Preliminary Geotechnical Engineering Report

SIUE Health Sciences Building
Edwardsville, Illinois
September 15, 2021
Terracon Project No. 15215038

Prepared for:
HOK
St. Louis, Missouri

Prepared by:
Terracon Consultants, Inc.
St. Louis, Missouri

September 15, 2021

HOK
10 South Broadway, Suite 200
St. Louis, Missouri 63102

Attn: Ms. Barb Anderson-Kerlin

Re: Preliminary Geotechnical Engineering Report
SIUE Health Sciences Building
University Park Drive
Edwardsville, Illinois
Terracon Project No. 15215038

Dear Ms. Anderson-Kerlin:

We have completed a Preliminary Geotechnical Engineering evaluation for the referenced project. This study was performed in general accordance with Terracon Proposal No. P15215038, dated February 25, 2021. This report presents the findings of the subsurface exploration and provides preliminary geotechnical recommendations concerning earthwork and the design and construction of foundations, floor slabs, and pavements for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report, or if we may be of further service, please contact us.

Sincerely,

Terracon Consultants, Inc.

Kaylee N. Cannon
Geotechnical Engineer

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REPORT TOPICS

Note: This report was originally delivered in a web-based format. **Orange Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the ***GeoReport*** logo will bring you back to this page. For more interactive features, please view your project online at client.terracon.com.

ATTACHMENTS

Note: Refer to each individual Attachment for a listing of contents.

Preliminary Geotechnical Engineering Report

SIUE Health Sciences Building
University Park Drive
Edwardsville, Illinois

Terracon Project No. 15215038
September 15, 2021

INTRODUCTION

This report presents the results of our subsurface exploration and preliminary geotechnical engineering evaluation performed for the proposed building to be located along University Park Drive in Edwardsville, Illinois. The purpose of these services is to provide information and preliminary geotechnical engineering recommendations relative to:

- Subsurface conditions
- Site preparation and earthwork
- Seismic site class per IBC
- Pavement design and construction
- Foundation design and construction
- Floor slab design and construction
- Lateral earth pressures

Maps showing the site and boring locations are included in the **Site Location** and **Exploration Plan** section. The results of the laboratory testing performed on samples obtained from the site during the field exploration are included on the boring logs in the **Exploration Results** section of this report.

The **General Comments** section provides an understanding of the report limitations.

SITE CONDITIONS

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
Parcel Information	The project is located at the SIUE Campus along University Park Drive in Edwardsville, Illinois Latitude: 38.7900°N, Longitude: 89.9923°W See **Site Location**
Existing Improvements	The campus bookstore and school of pharmacy with drive lanes and parking currently occupy the site.
Current Ground Cover	An undeveloped, grass lot covers the western portion of the site, and the eastern portion of the site has existing structures, landscaped areas, and parking/drive areas.

Item	Description
Existing Topography	The site slopes from the south central portion down towards the western, eastern, and northern portions of the site with about 16 feet of grade change between boring locations.
Geology	Based on the Geological Map provided by the United States Geologic Survey (USGS), the subject site is located over the Modesto and Carbondale Formations. The Modesto Formation consists of shale and sandstone bedrock with smaller amounts of limestone, coal, and black shale. The Carbondale Formation consists of shale and limestone bedrock with smaller amounts of sandstone, coal, and black shale.
Undermine Potential	According to the Illinois State Geological Survey, coal mining has occurred in Madison County, Illinois. The project site is near a known underground coal mine. The exact location of the mine and the extent of its workings is uncertain. A Coal Mine Map is provided in **Attachments**. Terracon's scope of services does not include exploration or research into prior underground mining beneath the site. Evidence of mining was not encountered in our limited subsurface exploration; however, mining operations usually occur at depths greater than those explored.

PROJECT DESCRIPTION

Our initial understanding of the project was provided in our proposal and was discussed in the project planning stage. A period of collaboration has transpired since the project was initiated, and our current understanding of the project conditions is as follows:

Item	Description
Project Description	We understand that approximately 220,000 square feet of structures will be renovated and constructed for this project. Currently, there are three options being considered in preliminary design. The project includes multiple, multi-story structures and anticipated parking and drive areas. The final layout and size of the buildings is unknown at this time.
Maximum Loads	Anticipated structural loads for the new buildings were not provided. Based on our experience with similar structures, we have considered the following maximum loads: ■ Columns: 500 kips ■ Walls: 3 kips per linear foot (klf) ■ Slabs: 250 pounds per foot (psf)
Grading	A site grading plan was not provided. Based on current site grades, we have considered no more than 3 feet of cut/fill will be required.

Item	Description
Free-Standing Retaining Walls	No free-standing retaining walls are planned.
Below-Grade Areas	Basements under the building(s) are being considered.
Pavements	Anticipated traffic was not provided; however, the following traffic frequencies will be considered: ▪ Autos/light trucks: 1,000 vehicles per day ▪ Light delivery and trash collection vehicles: 10 vehicles per week ▪ Tractor-trailer trucks: less than 5 vehicle per week The pavement design period is 20 years. Traffic frequencies should be provided prior to the design-phase geotechnical engineering report.

GEOTECHNICAL CHARACTERIZATION

We have developed a general characterization of the subsurface conditions based upon our review of the subsurface exploration, laboratory data, and geologic setting. This characterization, termed GeoModel, forms the basis of our geotechnical evaluation. Conditions encountered at each boring location are indicated on the individual logs. The individual logs and GeoModel can be found in the **Exploration Results** section of this report.

As part of our analyses, we identified the following model layers within the subsurface profile.

Model Layer	Layer Name	General Description
1	**Existing Fill**	Lean clay trace silt and sand, fat clay, lean clay trace sand and gravel, lean clay trace silt, fat clay trace sand, lean clay with silt, lean clay with sand
2	**Loess**	Lean clay with varying amounts of silt, fat clay trace sand, lean clay with organics and silt, lean clay, fat clay, lean clay trace sand
3	**Glacial Till**	Sandy lean clay, sandy lean clay trace gravel, clayey sand trace gravel, lean clay trace gravel
4	**Organic Soil**	Organic clay

The boreholes were observed while drilling and after completion for the presence and level of groundwater. The water levels observed in the boreholes can be found on the boring logs in **Exploration Results**.

Groundwater was encountered during drilling in Boring B-5 at 14 feet; however, groundwater was not encountered in the other borings. This does not necessarily mean the other borings terminated above groundwater or that the water level observed in Borings B-5 is a stable groundwater level.

