

**SUBSURFACE INVESTIGATION &
GEOTECHNICAL RECOMMENDATIONS**

**TANNER'S CREEK MANOR
58 DOUGHTY ROAD
LAWRENCEBURG, INDIANA
ALT & WITZIG ENGINEERING PROJECT No.: 25CN0405**

**PREPARED FOR:
SPIRE DEVELOPMENT, INC.
330 W. SPRING STREET, SUITE 430
COLUMBUS, OH 43215**

**PREPARED BY:
ALT & WITZIG ENGINEERING, INC.
GEOTECHNICAL DIVISION
HEBRON, KENTUCKY**

JANUARY 16, 2026



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January 16, 2026

Spire Development, Inc.
330 W. Spring Street, Suite 430
Columbus, Ohio 43215
Attention: Mr. Scott Harold

Report of Subsurface Investigation and Geotechnical Recommendations

RE: Tanner's Creek Manor
58 Doughty Road
Lawrenceburg, Indiana
Alt & Witzig Engineering Project No.: 25CN0405

Mr. Harold:

In compliance with your request, Alt & Witzig Engineering, Inc. has completed a subsurface investigation for the above-mentioned Site. The Statement of Objectives, Scope of Work, and results of our investigation are presented in the following report

The results of our test borings and laboratory tests completed to date are presented in the appendix of the report. Recommendations for the project are presented in the "Geotechnical Analyses and Recommendations" section of the report. If you have any questions or comments regarding this matter, please contact us at your convenience.

Sincerely,
Alt & Witzig Engineering, Inc.

Benjamin E. Armstrong, P.E.
Project Engineer

Patrick A. Knoll, P.E.
Principal Engineer



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EXECUTIVE SUMMARY

Alt & Witzig Engineering, Inc. has performed a subsurface investigation and geotechnical analysis for the proposed development to be constructed at 58 Doughty Road in Lawrenceburg, Indiana, in conformance with the scope and limitations of the proposal dated November 25, 2025 (*Alt & Witzig Engineering Proposal 2511CN035*). This investigation was performed for Spire Development, Inc.. Authorization to perform this investigation was in the form of an Alt & Witzig Engineering proposal accepted by Mr. Scott Harold of Spire Development, Inc. and an executed agreement.

In compliance with your original request, a total of 8-soil borings were completed at the above referenced site for the proposed development. The purpose of this investigation was to determine the various soil profile components, the engineering characteristics of the subsurface materials and to provide geotechnical recommendations for use in design of the proposed project.

Based on the investigation, the following conditions and concerns are relevant for this project:

- A grading plan had not been prepared at the time of this investigation. **Desired grading conditions must be reviewed by Alt & Witzig to affirm or modify the recommendations made in this report.** Significant portions of the soils tested at the boring locations are classified as colluvium. Colluvial soils are common on hillsides and are innately more unstable than other native soil types. The preliminary site concept indicates multiple cuts into the existing hillside will be required to construct site retaining walls. **A review of the grading is required prior to design of these walls as the wall type may be dependent upon these conditions. Additional geotechnical exploration and analysis may be required as a result to finalize desired grading details and retaining wall design parameters.** Top-down constructed walls such as a pier and plug wall could be required to protect the existing slope throughout construction.
- Undocumented fill soils were recorded at borings B-01, B-02, and B-04 to depths ranging between 3 and 6.5-feet beneath existing grades. These materials soils are unsuitable for foundation and slab support. During the bulk earthwork phase of the project, these materials should be over-excavated and replaced with documented structural fills in all instances inside the building footprint and up to 5-feet beyond the building footprint as well as any areas where new retaining walls are proposed.
- Conventional foundations appear feasible for building support provided that the new foundations extend through any undocumented fill material. A net allowable bearing pressure of 2,500-psf can be used for dimensioning foundations bearing immediately upon stiff, native materials or documented structural fills. All exterior foundations should be founded a minimum of 30-inches or greater below the finished grade to reduce frost action.

1.0 INTRODUCTION

1.1 Purpose

The purpose of this investigation was to determine the various soil profile components, the engineering characteristics of the subsurface materials, and to provide geotechnical recommendations for use in the design and construction of building foundations and ancillary structure design.

1.2 Statement of Objectives

In compliance with your request, a total of 8-soil borings were completed at the above referenced site for the proposed development in Lawrenceburg, Indiana.

This project included:

- A review of geological maps of the area and review of geologic and related literature
- A reconnaissance of the immediate site and subsurface exploration
- Field and laboratory testing
- Engineering analysis and evaluation of the materials

1.3 Incorporations by Reference

The subsurface investigation was conducted in accordance with guidelines set forth in the scope of services and applicable industry standards. This investigation was performed for Spire Development, Inc. The proposed statement of objectives and scope of work were outlined in the form of *Alt & Witzig Engineering Proposal Number 2511CN035* duly authorized by Mr. Scott Harold of Spire Development, Inc..

1.4 Report Reliance

This report is solely for the use of Spire Development, Inc. and any reliance of this report by third parties shall be at such party's sole risk and may not contain sufficient information for purposes of other parties for other uses. This report shall only be presented in full and may not be used to support any other objectives than those set out in the scope of work, except where written approval and consent are provided by Spire Development, Inc. and Alt & Witzig Engineering.

2.0 BACKGROUND INFORMATION

2.1 Site Location

The site is located at 58 Doughty Road in Lawrenceburg, Indiana. The location of the site (filled in red) is shown on the enclosed *Site Location Map* presented in the *Appendix* and in *Figure 1*.



