and/or continuous spread-footing foundations, bearing on the existing natural soil or on properly compacted engineered fill, will be suitable to support the proposed building structure. An allowable bearing capacity of 2,500 psf may be utilized for the design of the spread-footing foundations.

All perimeter footings must be placed at a minimum depth of 42 inches below the finished grade in order to protect against frost action. Interior foundations in heated areas may be placed at a depth of at least 18 inches below the floor slab, provided they will be bearing on acceptable natural or compacted engineered fill soils.

Extreme care should be taken to prevent weakening of the foundation bearing materials because of prolonged atmospheric exposure, construction activity disturbance or an increase in moisture content. If an overnight delay in concrete placement is anticipated, the foundation excavations should be cut approximately 6 inches and subsequently excavated to final grade immediately before placement of concrete.

In order to reduce the effects of differential movement that may occur due to variations in the character of the supporting soil and any variations in seasonal moisture contents, it is recommended that all continuous footings be reinforced, as per structural considerations. Foundations supporting individual columns should have a minimum dimension of 24 inches, and continuous wall foundations should have a minimum width of 18 inches.

Based on the assumed structural loads, it is anticipated that total and differential foundation settlements will be less than 1.0-inch and 0.50-inch, respectively. However, actual settlements will be dependent upon the depth of the foundations, column spacing, structural loads and other related factors. The structural and architectural design should include provisions for liberally spaced, vertical control joints to minimize the effects of potential settlement.

Control points should be established within the anticipated fill areas (more than 4 feet) to monitor, during and subsequent to the completion of the fill operations, any and all settlements of the final grade resulting from

consolidation of the area's subsurface materials under the weight of the engineered fill, and from the engineered fill under their own weight. Settlement-time data, thus developed, should be employed to establish the time of placement of the building structure and pavement areas.

PSI should be retained to provide observation and testing of construction activities involved in the foundation, earthwork and related activities of this project. PSI cannot accept responsibility for conditions that deviate from those described in this report, nor for the performance and testing for this project.

Based on table 1615.1.1 of the OBC Building Code, the test boring results, and review of the geology in vicinity to the project area, a **Site Classification of 'C'** can be utilized for the seismic design.

#### 3.4 FLOOR SLAB DESIGN AND CONSTRUCTION

Preparation of floor slab subgrades should be in accordance with the recommendations outlined in the *Site Preparation* and *Engineered Fill* sections of the report. If subsurface materials at the finished subgrade elevations exhibit excessive moisture contents and unstable subgrade conditions, then undercutting and replacement of the objectionable soils should be performed to achieve firm subgrade support. Alternatively, the unstable soils can be stabilized by choking the exposed bearing surface with crushed limestone or similar coarse aggregate.

After the soils in the building area have been prepared as discussed, it is recommended that the subgrade surface be subjected to surface compaction to the extent that a minimum of 24 inches of materials underlying the slab subgrade elevation achieve a minimum in-place density of 98 percent of the maximum laboratory dry density and should be within  $\pm$  2 % of the optimum moisture content, as determined in general accordance with ASTM D-698.

A capillary gravel layer (such as AASHTO #57 or ODOT #304) should be provided between the floor slab and the approved subgrade materials. The gravel layer should have a minimum thickness of 6 inches and should be properly compacted. Also, a vapor barrier is recommended below the floor slab as per ACI specifications. We recommend that a subgrade modulus (k) of 80 pci be used in floor slab design calculations.

Careful field control is to be exercised in finish grading operations in order to assure that subgrade tolerances are maintained. It is particularly important that no low sectors or depressions be allowed to exist within these areas, water may accumulate and lead to serious loss of supporting capacity.

The floor slab should be suitably reinforced, as per structural considerations, to make it as rigid as practical. Proper joints should be provided at the junctions of the slab and foundation system so that a small amount of independent movement can occur without causing damage. Large floor areas should be provided with joints at frequent intervals to compensate for concrete volume changes during curing and temperature changes.

#### 3.5 PAVEMENT RECOMMENDATIONS

Pavement design will include proper preparation of subgrade sectors, careful design of the pavement area drainage systems and utilization of an aggregate base course with asphalt concrete or concrete surface course. Preparation of pavement subgrades should be in accordance with the recommendations outlined in the *Site Preparation* and *Engineered Fill* sections of the report. Careful attention will be required in fine grading the subgrade surfaces in order to eliminate undulations and depressions that would tend to collect water.



We recommend that the exposed surface be proof rolled, and any soft areas removed. Compaction of fill soil intended to support pavement should meet or exceed 98% of the maximum dry density as determined by ASTM D698 (Standard Proctor). The moisture content at the time of compaction should be within 2% of the optimum value. Any removed soil should be replaced by compacted structural fill to arrive at the desired grade.

The proposed pavement construction will be primarily for car and bus traffic. No traffic information was provided at the time of this report. However, PSI has assumed average daily traffic (ADT) of about 150 cars, 30 buses, and 2 semi-trucks. Based on the anticipated pavement design information, the following pavement design parameters may be utilized for new pavement design:

Design Parameters												
	Flexible Pavement	<b>Rigid Pavement</b>										
Light Duty design 18-kip ESAL's	50,000	50,000										
Heavy Duty design 18-kip ESAL's	200,000	200,000										
Reliability:	80%	80%										
Overall Deviation:	0.49	0.39										
Design Life (Years):	20	20										
Initial Serviceability:	4.5	4.2										
Terminal Serviceability:	2.5	2.5										
Design CBR	4											
Subgrade Modulus (k, pci)		80										

#### Flexible Pavement

The recommended pavement thickness values are shown in Tables 1 and 2. These design thicknesses assume that a properly prepared subgrade has been achieved.

	Light-Duty*	Heavy Duty
Surface Course (ODOT #448 Type 1)	1.5 inches	1.5 inches
Intermediate Course (ODOT #448 Type 2)	2.5 inches	3.5 inches
Aggregate Base Course (ODOT #304)	6.0 inches	8.0 inches
*Parking spaces only		

#### Table 1: Flexible Pavement Sections (20-Year Design Life)

For parking stalls that allow free movement through them (i.e., no parking block or curbs), we recommend installing the heavy-duty asphalt section. Allowances for proper drainage and proper material selection of base materials are most important for performance of asphaltic pavements. Ruts and birdbaths in asphalt pavement allow for quick deterioration of the pavement primarily due to saturation of the underlying base and subgrade.

#### <u>Rigid Pavement</u>

The use of concrete for paving has become more prevalent in recent years due to the long-term maintenance cost benefits of concrete compared to asphaltic pavements. Should concrete pavement be utilized, the concrete should be properly reinforced and jointed, and should have a 28-day flexural strength of no less than 650 psi and

should be air entrained. Expansion joints should be sealed with a polyurethane sealant so that moisture infiltration into the subgrade soils and resultant concrete deterioration at the joints is reduced.

	Light-Duty*	Heavy Duty
Reinforced Concrete	5.0 inches	6.0 inches
Aggregate Base Course (ODOT #304)	4.0 inches	6.0 inches
*Parking spaces only		

#### **Table 2: Rigid Pavement Sections**

The portions of the site where rigid (concrete) pavements are recommended include the entrance/exit driveway aprons and the dumpster pad enclosure area. A heavy-duty pavement section is recommended for lanes designated for delivery trucks. Crushed aggregate base materials should be compacted to at least 98% of the standard Proctor (ASTM D 698) maximum dry density near optimum moisture content. The use of Portland cement concrete (PCC) for paving has become more prevalent in recent years based on material costs for concrete vs. bituminous and the long-term maintenance cost benefits of concrete compared to bituminous pavements. If PCC pavement is utilized, the concrete should be properly jointed, have proper load-transfer mechanisms installed, and should have a minimum 28-day compressive strength of 4,000 psi. Expansion and construction joints should be sealed with a polyurethane sealant so that moisture infiltration into the subgrade soils and resultant concrete deterioration at the joints is minimized. Concrete pavement at least 8 inches thick is recommended for the trash dumpster pad and entrance/exit aprons due to the high wheel and impact loads that these areas experience.

Design for drainage is of the utmost importance to minimize detrimental effects that may shorten the service life of the pavements. The pavement should be crowned or sloped in order to promote effective surface drainage and reduce the risk of water ponding. We recommend a minimum slope of 1.5 percent. In addition, the subgrade should be similarly sloped to promote effective subgrade drainage. We recommend "stub" or "finger" drains be provided around catch-basins and in other low areas of the proposed pavements to limit the accumulation of water on the frost susceptible subgrade soils. Subsurface edge drains should be provided at curbs. Where no curbs are proposed, ditches should be provided, and the pavement base course should be daylighted through the ditch side slope to facilitate drainage of the base course.