Due to the low permeability of the soils encountered in the borings, a relatively long period of time may be necessary for a groundwater level to develop and stabilize in a borehole. Long-term observations in piezometers or observation wells, sealed from the influence of surface water, are often required to define groundwater levels in materials of this type.

Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff and other factors not evident at the time the borings were performed. Therefore, groundwater levels during construction or at other times in the life of the structure may be different from the levels indicated on the boring logs. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

GEOTECHNICAL OVERVIEW

Based on the subsurface conditions, it is our opinion that a deep foundation system would be the most economical for the proposed development. However, when a final design with structural loads is provided, other foundation options may be feasible. Refer to the **Shallow Foundations** and **Deep Foundations** sections for more information.

Expansive Soils

The fat clay (CH) soils encountered in the borings are high in plasticity and prone to volume change with variations in moisture content. For this reason, we recommend that at least the upper 24 and 12 inches of soil below the bottom of the floor slab level in the building footprint and the pavement base rock, respectively, consist of low plasticity (LP) material as defined in the **Earthwork** section.

This LP layer should also be confirmed or placed below other flatwork abutting the structure. The procedures recommended in this report may not eliminate all future subgrade volume change and resultant movements. However, the procedures outlined should reduce the potential for subgrade volume change. Additional reductions in subgrade movements could be achieved by using a thicker LP zone. LP material could be imported, or the high plasticity soils could be chemically modified to reduce their volume change susceptibility.

This report provides recommendations to help mitigate the effects of soil shrinkage and expansion. However, even if these procedures are followed, some movement and at least minor cracking in the structure could still occur. The severity of cracking and other cosmetic damage such as uneven floor slabs on grade will likely increase if any modification of the site results in excessive wetting or drying of the expansive soils. Eliminating the risk of movement and cosmetic distress may not be feasible, but it may be possible to further reduce the risk of movement if more extensive measures are used during construction. We would be pleased to discuss other construction alternatives with you upon request.

Pavements may be somewhat more tolerant of shrink and swell characteristics of high plasticity soil subgrade conditions. Even so, we recommend that at least the upper 12 inches of pavement subgrade be constructed of engineered LP material, or the soils be chemically modified to reduce their volume change susceptibility.

Existing Fill

Existing fill was encountered to depths of about 3 to 6 feet in Borings B-3 to B-8, B10, and B-11. The fill could extend deeper in areas not explored. No documentation or records regarding the placement of this fill were provided for our review. If records are available, Terracon should be supplied with these documents to better assess the suitability of the existing fill. Further exploration and testing (e.g., test pits, geophysical testing, etc.) of the existing fills could be performed, if requested.

We do not anticipate that shallow foundations will be a feasible option based on the anticipated structural loads. However if the final building configuration and loads are such that shallow foundations will be considered, foundations for the new building should not bear on or above the undocumented fill materials. The existing fill should be removed and replaced so that shallow foundations bear on suitable native soils or on properly placed and compacted engineered fill extending to suitable native soils.

Provided the owner is willing to accept the risks associated with supporting floor slabs and pavements over the existing fill materials in exchange for reduced construction costs, portions of the existing undocumented fill could be left in place for support of floor slabs and pavements. If this alternative is chosen, at least 24 and 12 inches of new engineered fill should be placed directly below the floor slab and pavement base rock, respectively. If the owner is not willing to accept the risks of supporting floor slabs and pavements over existing undocumented fill materials, the existing fill should be completely removed and replaced.

To reduce the risk of adverse performance from higher settlement and provide more consistent support for floor slabs and pavements, the exposed existing fill materials should be observed and tested during construction. Where unsuitable conditions are observed, the materials should be improved by scarification and compaction or be removed and replaced with engineered fill. Unsuitable fill materials observed during construction may warrant further exploration at that time.

Support of floor slabs and pavements on or above existing fill materials is discussed within the **Floor Slabs** and **Pavements** sections. However, even with the recommended construction procedures, there is an inherent risk for the owner that compressible fill or unsuitable material within or buried by the fill will not be discovered. This risk of unforeseen conditions cannot be eliminated without completely removing the existing fill, but it can be reduced by following the recommendations contained in this report. To take advantage of the cost benefit of not removing the entire amount of undocumented fill, the owner must be willing to accept the risk associated with building over the undocumented fills following the recommended reworking of the material.

Soft Subgrade

The near surface soils consist of clay soils which could become unstable with typical earthwork and construction traffic, especially after precipitation events. Effective drainage should be completed early in the construction sequence and maintained after construction to avoid potential issues. If possible, the grading should be performed during the warmer and drier times of the year. If grading is performed during the wetter months, an increased risk for possible undercutting and replacement of unstable subgrade will persist. Additional site preparation recommendations including subgrade improvement and fill placement are provided in the **Earthwork** section.

EARTHWORK

Existing Fill

As noted in **Geotechnical Characterization**, Borings B-3 to B-8, B-10, and B-11 encountered existing fill to depths ranging from about 3 to 6 feet. Support of footings, floor slabs, and pavements, on or above existing fill soils, is discussed in this report. However, even with the recommended construction procedures, there is inherent risk for the owner that compressible fill or unsuitable material, within or buried by the fill will, not be discovered. This risk of unforeseen conditions cannot be eliminated without completely removing the existing fill, but it can be reduced by following the recommendations contained in this report.

If the owner elects to construct the floor slabs on the existing fill, the following protocol should be followed. Once the planned grading has been completed, the area should be undercut 2 feet within the building area and 5 feet beyond the lateral limits of the building area. Once materials have been removed, the entire area should be proofrolled with heavy, rubber tire construction equipment, to aid in delineating areas of soft or otherwise unsuitable soil. Once unsuitable materials have been remediated, and the subgrade is firm and stable during proofrolling, the existing and undocumented fill that was removed can be evaluated for reuse as structural fill.

If the owner elects to construct pavements on the existing fill, the following protocol should be followed. Once the planned subgrade elevation has been reached the entire pavement area should be proofrolled. Areas of soft or otherwise unsuitable material should be undercut and replaced with either new structural fill or suitable, existing on site materials.

Site Preparation

Demolition of the existing structures should include removal of existing foundations, walls, floor slabs, pavements, sidewalks, and any loose, soft, otherwise unsuitable materials. The demolition contractor should be aware of project requirements for complete removal of existing features, observation/testing of the base of demolition excavations prior to backfilling, use of appropriate backfill materials, and proper placement/compaction/testing of backfill materials so that removal

of the demolition contractor's backfill materials and replacement under controlled conditions is not necessary when building construction commences.

