GEOTECHNICAL EXPLORATION REPORT
PROPOSED PUMP STATION AND ROADWAY
WINCHESTER INDUSTRIAL PARK
WINCHESTER, ADAMS COUNTY, OHIO
ATLAS FILE NUMBER: 241GC00430

Prepared for: Adams County Community Improvement Corp
245 North Cross Street
West Union, Ohio 45693
Attn: Ms. Holly Johnson

Prepared By: Atlas Technical Consultants, LLC
11121 Canal Road
Cincinnati, Ohio 45241-1861

September 13, 2021

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September 13, 2021

Ms. Holly Johnson
Adams County Economic Development Director
Adams County Community Improvement Corp
215 North Cross Street
West Union, Ohio 45693

Re: Geotechnical Exploration Report
Proposed Pump Station and Roadway
Winchester Industrial Park
Dorsey Road
Winchester, Adams County, Ohio
Atlas File Number: 241GC00430

Gentlemen:

In compliance with your recent request, Atlas Technical Consultants, LLC (Atlas) has completed a subsurface exploration and evaluation for the above referenced project. It is our pleasure to transmit herewith this report of the result of this exploration.

This work was performed in general accordance with Atlas' Proposal No. 21-12617, dated August 13, 2021, and was authorized via written notification on August 17, 2021 from Mr. Brett Blevins, P.E., with CT Consultants on behalf of the client. If you have any questions regarding the report, please contact this office.

Sincerely,

Atlas Technical Consultants, LLC

STATE OF OHIO
ALEXANDER S. HAM
E-73527
REGISTERED PROFESSIONAL ENGINEER

Alexander S. Ham, P.E.
Project Geotechnical Engineer

John A. Kerr, P.E.
Principal Geotechnical Engineer

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GEOTECHNICAL EXPLORATION REPORT

PROPOSED PUMP STATION AND ROADWAY
WINCHESTER INDUSTRIAL PARK
WINCHESTER, ADAMS COUNTY, OHIO
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1.0 INTRODUCTION

This report presents the results of a geotechnical exploration and subsurface condition evaluation for the proposed pump station and roadway to be constructed as part of the Winchester Industrial Park to be located off of Dorsey Road in Winchester, Adams County, Ohio. The exploration was performed in general accordance with Atlas' Proposal No. 21-12617, dated August 13, 2021, and was authorized via written notification on August 17, 2021 from Mr. Brett Blevins, P.E., with CT Consultants on behalf of the client.

The purpose of the exploration was to identify the subsurface profile at the site, to evaluate the suitability of the materials for support of the proposed structure, and to develop recommendations relative to the design and construction of the pump station and roadway, as outlined in the report. Comments and recommendations regarding earthwork, site preparation, and foundation construction have also been developed.

The scope of the exploration included a review of available geologic and subsurface data for the project area, completion of four (4) test borings, field and laboratory testing of recovered samples, and an engineering analysis and evaluation of the subsurface conditions encountered at the site.

2.0 PROJECT AND SITE CHARACTERISTICS

The proposed site is generally located on the south side of Dorsey Road in Winchester, Ohio, at the site of the future Winchester Industrial Park. The pump station will be located across from 1100 Dorsey Road, and the proposed roadway will be located near the intersection of Dorsey Road and Edminsten Lane. The site areas are generally flat with less than approximately 5 feet of elevation difference across them, with the pump station area mainly agricultural in use and the roadway area mainly grass-covered with some areas of brush and small trees.

We presume that the proposed pump station will be a small-diameter, precast concrete structure, bearing at a depth less than approximately 20 feet below the existing ground surface. We understand the roadway will be a heavy-duty asphalt pavement for the future industrial park, approximately 1,500 feet long.

The Test Boring Location Plan, included in the Appendix, shows the locations of some of the existing and proposed site features, and the approximate locations of the borings completed for this study. If any of the information provided or Atlas' assumptions are misrepresented and/or incorrect, please contact Atlas so that we may review our recommendations.

3.0 GENERAL SUBSURFACE CONDITIONS

Four (4) test borings were completed for the proposed project on August 24, 2021. Subsurface material samples were recovered and returned to Atlas' Cincinnati, Ohio laboratory for analysis, testing and evaluation. Samples were classified by Atlas' engineering staff by visual/manual methods, and boring logs were prepared.

It should be noted that stratification lines shown on the soil boring logs represent approximate transitions between material types. In-situ strata changes could occur at slightly different levels, and/or may transition more gradually. It should also be noted that the boring logs depict conditions at the particular locations and times indicated on the logs. Some conditions, particularly groundwater levels can change with time. Variations may be present between boring positions. The generalized subsurface and groundwater conditions for each boring are described in detail on the test boring logs located in the Appendix of this report.

3.1 Geology

Review of available geologic information indicates the natural site soils as being glacially-deposited till of Illinoian- age. The Ohio Department of Natural Resources (ODNR) Bedrock Topography of the Winchester, Ohio 7.5-Minute Quadrangle, dated 1993, indicates bedrock in the area of the pump station to be shale, dolomite, and limestone associated with the Drakes Formation of the Ordovician geologic age, and the bedrock in the area of the roadway to be limestone and shale associated with the Dayton and Brassfield Formations Undivided of the Silurian geologic age.