Figure 1: Site Location (Filled in Red)

2.2 Site Description

At the time of this investigation, the site was occupied by a mixture of maintained grass, brush, trees, and a single standing storage structure in the middle. The site is moderately sloped, with elevations at boring locations ranging from 533 to 497-feet AMSL. The surrounding properties consist mainly of residential and commercial use structures. Historical aerial photographs indicate that a house used to stand where boring B-1 is located.

2.3 General Site Geology

The site lies within the Dearborn Upland Physiographic Region of the State of Indiana. Typical soil makeup consists of silty clay loam parented by clayey residuum over shale and limestone. Slopes typically range from 12 to 18% grade. Bedrock in this area is representative of the Ordovician aged Kope Formation. This formation consists of interbedded shale (75%) and limestone (25%). It is not uncommon for areas overlaying the Kope Formation to be subject to mild to severe landslides, due to the ease at which colluvium forms out of the parent rock. The shale that makes up this formation is weakly cemented, causing it to easily break apart.

3.0 WORK PERFORMED

3.1 Boring Locations

Alt & Witzig Engineering staked the locations of the soil borings using the provided project documents and available information from Google Earth. The soil boring locations were overlain on available imagery from Google Earth and can be reviewed on the *Boring Location Plan* found in the appendix of this report and in *Figure 2*. The borings should be field located by the survey/site engineer and shown on the proposed site layout and grading plan.



Figure 2: 2025 Google Earth Aerial - Boring Locations over Existing Conditions

3.2 Soil Sampling

The field investigation included a reconnaissance of the project site and completion of 8-soil borings. The soil borings were performed with a track-mounted drilling rig equipped with a rotary head. Conventional hollow-stem augers were used to advance the holes. During the sampling procedure, standard penetration tests were performed at regular intervals in accordance with ASTM Method D1586 to obtain the standard penetration value (N) of the soil. The standard penetration value is defined as the number of blows a 140-lb hammer, falling 30-inches, required to advance the split-spoon sampler 12-inches into the soil. The results of the standard penetration tests indicate the relative density and comparative consistency of the soils and thereby provide a basis for estimating the relative strength and compressibility of the soil profile components.

Soil samples from the split spoons were field classified and placed in unpreserved glass jars with Teflon-lined lids for transport to our geotechnical laboratory for further analysis.

3.2.1 Laboratory Analyses for Soil Samples

A supplementary laboratory investigation was conducted to ascertain additional pertinent engineering characteristics of the subsurface materials necessary in analyzing the behavior of the proposed structures. All phases of the laboratory investigation were conducted in general accordance with applicable ASTM Specifications.

The laboratory-testing program included:

- Visual classification in accordance with ASTM D 2488.
- Moisture content tests in accordance with ASTM D 2216.
- Atterberg limit testing in accordance with ASTM D 4318.

Samples of the cohesive soil from the split-spoon-sampling device were frequently tested in unconfined compression by use of a calibrated spring testing machine. In addition, a calibrated soil penetrometer was used as an aid in determining the strength of the soil. The unconfined compressive strength as determined on soil samples from the split-spoon sampling are approximate values since the split-spoon sampling techniques provide a representative but somewhat disturbed soil sample.

3.3 Groundwater Elevation

Initial depths to groundwater were estimated based on where water was observed on the sampling rods. Upon completion of drilling activities, the depth to water was measured using a 100-foot tape measure with a weighted end. The depths presented on the *Boring Logs* are accurate only for the day on which they were recorded. The exact location of the water table shall be anticipated to fluctuate depending upon normal seasonal variations in preparation and surface runoff.

3.4 Ground Surface Elevation

Ground surface elevations have been **estimated** using available information from Google Earth. The project surveyor should capture the existing elevations at the boring locations and provide this data to Alt & Witzig to revise the boring logs.

4.0 INVESTIGATION RESULTS

The types of subsurface materials encountered have been visually classified and are described in detail on the *Boring Logs*. The results of the field penetration tests, strength tests, water level observations and laboratory water contents are presented on the *Boring Logs* in numerical form. Representative samples of the soils encountered in the field were placed in sample jars and are now stored in our laboratory for further analysis if desired. Unless notified to the contrary, all samples will be disposed of after 30 days.

4.1 Subsurface Conditions

A total of 8-soil borings were completed across the site for the proposed multi-family structure. Field measurements of topsoil thicknesses ranged between 2 and 12-inches. Undocumented fill soils were encountered at borings B-01, B-02, and B-04 to depths ranging between 3 and 6.5-feet beneath existing grades. The existing fill materials are characterized as dark brown to brown and gray clays with varying amounts of silt, sand, gravel, organics, and traces of brick and ash.

Colluvium (material that has weathered in-situ and shifted, either through slope creep or complete failure) was encountered at borings B-04 and B-05, at depths of 6.5 to 13.5-feet and 3.5 to 6.0-feet below existing grades. Native materials obtained at the boring locations are classified as soils consisting of a mixture of brown and gray clays with varying amounts of sand, silt, and gravel.

Bedrock consisting of brown and gray highly weathered shale was encountered at borings B-1, B-2, B-3, and B-8, at depths ranging from 9 to 21-feet beneath existing grades. The following chart summarizes the subsurface conditions encountered at each boring location:

Boring	Topsoil (in)	Gravel (in)	Existing Fill Depths (ft)	Colluvium Depth (ft)	Bedrock Depth (ft)	Auger Refusal Depth (ft)
B-01	12.0	-	6.0	-	21.0	23.9
B-02	4.0	8.0	3.0	-	19.0	-
B-03	2.0	24.0	-	-	18.0	18.9
B-04	6.0	-	6.5	13.0	-	13.0
B-05	7.0	-	-	6.0	-	-
B-06	5.0	-	-	-	-	-
B-07	5.0	-	-	-	-	7.3
B-08	5.0	-	6.5	-	-	-

4.2 Water Observations

Groundwater was not observed during drilling operations. However, water levels upon completion were recorded at borings B-1 and B-3, at depths of 23.5 and 18.5-feet, respectively. The exact elevation of the water table will fluctuate depending upon normal seasonal variations in precipitation and surface runoff. It is anticipated that the groundwater table exists near the transition between the clay and bedrock boundary and that pockets of groundwater are trapped within the existing fill materials. The exact level of the water table should be expected to fluctuate based on seasonal variations.