If fill material is needed to establish the required pavement grade, fill placement and compaction must be performed in accordance with the procedures outlined in the *Site Preparation* section of this report. The edges of compacted fill should extend a minimum 2 feet beyond the edges of the pavement, or a distance equal to the depth of fill beneath the pavement, whichever is greater.

All materials to be employed and field operations required in connection with the contemplated pavement structures should follow recommendations and procedural details as per the Ohio Department of Transportation, Asphalt Institute, and/or American Concrete Institute.

# 4 CONSTRUCTION CONSIDERATIONS

## 4.1 GROUNDWATER CONTROL AND DRAINAGE

Free groundwater was encountered in test boring locations B-16 and B-18 at a depth of 9.5 to 13 feet below existing surface grade during the field drilling operations. However, groundwater and/or seepage could be encountered during foundation excavation and construction. Accordingly, a gravity drainage system, sump



pump or other conventional dewatering procedure, as deemed necessary by the field conditions, should be implemented throughout construction such that the groundwater is always controlled and maintained at an elevation of at least 2 feet below the excavation bottom. Every effort should be made to keep the excavations dry if water is encountered.

Water should not be allowed to collect near the foundation or floor slab areas of the building either during or after construction. Undercut or excavated areas should be sloped toward one corner to facilitate removal of any collected rainwater, groundwater or surface runoff. Positive site drainage should be provided to reduce infiltration of surface water around the perimeter of the building and beneath the floor slab. Overall site area drainage is to be arranged in a manner such that the possibility of water impounding below slab-on-grade areas and over the structural fill is prevented.

#### 4.2 EXCAVATIONS

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

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

We are providing this information solely as a service to our client. PSI is not assuming responsibility for construction site safety or the contractor's activities; such responsibility is not being implied and should not be inferred. If the excavations are left open and exposed to the elements for a significant length of time, desiccation of the clays may create minute shrinkage cracks which could allow large pieces of clay to collapse or slide into the excavation.

Materials removed from the excavation should not be stockpiled immediately adjacent to the excavation, inasmuch as this load may cause a collapse of the embankment.

#### 4.3 WEATHER CONSIDERATIONS

The soils encountered at this site are known to be sensitive to disturbances caused by construction traffic and to changes in moisture content. During wet weather periods, increases in the moisture content of the soil can cause significant reduction in the soil strength and support capabilities. Care should be exercised during the grading operations at the site. Due to the fine-grained nature of the surficial soils, the traffic of heavy equipment, including heavy compaction equipment, may very well create pumping and a general deterioration of those soils in the presence of water. Therefore, the grading should, if possible, be performed during a dry season. A layer of crushed stone may be required to allow the movement of construction traffic over the site during the rainy season. The



contractor should maintain positive site drainage and if wet/pumping conditions occur, the contractor will be responsible to over excavate the wet soils and replace them with a properly compacted engineered fill. During wet seasons, limestone stabilization may be required to place engineered fill.

#### 5 GEOTECHNICAL RISK

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

## 6 **REPORT LIMITATIONS**

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

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

After the plans and specifications are complete, it is recommended that PSI be provided the opportunity to review the final design and specifications, in order to verify that the earthwork and recommendations are properly interpreted and implemented. At that time, it may be necessary to submit supplementary recommendations. This report has been prepared for the exclusive use of Architectural Vision Group, LTD., for the specific application to the proposed New Elementary School located at 1 Paul E Brown Drive Southeast, in Massillon, Stark County, Ohio.

# APPENDIX

SOIL BORING LOCATION PLANS FENCE DIAGRAMS BORING LOGS GRAIN SIZE GRAPHS ATTERBERG LIMIT RESULTS GENERAL NOTES & USCS SOIL CLASSIFICATION CHART

# **Boring Location Plan**









DATE	STAF	RTED:			1	0/4/21		DRILL COM	PANY:		PSI, Ir	nc.	BORING B-01							
			ED: DT	u—	<u> </u>							: <u>ZO</u>	$\nabla$ While Drilling N/A							
BENC				п –		 N/A	<u> </u>	DRILLING METHOD: Hollo			llow Stem Auger			ate		on Com	oletion	N/A		
ELEV	ELEVATION: 1058 ft					SAMPLING METHOD:			2-in	SS		Š	Z Cav	ed Dep	th	18 feet				
LATIT	UDE:							HAMMER T	YPE:	A	utoma	tic		BORIN	- IG LOC/	ATION:				
LONG	ONGITUDE:							EFFICIENC	(		93%									
STAT	ION:_	Ν	I/A		OFFS	;ет: _	N/A	REVIEWED BY: AV												
REMA	RKS:				<del></del>								<u> </u>	1						
Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)		MATEF	RIAL DESC	RIPTIO	N	USCS Classification	SPT Blows per 6-inch (SS	Moisture, %		NDARD F TEST N in blo Moisture	PENETRA DATA wws/ft @ 25 CTH, tsf X	PL LL 50 Qp	Additional Remarks		
	- 0 -	<u>71 1</u> 7 . 71				12" To	opsoil							0	2	2.0	4.0			
				1	16	Stiff to	Medium S	Stiff to Stiff, Mo Silt, Trace to	oist, Gray Little Grave	el,	lopsoil	3-6-6	14		®×					
1055-			Δ-			Trace	Organics					N=12								
			M	2	15							3-4-3 N=7	22		×					
			X	3	17						CL	2-2-3 N=5	24	Ø	>	<				
1050—	  - 10 -		X	4	11							4-5-6 N=11	21		> ×					
1045—			M	5	16	Stiff to Trace	Very Stiff, Gravel	, Moist, Brown	Lean CLA	AY,		3-5-7	22		• ×					
1040	- 15 -  		∕∖-		Z	7					CL	N=12								
	 - 20 -			6	17							4-6-18 N=24	21			»)				
	in K	tert	e	<.		Pro 555 Cle Tel	fessiona 5 Canal veland, ( ephone:	l Service Ir Road OH 44125 (216) 447-	ndustries 1335	s, Inc.		PF PF LC	ROJE ROJE DCAT	:CT NC :CT: <u> </u> 'ION:	D.: Propose 1 Pau Mas	d Elem Il E Bro sillon, \$	0142-24 School wn Drive Stark Co	28 - Washington e, Southeast punty, Ohio		

