Report of Geotechnical Engineering Exploration

WATER MAIN
NEWBERRY, INDIANA
24-0293-01G

Prepared For:
Nicholas Murphy
American Structurepoint, Inc.
9025 River Road, Suite 200
Indianapolis, Indiana 46240

Patriot Engineering and Environmental, Inc.
6150 East 75th Street
Indianapolis, Indiana 46250

July 11, 2024

PATRIOT
ENGINEERING AND ENVIRONMENTAL, INC.

July 11, 2024

Mr. Nicholas Murphy
American Structurepoint, Inc.
9025 River Road, Suite 200
Indianapolis, Indiana 46240

Re: Report of Geotechnical Engineering Exploration
Water Main
County Road 475 South and County Road 100 West
Newberry, Indiana
Patriot Project No. 24-0293-01G

Dear Nicholas:

Attached is the report of our subsurface exploration for the above referenced project. This exploration was completed in general accordance with our Change Order No. 1 dated May 9, 2024, to this project.

We appreciate the opportunity to perform this geotechnical engineering exploration and are looking forward to working with you during the construction phase of the project. If you have questions regarding this report or if we may be of additional assistance regarding any geotechnical aspect of the project, please do not hesitate to contact our office.

Respectfully submitted,
Patriot Engineering and Environmental, Inc.

Akshat Saxena, PE
Project Engineer

William D. Dubois, PE
Senior Principal Engineer

6150 East 75th Street, Indianapolis, Indiana 46250
Ph. 317-576-8058 • Fax 317-576-1965 • Web www.patrioteng.com
INDIANA - Bloomington, Evansville, Fort Wayne, Indianapolis, Lafayette, Terre Haute
KENTUCKY - Louisville, OHIO - Cincinnati, Dayton

TABLE OF CONTENTS

APPENDICES

REPORT OF GEOTECHNICAL ENGINEERING EXPLORATION

WATER MAIN

NEWBERRY, INDIANA

24-0293-01G

1.0 INTRODUCTION

1.1 General

American Structurepoint, Inc. is planning the installation of a new water main/line/alignment to be located along County Road 475 South and County Road 100 West in Newberry, Indiana. The results of our geotechnical engineering exploration for the water main are presented in this report.

The results for our geotechnical engineering exploration for the Westgate Wastewater Treatment Plant (WWTP) will be conveyed in a follow-up report with the same project number.

1.2 Purpose and Scope

The purpose of this investigation is to determine the general near surface and subsurface conditions along the referenced alignment and to provide recommendations to aid in the design and construction of the planned water line. This was achieved by drilling twenty-five (25) soil borings and by conducting laboratory tests on samples taken from the borings. Originally, twenty-seven (27) borings were planned for the water main; however, two (2) borings in the vicinity of White River were not drilled due to vegetation.

2.0 PROJECT INFORMATION

The proposed project includes replacing the existing water main alignment along County Road 475 South and County Road 100 West near Newberry, Indiana, with a new 14-inch ductile iron section. We understand that the invert of the new water line will be about 6 feet below existing grades and will be constructed using open cut excavations and jack and bore methods.

The above narrative is based upon information provided to *Patriot*. This represents the most current information available at the time of issuance of this report. Our assumptions and the recommendations set forth in this report are therefore directly related to this information. *Patriot* should be notified immediately if the provided information provided to us changes during the design development. We cannot be responsible if changes are made to the project, and we are not allowed to determine if our recommendations remain valid.

3.0 EXPLORATIONAL PROCEDURES

3.1 Field Work

A total of twenty-five (25) soil borings were drilled, sampled, and tested at the project site between May 23 and May 29, 2024, at the approximate locations shown on the Soil Boring Location Map in Appendix A. All depths are given as feet below the existing ground surface. **Borings B-101 and B-102 (near the White River) were not drilled due to bushes and trees.**

The borings were advanced using 3¼" I.D. (inside diameter) hollow-stem augers. Samples were recovered in the undisturbed material below the bottom of the augers using the standard drive sample technique in accordance with ASTM D 1586-74. A 2" O.D. (outside diameter) by $1\frac{3}{8}$" I.D. split-spoon sampler was driven a total of 18 inches with the number of blows of a 140-pound hammer falling 30 inches recorded for each 6 inches of penetration. The sum of blows for the final 12 inches of penetration is the Standard Penetration Test result commonly referred to as the N-value (or blow-count). Where the Split-spoon sampler is advanced less than 6 inches in 50 blows, it is indicated as: 50 / (number of inches advanced per 6-inch interval). Split-spoon samples were recovered at 2.5-feet intervals, beginning at a depth of 1 foot below the existing surface grade, extending to a depth of 10 feet, and at 5-feet intervals thereafter to the termination of the boring. Water levels were monitored at each borehole location during drilling and upon completion of the boring. The boreholes were backfilled with auger cuttings prior to demobilization.

Upon completion of the boring program, the samples retrieved during drilling were returned to *Patriot*'s soil testing laboratory where they were visually examined and classified. A laboratory-generated log of each boring was prepared based upon the driller's field log, laboratory test results, and our visual examination. Test boring logs and a description of the classification system are included in Appendix A in this report. Indicated on each log are the primary strata encountered, the depth of each stratum change, the depth of each sample, the Standard Penetration Test results, groundwater conditions, and selected laboratory test data. The laboratory logs were prepared for each boring giving the appropriate sample data and the textural description and classification.

3.2 Laboratory Testing

Representative samples recovered in the borings were selected for testing in the laboratory to evaluate their physical properties and engineering characteristics. Laboratory analyses included natural moisture content determinations (ASTM D 2216), and an estimate of the cohesive soil strength was determined by utilizing a hand penetrometer (qp). The results of all laboratory tests are summarized in Section 4.2 and are shown on the boring logs and laboratory data sheets as appropriate.

4.0 SITE AND SUBSURFACE CONDITIONS

4.1 Alignment Conditions

Patriot visited the referenced alignment site on May 16, 2024, to mark the boring locations and to make visual observations within the limits of the proposed project footprint. The start of the water main alignment is located along County Road 475 South, immediately north of Doans Creek and end of the water main is situated near the intersection of County Road 100 West and County Road 710 South. The surrounding area is mainly agricultural development. The elevation increases from 501 feet at the start of the alignment to 615 feet at the end.

4.2 Subsurface Conditions

Our interpretation of the subsurface conditions is based upon widely spaced soil borings drilled at the approximate locations shown on the Boring Location Map in Appendix A. The following discussion is general; for more specific information, please refer to the boring logs presented in Appendix A. The dashed stratification lines shown on the soil boring logs indicate approximate transitions between soil types. In situ stratification changes could occur gradually or at different depths. All depths discussed below refer to depths below the existing ground surface.

Crushed Stone – Crushed stone was encountered at the surface in eight[1] (8) borings and underneath asphalt in four[2] (4) borings. The crushed stone thickness varied from 10 to 12 inches in the borings.

Topsoil – Topsoil, a surficial layer of material that is a blend of silts, sands, and clays, with varying amounts of organic matter, was observed in thirteen[3] (13) borings at ground surface and the thickness ranged between 10 and 14 inches.

Asphalt – Asphalt was noted at the surface in four[2] (4) borings, and the thickness was either 4 or 5 inches.

Native Cohesive Soils (CL and CL-ML) – Native cohesive soils observed within our borings were classified as soft to hard silty clays, sandy clays, and sandy silty clays. Standard Penetration Test N-values (blow counts) in this material varied from 4 to 89 blows per foot (bpf). Soft clayey soils (indicating yielding/compressible soils) were encountered in boring B-109 at a depth of about 6 feet. The native clayey materials have moisture contents ranging from 10 to 35 %.

Native Granular Soils (SP-SM and SM) – Native granular soils encountered within our borings were classified as loose to medium dense sands and silty sands. Standard Penetration Test N-values in this material varied from 5 to 23 bpf.

---

[1] B-103, B-108, B-112, B-114, B-116, B-117, B-118, B-122

[2] B-123 through B-126

[3] B-104 through B-107, B-109 through B-111, B-113, B-115, B-119 through B-121, B-127

Highly Weathered Shale - Highly weathered shale was encountered underlying the overburden soils at 8.5 feet in B-117. Standard Penetration Test N-value for the sample at 8.5 feet was 55 bpf.

Sandstone - Highly weathered sandstone was encountered underlying the overburden soils at 8.5 feet in B-122. Splitspoon refusal was noted for the sample at 8.5 feet.

4.3 Groundwater Conditions

Groundwater was observed in four (4) borings during drilling and in one (1) boring on completion above the cave-in depths when augers were removed from the boreholes. Refer to Table 1 for groundwater depths.

Table 1. Groundwater depths

Boring No.	Groundwater depth during drilling (feet)	Groundwater depth at completion (feet)
B-106, B-112	8.5	Dry
B-116	10	0 (ground surface)
B-120	1	Dry

The term groundwater pertains to any water that percolates through the soil found on site. This includes any overland flow that permeates through a given depth of soil, perched water, and water that occurs below the “water table”, a zone that remains saturated and water-bearing year-round.

It should be recognized that fluctuations in the groundwater level should be expected over time due to variations in rainfall and other environmental or physical factors. ***The true static groundwater level can only be determined through observations made in cased holes over a long period of time, the installation of which was beyond the scope of this exploration.***

5.0 DESIGN RECOMMENDATIONS

5.1 Basis

Our recommendations are based on data presented in this report, which include soil borings, laboratory testing and our experience with similar projects. Subsurface variations that may not be indicated by a dispersive exploratory boring program can exist on any site. If such variations or unexpected conditions are encountered during construction, or if the project information is incorrect or changed, we should be informed immediately since the validity of our recommendations may be affected.