Underground utility lines are likely present within the proposed construction area. If these utilities are to remain in place, we recommend that the backfill be tested by a representative of Terracon at the time of construction. If these utilities are to be relocated, the resulting trenches should be overexcavated, backfilled, and tested in accordance with the recommendations in the **Earthwork** section of this report.

In existing lawn/landscaped areas of the site, existing vegetation and root mat should be removed. Complete stripping of the topsoil should be performed in the proposed building and pavement areas. Organic soils removed during site preparation should not be used as fill beneath the proposed new building and pavement areas.

We recommend that the exposed subgrade be thoroughly evaluated by the Geotechnical Engineer prior to placement of new fill. The soils on the site are sensitive to disturbance from construction equipment traffic, particularly during wet periods. Excessively wet or dry material should either be removed or moisture conditioned and recompacted. The exposed subgrade, including areas of existing undocumented fill, should be proofrolled where possible to aid in locating loose or soft areas. If unsuitable areas are observed during construction, subgrade improvement will then be necessary to establish a suitable subgrade support condition. Potential subgrade stabilization techniques are discussed below.

- **Scarification and Recompaction** – It may be feasible to scarify, dry, and recompact the exposed soils. The success of this procedure would depend primarily upon favorable weather and sufficient time to dry the soils. Stable subgrades would likely not be achievable if the thickness of the unstable soil is greater than about 1 foot, if the unstable soil is at or near groundwater levels, or if construction is performed during a period of wet or cool weather when drying is difficult.

- **Crushed Stone** – The use of crushed stone or gravel is the most common procedure to improve subgrade stability. Typical undercut depths would be expected to range from about 6 to 30 inches below finished subgrade elevation with this procedure. The use of high modulus geosynthetics (i.e., geotextile or geogrid) could also be considered after underground work is completed. Prior to placing the geosynthetic, we recommend that all below-grade construction, such as foundation construction and utility line installation, be completed to avoid damaging the geosynthetic. Equipment should not be operated above the geosynthetic until one full lift of crushed stone fill is placed above it. The maximum particle size of granular material placed over the geosynthetic should meet the manufacturer's specifications, and generally should not exceed 1½ inches.

- **Chemical Stabilization** – Improvement of subgrades with portland cement, lime, lime kiln dust (Code L), or Class C fly ash could be considered for improving unstable soils.

Chemical modification should be performed by a prequalified contractor having experience with successfully stabilizing subgrades in the project area on similar sized projects with similar soil conditions. The results of chemical analysis of the additive materials should be provided to the Geotechnical Engineer prior to use. The hazards of chemicals blowing across the site or onto adjacent property should also be considered. Additional testing would be needed to develop specific recommendations to improve subgrade stability by blending chemicals with the site soils. Additional testing could include, but not be limited to, evaluating various stabilizing agents, the optimum amounts required, the presence of sulfates in the soil, and freeze-thaw durability of the subgrade. For estimating purposes, typical incorporation rates for chemical treatment (on a dry soil unit rate basis) are:

- 3 to 5 percent for hydrated lime, by weight;
- 5 to 7 percent for lime kiln dust (Code L), by weight; or
- 4 to 6 percent for portland cement, by weight.

Fill Material Types

Compacted structural fill should meet the following material property requirements:

Fill Type [1]	USCS Classification	Acceptable Location for Placement
High Plasticity Material	CH (LL≥70 or PI≥40)	Deeper fill areas, including at least 3 feet below floors and other lightly-loaded structures; at least 2 feet below shallow foundations; and at least 1 foot below pavement base rock
Moderate to High Plasticity Material [2]	CH or CL, with 70>LL≥45 or 40>PI≥25	Below shallow foundations; at least 2 feet below floor slabs and any other lightly-loaded structures; and at least 1 foot below pavement base rock
Granular Material [3]	GM	All locations and elevations
Low Plasticity (LP) Material [4]	CL (LL<45 & PI<25) or Granular Material [3]	

1. Compacted structural fill should consist of approved materials that are free of organic matter and debris. Frozen material should not be used, and fill should not be placed on a frozen subgrade. A sample of each material type should be submitted to Terracon for evaluation. On-site soils generally appear suitable for use as fill outside of the LP zone.
2. Delineation of moderate to high plasticity clays should be performed in the field by a qualified Geotechnical Engineer or their representative, and could require additional laboratory testing.
3. IDOT CA 6 crushed limestone aggregate or an approved alternate gradation.
4. LP material should consist of low plasticity cohesive soil or granular soil having low plasticity fines. Material should be approved by the Geotechnical Engineer.

Fill Compaction Requirements

Item	Description
Fill Lift Thickness	9 inches or less in loose thickness for heavy compaction equipment 4 to 6 inches or less in loose thickness for light, hand-operated compaction equipment
Compaction Requirements [1]	At least 95 percent of the material's maximum standard Proctor dry density
Moisture Content – Cohesive Soil	-1 to +3 percent of the optimum moisture content value as determined by the standard Proctor test
Moisture Content – Granular Material	Workable moisture levels [2]

1. We recommend that engineered fill be tested for moisture content and compaction during placement. Should the results of the in-place density tests indicate the specified moisture or compaction limits have not been met, the area represented by the test should be reworked and retested as required until the specified moisture and compaction requirements are achieved.
2. Specifically, moisture levels should be maintained low enough to allow for satisfactory compaction to be achieved without the cohesionless fill material pumping when proofrolled.

Utility Trench Backfill

All trench excavations should be made with sufficient working space to permit construction including backfill placement and compaction. If utility trenches in cohesive soils are backfilled with relatively clean granular material, they should be capped with at least 18 inches of cohesive fill in non-pavement areas to reduce the infiltration and conveyance of surface water through the trench backfill.

Utility trenches are a common source of water infiltration and migration. All utility trenches in cohesive soils that penetrate beneath buildings should be effectively sealed to restrict water intrusion and flow through the trenches that could migrate below the structure. We recommend constructing an effective clay "trench plug" that extends at least 5 feet out from the face of the structure exterior. The plug material should consist of lean clay compacted at a water content at or above the soil's optimum water content. The lean clay fill should be placed to completely surround the utility line and be compacted in accordance with the recommendations in this report. Alternately, lean concrete or flowable fill could be used to construct the trench plugs.

Grading and Drainage

All grades must provide effective drainage away from the building during and after construction and should be maintained throughout the life of the structure. Water retained next to the building can result in soil movements greater than those discussed in this report. These greater movements can result in unacceptable differential floor slab and/or foundation movements, cracked slabs and walls, and roof leaks. The roof should have gutters/drains with downspouts

that discharge onto a hard surface that slopes away from the building or onto splash blocks at a distance of at least 10 feet from the building.