DATE	<b>DATE STARTED:</b> 10/1/21						DRILL COMPANY: PSI, Inc.							BORING B-02							
DATE	COM	PLETE	ED:	—		10/1/2		DRILL	ER:	JJ	LOGO	ED BY	': <u>ZO</u>		<u>ب</u>			ling			
COMP	PLETI	ON DE	:PT	н_		15.01	t	DRILL	RIG:		AIV	CME-5			Ite	⊻ v		nnlotion	N/A		
		KK: _			10	N/A 70.ft							em Auger		Š	V C	aved De	npietion	11.5 feet		
		v:	107011				HAMN					atic		BOR			γμη Ι•	11.0 1001			
		E:						EFFIC		L		93%			DOI						
STAT	STATION: N/A OFFSET: N/A						REVIE		Y:		AV										
REMA	RKS:																				
vation (feet)	spth, (feet)	aphic Log	mple Type	ample No.	very (inches)		MATER	rial d	DESCF	RIPTION	N	S Classification	ws per 6-inch (SS)	10 Noisture, %	ST ×	ANDARI TE N in Moistu	D PENET ST DATA blows/ft o re	RATION	Additional Remarks		
Ele	ă	U	ŝ	S	Reco							nsc	SPT Blo	~		STRE Qu	NGTH, ts *	f Qp			
	- 0 -	2022				_ 2" Gr	avel					Base			0		2.0	4.	0		
			X	1	17	Stiff to Gray Silt	o Very Stiff Lean CLAY	to Stiff, with G	Moist, E ravel, Li	Brown to ttle to Soi	me		6-7-9 N=16	13		×ø					
				2	18								4-7-7	14		Ø					
1065—	- 5 -		M										N=14						_		
			Å	3	5							CL	5-6-7 N=13	14							
1060-	- 10 -		X	4	18								10-11-14 N=25	11		×			_		
1055-	  - 15 -		$\mathbf{X}$	5	<u> </u>	<u>_</u>							4-6-8 N=14	13		0					
intertekProfessional Service Industries, Inc. 5555 Canal Road Cleveland, OH 44125 Telephone: (216) 447-1335											PR PR LC	OJE OJE CAT	CT N CT: ION:	0.: Propo 1 P M	sed Ele aul E Bi assillon	0142-2 m Schoo own Dri Stark 0	2428 ol - Washington ve, Southeast County, Ohio				
DATE	STAF	RTED:	_		ç	9/30/21		DRILL	ANY:		PSI, li	nc.			F	BOF	SIV	IG F	3-03		
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	E STARTED:       9/30/21       DRILL COMPANY         E COMPLETED:       9/30/21       DRILLER:       TS         IPLETION DEPTH       20.0 ft       DRILL RIG:          CHMARK:       N/A       DRILLING METHODIC												: <u>ZO</u>		<b>_</b>	$\nabla$ w	/hile [	rillin			NI/A
			:P1	н _		<u>20.0 π</u>									ate	▼ u	non C	omn	letion		N/A
		\r J·			10	82 ft		SAMP	ING ME			2-in	SS		Š	τ c	aved I	Dept	h		18 feet
	UDE:	• _			10	02 11		HAMM	IER TY	PE:		Automa	tic		BOR		CATIC	DN:			
LONG	ITUDI	E:						EFFIC	IENCY			93%									
STAT	ION:	Ν	I/A		OFFS	SET:	N/A	REVIE	WED B	Y:		AV		_							
REMA	RKS:																				
ition (feet)	th, (feet)	phic Log	ple Type	nple No.	ery (inches)		MATEF	RIAL D	ESCF	RIPTIO	N	Classification	s per 6-inch (SS	isture, %	ST	ANDARI TE N in Moistu	D PENE ST DAT blows/f re 25	TRA FA t © I	TION PL LL 50	Addit Rem	ional arks
Eleva	o Dep	Gra	Sam	San	Recove							USCS (	SPT Blows	Moi	0	STRE Qu	 ENGTH, 2.0	, tsf ₩	Qp		
	- 0 -						soil					Topsoil									
1080—				1	17	CLAY v	vith Sand	and Gra	ist, Brov avel	wn Lean			5-5-4 N=9	15							
			M	2	14							CI	8-6-4	12							
	- 5 -												N=10								
1075—			Ň.	3	16								2-3-3 N=6	13	0	×					
	 - 10 -		<u> </u>	4	16	Stiff, M Gravel,	oist, Brow Some Cla	n <b>Sandy</b> ay	y SILT,	Trace		ML	3-4-6 N=10	12							
1070—						Mediun with Gr	n Dense, I avel, Trac	Noist, B e Clay	rown S	ilty SANI	ס										
	 - 15 -			5	11							SM	3-5-6 N=11	13		×					
1065—	 				Ī	Very St Gravel	iff, Moist,	Brown \$	Sandy S	<b>SILT</b> , Tra	ce	ML									
	- 20 -		Ň-	6	12								5-7-12 N=19	17			)				
	in K	tert	e	с.		Prof 5558 Clev Tele	essiona 5 Canal eland, ( phone:	l Servi Road DH 44 (216)	ice Inc 125 447-1	dustries 1335	s, Inc.		PF PF LC	ROJE ROJE DCA1	CT N CT: TON:	O.: Propo 1 P M	sed E aul E assillo	lem Brov on, S	0142-24 School vn Drive tark Co	128 - Washin e, Southe punty, Oh	gton ast o

DATE	STAF	RTED:	_		1	0/4/21		DRILL	COMP	ANY:		PSI, li	nc.				R(	) RII	NG	<b>B-04</b>	
DATE	COM	PLETE	ED:	—		10/4/2	1	DRILLE	ER:	TS		ED BY	: <u> </u>		<u> </u>	$\nabla$	Whil			0-04	NI/A
	PLETIC	ON DE	PT	н _		15.0 <sup>-</sup>	n	DRILL	RIG:	TUOD	AIV	CME-5	5		Itel	Ť			ng		N/A
		KK: _			10	N/A 56.ft				low Ste	em Auger		Š	Ť	Cave	ed Der	hth		12 feet		
					10	50 IL							tic		BOR		004		2011		12 1000
LONG								EFFICI	ENCY	L		93%	10				-007				
STAT	ION:	N	I/A		OFFS	SET:	N/A	REVIEW	NED B	Y:		AV									
REMA	RKS:				-																
Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)		MATE	rial di	ESCR	RIPTION	۷	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	ST × 0	ANDA N Moi: ST	RD P TEST in blov sture 2 RENG	ENETR DATA ws/ft @ 5 5 iTH, tsf %	ATION PL LL 50 Qp	Additio Rema	onal Irks
	- 0 -					2" To	psoil					opsoil									
1055—			$\mathbb{N}$	1	13	Soft, Grave	Moist, Blac el, Some Sl	k/Brown ag, Little	Sandy Cinder	SILT with s	1	Fill	5-2-1 N=3	10	Ø	×					
1050-			M	2	11			Maint D					3-2-2 N=4	16		>	<			-	
			X	3	18	with L	im Dense, .ittle Clay	Moist, Br	own Si	ity SAND			7-7-7 N=14	14							
1045	 - 10 - 		<u> </u>	4	16							SM	6-7-7 N=14	19			×			-	
	  - 15 -		X	5	<u>\</u> 18	Mediu	um Stiff, Mc	oist, Brow	vn Sand	dy SILT		ML	4-3-3 N=6	23	6		×			-	
intertek       Professional Service Industries, Inc.         5555 Canal Road       PROJECT NO.:         Cleveland, OH 44125       Proposed Ele         Telephone:       (216) 447-1335													d Elem E Bro sillon, S	0142-2 1 Schoo wn Driv Stark C	428 I - Washing re, Southea ounty, Ohio	<u>aton</u> ist					



DATE	STAF	RTED:			ç	9/30/21		DRILL CO	OMPANY	′:	PSI	Inc				В	ORI	NG	B-06
	NTE COMPLETED:       9/30/21       DRILLER:       TS       LOGGED BY:       ZO         DMPLETION DEPTH       10.0 ft       DRILL RIG:       ATV CME-55       Image: Complex														ina	N/A			
BENC		RK:	-			N/A	<u> </u>		G METHO	DD:	Hollow S	Stem	Auger	-	ate	Up Up	on Con	pletion	N/A
ELEV		- ۱:			10	80 ft		SAMPLIN	IG METH	IOD:	2-	in S	S		3	📱 Ca	ved De	pth	8 feet
LATIT	UDE:							HAMMER	R TYPE:		Auton	natic	;		BORI	NG LOO	ATION	:	
		E:	1/A		OEEG	ет.	NI/A	EFFICIEN			93%	,							
REMA	RKS:				_0110	<u> </u>			_D D1.		<u>Av</u>								
Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)		MATEF	RIAL DE	SCRIP	TION	USCS Classification		SPT Blows per 6-inch (SS)	Moisture, %	ST/ ×	ANDARD TES N in b Moisture STREM	PENETF T DATA lows/ft @ e 25 J J J GTH, tst %	PL LL 50 Qp	Additional Remarks
	- 0 -					3" Asj	halt over	21" Black	Sand and	d Gravel	I Aspha	alt					2.0		
				1	15	Mediu CLAY	m Stiff to S with Sand	Stiff, Moist, and Grave	Brown L	.ean	Base	9	4-4-2 N=6	10 14	9	×			
1075—			X	2	12								3-8-6 N=14	13					-
			X	3	7 	<u>_</u>							4-5-5 N=10	7	×	0			
1070—	 - 10 -			4	13								3-5-7 N=12	17		© ×			-
						Pro	fessiona	I Service	Indust	tries It			PF		GT N	0.		0142-2	428
	S		e	к.		Pro 555 Cle Tel	veland, ( phone:	Road OH 4412 (216) 44	25 47-133	uies, Ir 5	nc.		PR PR LC	OJE ROJE DCAT	CT: ION:	0.: Propos 1 Pa Ma	ed Eler iul E Bro issillon,	o142-2 n Schoo own Driv Stark C	428 Il - Washington /e, Southeast ounty, Ohio