5.2 Subsurface Utilities

As previously mentioned, we understand that the proposed 14-inch diameter water main replacement will bear approximately 6 feet below existing grades. We understand that installation will include either open cut construction or trenchless technology construction (directional drilling).

5.2.1 Open Cut Construction

We understand that excavations up to 6 feet below the existing grade will be performed for the proposed receiving pits and small sections of the proposed water main. The feasibility of performing open-cut excavations will be influenced by several factors including easement widths/excavation limits, groundwater conditions and control, and the location of existing utilities and structures. The contractor shall evaluate the need for temporary retention (in conjunction with our recommendations in this section) prior to excavation and is completely responsible for selection, design, installation, and satisfactory performance of the retention system. The design of the retention system should not only take into account the lateral forces but also the tolerable lateral deflections. In areas where the excavation is in close proximity to existing structures, we recommend that a preconstruction survey of these structures be performed prior to construction. In addition, periodic survey monitoring (of both the structure and retention system) during construction is recommended. The contractor's "responsible person" should also establish a minimum lateral distance from the crest of the slope or excavation for all spoil piles and construction equipment. Likewise, the contractor's "responsible person" should establish protective measures for exposed faces.

The following are our recommendations for temporary open-cut excavation slopes based on subsurface conditions revealed by the borings in this exploration. These recommendations are based on the assumption that groundwater will be effectively controlled by dewatering. Inadequate groundwater management could cause unstable slopes that may require additional flattening of slopes, installation of intermediate benches and possibly a retention system.

All open-cut excavations deeper than 5 feet (up to 20 feet) should, as a minimum, be performed per current OSHA Excavation Regulations. Open-cut excavations deeper than 20 feet should be designed by a registered professional engineer.

The location of existing utilities to remain operational during construction and adjacent structures (including basement information) should be taken into consideration in evaluating the feasibility of an open cut excavation. Where sufficient space is available, the excavation slopes should, as a minimum, be laid back in accordance with current OSHA Excavation Regulations. If open-cut excavation is not feasible, consideration could be given to use of trench boxes for temporary retention or a combination of open-cut excavation and trench boxes. In areas where temporary retention is required, it is important that the retention system be installed prior to the excavation.

Most of the borings performed along the water main alignment encountered layers of loose to medium dense sands at various depths which are expected to be free-flowing and will tend to readily cave and/or slough into excavations.

Highly weathered shale and sandstone was encountered in borings B-117 and B-122, respectively, at 8.5 feet below the existing ground surface (Elevation 539.5 to 532.5 feet, respectively). Although our drill rig was able to drill thorough most of the highly weathered shale, the contractor should select appropriate equipment to excavate the anticipated material. Additionally, highly weathered zones of sandstone can be excavated with conventional equipment. However, it should be noted that ripping in the slightly weathered and unweathered shales and sandstones will be needed. Furthermore, the excavation will become progressively more difficulty with increase in depth and decrease in weathering.

It is recommended that the temporary excavation slopes be examined periodically to evaluate potential destabilizing effects. The presence of perched water within the walls of the temporary excavations (wet seams and layers) could require flatter temporary slopes than those recommended. The stockpiling of excavated soils and rock at/near the top of the excavation can impact the stability of the excavation slopes. We recommend that the excavated soils and rock be stockpiled a minimum 10 feet away from the top of the excavation to minimize surcharge effects on the slope. The operation/storage of heavy construction equipment near the top of the excavation slope and its impact on the stability of the slope should be further evaluated to determine appropriate setbacks.

Excavations in the vicinity of slopes should be performed with extreme care. In these areas, we recommend the excavations be performed in maximum 20 foot long sections to minimize disturbance of the slope. Each section should be backfilled prior to opening up the adjacent one. Temporary retention (as needed) should be in-place prior to beginning the excavation. We recommend flowable fill be used to backfill excavations in the vicinity of slopes.

5.2.2 Trenchless Installation

As mentioned previously, it is our understanding that the proposed invert water main depth is approximately 6 feet below existing grades or shallower. ***As indicated earlier,*** **highly weathered shale and sandstone were noted in B-117 and B-122, respectively, at 8.5 feet (Elevation 539.5 to 532.5 feet, respectively).** The contractor should choose an appropriate trenchless technology based on the soil and weathered rock conditions presented in this report and the proposed invert elevations.

5.2.3 Pipe Bedding

In general, pipe bedding should consist of relatively clean, well-graded aggregate and meet all local requirements. The excavated soils for this project are generally not suitable for use as pipe bedding. We offer these general comments on pipe bedding for consideration.

It is recommended that granular pipe bedding material be used and consist of well-graded sand and gravel with no more than 10% passing the No. 200 sieve. This granular material should not be less than 6 inches in thickness below the bottom of the pipe and should extend to a height of at least 12 inches above the top of the pipe. This material should be moisture conditioned to within + 2% of its optimum moisture content and compacted to at least 95% of Standard Proctor maximum dry density, ASTM D 698. The compaction of material above the pipe should be performed with caution to prevent pipe damage. The remaining trench backfill above the granular zone previously described, shall consist of backfill as described in the following section.

6.0 CONSTRUCTION CONSIDERATIONS

6.1 Structural Fill and Fill Placement Control

Structural fill, defined as any fill which will support structural loads, should be clean and free of organic material, debris, deleterious materials, and frozen soils. Samples of the proposed fill materials should be tested prior to initiating the earthwork and backfilling operations to determine the classification, the natural and optimum moisture contents and maximum dry density and overall suitability as a structural fill. **Structural fill should have a Liquid Limit (LL) less than 40 and a Plasticity Index (PI) between 10 and 20.**

6.1.1 Existing Site Materials

Regarding the suitability of the on-site soils for use as structural fill, the upper few feet of these soils are expected to be wetter than the estimated optimum moisture contents, depending on the prevailing weather conditions at the time of construction. Therefore, scarification and/or drying may be required to reduce the moisture content of the soils to achieve adequate compaction of the clays and proper strength.

6.1.2 Fill Placement Control

Structural fill supporting, around and over utilities should be compacted to at least 95 percent (%) of its maximum Standard Proctor dry density (ASTM D-698) for utilities underlying structural areas (i.e. buildings, pavements, sidewalks, etc…). However, the minimum compaction requirement can be reduced for backfill around and over the utilities to 95 percent (%) of the maximum Standard Proctor dry density where utilities underlie greenbelt areas (i.e. grassy lawns, landscaping, etc…). It is recommended that a clean well-grade granular material be utilized as the bedding material, as well as the backfill material around and over the utility lines.

To achieve the recommended compaction of the structural fill, we suggest that the fill be placed and compacted in layers not exceeding 8 inches in loose thickness (the loose lift thickness should be reduced to 6 inches when utilizing small hand compactors) and within the range of 2 percentage (%) points below or above the optimum moisture content value. All fill placement should be monitored by a *Patriot* representative. *Each lift should be tested for proper compaction at a frequency of at least one (1) test for every 50 lineal feet of utility installation.*

6.2 Groundwater

Groundwater was observed in four (4) borings during drilling between 1 and 10 feet. At completion, groundwater was noted in one (1) boring at the ground surface; these depths are within the planned excavation depths. Consequently, groundwater infiltration will occur within the excavations on this site. Additionally, the groundwater level will rise above the current levels during wet periods and flood events. Significant inflow can be expected in deeper excavations requiring more aggressive dewatering techniques, such as well or wellpoint systems. The type of dewatering method necessary for this project can only be adequately determined during construction.

7.0 LIMITS OF EXPLORATION

The recommendations provided herein were developed from the information obtained in the test borings, which depict subsurface conditions only at specific locations. Subsurface conditions at other locations may differ from those occurring at the specific drill sites. The nature and extent of variations between borings may not become evident until the time of construction. If variations become evident, it will be necessary to re-evaluate the recommendations of this report after performing on-site observations during construction and noting the characteristics of any variation.

Our professional services have been performed, findings obtained, and recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. This warranty is in lieu of all other warranties either expressed or implied. This company is not responsible for the independent conclusions, opinions or recommendations made by others based on the field and laboratory data presented in this report. The scope of our services did not include any environmental assessment or investigation for the presence or absence of wetlands, hazardous or toxic materials in the soil, groundwater, or surface water within or beyond the site studied.