4.3 Seismic Parameters

An evaluation of the seismic site class has been performed for this site. The Indiana Building Code indicates that the seismic site class is determined by averaging soil conditions within the top 100-feet with respect to the shear wave velocity. This evaluation is based on data obtained on soil to termination of the borings and our knowledge of soils in the area. Based on the field and laboratory tests performed on the encountered subsurface materials to boring termination, this site should be considered a Site Class C in accordance with the current Indiana Building Code. Seismic acceleration parameters of $S_s=0.149g$ and $S_1=0.079g$ can be utilized for design, assuming the building has risk category of 1, 2, or 3.

5.0 GEOTECHNICAL ANALYSES AND RECOMMENDATIONS

5.1 Project Description

Preliminary project documents indicate that a 4-story multi-family residential building, retaining walls, with surface parking and associated drives will be constructed. Multiple retaining walls will be constructed to facilitate surface parking and ramp walkways. This will include the demolition of the existing onsite standing structure.

A grading plan had not been prepared at the time of this investigation. **Desired grading conditions must be reviewed by Alt & Witzig to affirm or modify the recommendations made in this report. Additional geotechnical exploration and analysis may be required as a result to finalize desired grading details and retaining wall design parameters.** Finished slopes steeper than 3H:1V should not be considered for this project. Significant portions of the soils tested at the boring locations are classified as colluvium. Colluvial soils are common on hillsides and are innately more unstable than other native soil types. The preliminary site concept indicates multiple cuts into the existing hillside will be required to construct site retaining walls. A review of the grading is required prior to design of these walls as the wall type may be dependent upon these conditions. Top-down constructed walls such as a pier and plug wall may be required to protect the existing slope throughout construction.

The following figure shows the approximate locations for the retaining walls.



Figure 4: Locations of Retaining Walls Over Site Plan and Existing Conditions

5.2 Bulk Earthwork

Topsoil thicknesses at the boring locations measured between 2 and 12-inches. Undocumented fill soils were recorded at borings B-01, B-02, and B-04 to depths ranging between 3 and 6.5-feet beneath existing grades. These materials soils are unsuitable for foundation and slab support. During the bulk earthwork phase of the project, these materials should be over-excavated and replaced with documented structural fills in all instances inside the building footprint and up to 5-feet beyond the building footprint as well as any areas where new retaining walls are proposed.

After the above-mentioned stripping and existing fill removal has been performed, the exposed subgrade should be proofrolled with approved equipment to identify soft or yielding soils. Any soft or unsuitable soils should be removed and replaced with a well-compacted material. It is recommended that a representative of Alt & Witzig Engineering, Inc. be present for this phase of this project. After the existing subgrade soils are excavated to design grade, proper control of subgrade compaction and fill, and structural fill replacement should be maintained by a representative of the soils engineer. This will minimize volume changes and differential settlements which are detrimental to behavior of shallow foundations, floor slabs and pavements. The following table illustrates the recommended compaction percentage in several areas of the site:

Area	Percentage of Compaction ASTM D698	Acceptable Material*	Typical Maximum Lift Thickness
Roads, Drives, & Parking Areas (including future areas)	98%	Any besides ML, MH, CH, OL, OH	8”
Under Foundations and Footings	98%	Any besides ML, MH, CH, OL, OH	8”
Sub grade Below Slab-On-Grade	98%	Dense grade crushed stone or other coarse-grained material	8”
Lower-Level Walls	98%	Clean, GW or SW containing less than 5 percent fines by weight, approved by geotechnical engineer.	8”
Construction of Permanent Slopes	98%	Any* besides ML, MH, CH, OL, OH	8”
Green Space (not including permanent slopes)	85%	Any	12”
Landscaped Areas	Maximum 90%	Any	12”
Trench Backfill within Buildings and Pavement Areas	98%	GW, GP, SW, SP	8”
USCS Classifications: GW-Well Graded Gravel GP-Poorly Graded Gravel GM-Silty Gravel GC-Clayey Gravel	SW-Well Graded Sand SP-Poorly Graded Sand SM-Silty Sand SC-Clayey Sand CL-Lean Clay	ML-Silt CH-Fat Clay MH-Elastic Silt OL-Organic Clay/Silt OH-Organic Clay/Silt	

Excluding organics and any undocumented fill with high contents of construction debris, the on-site soils observed in the borings are suitable for reuse as structural fill. The laboratory tests indicated that the soils have moisture contents ranging between 9% and 33% with an average of 21%. Optimum moisture content for the clay soils is anticipated to be in the range of 16% to 21% based on experience with similar soils. Proper moisture content must be maintained for these soils to be used as structural fill.

Based on moisture contents of the boring samples, portions of the shallow soils appear to be above optimum moisture content. Moisture conditioning of the cut soils to be used as structural fill will be required. This can be accomplished by spreading the soils in a thin (approximately 8-inches) loose lift in favorable weather conditions and continuously disking the soils until a suitable moisture content is reached. Alternatively, chemical drying can be performed by mixing very moist to wet soils with approximately 3% lime kiln dust per dry soil weight.

All fills should be formed from material free of vegetable matter, rubbish, rock larger than 12-inches in plane and 4-inches in depth, and other deleterious material. Prior to placement of fill, a sample of the proposed fill material should be submitted to Alt & Witzig Engineering for approval. The fill material should be placed in layers not to exceed the loose thickness mentioned in the chart above. Each layer should be uniformly compacted by means of suitable equipment of the type required by the materials composing the fill.