DATE	STAF	RTED:				0/4/21		DRILL COM	/IPANY: _		PSI, Ir	IC.				BOF	RIN	IG F	3-07	
DATE			ED:	u—		10/4/21	<u> </u>	DRILLER:	TS		SED BY	: <u>ZO</u>		<b>_</b>	$\nabla$	While C	Drillin		5 01	NI/A
			:P1	п _		10.01 N/A							-	ate	Ťι	Jpon C	Comp	9 letion		N/A
ELEV		۰۰۰. ۱:			10	56 ft		SAMPLING			2-in	SS	-	Š	Ī	Caved	Dept	h	8	feet
LATIT	UDE:							HAMMER 1	YPE:	-	Automa	tic		BOR	ING LO	CATIO	ON:			
LONG	ITUD	E:						EFFICIENC	Y		93%									
STAT RFMA	ON:_	N	I/A		OFFS	SET:	N/A	REVIEWED	BY:		AV									
												(Si		ST			FTRA			
Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	(ecovery (inches)		MATEF	RIAL DESO	CRIPTIO	N	JSCS Classification	Blows per 6-inch (9	Moisture, %	× 0	TE N ir Moisti	EST DA <sup>-</sup> blows/f ure 25 ENGTH	TA ft ⊚ ∎ ∎	PL LL 50	Additiona Remarks	al S
												SPT			Qu		Ж	Qp		
	- 0 -	////				_∖ <b>1" To</b> p	soil				Topsoil			0		2.0		4.0		
1055—			X	1	11	Mediu Grave	m Stiff, Mo and Rock	ist, Brown <b>Le</b> Fragments (	e <b>an CLAY</b> w (Clean Fill)	vith		3-2-2 N=4		Ø						
			X	2	12						CL	1-2-3 N=5	14		$\times$					
1050—			X	3	18 <u>\</u>	Stiff, N and R	loist, Brow ock Fragm	rn <b>Lean CLA`</b> ents	<b>Y</b> with Grave	el	CL	5-6-7 N=13								
			X	4	18							3-4-5 N=9	23		 	×				
						Pro	fessiona	I Service I	ndustries			PF						142-24	28	
	S		e	<		555 Cle Tele	veland, ( phone:	Road DH 44125 (216) 447	ridustries 7-1335	s, INC.		PF PF LC	ROJE ROJE DCAT	CT: TON:	<u>Propo</u> <u>1 F</u>	osed E Paul E Aassillo	0 Elem S Brow on, S	School /n Drive tark Cc	- Washingto - Washingto e, Southeast punty, Ohio	<u>n</u> —

DATE	STAF	RTED:			1	0/1/21		DRILL	COMPA	NY:		PSI, I	nc.				BOR	NG	B-08	
DATE	COM	PLET	ED:	—		10/1/2	1	DRILLE	ER:	JJ	LOGG	ED BY	: <u>ZO</u>		<u>د</u>	$\nabla$		ling	<b>D</b> -00	NI/A
COMP	PLETIC	ON DE	PT	н_		15.0	ft		CME-5	.5		Itel	Ť		nng molotior	<b>.</b>	N/A			
		KK: _			10	N/A					HO	low Ste	em Auger		Š	Ť	Caved De	npielioi	I	13 feet
		·			10	02 IL				1HOD. :-			tic		BOR			I•		10 1000
		=:						EFFICI	ENCY		/	93%			DOIN					
STAT	ION:	 N	J/A		OFFS	SET:	N/A	REVIE	WED BY:	:		AV								
REMA	RKS:				_															
Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)		MATE	RIAL D	ESCRI	PTION		USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	ST × 0	ANDA T N Mois STF Qu	RD PENET TEST DATA in blows/ft of sture	RATION	Addit 50 Rem .0	ional arks
	U						avel Stiff Moist	Brown	oan CL /	<b>V</b> with		Base								
1060—			X	1	8	Sand	and Grave	I				CL	4-14-14 N=28	11		×	ø			
	 - 5 -			2	14	Stiff f Sand	o Medium S <b>y SILT</b> , Tra	Stiff, Mois ce to Litt	st, Browr le Grave	n/Gray I			3-4-5 N=9	23		ø	×			
1055—			X	3	16								3-3-3 N=6	25	Ø		×			
			X	4	18							ML	2-2-2 N=4	22	0		×		_	
1050—	  		X	5	<u>7</u> 18	<u></u>							2-2-3 N=5	26	0		×			
	Professional Service Industries, Inc. 5555 Canal Road Cleveland, OH 44125 Telephone: (216) 447-1335												PF PF LC	ROJE ROJE DCAT	CT N CT: ION:	IO.: Prop 1	oosed Ele Paul E Bi Massillon	0142- m Scho rown Dr , Stark (	2428 ol - Washir ive, Southe County, Oh	igton ast io



DATE	STAF	RTED:	_		1	0/4/21		DRILL	COMP	ANY:		PSI, I	nc.				R(		JG F	3-10	
DATE			ED:	—		10/4/2	1		ER:	TS	LOGG	ED BY	: <u> </u>		5	$\nabla$	Whi				NI/A
	PLETI		PT	н _		15.0	ft		RIG:	TUOD	AIV	CME-5			Itel	Ť		n Com	nletion		N/A
		KK: _			10	N/A 56.ft					Holl	ow Ste	em Auger		Na	Ī	Cav	ed Der	th	13	feet
		·			10	50 IL					Δ		tic		BOR					10	1001
		E:						EFFICI	ENCY	L		93%			DOI		2007				
STAT	ION:		I/A		OFFS	SET:	N/A	REVIE	WED B	Y:		AV									
REM/	ARKS:	-			-			-													
Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	ecovery (inches)		MATE	RIAL D	ESCF	RIPTION	J	JSCS Classification	Blows per 6-inch (SS)	Moisture, %	S1 ×	FANDA N Moi	ARD P TEST I in blo isture 2 RENG	ENETR/ DATA ws/ft @ 4 5 5 6TH, tsf	PL LL 50	Additiona Remarks	al S
					L CE							_	SPT			A Qu	ı	Ж	Qp		
	- 0 -	<i></i>				2" To	neoil					onsoil			0		2	.0	4.0		
1055–				1	18	Very with	Stiff to Stiff Gravel and	f, Moist, E Rock Fra	Brown <b>S</b> agments	Sandy SIL	T	Upson	8-11-6 N=17	12		×	0				
1050-			X	2	12							ML	9-8-7 N=15	8	;	× ¢	) 				
			X	3	8								5-5-4 N=9	10							
1045-	 - 10 -			4	11	Medi Grav	um Stiff, Mo el and Shal	oist, Brow e Fragme	vn <b>Lear</b> ents	I CLAY wi	ith		2-3-2 N=5	20			×				
	  - 15 -			5	<u>\</u> 14	<b>7</b>						CL	2-2-2 N=4	12	0	*					
intertek       Professional Service Industries, Inc.         S555 Canal Road       PROJECT NO.:         Cleveland, OH 44125														28 - Washington e, Southeast punty, Ohio							

DATE	STAF	RTED	: _			10/1/21		DRILL COMP		PSI, Ir	IC.			E	ORI	NG E	3-11	
			ED:	u—		10/1/21	+			<u>ZO</u>		<u>ب</u>	⊽ w	hile Drilli	ina	N/A		
		SK.	CPI	п _		10.0 Π N/Δ		o m Auger		ate	Ur Ur	on Com	pletion	N/A				
ELEV	ATIO	N:			10	62 ft		SAMPLING N	IETHOD:	1101	2-in	SS		Š	Ū Ca	ved Dep	oth	7 feet
LATIT	UDE:							HAMMER TY	PE:	A	utoma	tic	_	BOR	NG LOO	CATION:		
		E: _			0550	<b>.</b>	N1/A	EFFICIENCY		9	93%							
REMA	ARKS:	I	N/A		_0663	DEI:	IN/A	REVIEWEDE	ST:		AV							
Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)		MATEF	RIAL DESCI	RIPTION	I	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	ST × 0	ANDARD TES N in t Moistur STREI	PENETR T DATA lows/ft © e 25 VGTH, tsf % 2.0	ATION PL LL 50 Qp 4.0	Additional Remarks
	- 0 -		Š			- 2" Gra	vel loist Brow	n/Black Loan (			Base							
1060—				1	13	Silt, G	ravel and (	Cobbles, Trace	e Slag		Fill	4-7-7 N=14	9		×ø			
	 - 5 -			2	13	Mediu SILT,	m Stiff to S Trace Grav	stiff, Moist, Bro vel, Trace Clay	wn <b>Sandy</b>			4-3-3 N=6	17	6	/ ×			
1055—			X	3	18 <u>7</u>	<b>Z</b>					ML	6-4-4 N=8	23		>	×		
	 - 10 -		X	4	18							3-3-5 N=8	21	(	>	<		
						Pro	fessiona	I Service In	dustries	Inc				CT N	0.		0142.24	28
intertekProfessional Service Industries, Inc.PROJECT NO.:0142-2425555 Canal Road5555 Canal RoadPROJECT:Proposed Elem School -Cleveland, OH 44125Cleveland, OH 447-1335LOCATION:1 Paul E Brown DriveMassillon, Stark CourtMassillon, Stark CourtMassillon, Stark Court												28 - Washington e, Southeast punty, Ohio						