APPENDIX A

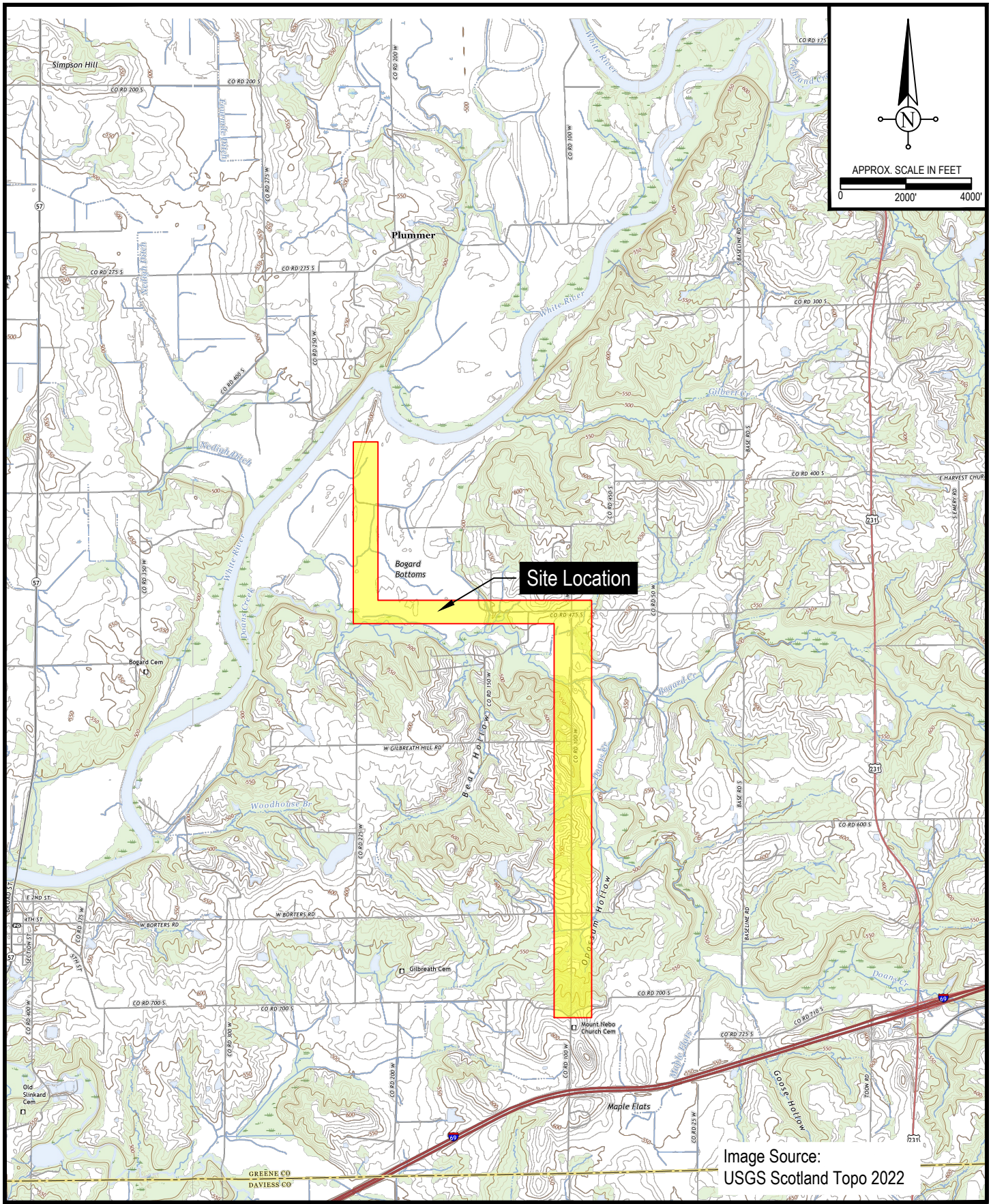
Site Vicinity Map

Soil Boring Location Map

Boring Logs

Boring Log Key

Unified Soil Classification System (USCS)



Patriot Engineering & Environmental, Inc.

Project: Water Main
County Rd 100 W and County Rd 475 S
Crane, Indiana

	Drawn By: T. Humphreys
Project Number:24-0293-01	Approved: A. Saxena
Date: July 9, 2024	DWG: 24-0293-01_geo

Figure 1

Site Vicinity Map

Patriot Engineering & Environmental, Inc.

NOTES:
1. Boring locations were staked by PATRIOT. All locations are shown as approximate.
2. All locations were determined in the field with references to existing landmarks.
3. Image Source: Bing
4. Scale as shown.

Project: Water Main
County Rd 100 W and County Rd 475 S
Crane, Indiana

	Drawn By: T. Humphreys
Project Number: 24-0293-01	Approved By: A. Saxena
Date: July 9, 2024	DWG: 24-0293-01_site

Figure 2

Soil Boring Location Map

PATRIOT ENGINEERING and Environmental Inc.
Indianapolis, Terre Haute, Evansville, Fort Wayne, Lafayette, Bloomington Louisville, KY Dayton, Cincinnati, OH

LOG OF BORING B-103

Water Main
County Road 475 South and County Road 100 West
Newberry, Indiana

Client Name	: American Structurepoint, Inc.	Driller	: M. Walker
Project Number	: 24-0293-01G	Sampling	: Splitspoon
Logged By	: C. Moreno	Approx. Elevation	: +/- 503 feet
Start Date	: 05/29/2024	Latitude	: 38.950142°
Drilling Method	: HSA	Longitude	: -86.967695°

Water Levels
- During Drilling - Dry
- After Completion - Dry
- After 24 Hours - N/A

Depth (Feet)	Elevation (Feet) 503	Water Level	USCS	GRAPHIC	DESCRIPTION	Samples	Rec %	SPT Results	qp tsf	w %	REMARKS
0					CRUSHED STONE (12")						
	500		CL		Brown, slightly moist, stiff, SANDY CLAY with trace gravel	1	100	6/7/8	2.5	15	
					Brown and gray, very moist, stiff, SILTY CLAY with trace sand	2	100	7/5/5	3.3	25	
5			CL			3	100	3/4/5	4.5	26	Boring caved to 6 feet upon auger removal.
	495		SM		Brown, slightly moist, loose, SILTY SAND with interbedded clay seams	4	100	3/4/5			
10					Boring terminated at 10 feet.						Groundwater was not encountered during drilling, nor upon completion.
	490										
15											
	485										
20											
	480										
25											

07-10-2024 C:\Users\asaxena\Patriot Engineering\GEO - Documents\Mtech\2024 Mtech\0293-01G\B-103.bor

PATRIOT ENGINEERING and Environmental Inc.
Indianapolis, Terre Haute, Evansville, Fort Wayne, Lafayette, Bloomington Louisville, KY Dayton, Cincinnati, OH

LOG OF BORING B-104

Water Main
County Road 475 South and County Road 100 West
Newberry, Indiana

Client Name	: American Structurepoint, Inc.	Driller	: M. Walker
Project Number	: 24-0293-01G	Sampling	: Splitspoon
Logged By	: C. Moreno	Approx. Elevation	: +/- 508 feet
Start Date	: 05/23/2024	Latitude	: 38.950250°
Drilling Method	: HSA	Longitude	: -86.965604°

Water Levels
- During Drilling - Dry
- After Completion - Dry
- After 24 Hours - N/A

Depth (Feet)	Elevation (Feet) 508	Water Level	USCS	GRAPHIC	DESCRIPTION	Samples	Rec %	SPT Results	qp tsf	w %	REMARKS
0					TOPSOIL (14")						
	505		SM		Brown, slightly moist, loose to medium dense, SILTY SAND	1	100	3/3/4			Boring caved to 6 feet upon auger removal.
5						2	100	3/3/4			
						3	100	4/5/4			
	500					4	100	4/4/7			
10					Boring terminated at 10 feet.						Groundwater was not encountered during drilling, nor upon completion.
	495										
15											
	490										
20											
	485										
25											

07-10-2024 C:\Users\asaxena\Patriot Engineering\GEO - Documents\Mtech\2024 Mtech\0293-01G\B-104.bor

PATRIOT ENGINEERING and Environmental Inc.
Indianapolis, Terre Haute, Evansville, Fort Wayne, Lafayette, Bloomington Louisville, KY Dayton, Cincinnati, OH

LOG OF BORING B-105

Water Main
County Road 475 South and County Road 100 West
Newberry, Indiana

Client Name	: American Structurepoint, Inc.	Driller	: M. Walker
Project Number	: 24-0293-01G	Sampling	: Splitspoon
Logged By	: C. Moreno	Approx. Elevation	: +/- 511 feet
Start Date	: 05/23/2024	Latitude	: 38.950319°
Drilling Method	: HSA	Longitude	: -86.963839°

Water Levels
- During Drilling - Dry
- After Completion - Dry
- After 24 Hours - N/A

Depth (Feet)	Elevation (Feet) 511	Water Level	USCS	GRAPHIC	DESCRIPTION	Samples	Rec %	SPT Results	qp tsf	w %	REMARKS
0	510				TOPSOIL (13")						
			SM		Brown, slightly moist, loose, SILTY SAND	1	100	4/3/4			
						2	100	5/5/4			Boring caved to 5 feet upon auger removal.
5	505					3	100	4/3/3			
						4	100	3/3/3			
10	500				Boring terminated at 10 feet.						Groundwater was not encountered during drilling, nor upon completion.
15	495										
20	490										
25											

07-10-2024 C:\Users\asaxena\Patriot Engineering\GEO - Documents\Mtech\2024 Mtech\0293-01G\B-105.bor

PATRIOT ENGINEERING and Environmental Inc.
Indianapolis, Terre Haute, Evansville, Fort Wayne, Lafayette, Bloomington Louisville, KY Dayton, Cincinnati, OH

LOG OF BORING B-106

Water Main
County Road 475 South and County Road 100 West
Newberry, Indiana

Client Name	: American Structurepoint, Inc.	Driller	: M. Walker
Project Number	: 24-0293-01G	Sampling	: Splitspoon
Logged By	: C. Moreno	Approx. Elevation	: +/- 509 feet
Start Date	: 05/28/2024	Latitude	: 38.950354°
Drilling Method	: HSA	Longitude	: -86.962081°

Water Levels
- During Drilling - 8.5 feet
- After Completion - Dry
- After 24 Hours - N/A