3.2 Subsurface Profile

At the ground surface, the borings encountered approximately 4 to 12 inches of topsoil. Beneath the surficial materials, the borings generally encountered brown-gray and brown and gray lean to fat clay (CL to CH, as per the Unified Soil Classification System, USCS) with varying amounts of silt, sand, and organics to depths ranging from approximately 6 to 8 feet below the existing ground surface. Standard Penetration Test (SPT) N-values in the material ranged from 2 to 46 blows per foot (bpf), indicating very soft to hard consistencies for cohesive soils, but most generally exhibited medium stiff to stiff consistencies. Two Atterberg Limit tests were performed on samples from this stratum (Boring 1, Sample 1, 1.0 to 2.5 feet; Boring 3, Sample 2, 3.5 to 5.0 feet), returning Liquid Limits (LL) of 30 and 51, Plastic Limits (PL) of 20 and 19, and Plasticity Indicies (PI) of 10 and 32, respectively, resulting in CL (lean clay) and CH (fat clay) soil classifications, based on USCS.

Beneath the upper cohesive material, the borings generally encountered brown, gray, brown-gray, and gray-brown silty clay (CL, as per USCS) with varying amounts of sand, gravel, and limestone fragments to depths ranging from approximately 9 to 28 feet below the existing ground surface. This material is generally believed to represent glacially-deposited till. SPT N-values in this material ranged from 16 bpf to split-spoon sampler refusal (greater than 50 blows over 6 inches), indicating very stiff to hard consistencies for cohesive soils. One Atterberg Limit test was performed on a sample from this stratum (Boring 4, Sample 8, 18.5 to 20.0 feet), returning a Liquid Limit (LL) of 26, Plastic Limit

(PL) of 15, and Plasticity Index (PI) of 11, resulting in a CL (lean clay) soil classification, based on USCS. Borings 2 and 3 were terminated in this material at a depth of approximately 15 feet below the existing ground surface. Boring 1 was terminated in this material at a depth of approximately 9 feet below the existing ground surface due to auger refusal.

Beneath the glacial till material, Boring 4 then encountered bedrock material consisting of red-brown completely-weathered shale at a depth of approximately 28 feet below the existing ground surface. Boring 4 was terminated in the material at a depth of approximately 28.8 feet below the existing ground surface due to split-spoon sampler refusal.

The generalized subsurface and groundwater conditions for each boring completed for this investigation are described in detail on the test boring logs presented in the Appendix of this report.

3.3 Groundwater Conditions

Groundwater level observations were made both during and at the completion of drilling operations. Groundwater was observed upon completion of drilling in Boring 4 at a depth of approximately 23 feet below the existing ground surface. Boring cave-in depths were observed to vary from 9 to 26.5 feet upon withdrawal of the augers. It should be noted that the observed groundwater levels may fluctuate in response to short-term and seasonal variations in precipitation, surface runoff, and that local pockets of groundwater may be present at shallower depths in the profile during wetter periods, specifically in the granular layer of material encountered in the borings.

4.0 GEOTECHNICAL CONCLUSIONS AND RECOMMENDATIONS

Based upon our analysis of the soil conditions and our understanding of the preliminary design details for this project as previously outlined, the following conclusions have been reached, and the following recommendations developed. If the project characteristics are changed from those assumed herein, or if different subsurface conditions are encountered, Atlas should be notified so that our recommendations can be reviewed and any necessary modifications provided.

4.1 Pump Station Support

As stated above, while no specific details for the pump station have been provided, it is presumed that it will be a small-diameter, precast concrete structure, bearing on a mat foundation at a depth less than approximately 20 feet below the existing ground surface. Stiff to hard glacial till will be present at that depth, based on Boring 4. This material should offer sufficient support for the proposed structure, particularly considering the weight compensation from the removal of the excavated soil in comparison to the expected weight of the structure.

4.2 Pump Station Excavation

Conventional hydraulic excavators should be able to excavate the overburden soils encountered in the area of the proposed pump station. Groundwater was observed in Boring 4 upon completion at a depth of approximately 23 feet below the existing ground surface; however, the soil coloration indicates the long-term groundwater level may be on the order of approximately 13 feet below the existing ground surface. As previously stated, we presume the pump station will bear no deeper than 20 feet below the existing ground surface. Therefore, depending upon the seasonal and the recent precipitation amounts, some groundwater may be encountered when excavating for the project. It is our opinion that if seepage is encountered, it should be able to be controlled with sump pumps placed in the excavation, as the groundwater would like originate from granular seams of limited extent that can occur within the low-permeability clayey glacial till.

All temporary excavations for utilities or other structures should be shored and/or sloped in accordance with Occupational Safety and Health Administration (OSHA) requirements, and stabilized as necessary. It is our opinion that the cohesive materials encountered in the upper approximate 6 feet in Boring 4 should be considered OSHA

Type "B" material, requiring excavation sideslopes to be 1 horizontal to 1 vertical (1H:1V) or flatter, and/or braced as necessary. We believe that the stiff to hard glacial till material can be considered an OSHA Type "A" soil, allowing open trench side slopes laid back at 0.75H:1V or flatter, and/or suitably braced. A 'competent person' as defined by OSHA should evaluate the actual excavation conditions during construction and modify trench stabilization measures as appropriate.