Exposed ground should be sloped and maintained at a minimum 5 percent away from the building for at least 10 feet beyond the perimeter of the building. Locally, flatter grades may be necessary to transition ADA access requirements for flatwork. After completion of building construction and landscaping, final grades should be checked to document that effective drainage has been achieved. Grades around the structure should also be periodically inspected and adjusted, as necessary, as part of the structure's maintenance program. Where paving or flatwork abuts the structure, a maintenance program should be established to effectively seal and maintain joints to resist surface water infiltration.

Earthwork Construction Considerations

Upon completion of filling and grading, care should be taken to maintain the subgrade water content. Construction traffic over the completed subgrades should be avoided. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. Any water that collects over, or adjacent to, construction areas should be promptly removed. If the subgrade freezes, or becomes excessively wet or dry, or is disturbed, the affected material should be removed, or these materials should be scarified, moisture conditioned, and recompacted, prior to further construction. These processes should be observed by Terracon.

As a minimum, excavations should be performed in accordance with OSHA 29 CFR, Part 1926, Subpart P, "Excavations" and its appendices, and in accordance with any applicable local, and/or state regulations. Construction site safety is the sole responsibility of the contractor who controls the means, methods, and sequencing of construction operations. Under no circumstances shall the information provided herein be interpreted to mean Terracon is assuming any responsibility for construction site safety, or the contractor's activities; such responsibility shall neither be implied nor inferred.

PRELIMINARY SHALLOW FOUNDATION CONSIDERATIONS

Based on conditions encountered at the boring locations, it does not appear feasible to support the building(s) on shallow foundations with the anticipated structural loads. Even with a low bearing capacity, settlements on the order of 2 inches are anticipated. In our opinion, to avoid the potential for excessive settlement, we recommend supporting the structure(s) on deep foundations. In the final design, the foundations for the structure(s) should be evaluated individually based on the planned finished floor elevation and the structural loads. A ground improvement system could be utilized depending on the final design loads.

Final design bearing pressures for the buildings can be provided in a design-phase geotechnical engineering report once the building locations, sizes, structural loads, and finished floor elevations

are determined and after additional exploratory borings and laboratory testing have been completed.

GROUND IMPROVEMENT

As an alternative to supporting heavier structures on deep foundations, a ground improvement system could be installed. A ground improvement system (such as stone columns or rammed aggregate piers) generally consists of aggregate-filled piers that replace a portion of the on-site soils and improve the foundation support capability of the adjacent remaining soils. Prior to installation of ground improvement system, a layer of crushed stone aggregate is typically placed to provide to protect the subgrade from disturbance by the construction equipment. Once the ground improvement system is installed, conventional footing foundations can then be constructed to support the structures over the improved soils.

Ground improvement systems are procured on a design-build basis from specialty contractors. The design-build specialty contractor will use the subsurface information summarized on the attached boring logs, the structural loads and settlement tolerances provided by the design team, and other project information from the owner and design team to perform their analysis, formulate a design, and prepare a cost estimate. Upon request, Terracon can provide contact information for specialty contractors who are experienced with designing and installing ground improvement systems.

PRELIMINARY DEEP FOUNDATION CONSIDERATIONS

We have provided preliminary deep foundation design parameters in the sections below; however, the preliminary subsurface exploration program for this project consisted of 13 widely-spaced borings performed across the site. Terracon should be retained to perform additional field exploration and laboratory testing and to prepare a design-phase geotechnical engineering report for the development when more detailed information becomes available.

Preliminary Deep Foundation Design Parameters

Allowable compressive capacity may be computed by multiplying the end area of the shaft times the end bearing value plus the area of the shaft sides times the allowable skin friction within the various soil layers. Allowable tensile capacity may be calculated using the allowable unit skin friction in uplift for the various layers along the shaft, neglecting end bearing, and adding the weight of the shaft; only the portion of the shaft which is reinforced should be considered available to resist uplift forces.

Soil parameters for the design of the drilled shafts (also referred to as drilled piers) and augered, cast-in-place (ACIP) piles are provided below in the **Deep Foundations Design Summary** table.

Deep Foundations Design Summary [1,2]								
Approximate Depth (feet)	**Allowable Skin Friction (psf) [3]**	**Allowable End Bearing Pressure (psf) [4, 5]**	**Effective Unit Weight (pcf)**	**LPILE Soil Type**	**Cohesion (psf)**	**Internal Angle of Friction (Degrees)**	**Strain ε_{50} [6]**	**Lateral Subgrade Modulus, k (pci) [6]**
Frost Depth (0 – 3)	--	--	--	--	--	--	--	--
Loess Soils (3 to 15)	300	--	115	Soft Clay	450	--	0.020	100
Loess Soils (15 to 45)	300	--	55	Soft Clay	450	--	0.020	100
Glacial Till Outwash (Sand Layers)	850	10,000	50	Sand	--	36	--	60
Glacial Till (Below 45)	850	10,000	65	Stiff Clay without free water	3,000	--	0.004	2,000

1. Design capacities are dependent upon the method of installation, and quality control parameters. The values provided are estimates and should be verified when installation protocol have been finalized.
2. Design capacities can be increased by 33 percent for highly transient loads unless those loads have been factored to account for transient conditions.
3. Pier observation is recommended to adjust pier length if variable soil conditions are encountered.
4. Applicable for compressive loading only. Reduce to 2/3 of values shown for uplift loading. Effective weight of shaft can be added to uplift load capacity.
5. Minimum pier length of 4 diameters required. Terracon should be contacted if the pier length is less than four times the pier diameter as modifications to our design parameters may be warranted. The drilled pier must extend 3 feet, or one pier diameter, whichever is greater, into the bearing strata to achieve the full listed end bearing capacity.
6. Lateral subgrade modulus and ε_{50} values provided above are to be used with LPILE software.

The above-indicated cohesion and lateral subgrade modulus values are ultimate values without factors of safety. The end bearing is an allowable parameter with a factor of safety of 3. The skin friction values are allowable parameters with factors of safety of 2. The values given in the above table are based on our boring and past experience with similar soil types. Lateral resistance and friction in the upper 3 feet should be ignored due to the potential effects of frost action, desiccation, and drilling disturbance.