Depth (Feet)	Elevation (Feet) 509	Water Level	USCS	GRAPHIC	DESCRIPTION	Samples	Rec %	SPT Results	qp tsf	w %	REMARKS
0					TOPSOIL (14")						
			SM		Brown, slightly moist, medium dense, SILTY SAND	1	100	4/5/6			
	505				Brown, slightly moist, medium dense to loose, SILTY SAND	2	100	4/6/7			
5			SM			3	100	2/3/2			Boring caved to 6 feet upon auger removal.
	500	▼	CL		Brown and dark brown, very moist, medium stiff, SILTY CLAY with trace sand	4	100	2/2/3		28	
10					Boring terminated at 10 feet.						
	495										
15											
	490										
20											
	485										
25											

07-10-2024 C:\Users\asaxena\Patriot Engineering\GEO - Documents\Mtech\2024 Mtech\0293-01G\B-106.bor

PATRIOT ENGINEERING and Environmental Inc.
Indianapolis, Terre Haute, Evansville, Fort Wayne, Lafayette, Bloomington Louisville, KY Dayton, Cincinnati, OH

LOG OF BORING B-107

Water Main
County Road 475 South and County Road 100 West
Newberry, Indiana

Client Name	: American Structurepoint, Inc.	Driller	: M. Walker
Project Number	: 24-0293-01G	Sampling	: Splitspoon
Logged By	: C. Moreno	Approx. Elevation	: +/- 493 feet
Start Date	: 05/28/2024	Latitude	: 38.950389°
Drilling Method	: HSA	Longitude	: -86.960315°

Water Levels
- During Drilling - Dry
- After Completion - Dry
- After 24 Hours - N/A

Depth (Feet)	Elevation (Feet) 493	Water Level	USCS	GRAPHIC	DESCRIPTION	Samples	Rec %	SPT Results	qp tsf	w %	REMARKS
0					TOPSOIL (12")						
	490		CL		Gray and brown, moist, medium stiff, SILTY CLAY with trace sand	1	100	3/3/3			Boring caved to feet upon auger removal.
5						2	100	3/3/3			
	485		CL		Gray and brown, moist, stiff, SANDY CLAY with interbedded sand seams	3	100	2/5/4			
10			CL		Gray, very moist, medium stiff, SANDY CLAY with interbedded sand seams	4	100	3/3/3			
	480				Boring terminated at 10 feet.						Groundwater was not encountered during drilling, nor upon completion.
15											
	475										
20											
	470										
25											

07-10-2024 C:\Users\asaxena\Patriot Engineering\GEO - Documents\Mtech\2024 Mtech\0293-01G\B-107.bor

PATRIOT ENGINEERING and Environmental Inc.
Indianapolis, Terre Haute, Evansville, Fort Wayne, Lafayette, Bloomington Louisville, KY Dayton, Cincinnati, OH

LOG OF BORING B-108

Water Main
County Road 475 South and County Road 100 West
Newberry, Indiana

Client Name	: American Structurepoint, Inc.	Driller	: M. Walker
Project Number	: 24-0293-01G	Sampling	: Splitspoon
Logged By	: C. Moreno	Approx. Elevation	: +/- 491 feet
Start Date	: 05/28/2024	Latitude	: 38.949553°
Drilling Method	: HSA	Longitude	: -86.959458°

Water Levels
- During Drilling - Dry
- After Completion - Dry
- After 24 Hours - N/A

Depth (Feet)	Elevation (Feet) 491	Water Level	USCS	GRAPHIC	DESCRIPTION	Samples	Rec %	SPT Results	qp tsf	w %	REMARKS
0					CRUSHED STONE (12")						
	490		CL		Brown and gray, moist, stiff to medium stiff, SANDY CLAY	1	100	4/4/5	0.5	20	
						2	100	4/3/3	0.7	23	
5	485		SM		Brown, slightly moist, loose, SILTY SAND	3	100	3/3/3			Boring caved to 6 feet upon auger removal.
			SP-SM		Gray, slightly moist, loose, fine to medium grained, SAND with trace silt and trace gravel	4	100	4/3/3			
10	480				Boring terminated at 10 feet.						Groundwater was not encountered during drilling, nor upon completion.
15	475										
20	470										
25											

07-10-2024 C:\Users\asaxena\Patriot Engineering\GEO - Documents\Mtech\2024 Mtech\0293-01G\B-108.bor

PATRIOT ENGINEERING and Environmental Inc.
Indianapolis, Terre Haute, Evansville, Fort Wayne, Lafayette, Bloomington Louisville, KY Dayton, Cincinnati, OH

LOG OF BORING B-109

Water Main
County Road 475 South and County Road 100 West
Newberry, Indiana

Client Name	: American Structurepoint, Inc.	Driller	: M. Walker
Project Number	: 24-0293-01G	Sampling	: Splitspoon
Logged By	: C. Moreno	Approx. Elevation	: +/- 491 feet
Start Date	: 05/28/2024	Latitude	: 38.948496°
Drilling Method	: HSA	Longitude	: -86.959480°

Water Levels
- During Drilling - Dry
- After Completion - Dry
- After 24 Hours - N/A

Depth (Feet)	Elevation (Feet) 491	Water Level	USCS	GRAPHIC	DESCRIPTION	Samples	Rec %	SPT Results	qp tsf	w %	REMARKS
0					TOPSOIL (10")						
	490		CL		Brown and gray, moist to very moist, medium stiff to stiff, SILTY CLAY with trace sand	1	100	3/3/4	1.2	22	
5						2	100	3/5/5	1.0	27	
	485		CL		Gray, very moist, soft, SILTY CLAY with trace sand	3	100	2/2/2		35	
10			SP-SM		Gray, slightly moist, medium dense, fine to medium grained, SAND with trace silt and trace gravel	4	100	11/8/11			
	480										
15			CL		Brown and gray, moist, stiff, SILTY CLAY with trace sand	5	100	5/6/7	4.2	22	Boring caved to 14 feet upon auger removal.
	475										
			CL		Gray and brown, moist, stiff, SILTY CLAY with trace sand	6	100	4/7/8	1.1	22	
20					Boring terminated at 20 feet.						Groundwater was not encountered during drilling, nor upon completion.
	470										
25											

07-10-2024 C:\Users\asaxena\Patriot Engineering\GEO - Documents\Mtech\2024 Mtech\0293-01G\B-109.bor

PATRIOT ENGINEERING and Environmental Inc.
Indianapolis, Terre Haute, Evansville, Fort Wayne, Lafayette, Bloomington Louisville, KY Dayton, Cincinnati, OH

LOG OF BORING B-110

Water Main
County Road 475 South and County Road 100 West
Newberry, Indiana

Client Name	: American Structurepoint, Inc.	Driller	: M. Walker
Project Number	: 24-0293-01G	Sampling	: Splitspoon
Logged By	: C. Moreno	Approx. Elevation	: +/- 491 feet
Start Date	: 05/28/2024	Latitude	: 38.947089°
Drilling Method	: HSA	Longitude	: -86.959466°

Water Levels
- During Drilling - Dry
- After Completion - Dry
- After 24 Hours - N/A

Depth (Feet)	Elevation (Feet) 491	Water Level	USCS	GRAPHIC	DESCRIPTION	Samples	Rec %	SPT Results	qp tsf	w %	REMARKS
0	490				TOPSOIL (12")						
					Brown and gray, moist to very moist, stiff to medium stiff, SANDY CLAY with interbedded silt seams	1	100	7/5/4		20	
						2	100	4/4/4		19	
5	485		CL			3	100	5/4/8	1.6	26	Boring caved to 6 feet upon auger removal.
						4	100	7/6/4	1.2	21	
10	480		SM		Gray, slightly moist, loose, SILTY SAND						
					Boring terminated at 10 feet.						Groundwater was not encountered during drilling, nor upon completion.
15	475										
20	470										
25											

07-10-2024 C:\Users\asaxena\Patriot Engineering\GEO - Documents\Mtech\2024 Mtech\0293-01G\B-110.bor

PATRIOT ENGINEERING and Environmental Inc.
Indianapolis, Terre Haute, Evansville, Fort Wayne, Lafayette, Bloomington Louisville, KY Dayton, Cincinnati, OH

LOG OF BORING B-111

Water Main
County Road 475 South and County Road 100 West
Newberry, Indiana

Client Name	: American Structurepoint, Inc.	Driller	: M. Walker
Project Number	: 24-0293-01G	Sampling	: Splitspoon
Logged By	: C. Moreno	Approx. Elevation	: +/- 492 feet
Start Date	: 05/28/2024	Latitude	: 38.945699°
Drilling Method	: HSA	Longitude	: -86.959476°

Water Levels
- During Drilling - Dry
- After Completion - Dry
- After 24 Hours - N/A

Depth (Feet)	Elevation (Feet) 492	Water Level	USCS	GRAPHIC	DESCRIPTION	Samples	Rec %	SPT Results	qp tsf	w %	REMARKS
0					TOPSOIL (12")						
	490				Brown and gray, very moist to moist, medium stiff to stiff, SANDY SILTY CLAY	1	100	4/4/4	1.1	27	
						2	100	2/2/3	1.3	21	
5			CL-ML			3	100	6/7/8	1.9	18	Boring caved to 6 feet upon auger removal.
	485					4	100	6/4/4		25	
10					Boring terminated at 10 feet.						Groundwater was not encountered during drilling, nor upon completion.
	480										
15											
	475										
20											
	470										
25											

07-10-2024 C:\Users\asaxena\Patriot Engineering\GEO - Documents\Mtech\2024 Mtech\0293-01G\B-111.bor

PATRIOT ENGINEERING and Environmental Inc.
Indianapolis, Terre Haute, Evansville, Fort Wayne, Lafayette, Bloomington Louisville, KY Dayton, Cincinnati, OH