4.3 Pavement Recommendations

In order for a pavement to perform satisfactorily, the subgrade materials must have sufficient strength and stability to avoid deterioration from construction traffic and to support paving equipment. In addition, the completed pavement sections must resist freeze/thaw cycles and wheel loads from the intended traffic. The pavement subgrade area should be prepared in accordance with the recommendations of Section 5.0 and its subsections, with particular attention being paid to the proofrolling requirements. Areas showing deflection or yielding under the proofroll loads should be stabilized by undercutting and replacement with granular backfill, stabilized backfill, or coarse aggregate and geogrid as recommended by the geotechnical engineer.

For successful long-term pavement performance, both the subgrade and the pavement surface should have a minimum slope of one-quarter inch per foot to promote surface drainage and allow removal of water trapped in the aggregate base course. The aggregate base course of the pavement should be provided with a means of water outlet by extending the aggregate base course through to daylight at the pavement edge, to an underdrain system and/or to weeps or finger drains at surface drainage structures such as storm inlets as appropriate to the final grading plan.

The following traffic volume information was provided to us by CT Consultants:

- Passenger car vehicles: 5,500 round trips/day
- Semi-truck: 855 round trips/day
- 20 year design life

Using the ODOT Pavement Design Manual and assuming an assumed California Bearing Ration (CBR) of 3.0, the following minimum section is recommended for heavy-duty asphalt pavement:

- 1 inch of ODOT 448 Surface Course Type I
- 2 inches of ODOT 448 Intermedia Course Type II
- 8 inches of ODOT 301 Base Course
- 12 inches of ODOT 304 Aggregate Base

4.4 Drainage

Adequate surface water drainage should be provided at the site to minimize the potential for moisture content changes within the foundation and subgrade soils. The ground surface should be sloped away from the building to prevent ponding of water adjacent to the building. Site drainage should also be arranged so that runoff onto adjacent properties is properly controlled. Positive drainage of the site should also be maintained throughout the construction period.

5.0 RECOMMENDED EARTHWORK PROCEDURES

Variations in subsurface conditions could occur at this site, particularly since the site has been previously developed. It is recommended that the geotechnical engineer be retained by the owner to provide ongoing review of the phases of the project related to subsurface conditions and to correlate the test boring data with the subsurface conditions that are encountered during construction.

5.1 Site Preparation

It is essential to the adequate performance of the proposed structure that the site is prepared properly to provide relatively uniform subgrade support for the proposed structure and pavement. This includes the removal of any old utilities, existing foundations and basement substructures, and asphalt/concrete pavements during site excavations. Abandoned utility pipes should be removed or plugged, so they will not serve as conduits for subsurface erosion which could result in the formation of voids or depressions, with adverse effects on foundations and floor slabs. It should be noted that depending on the weather conditions and the condition of the soil during construction, some of the natural soils may require moisture conditioning either in the form of adding water or drying of the soils, either prior to or during filling operations, or in the preparation of the final subgrade surface.

It is recommended that after stripping and undercutting, the subgrade be monitored by means of a proofroll test using suitable equipment such as a fully loaded tandem axle dump truck. Any areas showing excessive deflection or substantial yielding under the proofroll loads should be removed and replaced, aerated, moisture conditioned, and recompacted, or otherwise stabilized as directed by the geotechnical engineer prior to placing any new fill, foundations, and/or floor slabs.

In addition, care to protect subgrade surfaces should be exercised during the grading operations at the site. The traffic of construction equipment may create pumping and general deterioration of the shallower soils, especially if excess surface water is present. It is important that positive surface drainage be established at the beginning of the earthwork operations and be maintained throughout the project. Surface water must not be allowed to pond. Furthermore, compaction and sealing of the subgrade surface is important when precipitation is expected. The site storm drainage elements (i.e., catch basins, pipes, manholes, etc.) and any connecting weeps or finger drains should be installed as early in the construction sequence as possible, which will aid in control of surface and ground water.

5.2 Fill Placement

Once the site has been stripped and proofrolled, fill may be placed as necessary to develop desired final grades. In general, any non-organic naturally occurring soil with a Liquid Limit (LL) less than approximately 50 percent and Plasticity Index (PI) less than approximately 25 can be used for structural fill. The fill should be free of rock fragments with dimensions greater than 3 inches. If fill construction takes place during the winter months, care should be taken so as not to place fill over frozen soil, and to exclude all frozen materials from fills being placed.

The fill should be placed in lifts of uniform thickness. The fill in the basement area should be blended into the medium stiff or better natural soils in level benches. In general, 8-inch loose lifts for cohesive soils and 12-inch loose lifts for granular soils should be suitable. Granular fill will require vibratory compaction equipment. It is recommended that structural fills supporting footings, floor slabs, pavements and other structures be compacted to a minimum of 98 percent of the maximum dry density as determined in accordance with ASTM standard method D 698. For proper and timely construction of the fills, the soils should be placed at or near the optimum moisture content as determined in accordance with ASTM D 698. Once identified, the proposed fill material should be evaluated by Atlas prior to use for recommendations regarding moisture content parameters during placement. Suitable equipment for either aerating of wet materials or adding water to dry materials should be available during earthwork operations.