Long-term settlement of drilled shaft or ACIP foundations designed and constructed in accordance with the recommendations presented in this report is expected to be about ¾ inch or

less. These settlement estimates do not account for potential elastic shortening of the concrete or grout in the shafts/piles.

ACIP Pile Construction Considerations

ACIP piles should be spaced at least three pile diameters apart (center-to-center) to reduce the potential for group effect. If this is not possible, axial load capacity of a pile group can be determined by comparing the allowable axial capacity determined from the sum of individual piles in a group versus the capacity calculated using the perimeter of the pile group acting as a unit. The lesser of the two capacities should be used in design.

Proper ACIP pile installation is highly operator-dependent and requires a greater than average dependence on quality workmanship and quality control monitoring. In addition, the successful ACIP pile completion largely depends on the equipment and installation procedures. The auger should be withdrawn in a controlled manner and a sufficient head of grout should be maintained in the augers to prevent necking of fluid grout due to hydrostatic pressures.

Terracon should be retained to observe and document the pile installation process including soil and groundwater conditions encountered, consistency with expected conditions, and details of the installed pile.

Drilled Shaft Construction Considerations

Groundwater was encountered in Boring B-5 at a depth of 14 feet; however, groundwater was not encountered in the other borings. It may be encountered in drilled shaft excavations. In addition, the sidewalls of shaft excavations may be susceptible to caving, especially in the clayey sand layers. Therefore, temporary casing may be needed to advance drilled shaft excavations. Temporary casing should be installed if personnel will enter the shafts.

The bottom of the shaft excavations should be cleaned of any water and loose material before placing reinforcing steel and concrete. A minimum shaft diameter of at least 30 inches is recommended to facilitate clean-out and possible dewatering of the shaft excavation.

Concrete should be placed soon after excavating to reduce bearing surface disturbance. It is recommended the Geotechnical Engineer be retained to observe the foundation bearing materials. Any water that accumulates in the shaft excavation should be pumped from the excavation or the water level should be allowed to stabilize and then concrete should be placed using the tremie method.

If concrete will be placed as the temporary casing is being removed, we recommend the concrete mixture be designed with a slump of about 5 to 7 inches to reduce the potential for arching when removing the casing. While removing the casing from a shaft excavation during concrete

placement, the concrete inside the casing should be maintained at a sufficient level to resist any earth and hydrostatic pressures outside the casing during the entire casing removal procedure.

We recommend that a representative of Terracon be present during drilling activities to evaluate the materials removed from the drilled shaft excavations to document that adequate bearing materials have been reached at the base of the excavation, to observe the base of the drilled shaft excavation to document that the cuttings have been adequately removed, and also to observe concrete placement.

Although obvious signs of harmful gases such as methane, carbon monoxide, etc., were not noted in the boring during the drilling operations, gas could potentially be encountered in the drilled shaft excavations during construction. Although we do not expect (or recommend) that personnel will enter the shaft excavation, the contractor should check for gases and/or oxygen deficiency in the event that any workers need to enter the excavation. Casing will be required if personnel enter the excavation.

SEISMIC CONSIDERATIONS

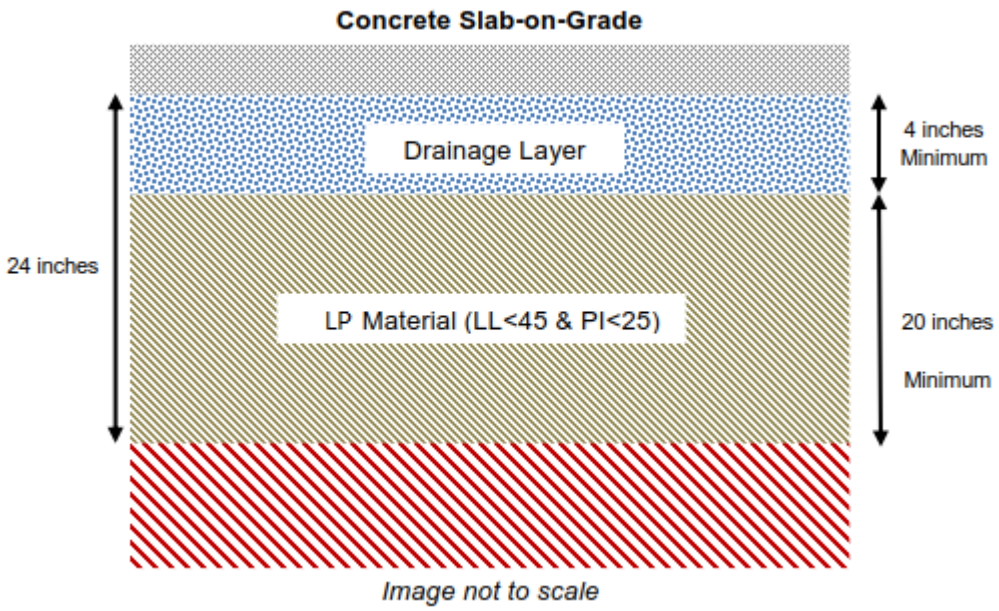
Code	Site Class
2018 International Building Code (IBC)	E [1]

1. The 2018 International Building Code (IBC) seismic site class definitions are based on average properties of the subsurface profile to a depth of 100 feet. The exploratory borings terminated within clay and sand soils at depths of approximately 10 to 80 feet. Our opinion of site class is based on the subsurface data and our knowledge of local geological and geotechnical conditions.

PRELIMINARY FLOOR SLAB CONSIDERATIONS

The subgrade soils include moderate to high plasticity clays, and these soils exhibit the potential to swell with increased water content. Construction of the floor slab, combined with the removal of existing structures and revising site drainage, creates the potential for gradual increased water contents within the clays. Increases in water content could cause the clays to swell and damage the floor slab. To reduce the swell potential, we recommend that at least the upper 24 inches of materials below the floor slab be an approved Low Plasticity (LP) material.

As previously discussed, if the owner is not willing to accept the risks of supporting floor slabs over existing undocumented fill materials, then the existing fill should be removed and replaced to support floor slabs. If the owner is willing to accept the risks of supporting the floor slab on existing fill, then at least 24 inches of newly placed LP structural fill should be placed beneath the bottom of the floor slab.



Design parameters for floor slabs assume that the requirements for **Earthwork** have been followed. Specific attention should be given to positive drainage away from the structure. This also includes positive drainage of the aggregate base beneath the floor slab.