DATE STARTED:       9/30/21       DRILL COMPANY:       PSI, Inc.       BOR         DATE COMPLETED:       9/30/21       DRILLER:       TS       LOGGED BY:       ZO         COMPLETION DEPTH       10.0 ft       DRILL RIG:       ATV CME-55       TV       While D         BENCHMARK:       N/A       DRILLING METHOD:       Hollow Stem Auger       TV       Upon C														ORII	NG F	3-12		
DATE	COM		ED:			9/30/21	<u> </u>	DRILLER:	TS		SED BY	': <u>ZO</u>		<b>_</b>				
			:P1	Η		10.0 T	ι					on Auger		ate	▼ Up	on Com	pletion	N/A
ELEV		l:			10	78 ft		SAMPLING	METHOD:	:	2-ir	ISS	_	ŝ	🗴 Ca	ved Dep	oth	8 feet
LATIT	UDE:							HAMMER T	YPE:		Automa	ntic		BORI	NG LOC	ATION:		
LONG	ITUD	E:						EFFICIENC	Y		93%							
REMA	ION:_ ARKS:	N	I/A		OFFS	SET:	N/A	REVIEWED	) BY:		AV							
feet)	eet)	bo-	ype	No.	iches)						fication	3-inch (SS)	%	ST	ANDARD TES <sup>-</sup> N in bl	PENETR T DATA ows/ft ©	ATION	
Elevation (	Depth, (fe	Graphic I	Sample T	Sample 1	ecovery (ir		MATEF	RIAL DESC	CRIPTIO	N	JSCS Classi	Blows per 6	Moisture,	 ₀	Moisture STREN	e 4 25 GTH. tsf	LL 50	Additional Remarks
					L 52						L	SPT			Qu	*	Qp	
	- 0 -					Loose SAND	to Medium with Grave	n Dense, Moi el	st, Brown <b>\$</b>	Silty				0		2.0	4.0	
1075			X	1	17							3-3-3 N=6	6					
1075-			$\mathbb{N}$	2	13						SM	3-4-5 N=9	5	×0				
			M	3	12						OM	4-4-7	7	×	Q			
1070—					Ī	<b>7</b>						N=11						
	 - 10 -		X	4	17							5-10-15 N=25	6	×		8		
	intertek       Professional Service Industries, Inc.       PROJECT NO.:       0142-2428         5555 Canal Road       PROJECT:       Proposed Elem School - Washington         Cleveland, OH 44125       LOCATION:       1 Paul E Brown Drive, Southeast         Telephone:       (216) 447-1335       Massillon, Stark County, Ohio													28 - Washington e, Southeast ounty, Ohio				

DATE	STAF	RTED:			1	0/4/21		DRILL C	OMPAN	NY:	PSI,	Inc.			E	BOR	ING	B	-13	
DATE COMPLETED:       10/4/21       DRILLER:       JJ       LOGGED BY:       ZO         COMPLETION DEPTH       10.0 ft       DRILL RIG:       Truck D-50       Truck D-50         BENCHMARK:       N/A       DRILLING METHOD:       Hollow Stem Auger       Y       Upon Co         ELEVATION:       1054 ft       SAMPLING METHOD:       2-in SS       Y       Caved D														Illing			N/A			
COMPLETION DEPTH       10.0 ft       DRILL RIG:       Truck D-50       Truck D-50         BENCHMARK:       N/A       DRILLING METHOD:       Hollow Stem Auger       Upon Completion         ELEVATION:       1054 ft       SAMPLING METHOD:       2-in SS       Tube Care Depth         LATITUDE:       HAMMER TYPE:       Automatic       BORING LOCATION:															N/A					
					10	N/A 54 ft				HOD:		em Auger		Ň	τ c	aved D	epth			8 feet
		•			10	J <del>4</del> II		HAMME		······································	Autom	atic		BOR			<b>v</b> .			
LONG		E:						EFFICIE			94%			2010						
STAT	ION:	Ν	J/A		OFFS	ET:	N/A	REVIEW	ED BY:		AV									
REMA	RKS:	-			_							-								
Elevation (feet)	⊐ Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)		MATER	IAL DE	SCRI	PTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	ST × 0 0	ANDARI TE N in Moistu STRE Qu	D PENET ST DATA blows/ft Ire 25 ENGTH, t	RATION	<b>1</b> 50 4.0	Additi Rema	onal irks
	Ũ					- 2" Asp Mediu	n Stiff Moi	st Brown	n Sandy		Aspha	t								
			$\mathbb{N}$	1	14	Gravel		ot, Brown	Culluy		ML	5-3-2 N=5	14	٩	×					
1050—	  - 5 -		<u> </u>	2	16	Mediu Moist,	n Dense to Brown <b>Silt</b>	o Loose to <b>y SAND</b> v	o Mediu with Gra	m Dense, vel	,	12-15-11 N=26	5	×						
			X	3	10 	Z					SM	4-4-5 N=9	11		*					
1045—				4	16							4-4-7 N=11	6	×	0					
						Dro	foosions	Sorrio											2	
			e	с 		Pro 555 Clev Tele	tessional 5 Canal veland, C ephone:	Servic Road )H 441 (216) 4	e Indu 25 47-13	istries, I 35	nc.	P P L	ROJE ROJE OCA1	ECT N ECT: TION:	IO.: Propc P M	osed Ele Paul E B lassillor	0142 m Scho rown D , Stark	2-2428 ool - ` )rive, : Coui	8 Washing Southea nty, Ohio	<u>jton</u> ist 2

DATE STARTED:       10/1/21       DRILL COMPANY:       PSI, Inc.       BORING B-14         DATE COMPLETED:       10/1/21       DRILLER:       JJ       LOGGED BY:       ZO         COMPLETION DEPTH       20.0 ft       DRILL RIG:       ATV CME-55       Vial       While Drilling       Nu         BENCHMARK:       N/A       DRILLING METHOD:       Hollow Stem Auger       V       Upon Completion       Nu																			
DATE COMPLETED:       10/1/21       DRILLER:       JJ       LOGGED BY:       ZO         COMPLETION DEPTH       20.0 ft       DRILL RIG:       ATV CME-55       Image: Completion Completion         BENCHMARK:       N/A       DRILLING METHOD:       Hollow Stem Auger       Image: Completion         ELEVATION:       1062 ft       SAMPLING METHOD:       2-in SS       Image: Completion         LATITUDE:       HAMMER TYPE:       Automatic       BORING LOCATION:														N/A					
BENC	HMAF	RK:				N/A		DRILLING	METHOD:	Ho	llow Ste	em Auger		/ate	_ Upo	on Com	pletion		N/A
ELEV		1:			10	62 ft		SAMPLING	METHOD:		2-ir	n SS		<b>S</b>	📕 Cav	/ed Dep	oth	ç	) feet
	UDE:							HAMMER 1	ГҮРЕ:	ŀ	Automa	atic		BORIN	IG LOC	ATION:			
		L:	1/A		OFES	ст.	Ν/Λ		;Y		93%								
REMA	RKS:		N/A		_0663	<u> </u>		REVIEWED	, ы		<u> </u>								
ation (feet)	oth, (feet)	Iphic Log	nple Type	mple No.	ery (inches)		MATEF	RIAL DES	CRIPTIO	N	Classification	s per 6-inch (SS)	oisture, %	STA	NDARD F TEST N in blo Moisture	PENETR DATA pws/ft @	ATION PL LL 50	Additior Remark	nal ks
Elev	Del	G	Sar	Sa	Recov						nscs	SPT Blow	Ŭ		STREN	GTH, tsf Ж	Qp		
	- 0 -	موتكم				-, <b>2" Gr</b> a	avel				Base	05		0	: 	2.0	4.0		
1060—				1	6	Loose <b>Poori</b> Cobbl	e to Medium <b>y Graded S</b> es	n Dense, Moi <b>AND</b> with Gr	ist, Brown avel and		)	3-4-5 N=9	8	×					
	  - 5 -		X	2	10							7-7-4 N=11	5	× @	5				
1055—			X	3	13							4-7-4 N=11	5						
	 - 10 -		X	4	13	<u>r</u>					SP	7-13-18 N=31	5	×					
1050—																			
1045-	- 15 -		Ň	5	7							15-12-8 N=20	5	×	• •				
C+U			X	6	18							7-9-10 N=19	6	×	©				
	iol K		e	с.		Pro 555 Cle Tel	ofessiona 55 Canal eveland, ( ephone:	I Service I Road OH 44125 (216) 447	Industries 5 7-1335	, Inc.		PF PF LC	ROJE ROJE DCAT	:CT NC :CT: <u> </u> 'ION:	0.: Propose 1 Pau Mas	ed Elem ul E Bro ssillon, s	0142-24 School own Drive Stark Co	28 - Washingto e, Southeas punty, Ohio	<u>on</u> t