6.0 PLAN REVIEW AND CONSTRUCTION MONITORING

It is recommended that Atlas be retained to review final project plans and specifications, and to perform continuous monitoring of the geotechnical and earthwork phases of the project. If Atlas is not retained for these purposes, we can assume no responsibility for compliance of the work with the design concepts, specifications, or for modifications or recommendations made during construction. As part of this review, site clearing and stripping, undercutting, fill placement and foundation excavation operations should be monitored and in-place density tests should be performed on fill and backfill as frequently as necessary to allow evaluation of the fill with respect to project earthwork specifications.

7.0 FIELD AND LABORATORY INVESTIGATIONS

7.1 Field Exploration

The field exploration included the performance of four (4) soil test borings located approximately as shown on the enclosed Boring Location Plan. Test borings were performed with a truck-mounted drilling rig equipped with a rotary head. Conventional hollow-stem augers were used to advance the holes. Samples of the in-situ soils were obtained employing split-barrel sampling procedures in general accordance with ASTM Standard Method D-1586. Observations regarding groundwater levels, and other pertinent conditions were made at each boring location.

The encountered materials have been visually classified by the Atlas' engineering staff, and are described in detail on the boring logs. The results of the field penetration tests, strength tests, Atterberg Limit tests, water level observations and laboratory moisture content determinations are presented on the boring logs in numerical form. Samples of the soils encountered in the field were placed in sealed sample jars and are stored in the laboratory for further analysis, if desired. Unless notified to the contrary, all samples will be disposed of in thirty (30) days from the date of this report.

7.2 Laboratory Testing Program

In conjunction with the field exploration, a laboratory testing program was conducted to determine pertinent engineering characteristics of the subsurface materials as necessary for development of engineering recommendations. The laboratory-testing program included visual classification of all samples. Natural moisture content, Pocket Penetrometer, and Atterberg Limit tests were conducted on selected soil samples. All phases of the laboratory-testing program were conducted in general accordance with applicable ASTM specifications and procedures.

8.0 LIMITATIONS OF STUDY

8.1 Differing Conditions

Recommendations for this project were developed utilizing soil information obtained from the test borings that were completed at the proposed site. These borings indicate subsurface soil and groundwater conditions at the specific locations and time at which the borings were conducted. Conditions at other locations on the site may differ from those occurring at the boring positions. If deviations from the noted subsurface conditions are encountered during construction, they should be brought to the immediate attention of the geotechnical engineer so that recommendations can be reviewed and revised as required.

8.2 Changes in Plans

The conclusions and recommendations herein have been based upon the available soil information and the preliminary design details furnished by a representative of the owner of the proposed project and/or as assumed herein. Any revision in the plans for the proposed construction from those anticipated in this report should be brought to the attention of the geotechnical engineer to determine whether any changes in the foundation or earthwork recommendations are necessary.

8.3 Recommendations vs. Final Design

This report and the recommendations included within are not intended as a final design, but rather as a basis for the final design to be completed by others. It is the client's responsibility to ensure that the recommendations of the geotechnical engineer are properly integrated into the design, and that the geotechnical engineer is provided the opportunity for design input and comment after the submittal of this report, as needed. It is strongly recommended that Atlas be retained to review the final construction documents to confirm that the proposed project design sufficiently incorporates the geotechnical recommendations. Atlas should be represented at pre-bid and/or pre-construction meetings regarding this project to offer any needed clarifications of the geotechnical information to all involved.

8.4 Construction Issues

Although general constructability issues have been considered in this report, the means, methods, techniques, sequences and operations of construction, safety precautions, and all items incidental thereto and consequences of, are the responsibility of the parties to the project other than Atlas. This office should be contacted if additional guidance is needed in these matters.

8.5 Report Interpretation

Atlas is not responsible for conclusions, opinions, or recommendations developed by others on the basis of the data included herein. It is the client's responsibility to seek any guidance and clarifications from the geotechnical engineer needed for proper interpretation of this report.

8.6 Environmental Considerations

The scope of services does not include any environmental assessment investigation for the presence or absence of hazardous or toxic materials in the soil, groundwater, or surface water within or beyond the site studies. Any statements in this report or on the test boring logs regarding odors, staining of soils, or other unusual conditions observed are strictly for the information of our client. Unless complete environmental information regarding the site is already available, an environmental assessment is recommended prior to the development of this site.

8.7 Standard of Care

The professional services and engineering recommendations presented in this report have been developed in accordance with generally accepted geotechnical engineering principles and practices in the geographical area of the project at the time of the report. No other warranties, either expressed or implied are offered.

APPENDIX

Test Boring Location Plan

Logs of Borings (4)

Atterberg Limits Test Results

Field Classification System for Soil Exploration

Unified Soil Classification

Important Information About Your Report

ATLAS

Drawing:	TEST BORING LOCATION PLAN
Project:	PROPOSED PUMP STATION & ROADWAY
Location:	WINCHESTER INDUSTRIAL PARK, WINCHESTER, OH
Client:	ADAMS CO, COMMUNITY IMPROVEMENT CORP.
ATC Project No.:	241GC00430

TEST BORING LOG

CLIENT: Adams Co. Community Improvement Corp.
BORING #: 1
PROJECT NAME: Proposed Pump Station & Roadway
JOB #: 241GC00430
PROJECT LOCATION: Winchester Industrial Park, Winchester, Ohio
DRAWN BY: ASH
APPROVED BY: JAK

DRILLING and SAMPLING INFORMATION

Date Started	08/24/2021	Hammer Wt.	140 lbs.
Date Completed	08/24/2021	Hammer Drop	30 in.
Drill Foreman	TS	Spoon Sampler OD	2 in.
Inspector		Rock Core Dia.	in.
Boring Method	HSA	Shelby Tube OD	in.