Floor Slab Design Parameters

Item	Description
Floor slab support [1]	Minimum 4 inches of free-draining (less than 5 percent passing the U.S. No. 200 sieve) crushed aggregate compacted to at least 95 percent of ASTM D 698 [2, 3] over at least 20 inches of LP material.
Estimated modulus of subgrade reaction [2]	150 pounds per square inch per inch (psi/in) for point loads.

1. Floor slabs should be structurally independent of any building footings or walls to reduce the potential of floor slab cracking caused by differential movements between the slab and foundation.
2. Modulus of subgrade reaction is an estimated value based upon our experience with the subgrade condition, the requirements noted in **Earthwork**, and the floor slab support as noted in this table, including the 24-inch thick LP layer. It is provided for point loads. For large area loads the modulus of subgrade reaction would be lower.
3. Other design considerations, such as cold temperatures and condensation development could warrant more extensive design provisions.

The use of a vapor retarder should be considered beneath concrete slabs on grade covered with wood, tile, carpet, or other moisture sensitive or impervious coverings, or when the slab will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder,

the slab designer should refer to ACI 302 and/or ACI 360 for procedures and cautions regarding the use and placement of a vapor retarder.

Saw-cut control joints should be placed in the slab to help control the location and extent of cracking. For additional recommendations refer to ACI guidelines. Joints or any cracks that develop should be sealed with a waterproof, non-extruding compressible compound.

Where floor slabs are tied to perimeter walls or turn-down slabs to meet structural or other construction objectives, our experience indicates differential movement between the walls and slabs will likely be observed in adjacent slab expansion joints or floor slab cracks beyond the length of the structural dowels. The Structural Engineer should account for potential differential settlement through use of sufficient control joints, appropriate reinforcing, or other means.

Settlement of floor slabs supported on existing fill materials cannot be accurately predicted, but it could be larger than normal and result in some cracking. Mitigation measures as noted in **Existing Fill** within **Earthwork** are critical to the performance of floor slabs. In addition to those mitigation measures, the floor slab can be stiffened by adding steel reinforcement, grade beams, and/or post-tensioned elements.

Floor Slab Construction Considerations

Finished subgrade within the floor slab area and for at least 10 feet beyond the floor slab should be protected from traffic, rutting, or other disturbance and maintained in a relatively moist condition until floor slabs are constructed. If the subgrade should become excessively wet or dry, or damaged prior to construction of floor slabs, the affected material should be removed and structural fill should be added to replace the resulting excavation. Final conditioning of the finished subgrade should be performed immediately prior to placement of the floor slab support course.

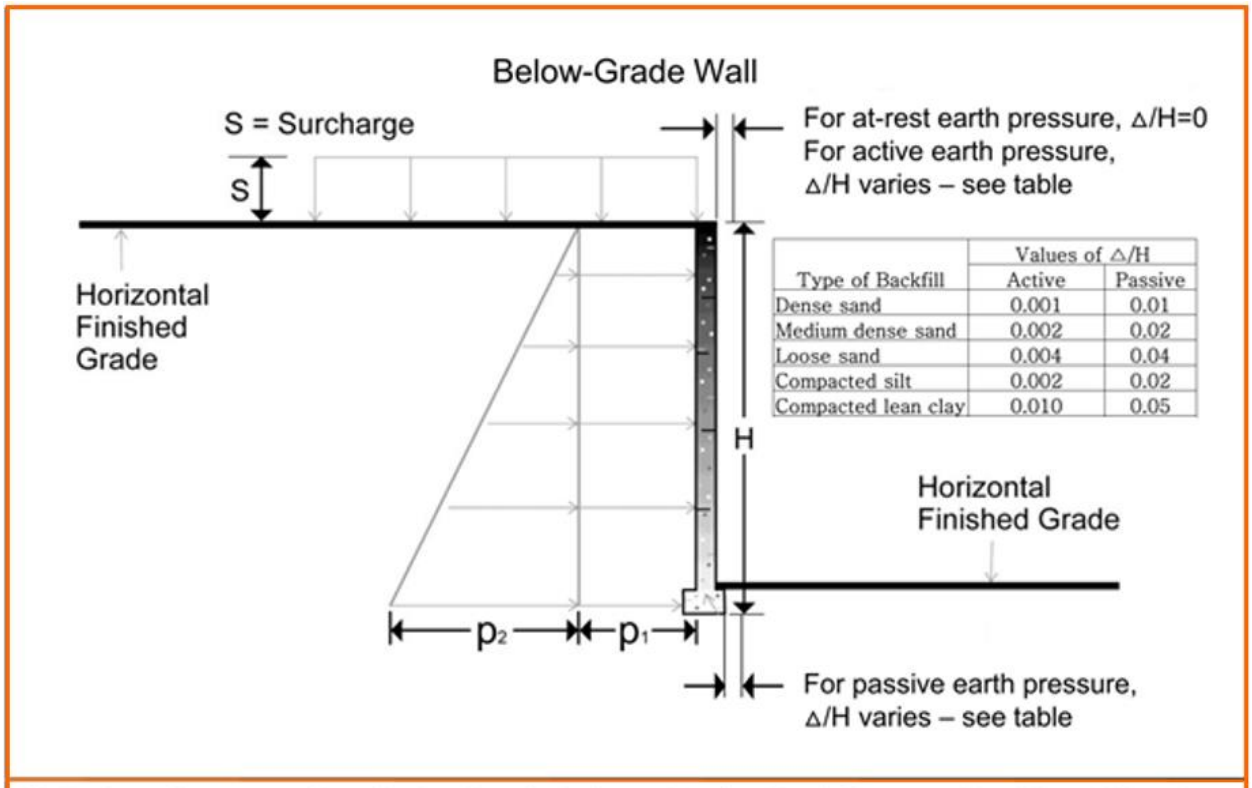
The Geotechnical Engineer should evaluate the condition of the floor slab subgrades immediately prior to placement of the floor slab support course, reinforcing steel, and concrete. Attention should be paid to high traffic areas that were rutted and disturbed earlier, and to areas where backfilled trenches are located.

LATERAL EARTH PRESSURES

Lateral Earth Pressure Design Parameters

Rigid below-grade structures with unbalanced backfill levels on opposite sides, such as reinforced concrete walls, should be designed for earth pressures at least equal to those indicated in the following table. Earth pressures will be influenced by structural design of the walls, conditions of wall restraint, methods of construction and/or compaction, and the strength of the materials being restrained. Two wall restraint conditions are shown. Active earth pressure is commonly used for

design of free-standing cantilever retaining walls and assumes wall movement. The "at-rest" condition assumes no wall movement and is commonly used for basement walls, loading dock walls, or other walls restrained at the top. The recommended design lateral earth pressures do not include a factor of safety and do not provide for possible hydrostatic pressure on the walls (unless stated). These earth pressures do not apply to mechanically stabilized earth (MSE) or segmental retaining walls.