LOG OF BORING B-112

Water Main
County Road 475 South and County Road 100 West
Newberry, Indiana

Client Name	: American Structurepoint, Inc.	Driller	: M. Walker
Project Number	: 24-0293-01G	Sampling	: Splitspoon
Logged By	: C. Moreno	Approx. Elevation	: +/- 493 feet
Start Date	: 05/28/2024	Latitude	: 38.944603°
Drilling Method	: HSA	Longitude	: -86.959469°

Water Levels
- During Drilling - 8.5 feet
- After Completion - Dry
- After 24 Hours - N/A

Depth (Feet)	Elevation (Feet) 493	Water Level	USCS	GRAPHIC	DESCRIPTION	Samples	Rec %	SPT Results	qp tsf	w %	REMARKS
0					CRUSHED STONE (10")						
			CL		Brown, very moist to moist, medium stiff to stiff, SANDY CLAY with trace gravel and interbedded silt seams	1	100	3/3/5	1.0	25	Boring caved to ??? feet upon auger removal.
	490					2	100	4/7/5	1.5	18	
5			SM		Brown and gray, slightly moist, loose, SILTY SAND	3	100	5/4/6			
	485	▼			Gray, saturated, loose to medium dense, SILTY SAND	4	100	3/4/3			
10											
	480		SM			5	100	6/7/8			
15											
	475										
			CL		Gray, very moist, stiff, SILTY CLAY with trace sand	6	100	8/5/7	2.6	25	
20					Boring terminated at 20 feet.						
	470										
25											

PATRIOT ENGINEERING and Environmental Inc.
Indianapolis, Terre Haute, Evansville, Fort Wayne, Lafayette, Bloomington Louisville, KY Dayton, Cincinnati, OH

LOG OF BORING B-113

Water Main
County Road 475 South and County Road 100 West
Newberry, Indiana

Client Name	: American Structurepoint, Inc.	Driller	: M. Walker
Project Number	: 24-0293-01G	Sampling	: Splitspoon
Logged By	: C. Moreno	Approx. Elevation	: +/- 530 feet
Start Date	: 05/29/2024	Latitude	: 38.939571°
Drilling Method	: HSA	Longitude	: -86.959473°

Water Levels
- During Drilling - Dry
- After Completion - Dry
- After 24 Hours - N/A

Depth (Feet)	Elevation (Feet) 530	Water Level	USCS	GRAPHIC	DESCRIPTION	Samples	Rec %	SPT Results	qp tsf	w %	REMARKS
0					TOPSOIL (13")						
			CL		Brown, slightly moist, medium stiff, SILTY CLAY with trace sand and trace gravel	1	100	3/3/3	1.3	10	
			CL		Brown and gray, very moist, stiff, SILTY CLAY with trace sand	2	100	4/5/4	1.6	26	Boring caved to 4 feet upon auger removal.
5	525		CL		Brown and gray, moist, stiff, SANDY CLAY with trace gravel	3	100	3/5/7	2.0	20	
			CL		Brown and gray, moist, stiff, SANDY CLAY with interbedded sand seams	4	100	7/5/5	1.4	16	
10	520				Boring terminated at 10 feet.						Groundwater was not encountered during drilling, nor upon completion.
15	515										
20	510										
25	505										

07-10-2024 C:\Users\asaxena\Patriot Engineering\GEO - Documents\Mtech\2024 Mtech\0293-01G\B-113.bor

PATRIOT ENGINEERING and Environmental Inc.
Indianapolis, Terre Haute, Evansville, Fort Wayne, Lafayette, Bloomington Louisville, KY Dayton, Cincinnati, OH

LOG OF BORING B-114

Water Main
County Road 475 South and County Road 100 West
Newberry, Indiana

Client Name	: American Structurepoint, Inc.	Driller	: M. Walker
Project Number	: 24-0293-01G	Sampling	: Splitspoon
Logged By	: C. Moreno	Approx. Elevation	: +/- 552 feet
Start Date	: 05/29/2024	Latitude	: 38.938279°
Drilling Method	: HSA	Longitude	: -86.959441°

Water Levels
- During Drilling - Dry
- After Completion - Dry
- After 24 Hours - N/A

Depth (Feet)	Elevation (Feet) 552	Water Level	USCS	GRAPHIC	DESCRIPTION	Samples	Rec %	SPT Results	qp tsf	w %	REMARKS
0					CRUSHED STONE (12")						
	550		CL		Brown, slightly moist to moist, stiff to very stiff, SANDY CLAY with trace gravel	1	100	4/4/6	1.8	15	
						2	100	6/5/6	2.0	14	
5						3	100	8/9/8	1.9	18	Boring caved to 6 feet upon auger removal.
	545		SP-SM		Brown, slightly moist, loose, fine to medium grained, SAND with trace silt and trace gravel	4	100	3/4/5			
10					Boring terminated at 10 feet.						Groundwater was not encountered during drilling, nor upon completion.
	540										
15											
	535										
20											
	530										
25											

07-10-2024 C:\Users\asaxena\Patriot Engineering\GEO - Documents\Mtech\2024 Mtech\0293-01G\B-114.bor

PATRIOT ENGINEERING and Environmental Inc.
Indianapolis, Terre Haute, Evansville, Fort Wayne, Lafayette, Bloomington Louisville, KY Dayton, Cincinnati, OH

LOG OF BORING B-115

Water Main
County Road 475 South and County Road 100 West
Newberry, Indiana

Client Name	: American Structurepoint, Inc.	Driller	: M. Walker
Project Number	: 24-0293-01G	Sampling	: Splitspoon
Logged By	: C. Moreno	Approx. Elevation	: +/- 565 feet
Start Date	: 05/29/2024	Latitude	: 38.937226°
Drilling Method	: HSA	Longitude	: -86.959444°

Water Levels
- During Drilling - Dry
- After Completion - Dry
- After 24 Hours - N/A

Depth (Feet)	Elevation (Feet) 565	Water Level	USCS	GRAPHIC	DESCRIPTION	Samples	Rec %	SPT Results	qp tsf	w %	REMARKS
0					TOPSOIL (10")						
			CL		Brown, very moist to moist, stiff, SILTY CLAY with trace to little sand	1	100	7/5/6	1.8	26	
						2	100	3/3/4	1.3	19	
5	560										Boring caved to 5 feet upon auger removal.
			CL		Reddish brown, moist, medium stiff, SILTY CLAY with little sand and some sandstone	3	100	3/3/4	2.4	16	
			CL		Brown, moist, stiff, SANDY CLAY with trace gravel	4	100	7/7/7	1.8	17	
10	555				Boring terminated at 10 feet.						Groundwater was not encountered during drilling, nor upon completion.
15	550										
20	545										
25	540										

07-10-2024 C:\Users\asaxena\Patriot Engineering\GEO - Documents\Mtech\2024 Mtech\0293-01G\B-115.bor

PATRIOT ENGINEERING and Environmental Inc.
Indianapolis, Terre Haute, Evansville, Fort Wayne, Lafayette, Bloomington Louisville, KY Dayton, Cincinnati, OH

LOG OF BORING B-116

Water Main
County Road 475 South and County Road 100 West
Newberry, Indiana

Client Name	: American Structurepoint, Inc.	Driller	: M. Walker
Project Number	: 24-0293-01G	Sampling	: Splitspoon
Logged By	: C. Moreno	Approx. Elevation	: +/- 503 feet
Start Date	: 05/29/2024	Latitude	: 38.934966°
Drilling Method	: HSA	Longitude	: -86.959444°

Water Levels
- During Drilling - 10 feet
- After Completion - 0 feet
- After 24 Hours - N/A

Depth (Feet)	Elevation (Feet) 503	Water Level	USCS	GRAPHIC	DESCRIPTION	Samples	Rec %	SPT Results	qp tsf	w %	REMARKS
0		▽			CRUSHED STONE (12")						
			CL		Brown and gray, moist to very moist, medium stiff, SANDY CLAY with trace gravel	1	100	3/4/4	1.5	18	
	500					2	100	3/3/3	1.4	26	
5			CL		Gray and brown, moist, medium stiff, SANDY CLAY and gravel	3	100	3/3/3	4.7	16	Boring caved to 6 feet upon auger removal.
	495										
10		▼	CL		Gray and brown, moist, medium stiff, SANDY CLAY with trace gravel	4	100	3/3/5	1.6	17	
					Boring terminated at 10 feet.						
	490										
15											
	485										
20											
	480										
25											

07-10-2024 C:\Users\asaxena\Patriot Engineering\GEO - Documents\Mtech\2024 Mtech\0293-01G\B-116.bor

PATRIOT ENGINEERING and Environmental Inc.
Indianapolis, Terre Haute, Evansville, Fort Wayne, Lafayette, Bloomington Louisville, KY Dayton, Cincinnati, OH

LOG OF BORING B-117

Water Main
County Road 475 South and County Road 100 West
Newberry, Indiana

Client Name	: American Structurepoint, Inc.	Driller	: M. Walker
Project Number	: 24-0293-01G	Sampling	: Splitspoon
Logged By	: C. Moreno	Approx. Elevation	: +/- 548 feet
Start Date	: 05/29/2024	Latitude	: 38.933359°
Drilling Method	: HSA	Longitude	: -86.959461°

Water Levels
- During Drilling - Dry
- After Completion - Dry
- After 24 Hours - N/A