TEST DATA

SOIL CLASSIFICATION / SURFACE ELEVATION	Stratum Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics / Recovery Graphics	Groundwater	Standard Penetration Test, blows per foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content %	Liquid Limit (LL)	Plasticity Index (PI)	Remarks
12 inches TOPSOIL.	1.0												
Brown-gray SILTY CLAY (CL), trace Sand and Organics. Moist. Very soft to medium stiff.			1	SS			2		0.5	22	30	10	
		5	2	SS			6		0.5	26			
Brown and gray SILTY CLAY (CL) with Limestone fragments. Moist. Hard. [Glacial Till]	6.0		3	SS			63		4.5+	11			
	9.0		4	SS		Cave	50/1"			4			
- Boring complete at a depth of 9 feet due to auger refusal.													

Sample Type
- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube
- SPT - Standard Penetration Test

Depth to Groundwater
- Noted on Drilling Tools: Dry ft.
- At Completion (in augers) ___ ft.
- At Completion (open hole) Dry ft.
- After ___ days ___ ft.
- After ___ days ___ ft.
- Cave Depth 9.0 ft.

Boring Method
- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- DC - Driving Casing
- MD - Mud Drilling

TEST BORING LOG

ATLAS

CLIENT	Adams Co. Community Improvement Corp.	BORING #	2
PROJECT NAME	Proposed Pump Station & Roadway	JOB #	241GC00430
PROJECT LOCATION	Winchester Industrial Park	DRAWN BY	ASH
	Winchester, Ohio	APPROVED BY	JAK

DRILLING and SAMPLING INFORMATION

Date Started	08/24/2021	Hammer Wt.	140 lbs.
Date Completed	08/24/2021	Hammer Drop	30 in.
Drill Foreman	TS	Spoon Sampler OD	2 in.
Inspector		Rock Core Dia.	in.
Boring Method	HSA	Shelby Tube OD	in.

TEST DATA

SOIL CLASSIFICATION / SURFACE ELEVATION	Stratum Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Groundwater	Standard Penetration Test, blows per foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content %	Liquid Limit (LL)	Plasticity Index (PI)	Remarks
8 inches TOPSOIL.	0.7												
Brown-gray SILTY CLAY (CL), little Sand. Moist. Soft.	3.0		1	SS			5		1.75	24			
Brown and gray FAT CLAY (CH), little Sand and Gravel. Moist. Stiff to hard.		5	2	SS			14		3.5	18			
	8.0		3	SS			46		3.5	13			
Gray-brown SILTY CLAY (CL), some Sand and Gravel. Moist. Hard. [Glacial Till]		10	4	SS			40		4.5+	10			
	13.0					Cave (12.0)							
Gray SILTY CLAY (CL), some Sand and Gravel. Moist. Very stiff. [Glacial Till]	15.0	15	5	SS			16		4.5	11			
- Boring complete at a depth of 15 feet.													

Sample Type
- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube
- SPT - Standard Penetration Test

Depth to Groundwater
- Noted on Drilling Tools Dry ft.
- At Completion (in augers) ft.
- At Completion (open hole) Dry ft.
- After days ft.
- After days ft.
- Cave Depth 12.0 ft.

Boring Method
- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- DC - Driving Casing
- MD - Mud Drilling

TEST BORING LOG

ATLAS

CLIENT: **Adams Co. Community Improvement Corp.**
PROJECT NAME: **Proposed Pump Station & Roadway**
PROJECT LOCATION: **Winchester Industrial Park**
Winchester, Ohio

BORING #: **3**
JOB #: **241GC00430**
DRAWN BY: **ASH**
APPROVED BY: **JAK**

DRILLING and SAMPLING INFORMATION

Date Started: **08/24/2021**
Date Completed: **08/24/2021**
Drill Foreman: **TS**
Inspector:
Boring Method: **HSA**

Hammer Wt.: **140** lbs.
Hammer Drop: **30** in.
Spoon Sampler OD: **2** in.
Rock Core Dia.: in.
Shelby Tube OD: in.

TEST DATA

SOIL CLASSIFICATION / SURFACE ELEVATION	Stratum Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics / Recovery Graphics	Groundwater	Standard Penetration Test, blows per foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content %	Liquid Limit (LL)	Plasticity Index (PI)	Remarks
4 inches TOPSOIL.	0.3												
Brown and gray FAT CLAY (CH), little Sand. Moist. Stiff to very stiff.			1	SS			11		4.5+	24			
			2	SS			17		4.0	21	51	32	
	6.0	5											
Brown and brown-gray SILTY CLAY (CL), some Sand and Gravel. Moist. Very stiff to hard. [Glacial Till]			3	SS			16		4.25	16			
			4	SS			39		4.25	13			
		10				Cave							
			5	SS			45		4.5+	11			
	15.0	15											
- Boring complete at a depth of 15 feet.													