5.3 Foundation Recommendations

Undocumented fill soils were encountered at borings B-01, B-02, and B-04 to depths ranging between 3 and 6.5-feet beneath existing grades. Existing fill soils are unsuitable for foundation support and should be remediated as outlined in the *Bulk Earthwork* section of this report. A grading plan has not been prepared at the time of this investigation. **Once a grading plan has been prepared, a copy must be provided to Alt & Witzig to determine if modifications to this report are necessary.** The following table can be utilized to dimension foundations that extend through any undocumented fill soils and are immediately supported by suitable native materials or documented structural fills:

	Footing Type	
	Continuous Footings	Spread Footings
Net Allowable Bearing Pressure*	2,500-psf	2,500-psf
Minimum Frost Protection Depth	30-inches	30-inches
Estimated Maximum Total Settlement	1-inch	1-inch
Estimated Maximum Differential Settlement	½-inch	½ -inch

*Note - In utilizing a net allowable bearing pressure, it is only necessary to account for structural loads applied above finished floor elevation.

The above recommended bearing pressures are "net allowable soil pressures". In utilizing these net allowable pressures for dimensioning footings, it is necessary to consider only those loads applied above the finished floor elevations.

All foundation excavations should be inspected by Alt & Witzig personnel prior to placement of foundation reinforcement and concrete. Soils deemed unsuitable for foundation support such as organics, undocumented fills, highly plastic soils will be over-excavated until suitable conditions are achieved. The over-excavated areas should be backfilled with lean concrete (min. compressive strength of 1,500-psi). All exterior foundations should be found a minimum of 30-inches below the finished grades to reduce frost action. *Figure 5* depicts a typical undercut replaced with lean concrete.

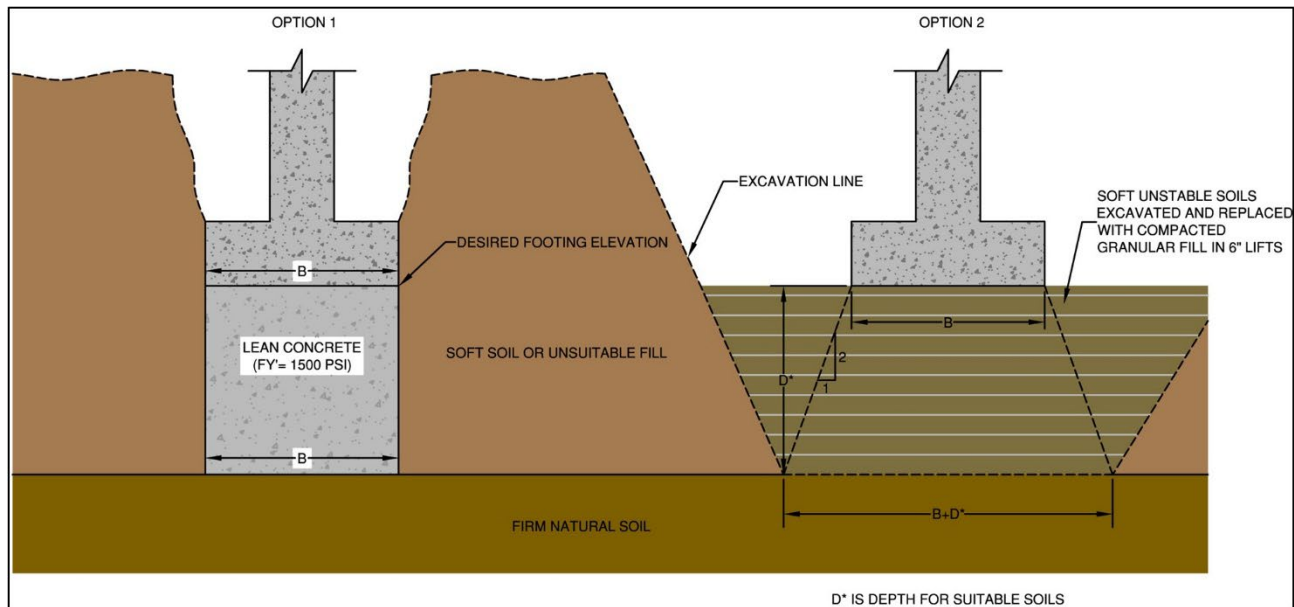


Figure 5: Example of Undercut Soils Replaced with Lean Concrete or Suitable Structural Fill

5.4 Retaining Wall Discussion

Construction will include excavations and installation of several retaining walls. Due to the elevated risk of landslides and instability of the existing slope, ramp retaining walls in the form of pier and plug walls could be required. A pier and plug wall utilizes structural piers consisting of reinforced concrete that are separated by plug piers. The structural piers extend to design depths and the plug piers need only extend 1 to 2-feet beyond the failure surface. Prior to making any cuts along the hillside, this slope should be filled and buttressed to allow for access of the pier installation equipment. Once the wall has been installed, the excavations down slope can commence. **Once a grading plan has been provided, Alt & Witzig can provide more detailed recommendations for wall construction. Additional geotechnical exploration and analysis may be required as a result to finalize retaining wall design parameters.**

5.5 Floor Slab Recommendations

Undocumented fill soils were encountered at borings B-01, B-02, and B-04 to depths ranging between 3 and 6.5-feet beneath existing grades. These materials are not suitable for slab support and should be remediated during the bulk earthwork phase of the development as outlined in the *Bulk Earthwork* section of this report. After the building area has been cut to the proper elevation, a minimum of at least 4-inches of compacted dense grade limestone should be placed beneath the floor slabs.