Depth (Feet)	Elevation (Feet) 548	Water Level	USCS	GRAPHIC	DESCRIPTION	Samples	Rec %	SPT Results	qp tsf	w %	REMARKS
0					CRUSHED STONE (12")						
	545		CL		Brown, moist, stiff to medium stiff, SANDY CLAY with trace gravel	1	100	4/4/5	1.7	19	
5						2	100	2/2/3	0.6	23	Boring caved to 5 feet upon auger removal.
	540		CL		Brown and gray, moist, stiff, SILTY CLAY (DECOMPOSED SHALE)	3	100	6/5/9	>6.0	17	
					Brown, highly weathered, SHALE	4	100	18/21/34			
10					Boring terminated at 10 feet.						Groundwater was not encountered during drilling, nor upon completion.
	535										
15											
	530										
20											
	525										
25											

07-10-2024 C:\Users\asaxena\Patriot Engineering\GEO - Documents\Mtech\2024 Mtech\0293-01G\B-117.bor

PATRIOT ENGINEERING and Environmental Inc.
Indianapolis, Terre Haute, Evansville, Fort Wayne, Lafayette, Bloomington Louisville, KY Dayton, Cincinnati, OH

LOG OF BORING B-118

Water Main
County Road 475 South and County Road 100 West
Newberry, Indiana

Client Name	: American Structurepoint, Inc.	Driller	: M. Walker
Project Number	: 24-0293-01G	Sampling	: Splitspoon
Logged By	: C. Moreno	Approx. Elevation	: +/- 543 feet
Start Date	: 05/29/2024	Latitude	: 38.931149°
Drilling Method	: HSA	Longitude	: -86.959472°

Water Levels
- During Drilling - Dry
- After Completion - Dry
- After 24 Hours - N/A

Depth (Feet)	Elevation (Feet) 543	Water Level	USCS	GRAPHIC	DESCRIPTION	Samples	Rec %	SPT Results	qp tsf	w %	REMARKS
0					CRUSHED STONE (12")						
	540		CL		Brown and gray, moist, medium stiff to stiff, SILTY CLAY with trace sand and trace to little gravel	1	100	4/3/4	2.1	22	
5						2	100	4/4/3		22	
	535					3	100	4/7/5	1.7	23	Boring caved to 7 feet upon auger removal.
10			CL		Brown and gray, moist, hard, SILTY CLAY (DECOMPOSED SHALE)	4	100	12/13/21		16	
	530				Boring terminated at 10 feet.						Groundwater was not encountered during drilling, nor upon completion.
15											
	525										
20											
	520										
25											

07-10-2024 C:\Users\asaxena\Patriot Engineering\GEO - Documents\Mtech\2024 Mtech\0293-01G\B-118.bor

PATRIOT ENGINEERING and Environmental Inc.
Indianapolis, Terre Haute, Evansville, Fort Wayne, Lafayette, Bloomington Louisville, KY Dayton, Cincinnati, OH

LOG OF BORING B-119

Water Main
County Road 475 South and County Road 100 West
Newberry, Indiana

Client Name	: American Structurepoint, Inc.	Driller	: M. Walker
Project Number	: 24-0293-01G	Sampling	: Splitspoon
Logged By	: C. Moreno	Approx. Elevation	: +/- 528 feet
Start Date	: 05/29/2024	Latitude	: 38.930528°
Drilling Method	: HSA	Longitude	: -86.959477°

Water Levels
- During Drilling - Dry
- After Completion - Dry
- After 24 Hours - N/A

Depth (Feet)	Elevation (Feet) 528	Water Level	USCS	GRAPHIC	DESCRIPTION	Samples	Rec %	SPT Results	qp tsf	w %	REMARKS
0					TOPSOIL (12")						
	525		CL		Brown and gray, moist, stiff, SILTY CLAY with trace sand and trace gravel	1	100	3/5/8	1.9	22	
5			CL		Brown and gray, slightly moist, hard, SILTY CLAY (DECOMPOSED SHALE)	2	100	3/17/25	5.6	13	Boring caved to 5 feet upon auger removal.
	520					3	100	22/35/39	>6.0	14	
10						4	100	38/42/47	>6.0	14	
	515				Boring terminated at 10 feet.						Groundwater was not encountered during drilling, nor upon completion.
15											
	510										
20											
	505										
25											

07-10-2024 C:\Users\asaxena\Patriot Engineering\GEO - Documents\Mtech\2024 Mtech\0293-01G\B-119.bor

PATRIOT ENGINEERING and Environmental Inc.
Indianapolis, Terre Haute, Evansville, Fort Wayne, Lafayette, Bloomington Louisville, KY Dayton, Cincinnati, OH

LOG OF BORING B-120

Water Main
County Road 475 South and County Road 100 West
Newberry, Indiana

Client Name	: American Structurepoint, Inc.	Driller	: M. Walker
Project Number	: 24-0293-01G	Sampling	: Splitspoon
Logged By	: C. Moreno	Approx. Elevation	: +/- 526 feet
Start Date	: 05/29/2024	Latitude	: 38.929438°
Drilling Method	: HSA	Longitude	: -86.959489°

Water Levels
- During Drilling - 1.0 feet
- After Completion - Dry
- After 24 Hours - N/A

Depth (Feet)	Elevation (Feet) 526	Water Level	USCS	GRAPHIC	DESCRIPTION	Samples	Rec %	SPT Results	qp tsf	w %	REMARKS
0					TOPSOIL (10")						
	525	▼			Brown, very moist to moist, stiff, SILTY CLAY with trace sand and trace gravel	1	100	3/4/5	0.7	27	
			CL			2	100	3/3/7	1.7	22	
5	520				Brown and gray, slightly moist, very stiff to hard, SILTY CLAY (DECOMPOSED SHALE)	3	100	5/7/16	>6.0	15	Boring caved to 6 feet upon auger removal.
			CL			4	100	21/28/38		12	
10	515				Boring terminated at 10 feet.						
15	510										
20	505										
25											

07-10-2024 C:\Users\asaxena\Patriot Engineering\GEO - Documents\Mtech\2024 Mtech\0293-01G\B-120.bor

PATRIOT ENGINEERING and Environmental Inc.
Indianapolis, Terre Haute, Evansville, Fort Wayne, Lafayette, Bloomington Louisville, KY Dayton, Cincinnati, OH

LOG OF BORING B-121

Water Main
County Road 475 South and County Road 100 West
Newberry, Indiana

Client Name	: American Structurepoint, Inc.	Driller	: M. Walker
Project Number	: 24-0293-01G	Sampling	: Splitspoon
Logged By	: C. Moreno	Approx. Elevation	: +/- 534 feet
Start Date	: 05/29/2024	Latitude	: 38.927884°
Drilling Method	: HSA	Longitude	: -86.959504°

Water Levels
- During Drilling - Dry
- After Completion - Dry
- After 24 Hours - N/A

Depth (Feet)	Elevation (Feet) 534	Water Level	USCS	GRAPHIC	DESCRIPTION	Samples	Rec %	SPT Results	qp tsf	w %	REMARKS
0					TOPSOIL (10")						
			CL		Brown and gray, moist, very stiff, SANDY CLAY with trace gravel	1	100	7/10/10	3.4	18	
	530					2	100	4/8/9	2.2	20	
5											
			CL		Brown and gray, slightly moist, hard, SILTY CLAY (DECOMPOSED SHALE)	3	100	12/18/28	>6.0	14	Boring caved to 6 feet upon auger removal.
	525					4	100	14/16/29	>6.0	13	
10					Boring terminated at 10 feet.						Groundwater was not encountered during drilling, nor upon completion.
	520										
15											
	515										
20											
	510										
25											

PATRIOT ENGINEERING and Environmental Inc.
Indianapolis, Terre Haute, Evansville, Fort Wayne, Lafayette, Bloomington Louisville, KY Dayton, Cincinnati, OH

LOG OF BORING B-122

Water Main
County Road 475 South and County Road 100 West
Newberry, Indiana

Client Name	: American Structurepoint, Inc.	Driller	: M. Walker
Project Number	: 24-0293-01G	Sampling	: Splitspoon
Logged By	: C. Moreno	Approx. Elevation	: +/- 541 feet
Start Date	: 05/29/2024	Latitude	: 38.925406°
Drilling Method	: HSA	Longitude	: -86.959494°

Water Levels
- During Drilling - Dry
- After Completion - Dry
- After 24 Hours - N/A

Depth (Feet)	Elevation (Feet) 541	Water Level	USCS	GRAPHIC	DESCRIPTION	Samples	Rec %	SPT Results	qp tsf	w %	REMARKS
0	540				CRUSHED STONE (11")						
			CL		Brown and gray, slightly moist, very stiff, SANDY CLAY with trace gravel	1	100	8/8/8	2.7	14	
5						2	100	8/10/12	4.4	10	
	535		CL		Brown and gray, slightly moist, very stiff, SILTY CLAY with trace sand and trace gravel	3	100	8/9/10	5.1	13	Boring caved to 6 feet upon auger removal.
10	530				Brown, highly weathered, SANDSTONE	4	22	50-4"			
					Boring terminated at 10 feet.						Groundwater was not encountered during drilling, nor upon completion.
15	525										
20	520										
25											

07-10-2024 C:\Users\asaxena\Patriot Engineering\GEO - Documents\Mtech\2024 Mtech\0293-01G\B-122.bor

PATRIOT ENGINEERING and Environmental Inc.
Indianapolis, Terre Haute, Evansville, Fort Wayne, Lafayette, Bloomington Louisville, KY Dayton, Cincinnati, OH