Sample Type
- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube
- SPT - Standard Penetration Test

Depth to Groundwater
- Noted on Drilling Tools **Dry** ft.
- At Completion (in augers) ft.
- At Completion (open hole) **Dry** ft.
- After ___ days ___ ft.
- After ___ days ___ ft.
- Cave Depth **11.5** ft.

Boring Method
- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- DC - Driving Casing
- MD - Mud Drilling

TEST BORING LOG

CLIENT: Adams Co. Community Improvement Corp.
PROJECT NAME: Proposed Pump Station & Roadway
PROJECT LOCATION: Winchester Industrial Park
Winchester, Ohio

BORING #: 4
JOB #: 241GC00430
DRAWN BY: ASH
APPROVED BY: JAK

DRILLING and SAMPLING INFORMATION

Date Started: 08/24/2021
Date Completed: 08/24/2021
Drill Foreman: TS
Inspector:
Boring Method: HSA

Hammer Wt.: 140 lbs.
Hammer Drop: 30 in.
Spoon Sampler OD: 2 in.
Rock Core Dia.: in.
Shelby Tube OD: in.

TEST DATA

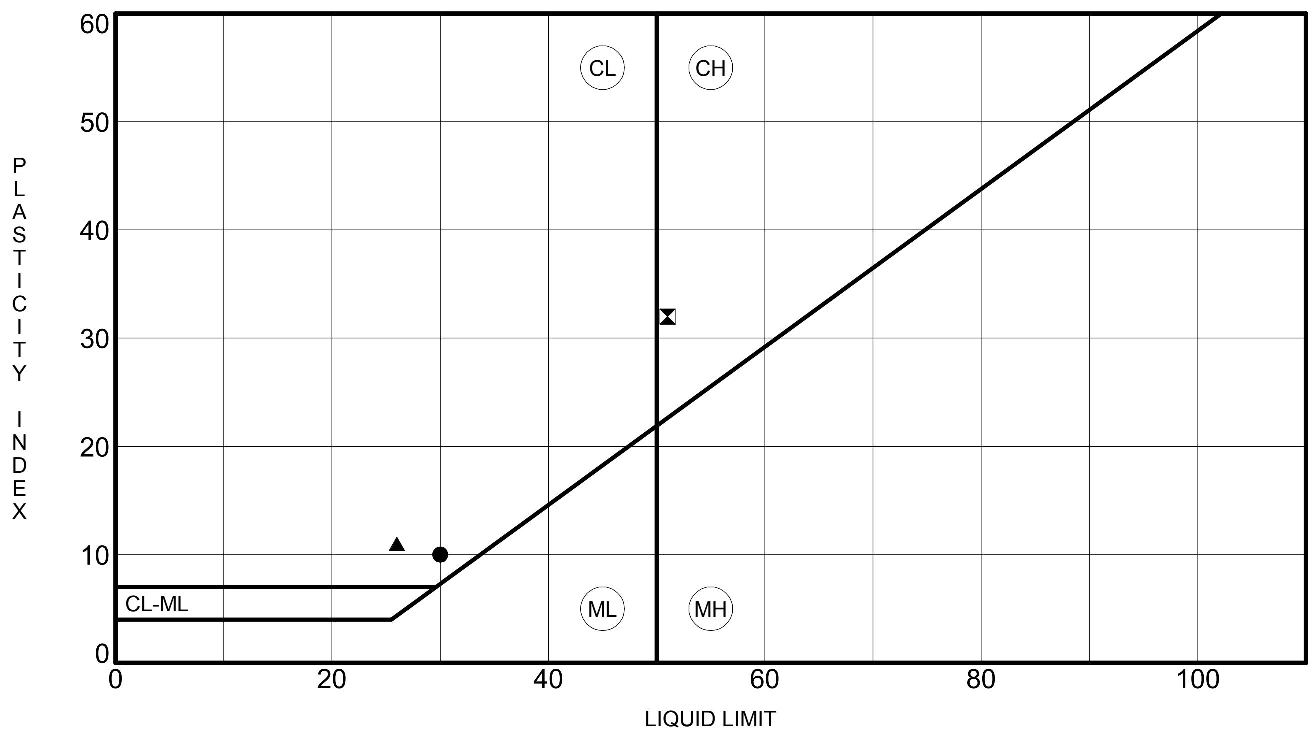
SOIL CLASSIFICATION / SURFACE ELEVATION	Stratum Depth	Sample No.	Sample Type	Groundwater	Standard Penetration Test, blows per foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content %	Liquid Limit (LL)	Plasticity Index (PI)	Remarks
4 inches TOPSOIL.	0.3										
Brown and gray FAT CLAY (CH), little Sand. Moist. Medium stiff to stiff.		1	SS		10		4.5+	17			
		2	SS		14		4.0	21			
Brown and brown-gray SILTY CLAY (CL), some Sand, little Gravel. Moist. Very stiff to hard. [Glacial Till]	6.0	3	SS		17		4.5+	13			
		4	SS		54		4.5+	9			
		5	SS		49		4.5+	10			
Gray SILTY CLAY (CL), some Sand and Gravel. Moist. Stiff to hard. [Glacial Till]	13.0	6	SS		23		4.5+	9			
		7	SS		15		4.5+	14			
		8	SS		24		4.5+	11	26	11	
		9	SS	▽ (23.0)	29		4.5+	11			
		10	SS		27		4.5+	9			
		11	SS	Cave (26.5)	50/2"		4.5	9			
Red-brown completely weathered SHALE. Soft.	28.0										
- Boring complete at a depth of 28.8 feet due to split-spoon sampler refusal.	28.8	12	SS		50/4"			10			