DATE	STAF	RTED:			1	0/4/21		DRILL COM	PANY:	PSI,	Inc.			F	BORI	NG F	3-16
DATE	COM		ED:	—		10/4/2	<u>1</u> 	DRILLER:	JJ		<b>Y</b> : <u>ZO</u>		<u> </u>				0.5 feet
			PI	н_		14.01	t	DRILL RIG:		I ruck D-5	0		Ite	VV V		nletion	9.5 IEEL
		κ: _			10	N/A			METHOD:	Hollow St	tem Auger		Na		aved De	nth	12 feet
		e:			10	40 II			VDE:	 Autom	n 55 atic					•	12 1661
	סטב. מוודו:	=						EFFICIENC	V	Autom	allo		DURI		CATION	•	
STAT			1/Δ		OFES	FT	Ν/Δ	REVIEWED	RV·	Δ\/							
REMA	RKS:				_0110		10/7 (		DI	7.0							
											ss)		ST	ANDARD	) PENETF	RATION	
Ŧ					es)					ion	ਿੱ ਦ			TES	ST DATA		
fee	set)	bo-	уре	è	- UC					ficat	0-ine	%		N in I	blows/ft @		
) u	, (fe	lic I	е	le l	y (ir		MATE	RIAL DESC	RIPTION	assi	er (	ure,	×	Moistu	re 🗖		Additional
/atio	pth	aph	<u>d</u> m	dme	ver					Ö	sv	loist	0		25	50	Remarks
Ше	ă	Ģ	Sa	ő	eco					sce	Blov	≥		STRE	NGTH tet	F	
					Ř						Ц			Qu	スロール, 151 米	Qp	
	- 0 -					011 T -				Tanaa	0		0		2.0	4.0	
						Stiff to	p <b>son</b> Medium S	Stiff Moist Br	own Lean								
1045-						CLAY	with Sand	and Gravel	com Louin								
				1	14						701	10					
				I	14						N=12			Ĩ			
			빋														
			X	2	12						5-4-4	13	6	» *			
	-		$/ \Pi$								N=8						
	- 5 -																
1040																	
1040-			$\mathbf{M}$														
			X	3	16					CL	3-4-3	16	¢	$ \times $			
			$\square$								N=7						
			М											$\mathbf{M}$			
			Å	4	15	Z					3-3-8 N=11	14		۹X			
	- 10 -		μη											+		+	
															$\mathbf{X}$		
1035																	
						7										$\setminus$	
					1	_											
						Magl	Drown M	athered CAN	DOTONE		-						
		• • • •	ХН	5	4	vveak	, Brown <b>vv</b>	eathered SAN	IDSTONE	Rock	33-50/5"	4	×			>>©	)
						@ 14	feet; Auge	r Refusal									
	Professional Service Industries, Inc.												CT N	0.:		0142-24	28
						555	55 Canal	Road			PI	ROJE	ECT:	Propos	sed Eler	n School	- Washington
						Cle	veland, (	OH 44125			LC	CAT	FION:	1 Pa	aul E Bro	own Drive	e, Southeast
	Telephone: (216) 447-1335													Ma	assillon,	Stark Co	ounty, Ohio

DATE	STAF	RTED:				10/4/21		DRILL CO	OMPANY:		PSI, I	nc.			F	ROR	ING	R.	.17	
DATE	COM	PLETI	ED:	—		10/4/2	1	DRILLER	t:JJ	LOGO	GED BY	: <u>ZO</u>		•					- 17	N1/A
COMF	PLETI	on de	PT	н_		10.01	t	DRILL RI	G:	Tru	ck D-50	)		Itel	⊻ v	niie Dr	illing molotic			N/A
		κ: _			10	N/A				: <u>Ho</u>	ollow Ste	em Auger		Ma	V C	aved D	enth			IN/A 8 feet
		N:			10	40 II			NG INE I HUL D TVDE:	J:	Z-IN Automa	1 55 utic		BOR			N·			o ieei
		=. <u></u>						FFFICIEN			94%			BOR		CANO	N.			
STAT	ION:	 _ N	J/A		OFFS	SET:	N/A	REVIEW	ED BY:		AV									
REMA	RKS:												_							
Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)		MATEF	RIAL DES	SCRIPTIC	N	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	ST. × 0	ANDARI TE N in Moistu STRE Qu	D PENET ST DAT/ blows/ft re 25 25 SNGTH, 1	RATION ⓐ PL ■ LL :sf ₭ Qp	<b>1</b> 50 4.0	Additio Remar	nal ks
	- 0 -					3" To	psoil	Maint Du	/O		Topsoi									
1045—			X	1	14	CLAY	with Sand	Moist, Bro	bwn/Gray Le	ean		6-6-4 N=10	27		Ø	×				
			X	2	17						CL	3-4-6 N=10	26		©	×				
1040—			X	3	18 	<b>Z</b>						6-7-9 N=16	17		Ø					
	 - 10 -		X	4	18							5-11-13 N=24	14		×					
	intertekProfessional Service Industries5555 Canal RoadCleveland, OH 44125Telephone: (216) 447-1335											PF PF LC	ROJE ROJE DCAT	CT N CT: ION:	<b>O</b> .:	sed Ele aul E B assillor	0142 em Sch srown D n, Stark	2-2428 ool - \ 0rive, Cour	3 Washing Southeas hty, Ohio	ton st

<b>DATE STARTED:</b> 10/4/21						DRILL C	COMPAN	Y:	PS	I, Ir	nc.				R	ORI	NG	<b>R</b> -18			
DATE	COM	PLET	ED:	—		10/4/2	1	DRILLE	R:	IJ L		BY	: <u> </u>		<u>ب</u>	$\nabla$	Wh		ing	<u>D-10</u>	12 foot
COMP	PLETI	ON DE	:PT	н_		15.01	t		RIG:		I ruck D	- <u>50</u>	)		Itel	Ť			Ing		0 foot
		RK: _			10	N/A		DRILLIN		IOD:	Hollow	Ste	em Auger		Na	Ť	Cav		pletion		13 foot
		N:			10	48 II		SAMPLI			Auto	:-in ~~	tio						Jui		10 1661
	טטב. וחוודו:	=						FEEICIE	NCV	·	Auto	lla			DUR	ING	LUC	ATION.			
STAT			J/A		OFES	FT	N/A	REVIEW			<u>۸ بار</u> ۵۱	, ,									
REMA	RKS:													_							
feet)	eet)	bo-	ype	Po	iches)						lication		b-inch (SS)	%	SI	ANE	DARD F TEST N in blo	PENETR DATA ws/ft ©	ATION		
levation (	Depth, (fe	Graphic L	Sample T	Sample N	covery (ir		MATEF	rial de	ESCRIF	PTION	SCS Classif		3lows per 6	Moisture,	• •				PL LL 5	Adc Rei	itional narks
ш 	- 0 -				Re	12" S	and and Gr	avel			ڭ 		SPTE		0		U L L L L L L L L L L L L L L L L L L L	31H, tsf # 2.0	Qp 4.0	)	
											Bas	e									
			$\mathbb{N}$	1	17	Stiff, I Grave	Moist, Black I, Trace Or	k/Gray <b>Sa</b> ganics	indy SILT	<b>r</b> with	Fil		7-7-4 N=11	19		Ø	×				
1045—			M											16			×				
	- 5 -			2	14	Stiff to CLAY	Very Stiff, with Sand,	Moist, Br Trace to	rown/Gra Some G	ay <b>Lean</b> Gravel			3-3-5 N=8	14			<			-	
1040			X	3	16								6-9-8 N=17	13		×					
1040-	 - 10 -		$\mathbb{N}$	4	18	<u>L</u>					CL		7-10-15 N=25	12		*		•		_	
						@ 11	feet; Large	Cobbles													
1035—			M	5	12	<u>/</u>							9-15-12	14			<				
	- 15 -											_	N=27							-	
	in K	tert	e	<	1	Pro 555 Cle Tel	ofessiona 55 Canal eveland, ( ephone:	l Servic Road DH 441 (216) 4	e Indus 125 147-133	stries, I 35	nc.	[	PR PR LO	OJE OJE CA1	CT N CT: TON:	<b>IO</b> .: Pr	opose 1 Pau Mas	d Elen Il E Bro sillon,	0142-2 Schoo Stark C	428 d - Wash ve, South county, O	ington east hio