LOG OF BORING B-123

Water Main
County Road 475 South and County Road 100 West
Newberry, Indiana

Client Name	: American Structurepoint, Inc.	Driller	: M. Walker
Project Number	: 24-0293-01G	Sampling	: Splitspoon
Logged By	: C. Moreno	Approx. Elevation	: +/- 516 feet
Start Date	: 05/29/2024	Latitude	: 38.923802°
Drilling Method	: HSA	Longitude	: -86.959370°

Water Levels
- During Drilling - Dry
- After Completion - Dry
- After 24 Hours - N/A

Depth (Feet)	Elevation (Feet) 516	Water Level	USCS	GRAPHIC	DESCRIPTION	Samples	Rec %	SPT Results	qp tsf	w %	REMARKS
0	516				ASPHALT (4")						
	515				CRUSHED STONE (12")						
			CL		Gray and brown, moist, medium stiff, SANDY CLAY with trace gravel	1	100	4/2/3	1.6	17	
						2	100	3/3/3	0.7	24	
5	510		CL		Dark gray, very moist, medium stiff, SILTY CLAY with trace sand	3	100	2/2/5	1.4	27	Boring caved to 5 feet upon auger removal.
			CL		Brown and gray, moist, stiff, SANDY CLAY with trace gravel	4	100	3/4/5		19	
10	505				Boring terminated at 10 feet.						Groundwater was not encountered during drilling, nor upon completion.
15	500										
20	495										
25											

07-10-2024 C:\Users\asaxena\Patriot Engineering\GEO - Documents\Mtech\2024 Mtech\0293-01G\B-123.bor

PATRIOT ENGINEERING and Environmental Inc.
Indianapolis, Terre Haute, Evansville, Fort Wayne, Lafayette, Bloomington Louisville, KY Dayton, Cincinnati, OH

LOG OF BORING B-124

Water Main
County Road 475 South and County Road 100 West
Newberry, Indiana

Client Name	: American Structurepoint, Inc.	Driller	: M. Walker
Project Number	: 24-0293-01G	Sampling	: Splitspoon
Logged By	: C. Moreno	Approx. Elevation	: +/- 526 feet
Start Date	: 05/29/2024	Latitude	: 38.921597°
Drilling Method	: HSA	Longitude	: -86.959352°

Water Levels
- During Drilling - Dry
- After Completion - Dry
- After 24 Hours - N/A

Depth (Feet)	Elevation (Feet) 526	Water Level	USCS	GRAPHIC	DESCRIPTION	Samples	Rec %	SPT Results	qp tsf	w %	REMARKS
0					ASPHALT (4")						
	525				CRUSHED STONE (11")						Boring caved to feet upon auger removal.
			CL-ML		Brown and gray, slightly moist, stiff, SANDY SILTY CLAY with trace gravel	1	100	6/7/8	2.0	13	
5			CL		Brown and gray, moist, stiff, SANDY CLAY	2	100	4/5/4	1.7	21	
	520		CL		Gray, moist to slightly moist, stiff, SANDY CLAY with trace gravel and interbedded sand seams	3	100	4/5/6	1.6	18	
10	515				Boring terminated at 10 feet.	4	100	2/3/7	1.1	13	Groundwater was not encountered during drilling, nor upon completion.
15	510										
20	505										
25											

07-10-2024 C:\Users\asaxena\Patriot Engineering\GEO - Documents\Mtech\2024 Mtech\0293-01G\B-124.bor

PATRIOT ENGINEERING and Environmental Inc.
Indianapolis, Terre Haute, Evansville, Fort Wayne, Lafayette, Bloomington Louisville, KY Dayton, Cincinnati, OH

LOG OF BORING B-125

Water Main
County Road 475 South and County Road 100 West
Newberry, Indiana

Client Name	: American Structurepoint, Inc.	Driller	: M. Walker
Project Number	: 24-0293-01G	Sampling	: Splitspoon
Logged By	: C. Moreno	Approx. Elevation	: +/- 561 feet
Start Date	: 05/29/2024	Latitude	: 38.919961°
Drilling Method	: HSA	Longitude	: -86.959362°

Water Levels
- During Drilling - Dry
- After Completion - Dry
- After 24 Hours - N/A

Depth (Feet)	Elevation (Feet) 561	Water Level	USCS	GRAPHIC	DESCRIPTION	Samples	Rec %	SPT Results	qp tsf	w %	REMARKS
0	560				ASPHALT (5")						
					CRUSHED STONE (10")						
			CL		Reddish brown, slightly moist, stiff, SANDY CLAY	1	100	4/5/6	2.2	14	
						2	100	3/6/7		14	
5	555		SM		Reddish brown, slightly moist, medium dense, SILTY SAND	3	100	8/10/9			Boring caved to 6 feet upon auger removal.
						4	100	16/11/12			
10	550				Boring terminated at 10 feet.						Groundwater was not encountered during drilling, nor upon completion.
15	545										
20	540										
25											

07-10-2024 C:\Users\asaxena\Patriot Engineering\GEO - Documents\Mtech\2024 Mtech\0293-01G\B-125.bor

PATRIOT ENGINEERING and Environmental Inc.
Indianapolis, Terre Haute, Evansville,
Fort Wayne, Lafayette, Bloomington
Louisville, KY Dayton, Cincinnati, OH

LOG OF BORING B-126

Water Main
County Road 475 South and County Road 100 West
Newberry, Indiana

Client Name	: American Structurepoint, Inc.	Driller	: M. Walker
Project Number	: 24-0293-01G	Sampling	: Splitspoon
Logged By	: C. Moreno	Approx. Elevation	: +/- 580 feet
Start Date	: 05/29/2024	Latitude	: 38.918577°
Drilling Method	: HSA	Longitude	: -86.959362°

Water Levels
- During Drilling - Dry
- After Completion - Dry
- After 24 Hours - N/A

Depth (Feet)	Elevation (Feet) 580	Water Level	USCS	GRAPHIC	DESCRIPTION	Samples	Rec %	SPT Results	qp tsf	w %	REMARKS
0					ASPHALT (4")						
					CRUSHED STONE (10")						
			SM		Reddish brown, slightly moist, loose, SILTY SAND	1	100	6/5/5			
						2	100	4/4/5			
5	575					3	100	4/4/5			Boring caved to 6 feet upon auger removal.
			SM		Brown, slightly moist, medium dense, SILTY SAND with interbedded clay seams	4	100	8/9/7			
10	570				Boring terminated at 10 feet.						Groundwater was not encountered during drilling, nor upon completion.
15	565										
20	560										
25	555										

07-10-2024 C:\Users\asaxena\Patriot Engineering\GEO - Documents\Mtech\2024 Mtech\0293-01G\B-126.bor

PATRIOT ENGINEERING and Environmental Inc.
Indianapolis, Terre Haute, Evansville, Fort Wayne, Lafayette, Bloomington Louisville, KY Dayton, Cincinnati, OH

LOG OF BORING B-127

Water Main
County Road 475 South and County Road 100 West
Newberry, Indiana

Client Name	: American Structurepoint, Inc.	Driller	: M. Walker
Project Number	: 24-0293-01G	Sampling	: Splitspoon
Logged By	: C. Moreno	Approx. Elevation	: +/- 614 feet
Start Date	: 05/29/2024	Latitude	: 38.917102°
Drilling Method	: HSA	Longitude	: -86.958444°

Water Levels
- During Drilling - Dry
- After Completion - Dry
- After 24 Hours - N/A

Depth (Feet)	Elevation (Feet) 614	Water Level	USCS	GRAPHIC	DESCRIPTION	Samples	Rec %	SPT Results	qp tsf	w %	REMARKS
0					TOPSOIL (10")						
					Reddish brown, slightly moist to slightly moist, stiff, SANDY CLAY with trace gravel	1	100	4/5/5		17	
	610					2	100	4/3/6		15	
5			CL								Boring caved to 5 feet upon auger removal.
						3	100	5/5/7		17	
	605					4	100	4/5/6		17	
10					Boring terminated at 10 feet.						Groundwater was not encountered during drilling, nor upon completion.
	600										
15											
	595										
20											
	590										
25											

07-10-2024 C:\Users\asaxena\Patriot Engineering\GEO - Documents\Mtech\2024 Mtech\0293-01G\B-127.bor

PATRIOT ENGINEERING and Environmental, Inc.
Engineering Value for Project Success
Consulting Environmental, Geotechnical and Materials Engineers

BORING LOG KEY

UNIFIED SOIL CLASSIFICATION SYSTEM
FIELD CLASSIFICATION SYSTEM
FOR SOIL EXPLORATION

NON COHESIVE SOILS
(Silt, Sand, Gravel and Combinations)

Density

Very Loose	-4 blows/ft. or less
Loose	-5 to 10 blows/ft.
Medium Dense	-11 to 30 blows/ft.
Dense	-31 to 50 blows/ft.
Very Dense	-51 blows/ft. or more

Grain Size Terminology

Soil Fraction	Particle Size	US Standard Sieve Size
Boulders	Larger than 12”	Larger than 12”
Cobbles	3” to12”	3” to 12”
Gravel: Coarse	¾” to 3”	¾” to 3”
Small	4.76mm to ¾”	#4 to ¾”
Sand: Coarse	2.00mm to 4.76mm	#10 to #4
Medium	0.42mm to 2.00mm	#40 to #10
Fine	0.074mm to 0.42mm	#200 to #40
Silt	0.005mm to 0.074 mm	Smaller than #200
Clay	Smaller than 0.005mm	Smaller than #200

RELATIVE PROPORTIONS FOR SOILS

Descriptive Term	Percent
Trace	1 - 10
Little	11 - 20
Some	21 - 35
And	36 - 50

COHESIVE SOILS
(Clay, Silt and Combinations)

Consistency	Unconfined Compressive Strength (tons/sq. ft.)	Field Identification (Approx.) SPT Blows/ft.
Very Soft	Less than 0.25	0 - 2
Soft	0.25 – < 0.5	3 - 4
Medium Stiff	0.5 - < 1.0	5 - 8
Stiff	1.0 - < 2.0	9 -15
Very Stiff	2.0 - < 4.0	16 - 30
Hard	Over 4.0	> 30

Classification on logs are made by visual inspection.