Depth Scale: 5, 10, 15, 20, 25

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube
SPT - Standard Penetration Test

Depth to Groundwater
● Noted on Drilling Tools: Dry ft.
At Completion (in augers) ft.
▽ At Completion (open hole) 23.0 ft.
After ____ days ____ ft.
After ____ days ____ ft.
Cave Depth 26.5 ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
MD - Mud Drilling



	Specimen Identification		LL	PL	PI	Fines	Classification
●	1	1.0	30	20	10		**Brown-gray SILTY CLAY (CL), trace Sand & Organics**
⧗	3	3.5	51	19	32		**Brown & gray FAT CLAY (CH), little Sand**
▲	4	18.5	26	15	11		**Gray SILTY CLAY (CL), some Sand & Gravel**

ATTERBERG LIMITS RESULTS

ATLAS

11121 Canal Road
Cincinnati, OH
Office (513) 771-2112
Fax (513) 782-6908

Project: Proposed Pump Station & Roadway

Location: Winchester Industrial Park

Number: 241GC00430

ATLAS

FIELD CLASSIFICATION SYSTEM FOR SOIL EXPLORATION

NON COHESIVE SOILS

(Silt, Sand, Gravel and Combinations)

Density

Very Loose	– 5 blows/ft. or less
Loose	– 6 to 10 blows/ft.
Medium Dense	– 11 to 30 blows/ft.
Dense	– 31 to 50 blows/ft.
Very Dense	– 51 blows/ft. or more

Relative Proportions

DESCRIPTIVE TERM	PERCENT
Trace	1 – 10
Little	11 – 20
Some	21 – 35
And	36 – 50

Particle Size Identification

Boulders	– 8 inch diameter or more	
Cobbles	– 3 to 8 inch diameter	
Gravel	– Coarse	– 1 to 3 inch
	– Medium	– 1/2 to 1 inch
	– Fine	– 1/4 to 1/2 inch
Sand	– Coarse	– 2.00 mm to 1/4 inch (diameter of pencil lead)
	– Medium	– 0.42 to 2.00 mm diameter of broom straw)
	– Fine	– 0.074 to 0.42 mm (dia. of a human hair)
Silt		– 0.074 to 0.002 mm (cannot see particles)

COHESIVE SOILS

(Clay, Silt and Combinations)

Consistency

Very Soft	– 3 blows/ft. or less
Soft	– 4 to 5 blows/ft.
Medium Stiff	– 6 to 10 blows/ft.
Stiff	– 11 to 15 blows/ft.
Very Stiff	– 16 to 30 blows/ft.
Hard	– 31 blows/ft. or more

Plasticity

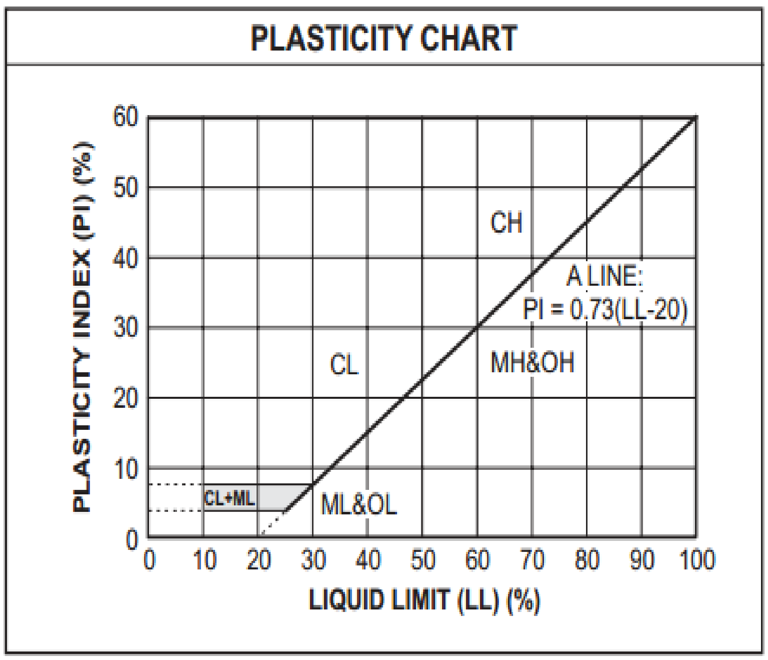
DEGREE OF PLASTICITY	PLASTICITY INDEX
None to slight	0 – 4
Slight	5 – 7
Medium	8 – 22
High to very high	over 22

Classification on logs are generally made by visual inspection of samples, but may be supplemented with laboratory testing as noted.