This compacted granular fill will provide a uniform surface for construction of the slab and minimize capillary rise of groundwater from the subgrade into the slab. A vapor barrier should be placed immediately below the floor slab in any areas of the building where floor coverings such as carpet, vinyl tile, ceramic tile, etc. will be placed.

5.6 Groundwater Considerations

Groundwater was not observed during drilling operations. However, water levels upon completion were recorded at borings B-1 and B-3, at depths of 23.5 and 18.5-feet, respectively. The exact elevation of the water table will fluctuate depending upon normal seasonal variations in precipitation and surface runoff. Groundwater is anticipated to be encountered at the interface between soil and bedrock.

Based on observations from the borings, groundwater concerns with short term excavations should not present major difficulties; however, groundwater seepage may occur depending upon the time of the year and the weather conditions when the excavations are made. Excavations should be frequently monitored for groundwater seepage. Flattening of excavations could be required if softening of the excavation sides occurs due to groundwater seepage and/or runoff. Groundwater is anticipated to be encountered at the interface between soil and bedrock.

Seepage from surface runoff may occur into shallow excavations and soften the subgrade soils. Since these foundation materials tend to loosen when exposed to free water, every effort should be made to keep the excavations dry should water be encountered. Sump pumps or other conventional dewatering procedures should be sufficient for this purpose. All concrete for footings be poured the same day as the excavation is made to prevent the softening of foundation soils.

5.7 Utility Excavations

With construction of the new residential building, placement of numerous underground structures will be required. **As previously indicated, a grading plan review is required to determine if additional recommendations are required.** The shallow soils encountered at the site are classified as Type C soils in OSHA Construction Standards for Excavations. Therefore, it will be necessary to maintain all construction slopes greater than 4 feet at 1H:1V or flatter. Flatter excavations may be required due to colluvial soils and desired grading conditions. If it is not possible to maintain this slope, shoring will be required. All shoring should be in accordance with applicable OSHA standards. It should be noted that the shallow soils are susceptible to erosion. Thus, the amount of time which excavations are left open and unprotected should be very limited. Note also that excavations greater than 20-feet in depth are required to be designed by a professional engineer.

Groundwater seepage through the undocumented fill soils observed in the borings may occur depending on the time of construction. As mentioned above, excavations should be frequently monitored for changes in conditions due to exposure to water.