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 **Patriot** 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 tests are recorded for each 6.0 inches of penetration on the drill log (Example - 6/8/9). The standard penetration test results can be obtained by adding the last two figures (i.e. 8 + 9 = 17 blows/ft.).

Strata Changes - In the column “Soil Descriptions” on the drill log the horizontal lines represent strata changes. A solid line (————) represents an actually observed change, a dashed line (- - - - - -) represents an estimated change.

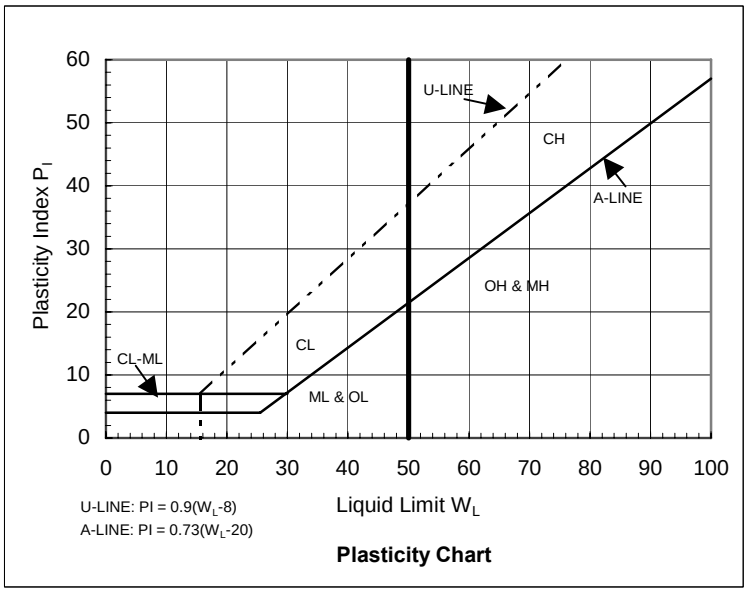
Groundwater observations were made at the times indicated. Porosity of soil strata, weather conditions, site topography, etc., may cause changes in the water levels indicated on the logs.

Groundwater symbols: ▼-observed groundwater elevation, encountered during drilling; ∇-observed groundwater elevation upon completion of boring.

PATRIOT ENGINEERING and Environmental, Inc.
Engineering Value for Project Success
Consulting Environmental, Geotechnical and Materials Engineers

Unified Soil Classification System

Major Divisions			Group Symbol		Typical Names	Classification Criteria for Coarse-Grained Soils		
Coarse-grained soils (more than half of material is larger than No. 200)	Gravels (more than half of coarse fraction is larger than No. 4 sieve size)	Clean gravels (little or no fines)	GW		Well-graded gravels, gravel-sand mixtures, little or no fines	$C_U \geq 4$ $1 \leq C_C \leq 3$	$C_U = \frac{D_{60}}{D_{10}}$	$C_C = \frac{D^2_{30}}{D_{10} D_{60}}$
			GP		Poorly graded gravels, gravel-sand mixtures, little or no fines	Not meeting all gradation requirements for GW ($C_U < 4$ or $1 > C_C > 3$)		
		Gravels with fines (appreciable amount of fines)	GM	d / u	Silty gravels, gravel-sand-silt mixtures	Atterberg limits below A line or $P_I < 4$	Above A line with $4 < P_I < 7$ are borderline cases requiring use of dual symbols	
			GC		Clayey gravels, gravel-sand-clay mixtures	Atterberg limits above A line or $P_I > 7$		
	Sands (more than half of coarse fraction is smaller than No. 4 sieve size)	Clean sands (little or no fines)	SW		Well-graded sands, gravelly sands, little or no fines	$C_U \geq 6$ $1 \leq C_C \leq 3$	$C_U = \frac{D_{60}}{D_{10}}$	$C_C = \frac{(D_{30})^2}{D_{10} D_{60}}$
			SP		Poorly graded sands, gravelly sands, little or no fines	Not meeting all gradation requirements for SW ($C_U < 6$ or $1 > C_c > 3$)		
		Sands with fines (appreciable amount of fines)	SM	d / u	Silty sands, sand-silt mixtures	Atterberg limits below A line or $P_I < 4$	Limits plotting in hatched zone with $4 \leq P_I \leq 7$ are borderline cases requiring use of dual symbols	
			SC		Clayey sands, sand-clay mixtures	Atterberg limits above A line with $P_I > 7$		
Fine-grained soils (more than half of material is smaller than No. 200)	Silt and clays (liquid limit <50)		ML		Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity	1. Determine percentages of sand and gravel from grain size curve. 2. Depending on percentages of fines (fraction smaller than 200 sieve size), coarse-grained soils are classified as follows: Less than 5% - GW, GP, SW, SP More than 12% - GM, GC, SM, SC 5-12% - Borderline cases requiring dual symbols		
			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			
	Silts and clays (liquid limit >50)		MH		Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts			
			CH		Inorganic clays or high plasticity, fat clays			
			OH		Organic clays of medium to high plasticity, organic silts			
	Highly organic soils		PT		Peat and other highly organic soils			



Plasticity Chart

APPENDIX B

GENERAL QUALIFICATIONS

STANDARD CLAUSE FOR UNANTICIPATED SUBSURFACE CONDITIONS

GENERAL QUALIFICATIONS

of Patriot Engineering's Geotechnical Engineering Investigation

This report has been prepared at the request of our client for his use on this project. Our professional services have been performed, findings obtained, and recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. This warranty is in lieu of all other warranties either expressed or implied.

The scope of our services did not include any environmental assessment or investigation for the presence or absence of wetlands, hazardous or toxic materials in the soil, groundwater, or surface water within or beyond the site studied. Any statements in this report or on the test borings logs regarding vegetation types, odors or staining of soils, or other unusual conditions observed are strictly for the information of our client and the owner.

This report may not contain sufficient information for purposes of other parties or other uses. This company is not responsible for the independent conclusions, opinions or recommendations made by others based on the field and laboratory data presented in this report. Should there be any significant differences in structural arrangement, loading or location of the structure, our analysis should be reviewed.

The recommendations provided herein were developed from the information obtained in the test borings, which depict subsurface conditions only at specific locations. The analysis, conclusions, and recommendations contained in our report are based on site conditions as they existed at the time of our exploration. Subsurface conditions at other locations may differ from those occurring at the specific drill sites. The nature and extent of variations between borings may not become evident until the time of construction. If, after performing on-site observations during construction and noting the characteristics of any variation, substantially different subsurface conditions from those encountered during our explorations are observed or appear to be present beneath excavations, we must be advised promptly so that we can review these conditions and reconsider our recommendations where necessary.

If there is a substantial lapse of time between the submission of our report and the start of work at the site, or if conditions have changed due to natural causes or construction operations at or adjacent to the site, we urge that our report be reviewed to determine the applicability of the conclusions and recommendations considering the changed conditions and time lapse.

We urge that Patriot be retained to review those portions of the plans and specifications that pertain to earthwork and foundations to determine whether they are consistent with our recommendations. In addition, we are available to observe construction, particularly the compaction of structural backfill and preparation of the foundations, and such other field observations as may be necessary.

In order to fairly consider changed or unexpected conditions that might arise during construction, we recommend the following verbiage (Standard Clause for Unanticipated Subsurface Conditions) be included in the project contract.

STANDARD CLAUSE FOR UNANTICIPATED SUBSURFACE CONDITIONS

"The owner has had a subsurface exploration performed by a soils consultant, the results of which are contained in the consultant's report. The consultant's report presents his conclusions on the subsurface conditions based on his interpretation of the data obtained in the exploration. The contractor acknowledges that he has reviewed the consultant's report and any addenda thereto, and that his bid for earthwork operations is based on the subsurface conditions as described in that report. It is recognized that a subsurface exploration may not disclose all conditions as they actually exist and further, conditions may change, particularly groundwater conditions, between the time of a subsurface exploration and the time of earthwork operations. In recognition of these facts, this clause is entered in the contract to provide a means of equitable additional compensation for the contractor if adverse unanticipated conditions are encountered and to provide a means of rebate to the owner if the conditions are more favorable than anticipated.

At any time during construction operations that the contractor encounters conditions that are different than those anticipated by the soils consultant's report, he shall immediately (within 24 hours) bring this fact to the owner's attention. If the owner's representative on the construction site observes subsurface conditions which are different than those anticipated by the consultant's report, he shall immediately (within 24 hours) bring this fact to the contractor's attention. Once a fact of unanticipated conditions has been brought to the attention of either the owner or the contractor, and the consultant has concurred, immediate negotiations will be undertaken between the owner and the contractor to arrive at a change in contract price for additional work or reduction in work because of the unanticipated conditions. The contract agrees that the following unit prices would apply for additional or reduced work under the contract. For changed conditions for which unit prices are not provided, the additional work shall be paid for on a time and materials basis."

Another example of a changed conditions clause can be found in paper No. 4035 by Robert F. Borg, published in ASCE Construction Division Journal, No. CO2, September 1964, page 37.