Type of Backfill	Values of Δ/H Active	Passive
Dense sand	0.001	0.01
Medium dense sand	0.002	0.02
Loose sand	0.004	0.04
Compacted silt	0.002	0.02
Compacted lean clay	0.010	0.05

Table from Movements Required to Reach Active or Passive Earth Pressure Conditions (Clough and Duncan, 1991)

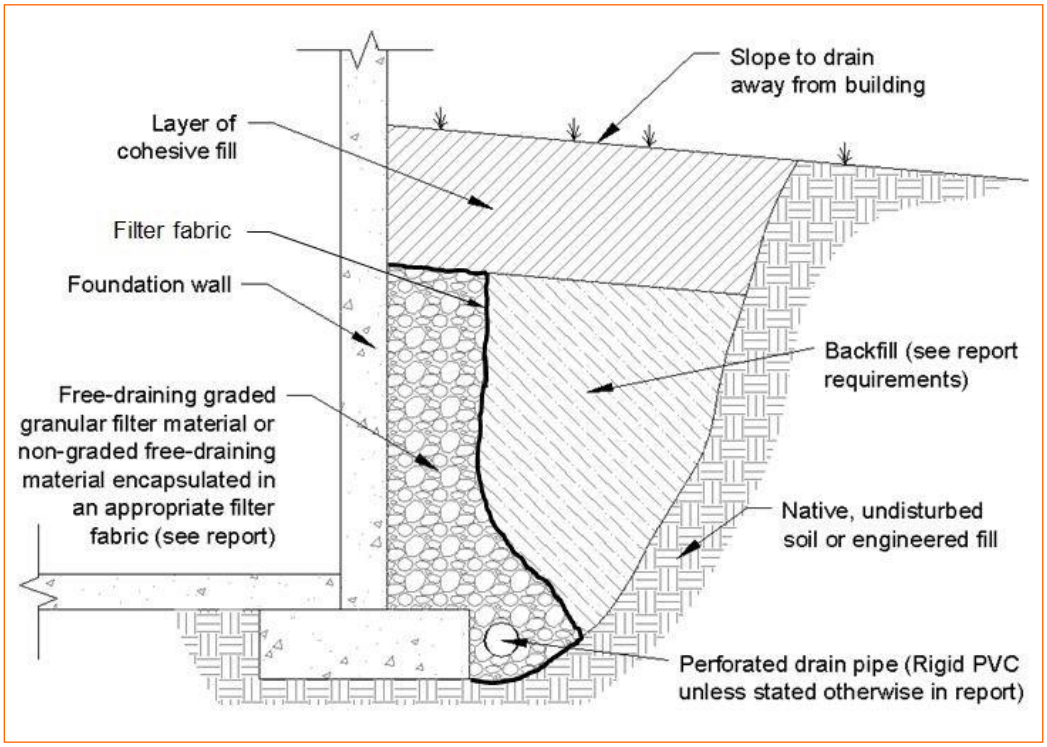
Lateral Earth Pressure Design Parameters					
Earth Pressure Condition	**Coefficient for Backfill Type**	**Minimum Φ Angle (degrees)**	**Equivalent Fluid Density (pcf)**	**Surcharge Pressure, p_1 (psf)**	**Earth Pressure, p_2 (psf)**
Active (K_a)	Granular - 0.33	30	40	(0.33)S	(40)H
	Lean Clay - 0.39	25	50	(0.39)S	(50)H
At-Rest (K_o)	Granular - 0.50	30	60	(0.50)S	(60)H
	Lean Clay - 0.56	25	70	(0.56)S	(70)H
Passive (K_p)	Granular - 3.0	30	360	---	---
	Lean Clay - 2.5	25	300	---	---

Applicable conditions to the above include:

- For active earth pressure, wall must rotate about base, with top lateral movements as indicated in the above tables
- For passive earth pressure to develop, wall must move horizontally to mobilize resistance as indicated in the above tables
- Uniform surcharge, where S is surcharge pressure
- Horizontal backfill, compacted at 95 to 98 percent of its standard Proctor maximum dry density
- Loading from heavy compaction equipment not included
- No hydrostatic pressures acting on wall
- No dynamic loading
- No safety factor included in soil parameters
- Ignore passive pressure in frost zone

Backfill placed against structures should consist of granular soils or low plasticity cohesive soils (i.e., fat clay is not acceptable backfill material). For the granular values to be valid, the granular backfill must extend out from the base of the wall at an angle of at least 45, 45 and 60 degrees from vertical for the active, at-rest and passive cases, respectively. To calculate the resistance to sliding, a value of 0.30 should be used as the ultimate coefficient of friction between the footing and the underlying soil.

A perforated rigid plastic or metal drain line installed behind the base of walls that extend below adjacent grade is recommended to limit hydrostatic loading on the walls. The invert of a drain line around a below-grade wall should be placed near foundation bearing level. The drain line should be sloped to provide positive gravity drainage or to a sump pit and pump. The drain line should be surrounded by clean, free-draining granular material having less than 5 percent (by weight) passing the U.S. No. 200 sieve. The free-draining aggregate should be encapsulated in a filter fabric. The granular fill should extend to within 2 feet of final grade, where it should be capped with compacted cohesive fill to reduce infiltration of surface water into the drain system.



As an alternative to free-draining granular fill, a pre-fabricated drainage composite may be used. A pre-fabricated drainage composite is a plastic drainage core or mesh which is covered with filter fabric to resist soil intrusion, and is fastened to the wall prior to placing backfill.

PRELMINARY PAVEMENT CONSIDERATIONS

Pavement subgrades should be prepared in accordance with the recommendations presented in **Earthwork**. Grading and paving are commonly performed by separate contractors and there is often a time lapse between the end of grading operations and the commencement of paving. Subgrades prepared early in the construction process may become disturbed by construction traffic. Non-uniform subgrades often result in poor pavement performance and local failures relatively soon after pavements are constructed. Depending on the paving equipment used by the contractor, measures may be required to improve subgrade strength to greater depths for support of heavily loaded concrete/asphalt trucks.

Pavements are typically more tolerant of non-uniform subgrade conditions than foundations and floor slabs. As discussed in **Expansive Soils**, we recommend at least 12 inches of LP material beneath the pavement base rock to reduce the shrink/swell potential of the subgrade. Support characteristics of subgrade for pavement design do not account for shrink/swell movements of an expansive clay subgrade, such as the soils encountered on this site. Thus, the pavement may be

adequate from a structural standpoint, yet still experience cracking and deformation due to shrink/swell related movement of the subgrade.