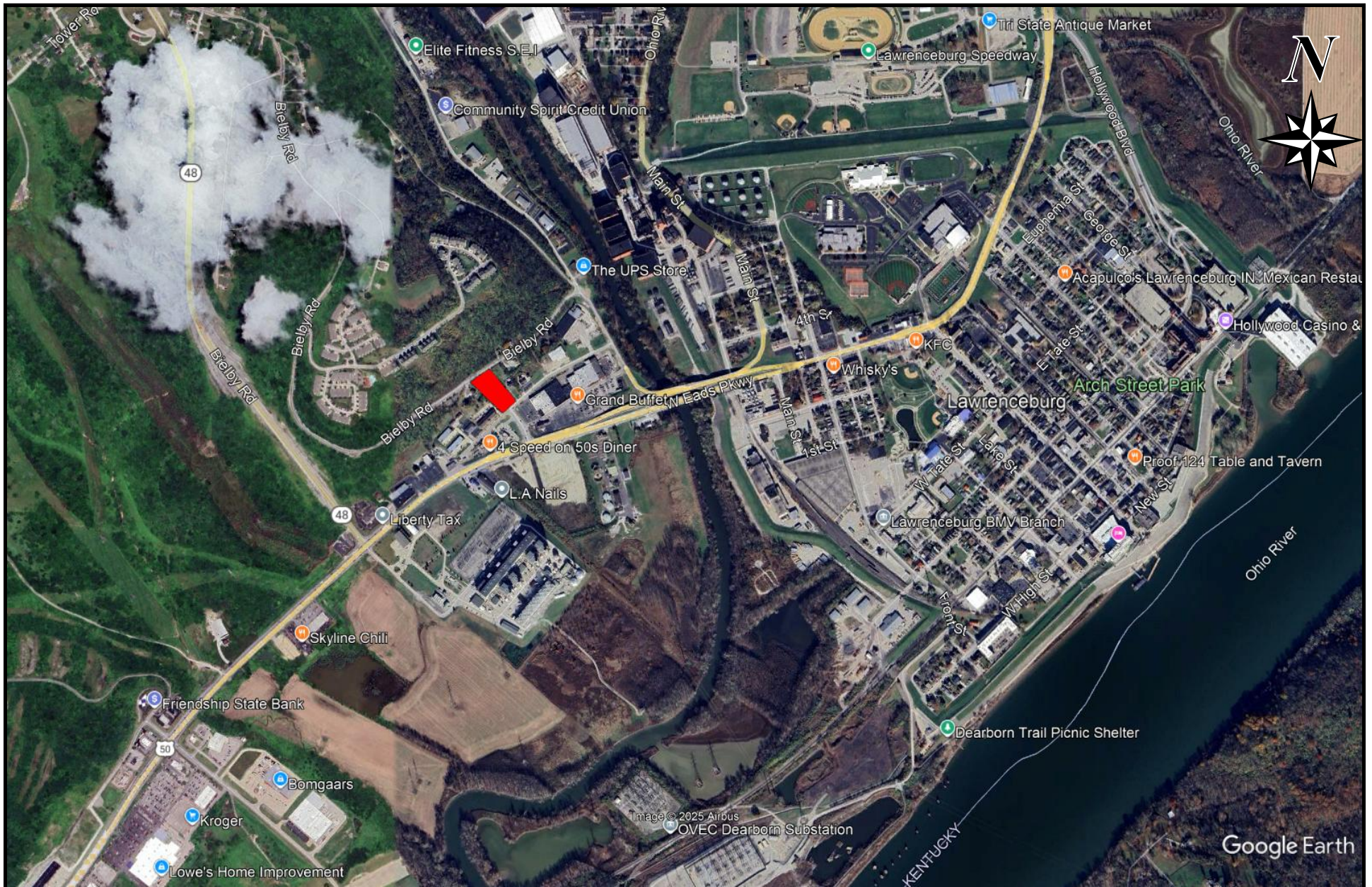
6.0 STATEMENT OF LIMITATIONS

An inherent limitation of any geotechnical engineering study is that conclusions must be drawn on the basis of data collected at a limited number of discrete locations. The geotechnical parameters provided in this report were developed from the information obtained from the test borings that depict subsurface conditions only at these specific locations and on the particular date indicated on the boring logs. Soil conditions at other locations may differ from conditions encountered at these boring locations and groundwater levels shall be expected to vary with time. The nature and extent of variations between the borings may not become evident until the course of construction.

The recommendations submitted are based on the available soil information and assumed design details enumerated in this report. If actual design details differ from those specified in this report, this information should be brought to the attention of Alt & Witzig Engineering, Inc. so that it may be determined if changes in the recommendations herein are required. If deviations from the noted subsurface conditions are encountered during construction, they should also be brought to the attention of Alt & Witzig Engineering, Inc.

Alt & Witzig Engineering, INC.

APPENDIX A
Site Location Map
Boring Location Plan
Boring Logs
General Notes



PROJECT: Tanner's Creek Manor
LOCATION: Lawrenceburg, Indiana
CLIENT: Spire Development, Inc.
ALT & WITZIG ENGINEERING FILE NO.: 25CN0405

SITE LOCATION MAP

Alt & Witzig Engineering, Inc.
 1020 Arbor Tech Drive Suite J
 Hebron, KY 41048
 TEL (859)551-4944 · www.altwitzig.com



PROJECT: Tanner's Creek Manor
LOCATION: Lawrenceburg, Indiana
CLIENT: Spire Development, Inc.
ALT & WITZIG ENGINEERING FILE NO.: 25CN0405

BORING LOCATION PLAN

Alt & Witzig Engineering, Inc.
1020 Arbor Tech Drive Suite J
Hebron, KY 41048
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BORING LOG

Alt & Witzig Engineering, Inc.

CLIENT **Spire Development, Inc.**
PROJECT NAME **Tanner's Creek Manor**
PROJECT LOCATION **Lawrenceburg, Indiana**

BORING # **B-01**
ALT & WITZIG FILE # **25CN0405**

DRILLING and SAMPLING INFORMATION

Date Started **12/4/25** Hammer Wt. **140** lbs.
Date Completed **12/4/25** Hammer Drop **30** in.
Boring Method **HSA** Spoon Sampler OD **2** in.
Driller **STRATA** Rig Type **D-50 Track ATV**

TEST DATA

STRATA ELEV.	SOIL CLASSIFICATION	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-1sf Unconfined Compressive Strength	PP-1sf Pocket Penetrometer	Moisture Content % Dry Unit Weight (pcf)	Remarks
	SURFACE ELEVATION 503.0											
502.0	TOPSOIL (12-inches)	1.0		1	SS			16		2.0	28.9	
499.0	Gray and Brown CLAY with Trace Organics (FILL)	4.0		2	SS			10		3.0	21.8	
497.0	Brown CLAY with Trace Sand and Trace Gravel (Possible Fill)	6.0	5	3	SS			16		3.5	20.4	
	Brown and Gray CLAY with Gravel	10		4	SS			18		4.5	16.1	
489.5	Brown CLAY	13.5	15	5	SS			20		3.8	19.8	
482.0		21.0	20	6	SS			24		4.5	20.9	
479.1	Gray Highly Weathered SHALE	23.9		7	SS			50/5		2.3	13.9	
	(Auger Refusal @ 23.9-feet) End of Boring at 23.9 feet											

Sample Type

SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Groundwater

○ During Drilling Dry ft.
▽ At Completion 23.5 ft.

Boring Method

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



BORING LOG

Alt & Witzig Engineering, Inc.

CLIENT **Spire Development, Inc.**
PROJECT NAME **Tanner's Creek Manor**
PROJECT LOCATION **Lawrenceburg, Indiana**

BORING # **B-02**
ALT & WITZIG FILE # **25CN0405**

DRILLING and SAMPLING INFORMATION

Date Started **12/5/25** Hammer Wt. **140** lbs.
Date Completed **12/5/25** Hammer Drop **30** in.
Boring Method **HSA** Spoon Sampler OD **2** in.
Driller **STRATA** Rig Type **D-50 Track ATV**

TEST DATA

STRATA ELEV.	SOIL CLASSIFICATION	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu- <i>tsf</i> Unconfined Compressive Strength	PP- <i>tsf</i> Pocket Penetrometer	Moisture Content % Dry Unit Weight (<i>pcf</i>)	Remarks
	SURFACE ELEVATION 513.0											
512.7	TOPSOIL	0.3										
512.0	(4-inches)	1.0		1	SS			5		3.0	9.5	
	Gravel											
	(8-inches)											
510.0	Brown Sandy CLAY with Gravel and Asphalt (FILL)	3.0		2	SS			11		2.8	20.4	
			5									
	Brown and Gray CLAY with Trace Sand			3	SS			14		3.5	20.4	LL = 45% PL = 18% PI = 27%
505.0		8.0		4	SS			14		4.5	17.8	
			10									
	Brown and Gray CLAY with Gravel and Sand											
500.0		13.0		5	SS			22		4.5	21.6	
			15									
	Brown and Gray CLAY with Gravel											
494.0		19.0		6	SS			39		4.5	18.0	
493.0		20.0										
	Brown and Gray Completely to Highly Weathered SHALE with Clay		20									
	End of Boring at 20 feet											

Sample Type

SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Groundwater

○ During Drilling Dry ft.
⚡ At Completion Dry ft.