DATE STARTED: 7/8/22						7/8/22	DRILL COMP	ANY:	PSI,	Inc.			R			3_19
DATE	DATE COMPLETED: 7/8/22				DRILLER:	JJ	LOGGED B	Y: SP						5-15		
COMF	PLETI	on de	PT	н_		20.0 ft	DRILL RIG:		Truck D-8	50		fer	⊻ Wh	le Drilli	ng	N/A
BENC	HMAF	rk: _				N/A	DRILLING ME	ethod: _	Hollow S	tem Auger		<b>Va</b>	Upc	on Com	pletion	N/A
ELEV	ATION	l:			10	61 ft	SAMPLING N	IETHOD:	2-	in SS		>	<u>v</u> Cav	ed Dep	oth	N/A
	UDE:				40.79	2882°	HAMMER TY	PE:	Autom	atic		BORI	NG LOC	ATION:		
	ITUD	=: <u> </u>			-81.4	<u>98219°</u>	EFFICIENCY		94%							
	ION:_	N	I/A			SEI: <u>N/A</u>	REVIEWEDB	ы <b>т</b> :	AV							
										ŝ		ет				
Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATE	RIAL DESCF	RIPTION	USCS Classification	SPT Blows per 6-inch (S	Moisture, %	× 0		DATA DATA Dws/ft © 25 GTH, tsf #		Additional Remarks
	- 0 -					6" Asphalt						0		2.0	4.0	
1060—			X	1	18	FILL: Medium D GRAVEL with Sa Seams, Trace C	eense, Moist, G and, Some Inte inders	ray, <b>Clayey</b> rbedded Si	lt	4-5-6 N=11	14		×		*	
1055-	- 5 -		$\mathbb{N}$	2	17					5-6-5 N=11	15		∮⊯≁	•		LL = 25 PL = 16 Fines=42.2%
1055			X.	3	16	Medium Stiff, Mo Sand, Trace Gra	bist, Brown, <b>Lea</b>	an CLAY wi	CL	3-3-3 N=6	20		\			
	 - 10 -		X	4	17	Medium Dense, Trace Gravel, Tr	Moist, Brown, <b>S</b> ace Clay	Silty SAND,	,	6-9-7 N=16	11					
1050—	  - 15 -		X	5	16	Stiff, Moist, Brow Trace Gravel, Tr	vn, <b>Lean CLAY</b> ace Interbedde	<b>with Sand</b> , d Silt Searr	, ns	4-6-6 N=12	12		Ø	*		
1045—	  - 20 -			6	16				CL	6-7-7 N=14	12		×		>>*	÷
	in K	cert	e	<		Professiona 5555 Canal Cleveland, Telephone:	I Service Ind Road OH 44125 (216) 447-1	dustries, 1335	Inc.	PI PI L(	ROJE ROJE DCA1	CT N CT: TON:	O.:	v East S Paul E. ssillon, S	0142-25 Side PK Brown I Stark Co	590 -3 School Drive, SE Dunty, Ohio

DATE	<b>DATE STARTED:</b> 7/8/22					DRILL C	OMPA	NY:		PSI, li	nc.				RΟ	RIN	JG F	3-20		
DATE	DATE COMPLETED: 7/8/22			DRILLEF	R:	JJ		ED BY	: <u>SP</u>		<u>ب</u>	$\nabla$ 1	Albila	Deillin						
COM	PLETI	ON DE	PTH			20.0	ft	DRILL R			Truc	ck D-50	)		tel	⊥ ▼ \	vnie	Drillin	ng Nation	N/A
		<b></b>			10	N/A					Hol	low Ste	em Auger		Na	T C	Jhou		th	N/A 14.0 feet
		N:			10 70	01 Π 2622°						Z-IN	<u>55</u> tic						ui	14.0 1001
	וסטב. אדווחו	F.			-81 4	2022 19823°		FEFICIE		E	F	94%			DUK		JCAI	ION.		
STAT		L	/A		OFFS	SFT:	N/A	REVIEW	FD BY			AV								
REM/	ARKS:				_ 0.1 0					·										
Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)		MATEF	RIAL DE	SCR	IPTION	N	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	ST ×	ANDAF Tł N ir Moist	RD PEN EST D/ h blows ure 25 ENGTI	NETRA ATA s/ft © I H, tsf X	ATION PL LL 50 Qp	Additional Remarks
	- 0 -					6" As	phalt										2.0		4.0	
1060-			X	1	17	<ul> <li>2" Sa</li> <li>Mediu</li> <li>Sand</li> </ul>	nd/Gravel I Im Stiff, Mc Trace Gra	<b>3ase</b> iist, Brown vel	n, Lear	CLAY w	vith	CL	3-4-4 N=8	14	0				*	ž
			$\mathbb{X}$	2	15	Mediu Trace	ım Dense, Gravel, Tra	Moist, Tar ace Clay	n, <b>Silty</b>	SAND,		SM	8-9-5 N=14	8	>	<				
1055—			$\mathbb{X}$	3	18	Stiff, I Trace	Moist, Brow Gravel	n, Lean C	LAY,	Trace Sa	ind,	CL	2-4-6 N=10	24		0	×		*	Ŕ
1050-	- 10 -		X	4	17	Sun u Sand Interb	y Lean CLA edded Silt	Moist, Re I <b>Y</b> , Trace ( Seams	Gravel	, Trace			5-6-7 N=13	13		× ×	*			
1045-	  - 15 - 		X	5	18	<u>_</u>						CL	6-6-8 N=14	12		ש	*			
	 - 20 -			6	18				- 1 - 1				5-7-9 N=16	10		× ©	*			
			ek			Pro 559 Cle Tel	oressiona 55 Canal eveland, ( ephone:	Road OH 441 (216) 4	e Ind 25 47-1:	ustries, 335	, INC.		PF PF LC	ROJE ROJE DCAT	CT N CT: TON:	IO.:I	<u>New E</u> 1 Pa ⁄lassil	East S Iul E. Ilon, S	0142-25 Side PK- Brown [ Stark Cc	990 -3 School Drive, SE punty, Ohio

<b>DATE STARTED:</b> 7/8/22						DRILL COM	PANY:		PSI, li	nc.			B	ORI	NG	B-21		
DATE	COM	PLET	ED:	—		7/8/22		DRILLER:	JJ		ED BY	: <u>SP</u>		<u>ب</u>			ing	
COMP	PLETI	ON DE	PT	н_		20.0 ft		DRILL RIG:		Truc	<u>ck D-50</u>	)		lter	⊻ vvr ▼ un		Ing	N/A
		κκ: _ 			10	N/A 61.ft				HOI	low Ste	em Auger		Š	⊥ Op √ Ca	ved De	nth	12.5 feet
	UDE:	·			40.79	)224°		HAMMER T	YPE:	A	Lutoma	itic	_	BOR				12.0 1000
LONG		E:			-81.4	98163°		EFFICIENC	Y		94%			2010				
STAT	ION:	Ν	J/A		OFFS	ET: N/A	\	REVIEWED	BY:		AV							
REMA	RKS:				_													
Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MA	TEF	RIAL DESC	RIPTION	N	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	ST × 0	ANDARD TES N in bl Moisture STREN Qu	PENETR T DATA ows/ft @ 25 	PL LL 50 Qp 4.0	Additional Remarks
	- 0 -	////				1" Asphalt	Brow			/								
1060—			X	1	17	Trace Grave	el	n, Lean CLA	r, frace Sa	ina,	CL	4-4-5 N=9	19				*	
1055	- 5 -			2	13	Medium Stif CLAY, Trace	f, Mo e Gra	iist, Brown, <b>Sa</b> avel	andy Lean		CL	3-3-2 N=5	13		$\times$	*		
1055				3	9	Medium Der with Gravel	nse, I , Trac	Moist, Brown, ce Clay	Silty SAN	כ		7-9-10 N=19	5	×				Non-Plastic Fines=14.0%
1050—	 - 10 - 		<u> </u>	4	15						SM	3-6-8 N=14	8		< 6			
1045-	  - 15 - 			5	<u>\</u> 18	Stiff, Moist, Trace Grave Medium Der Trace Grave	Brow el, Tra nse, I el, Tra	m, <b>Sandy Lea</b> ace Interbedd Moist, Brown, ace Clay	n CLAY, ed Silt Sea Silty SANI	ms D,	CL	5-7-7 N=14	12		ש		>>>	€
	  - 20 -		X	6	18						SM	4-6-10 N=16	10		ש			
	IntertekProfessional Service Industries, Inc. 5555 Canal Road Cleveland, OH 44125 Telephone: (216) 447-1335PROJECT NO.: PROJECT: LOCATION:0142-2590 New East Side PK-3 School LOCATION:Image: Professional Service Industries, Inc. PROJECT: DescriptionNew East Side PK-3 School 1 Paul E. Brown Drive, SE Massillon, Stark County, Ohio																	