Standard Penetration Test – Driving a 2.0' O.D., 1-3/8 I.D., sampler a distance of 1.0 foot into undisturbed soil with a 140 pound hammer free falling a distance of 30.0 inches. It is customary for Cardno ATC to drive the spoon 6.0 inches to seat into undisturbed soil, then perform the test. The number of hammer blows for seating the spoon and making the test are recorded for each 6.0 inches of penetration (Example: 6\8\9). The standard penetration test result N–value is obtained by adding the last two figures (Example: 8+9=17 blows/ft.) (ASTM D-1586-67).

Strata Changes – In the column "Soil Descriptions" on the drilling log the horizontal lines represent strata changes. A solid line (______) represents an actually observed change, and a dashed line (_ _ _ _ _ _) represents an estimated change.

Ground Water – Observations were made at the times indicated. Porosity of soil strata, weather conditions, site topography, etc., may cause changes in the water levels indicated on the logs.

Major Divisions			Group Symbol	Typical Names	Laboratory Classification Criteria		
COARSE GRAINED SOILS (More than half of material is larger than #200 sieve)	Gravels (More than half of coarse fraction is larger than #4 sieve)	Clean Gravels	GW	Well graded gravels, gravel-sand mixtures, little or no fines.	Determine percentages of sand and gravel from grain size curve. Depending on percentage of fines (fraction smaller than #200 sieve size), coarse grained soils, are classified as follow: Less than 5%......GW, GP, SW, SP More than 12%....GM, GC, SM, SC 5 to 12%......Borderline cases requiring dual symbols	$C_U=D_{60}/D_{10} > 4$ & $1 > C_C=D_{30}^2/(D_{10}xD_{60}) > 3$	
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines.		Not meeting all gradiation recruitments for GW	
		Gravels with fines	GM	Silty gravels, gravel-sand-silt mixtures.		Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols.
			GC	Clayey gravels, gravels-sand-clay mixtures.		Atterberg limits above "A" line with P.I. greater than 7	
	Sands (More than half of coarse fraction is smaller than #4 sieve)	Clean Sands	SW	Well graded sands, gravely sands, little or no fines		$C_U=D_{60}/D_{10} > 4$ & $1 > C_C=D_{30}^2/(D_{10}xD_{60}) > 3$	
			SP	Poorly graded sands, gravely sands, little or no fines.		Not meeting all gradiation requirements for SW.	
		Sands with fines	SM	Silty sands, sand-silt mixtures.		Atterberg limits below "A" line or P.I. less than 4	Limits plotting in hatched zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols.
			SC	Clayey sands, sand-clay mixtures.		Atterberg limits above "A" line with P.I. greater than 7	
FINE GRAINED SOILS (More than half of material is smaller than #200 sieve)	Silts and Clays (LL less than 50)		ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.			
			CL	Inorganic clays of low to medium plasticity, gravely clays, sandy clays, silty clays, lean clays.			
			OL	Organic silts and organic silty clay of low plasticity			
	Silts and Clays (LL greater than 50)		MH	Inorganic silts, micaceous or diatomaceous fine sand or silty soils, elastic silts.			
			CH	Inorganic clays of high plasticity, fat clays.			
			OH	Organic clays of medium to high plasticity, organic silts.			
	Highly Organic Soil		PT	Peat, humus, swamp soils with high organic contents.			

Unified Soil Classification System

ASTM Designation D- 2487

Important Information about This

Geotechnical-Engineering Report

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

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

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

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a civil engineer may not fulfill the needs of a constructor — a construction contractor — or even another civil engineer. Because each geotechnical- engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. No one except you should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply this report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical-engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

Geotechnical Engineers Base Each Report on a Unique Set of Project-Specific Factors

Geotechnical engineers consider many unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk-management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical-engineering report that was:

- not prepared for you;
- not prepared for your project;
- not prepared for the specific site explored; or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical-engineering report include those that affect:

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

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical-engineering report is based on conditions that existed at the time the geotechnical engineer performed the study. *Do not rely on a geotechnical-engineering report whose adequacy may have been affected by*: the passage of time; man-made events, such as construction on or adjacent to the site; or natural events, such as floods, droughts, earthquakes, or groundwater fluctuations. *Contact the geotechnical engineer before applying this report to determine if it is still reliable.* A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ — sometimes significantly — from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide geotechnical-construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are Not Final

Do not overrely on the confirmation-dependent recommendations included in your report. *Confirmation-dependent recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations *only* by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's confirmation-dependent recommendations if that engineer does not perform the geotechnical-construction observation required to confirm the recommendations' applicability.*

A Geotechnical-Engineering Report Is Subject to Misinterpretation

Other design-team members' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Constructors can also misinterpret a geotechnical-engineering report. Confront that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing geotechnical construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical-engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make constructors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give constructors the complete geotechnical-engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise constructors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure constructors have sufficient time* to perform additional study. Only then might you be in a position to give constructors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and constructors fail to recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Environmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform an *environmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold-prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, many mold- prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical- engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; *none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.*

Rely, on Your GBC-Member Geotechnical Engineer for Additional Assistance

Membership in the Geotechnical Business Council of the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you GBC-Member geotechnical engineer for more information.

GBC GEOTECHNICAL BUSINESS COUNCIL
of the Geoprofessional Business Association

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