Boring Method

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



BORING LOG

Alt & Witzig Engineering, Inc.

CLIENT Spire Development, Inc.
PROJECT NAME Tanner's Creek Manor
PROJECT LOCATION Lawrenceburg, Indiana

BORING # B-03
ALT & WITZIG FILE # 25CN0405

DRILLING and SAMPLING INFORMATION

Date Started 12/5/25 Hammer Wt. 140 lbs.
Date Completed 12/5/25 Hammer Drop 30 in.
Boring Method HSA Spoon Sampler OD 2 in.
Driller STRATA Rig Type D-50 Track ATV

TEST DATA

STRATA ELEV.	SOIL CLASSIFICATION	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % Dry Unit Weight (pcf)	Remarks
	SURFACE ELEVATION 513.0											
512.8	TOPSOIL (2-inches)	0.2										
511.0	Gravel with Ash	2.0		1	SS			5		4.5	24.7	
	Brown and Gray CLAY with Silt, Some Sand, and Trace Roots			2	SS			10		3.5	22.2	
			5									
507.0		6.0		3	SS			16		1.3	22.0	
	Brown and Gray CLAY with Sand and Gravel											
504.0		9.0		4	SS			22		4.5	19.8	
			10									
	Brown and Gray Residual CLAY											
				5	SS			22		4.5	19.8	
			15									
495.0		18.0										
494.1	Brown and Gray Highly Weathered SHALE	18.9		6	SS			50/5		4.5	21.2	
	(Auger Refusal @ 18.9-feet) End of Boring at 18.9 feet											

Sample Type

SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Groundwater

○ During Drilling Dry ft.
▽ At Completion 18.5 ft.

Boring Method

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



BORING LOG

Alt & Witzig Engineering, Inc.

CLIENT Spire Development, Inc.
PROJECT NAME Tanner's Creek Manor
PROJECT LOCATION Lawrenceburg, Indiana

BORING # B-04
ALT & WITZIG FILE # 25CN0405

DRILLING and SAMPLING INFORMATION

Date Started 12/5/25 Hammer Wt. 140 lbs.
Date Completed 12/5/25 Hammer Drop 30 in.
Boring Method HSA Spoon Sampler OD 2 in.
Driller STRATA Rig Type D-50 Track ATV

TEST DATA

STRATA ELEV.	SOIL CLASSIFICATION	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % Dry Unit Weight (pcf)	Remarks
	SURFACE ELEVATION 510.0											
509.5	TOPSOIL (6-inches)	0.5		1	SS			14		1.3	33.1	
	Gray Silty CLAY with Trace Organics (FILL)			2	SS			43		4.5	18.3	
505.5		4.5	5									
	Olive Brown and Gray CLAY with Trace Organics and Brick (FILL)			3	SS			26		4.5	15.3	
503.5		6.5		4	SS			9		4.3	19.6	
	Brown and Gray CLAY with Trace Organics and Gravel (Colluvium)		10									
497.0		13.0		5	SS			50/0				
	(Auger Refusal @ 13-feet) End of Boring at 13 feet											

Sample Type

SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Groundwater

○ During Drilling Dry ft.
⚡ At Completion Dry ft.

Boring Method

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



BORING LOG

Alt & Witzig Engineering, Inc.

CLIENT Spire Development, Inc.
PROJECT NAME Tanner's Creek Manor
PROJECT LOCATION Lawrenceburg, Indiana

BORING # B-05
ALT & WITZIG FILE # 25CN0405

DRILLING and SAMPLING INFORMATION

Date Started 12/4/25 Hammer Wt. 140 lbs.
Date Completed 12/4/25 Hammer Drop 30 in.
Boring Method HSA Spoon Sampler OD 2 in.
Driller STRATA Rig Type D-50 Track ATV

TEST DATA

STRATA ELEV.	SOIL CLASSIFICATION	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % Dry Unit Weight (pcf)	Remarks
	SURFACE ELEVATION 497.0											
496.4	TOPSOIL (7-inches)	0.6		1	SS			5		1.8	24.9	
	Brown CLAY											
493.5		3.5		2	SS			14		4.5	17.6	
	Brown and Gray CLAY with Gravel and Sand (Colluvium)		5									
491.0		6.0		3	SS			17		4.5	20.8	
490.0	Brown and Gray CLAY with Trace Gravel	7.0										
489.0	Dark Brown CLAY	8.0		4	SS			21		4.5	21.9	
			10									
	Brown and Gray CLAY with a Trace of Sand											
483.0		14.0		5	SS			27		4.5	15.7	
			15									
	Brown and Gray CLAY with Some Gravel											
478.0		19.0		6	SS			16		3.8	22.2	
477.0	Brown and Gray Residual CLAY with Trace Roots	20.0										
	End of Boring at 20 feet		20									

Sample Type

SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Groundwater

○ During Drilling Dry ft.
⚡ At Completion Dry ft.

Boring Method

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



BORING LOG

Alt & Witzig Engineering, Inc.