DATE STARTED: 7/8/22						DRILL COM	PANY:	F	PSI, Ir	nc.			BC	RIN	GE	3-22			
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				п –		10.0 N/Δ	<u>n</u>			Hollo	W Ste	m Auger	_	ate	Upor		etion		N/A
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1045	_					Mediu	um Stiff to S	tiff, Moist, Bro	own, <b>Lean</b>										
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Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	M	IATER	RIAL DES	CRIPTIO	N	USCS Classification	SPT Blows per 6-inch (SS	Moisture, %	ST. ~ 0	ANDARD   TES <sup>-</sup> N in bl Moisture	PENETR/ DATA pws/ft @ 25 GTH, tsf # 2.0	PL LL 50 Qp 4.0	Additional Remarks
				1	6	4 Gravel Medium E Trace Gra Interbedd	Dense, N avel, Tra ed Clay	/loist, Browi ice Rock Fr Seams	n, <b>Sandy Sli</b> agments, Ti	LT, race		5-8-9 N=17	8	>	< @			
1050—			<u> </u>	2	14	T					ML	8-8-11 N=19	7	×				
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	intertekProfessional Service Industries, Inc5555 Canal Road5555 Canal RoadCleveland, OH 44125Cleveland, OH 44125Telephone: (216) 447-1335								s, Inc.		PR PR LO	OJE OJE CAT	CT N CT: ION:	0.:	<u>w East S</u> Paul E. ssillon, S	0142-25 Side PK- Brown [ Stark Co	90 -3 School Drive, SE punty, Ohio	







### **GENERAL NOTES**

#### SAMPLE IDENTIFICATION

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

#### DRILLING AND SAMPLING SYMBOLS

- SFA: Solid Flight Auger typically 4" diameter flights, except where noted.
- HSA: Hollow Stem Auger typically 3<sup>1</sup>/<sub>4</sub>" or 4<sup>1</sup>/<sub>4</sub> I.D. openings, except where noted.
- M.R.: Mud Rotary Uses a rotary head with Bentonite or Polymer Slurry CP
- R.C.: Diamond Bit Core Sampler
- H.A.: Hand Auger
- P.A.: Power Auger Handheld motorized auger

#### SOIL PROPERTY SYMBOLS

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

#### RELATIVE DENSITY OF COARSE-GRAINED SOILS ANGULARITY OF COARSE-GRAINED PARTICLES

Relative Density	N - Blows/foot	<b>Description</b>	Criteria
Very Loose	0 - 4	Angular:	Particles have sharp edges and relatively plane sides with unpolished surfaces
Loose Medium Dense	4 - 10 10 - 30	Subangular:	Particles are similar to angular description, but have rounded edges
Dense Very Dense	30 - 50 50 - 80	Subrounded:	Particles have nearly plane sides, but have
Extremely Dense	80+	Rounded:	Particles have smoothly curved sides and no edges

#### **GRAIN-SIZE TERMINOLOGY**

Component	Size Range	Description
Boulders:	Over 300 mm (>12 in.)	Flat: P
Cobbles:	75 mm to 300 mm (3 in. to 12 in.)	Elongated: P
Coarse-Grained Gravel:	19 mm to 75 mm (¾ in. to 3 in.)	Flat & Elongated: P
Fine-Grained Gravel:	4.75 mm to 19 mm (No.4 to ¾ in.)	e
Coarse-Grained Sand:	2 mm to 4.75 mm (No.10 to No.4)	
Medium-Grained Sand:	0.42 mm to 2 mm (No.40 to No.10)	RELATIVE PR
Fine-Grained Sand:	0.075 mm to 0.42 mm (No. 200 to No.4	Descriptive
Silt:	0.00Gmm to 0.075 mm	
Clay:	_<0.00G{{ÁţÁ⊾€È€€ÍmmÁå^]^}åð}*Á;	}Áse≛^}&î

### PARTICLE SHAPE

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

#### RELATIVE PROPORTIONS OF FINES

escriptive Term	% Dry Weigh
Trace:	< 5%
With:	5% to 12%
Modifier:	>12%

SS: Split-Spoon - 1 3/8" I.D., 2" O.D., except where noted.ST: Shelby Tube - 3" O.D., except where noted.

- BS: Bulk Sample
- PM: Pressuremeter
- CPT-U: Cone Penetrometer Testing with Pore-Pressure Readings

Page 1 of 2



# GENERAL NOTES

#### **CONSISTENCY OF FINE-GRAINED SOILS**

<u>N - Blows/foot</u>	<u>Consistency</u>
0 - 2	Very Soft
2 - 4	Soft
4 - 8	Firm (Medium Stiff)
8 - 15	Stiff
15 - 30	Very Stiff
30 - 50	Hard
50+	Very Hard
	<u>N - Blows/foot</u> 0 - 2 2 - 4 4 - 8 8 - 15 15 - 30 30 - 50 50+

#### **MOISTURE CONDITION DESCRIPTION**

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

#### **RELATIVE PROPORTIONS OF SAND AND GRAVEL**

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

#### STRUCTURE DESCRIPTION

<b>Description</b>	Criteria	<b>Description</b>	Criteria
Stratified:	Alternating layers of varying material or color with layers at least 1/4-inch (6 mm) thick	Blocky:	Cohesive soil that can be broken down into small angular lumps which resist further breakdown
Laminated:	Alternating layers of varying material or color with layers less than 1/4-inch (6 mm) thick	Lensed: Layer:	Inclusion of small pockets of different soils Inclusion greater than 3 inches thick (75 mm)
Fissured:	Breaks along definite planes of fracture with little resistance to fracturing	Seam:	Inclusion 1/8-inch to 3 inches (3 to 75 mm) thick extending through the sample
Slickensided:	Fracture planes appear polished or glossy, sometimes striated	Parting:	Inclusion less than 1/8-inch (3 mm) thick
SCALE OF RELATIVE ROCK HARDNESS ROCK BEDDING T			BEDDING THICKNESSES

#### <u>Q<sub>U</sub> - TSF</u> <u>Consistency</u> 25-10 Extremely Soft

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

#### **ROCK VOIDS**

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

#### **ROCK QUALITY DESCRIPTION**

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

### ROCK BEDDING THICKNESSES

<b>Description</b>	Criteria
Very Thick Bedded	Greater than 3-foot (>1.0 m)
Thick Bedded	1-foot to 3-foot (0.3 m to 1.0 m)
Medium Bedded	4-inch to 1-foot (0.1 m to 0.3 m)
Thin Bedded	1¼-inch to 4-inch (30 mm to 100 mm)
Very Thin Bedded	<sup>1</sup> / <sub>2</sub> -inch to 1 <sup>1</sup> / <sub>4</sub> -inch (10 mm to 30 mm)
Thickly Laminated	1/8-inch to 1/2-inch (3 mm to 10 mm)
Thinly Laminated	1/8-inch or less "paper thin" (<3 mm)

#### **GRAIN-SIZED TERMINOLOGY**

(Typically Sedi	mentary Rock) Size Bange
oomponent	OIZC Mange
Very Coarse Grained	>4.76 mm
Coarse Grained	2.0 mm - 4.76 mm
Medium Grained	0.42 mm - 2.0 mm
Fine Grained	0.075 mm - 0.42 mm
Very Fine Grained	<0.075 mm

#### **DEGREE OF WEATHERING**

	Slightly Weathered:	Rock generally fresh, joints stained and discoloration extends into rock up to 25 mm (1 in), open joints may contain clay, core rings under hammer impact.
5	Weathered:	Rock mass is decomposed 50% or less, significant portions of the rock show discoloration and weathering effects, cores cannot be broken by hand or scraped by knife.
	Highly Weathered:	Rock mass is more than 50% decomposed, complete discoloration of rock fabric, core may be extremely broken and gives clunk sound when struck by hammer, may be shaved with a knife.

## SOIL CLASSIFICATION CHART

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

MAJOR DIVISIONS			SYMBOLS		TYPICAL
			GRAPH	LETTER	DESCRIPTIONS
	GRAVEL AND	CLEAN GRAVELS		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
	GRAVELLY SOILS	(LITTLE OR NO FINES)		GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
COARSE GRAINED SOILS	MORE THAN 50% OF COARSE	GRAVELS WITH FINES		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
	RETAINED ON NO. 4 SIEVE	(APPRECIABLE AMOUNT OF FINES)		GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% OF MATERIAL IS	SAND AND	CLEAN SANDS		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
LARGER THAN NO. 200 SIEVE SIZE	SANDY SOILS	(LITTLE OR NO FINES)		SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	SANDS WITH FINES		SM	SILTY SANDS, SAND - SILT MIXTURES
		(APPRECIABLE AMOUNT OF FINES)		SC	CLAYEY SANDS, SAND - CLAY MIXTURES
				ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
30123				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE		LIQUID LIMIT GREATER THAN 50		МН	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
	SILTS AND CLAYS			СН	INORGANIC CLAYS OF HIGH PLASTICITY
				ОН	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