CLIENT Spire Development, Inc.
PROJECT NAME Tanner's Creek Manor
PROJECT LOCATION Lawrenceburg, Indiana

BORING # B-06
ALT & WITZIG FILE # 25CN0405

DRILLING and SAMPLING INFORMATION

Date Started 12/5/25 Hammer Wt. 140 lbs.
Date Completed 12/5/25 Hammer Drop 30 in.
Boring Method HSA Spoon Sampler OD 2 in.
Driller STRATA Rig Type D-50 Track ATV

TEST DATA

STRATA ELEV.	SOIL CLASSIFICATION	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % Dry Unit Weight (pcf)	Remarks
	SURFACE ELEVATION 523.0											
522.6	TOPSOIL (5-inches)	0.4		1	SS			6		2.8	28.5	
	Dark Brown CLAY with Trace Organics											
519.0		4.0		2	SS			10		2.8	19.9	
			5									
	Brown CLAY with Trace Sand and Gravel			3	SS			15		2.5	22.2	LL = 45% PL = 18% PI = 27%
514.5		8.5		4	SS			21		4.5	17.5	
513.0	Brown Silty Sandy CLAY with Gravel	10.0	10									
	End of Boring at 10 feet											

Sample Type

SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Groundwater

○ During Drilling Dry ft.
▽ At Completion Dry ft.

Boring Method

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



BORING LOG

Alt & Witzig Engineering, Inc.

CLIENT Spire Development, Inc.
PROJECT NAME Tanner's Creek Manor
PROJECT LOCATION Lawrenceburg, Indiana

BORING # B-07
ALT & WITZIG FILE # 25CN0405

DRILLING and SAMPLING INFORMATION

Date Started 12/5/25 Hammer Wt. 140 lbs.
Date Completed 12/5/25 Hammer Drop 30 in.
Boring Method HSA Spoon Sampler OD 2 in.
Driller STRATA Rig Type D-50 Track ATV

TEST DATA

STRATA ELEV.	SOIL CLASSIFICATION	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-1sf Unconfined Compressive Strength	PP-1sf Pocket Penetrometer	Moisture Content % Dry Unit Weight (pcf)	Remarks
	SURFACE ELEVATION 522.0											
521.6	TOPSOIL (5-inches)	0.4										
520.5	Dark Brown CLAY	1.5		1	SS			10		2.5	26.8	
	Gray and Brown CLAY with Trace Gravel and Sand		5	2	SS			19		4.5	17.6	
515.0		7.0		3	SS			50/4		4.5	17.3	LL = 45% PL = 19% PI = 26%
514.7	Brown Silty Sandy CLAY with Some Gravel	7.3										
	(Auger Refusal @ 7.3-feet) End of Boring at 7.3 feet											

Sample Type

SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Groundwater

○ During Drilling Dry ft.
⚡ At Completion Dry ft.

Boring Method

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



BORING LOG

Alt & Witzig Engineering, Inc.

CLIENT Spire Development, Inc.
PROJECT NAME Tanner's Creek Manor
PROJECT LOCATION Lawrenceburg, Indiana

BORING # B-08
ALT & WITZIG FILE # 25CN0405

DRILLING and SAMPLING INFORMATION

Date Started 12/5/25 Hammer Wt. 140 lbs.
Date Completed 12/5/25 Hammer Drop 30 in.
Boring Method HSA Spoon Sampler OD 2 in.
Driller STRATA Rig Type D-50 Track ATV

TEST DATA

STRATA ELEV.	SOIL CLASSIFICATION	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-1sf Unconfined Compressive Strength	PP-1sf Pocket Penetrometer	Moisture Content % Dry Unit Weight (pcf)	Remarks
	SURFACE ELEVATION 533.0											
532.6	TOPSOIL (5-inches)	0.4		1	SS			6		3.0	24.2	
	Dark Brown CLAY with Trace Organics											
529.5		3.5		2	SS			14		1.5	20.8	
			5									
	Brown CLAY with Gravel			3	SS			10		2.0	19.5	LL = 45% PL = 19% PI = 26%
524.0		9.0		4	SS			16		4.5	18.8	
523.0	Brown and Gray Residual CLAY	10.0										
	End of Boring at 10 feet		10									

Sample Type

SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Groundwater

○ During Drilling Dry ft.
▽ At Completion Dry ft.

Boring Method

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

GENERAL NOTES

SAMPLE IDENTIFICATION

The Unified Soil Classification System is used to identify the soil unless otherwise noted.

SOIL PROPERTY SYMBOLS

- N: Standard "N" penetration: Blows per foot of a 140 pound hammer falling 30 inches on a 2 inch O.D. split-spoon.
- Qu: Unconfined compressive strength, TSF
- Qp: Penetrometer value, unconfined compressive strength, TSF
- Mc: Water content, %
- LL: Liquid limit, %
- PL: Plastic limit, %
- Dd: Natural dry density, PCF
- : Apparent groundwater level at time noted after completion

DRILLING AND SAMPLING SYMBOLS

- SS: Split-spoon - 1 3/8" I.D., 2" O.D., except where noted
- ST: Shelby tube - 3" O.D., except where noted
- AU: Auger sample
- DB: Diamond bit
- CB: Carbide bit
- WS: Washed sample

RELATIVE DENSITY AND CONSISTENCY CLASSIFICATION

<u>TERM (NON-COHESIVE SOILS)</u>	<u>BLOWS PER FOOT</u>
Very loose	0 - 4
Loose	5 - 10
Firm	11 - 30
Dense	31 - 50
Very Dense	Over 50

<u>TERM (COHESIVE SOILS)</u>	<u>Qu (TSF)</u>
Very soft	0 - 0.25
Soft	0.25 - 0.50
Medium	0.50 - 1.00
Stiff	1.00 - 2.00
Very Stiff	2.00 - 4.00
Hard	4.00+

PARTICLE SIZE

Boulders	8 in.(+)	Coarse Sand	5 mm-0.6 mm	Silt	0.075 mm - 0.005 mm
Cobbles	8 in. - 3 in.	Medium Sand	0.6mm-0.2 mm	Clay	0.005mm(-)
Gravel	3 in. - 5 mm	Fine Sand	0.2mm-0.075 mm		