As discussed in **Existing Fill**, portions of existing undocumented fill may remain in the pavement areas if the owner is willing to accept the potential for higher than normal settlement, distress, and/or maintenance in exchange for reduced construction costs. A minimum of 12 inches of the existing fill below the pavement base rock should be replaced with newly compacted structural fill consisting of LP material. If the owner is not willing to accept the risks of supporting pavements over existing undocumented fill materials, then the existing fill should be removed and replaced to support pavements.

Before paving, pavement subgrades should be proofrolled in the presence of a Terracon representative. Proofrolling should be accomplished with a loaded tandem-axle dump truck (minimum gross weight of 20 tons) or other approved rubber-tired equipment providing an equivalent subgrade loading. Proofrolling of the subgrade should help locate soft, yielding, or otherwise unsuitable soil at or just below the exposed subgrade level. Unsuitable areas observed should be improved by scarification and compaction or be removed and replaced with engineered fill.

Pavement thickness design is dependent upon:

- the anticipated traffic conditions,
- subgrade and paving material characteristics, and
- climate conditions at the project site.

Specific information regarding anticipated vehicle types, axle loads and traffic volumes was not provided. Once traffic information becomes available, specific recommendations for pavement sections can be provided in a design-phase geotechnical report.

ADDITIONAL EXPLORATION

The preliminary subsurface exploration program for this project consisted of 13 widely-spaced borings performed across the site. Specific information about the building locations, foundation loads, planned finish floor elevation(s), and site grading was not available at the time this preliminary report was prepared. Terracon should be retained to perform additional field exploration and laboratory testing and to prepare a design-phase geotechnical engineering report for the development when more detailed information becomes available.

GENERAL COMMENTS

The general geotechnical considerations contained in this report should be considered for preliminary planning purposes only. Specific information about the anticipated building locations,

foundation loads, planned finished floor elevation(s) and site grading was not available at the time this preliminary report was prepared. Terracon should be retained to provide additional subsurface exploration and prepare a design-phase geotechnical report so that specific geotechnical recommendations and design parameters can be provided.

Support of floor slabs and pavements over existing fill are discussed in this report. However, even with the recommended construction testing, there is a risk that unsuitable materials within or buried by the fill will not be discovered. This risk cannot be eliminated without removing the fill but can be reduced by thorough exploration and testing.

Underground mining has been documented in the vicinity of the site, and a coal mine map from the Illinois Geological Survey is attached. Our scope of services does not include exploration or research into prior underground mining beneath the site. Evidence of mining was not encountered in our limited subsurface exploration; however, mining operations usually occur at depths greater than those explored. If the client is concerned about this potential risk, further studies should be undertaken.

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Natural variations may occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during construction. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Our scope of services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence or collaboration through this system are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third party beneficiaries intended. Any third party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client, and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation costs. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as

there may be variations on the site that are not apparent in the data that could significantly impact excavation costs. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety, cost estimating, excavation support, and dewatering requirements/design are the responsibility of others. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES

Field Exploration

Boring No.	Boring Depth (feet)	Location
B-1	80	Option 3 Building Area
B-2	30	Option 3 Building Area, Option 1 Parking Area
B-3	50	Option 2 & 3 Building Areas, Option 1 Parking Area
B-4	30	Option 3 Building Area, Option 1 & 2 Parking Areas
B-5	80	Option 3 Building Area, Option 1 & 2 Parking Areas
B-6	30	Option 1 & 2 Building Areas
B-7	50	Option 1 Building Area
B-8	80	Option 1 Building Area
B-9	30	Option 1 & 2 Building Areas
B-10	30	Option 1 Building Area
B-11	80	Option 1 & 2 Building Areas
B-12	10	Option 1,2, & 3 Parking Areas
B-13	10	Option 1,2, & 3 Parking Areas

Boring Layout and Elevations: Terracon personnel provided the boring layout. Coordinates were obtained with a handheld GPS unit (estimated horizontal accuracy of about ±20 feet). Approximate elevations were obtained from Google Earth. If more precise elevations and boring locations are desired, we recommend the borings be surveyed.

Subsurface Exploration Procedures: We advanced the borings with an ATV-mounted rotary drill rig using continuous flight, hollow-stem augers or mud rotary drilling methods. Sampling was performed using thin-walled tube and split-barrel sampling procedures.

In the thin-walled tube sampling procedure, a seamless thin-walled steel tube with a sharpened beveled edge is pushed hydraulically into the cohesive or moderately cohesive soil at a selected depth at the base of the borehole. A relatively undisturbed sample of the soil is retained in the tube and extracted in the laboratory for further testing.

In the split-barrel sampling procedure, the number of blows required to advance a standard 2-inch (outside diameter) split-barrel sampler the last 12 inches of the typical total 18-inch penetration by means of a 140-pound automatic hammer with a free fall of 30 inches, is the standard penetration resistance (SPT N-value). This value is used to estimate the in-situ relative density of cohesionless soils and the consistency of cohesive soils.

The sampling depths, penetration distances, and other sampling information were recorded on the field boring logs. The samples were placed in appropriate containers and taken to our laboratory for testing and classification by a Geotechnical Engineer. Our exploration team prepared field boring logs as part of the drilling operations. These field logs included visual classifications of the materials encountered during drilling and our interpretation of the subsurface conditions between samples. Boring logs were prepared from the field logs. The boring logs represent the Geotechnical Engineer's interpretation of the field logs and include modifications based on observations and tests of the samples in our laboratory.

Laboratory Testing

Selected soil samples were tested in the laboratory to measure their natural water content and Atterberg limits. The test results are provided on the boring logs included in **Exploration Results**.

The soil samples were classified in the laboratory based on visual observation, texture, plasticity, and the laboratory testing described above. The soil descriptions presented on the boring logs are in accordance with the enclosed General Notes and the Unified Soil Classification System (USCS). The estimated USCS group symbols for native soils are shown on the boring logs, and a brief description of the USCS is included in this report.

SITE LOCATION AND EXPLORATION PLANS

Contents:

Site Location Plan
Exploration Plan
Coal Mine Map

Note: All attachments are one page unless noted above.

SITE LOCATION

SIUE Health Sciences Building ■ Edwardsville, Illinois
September 15, 2021 ■ Terracon Project No. 15215038

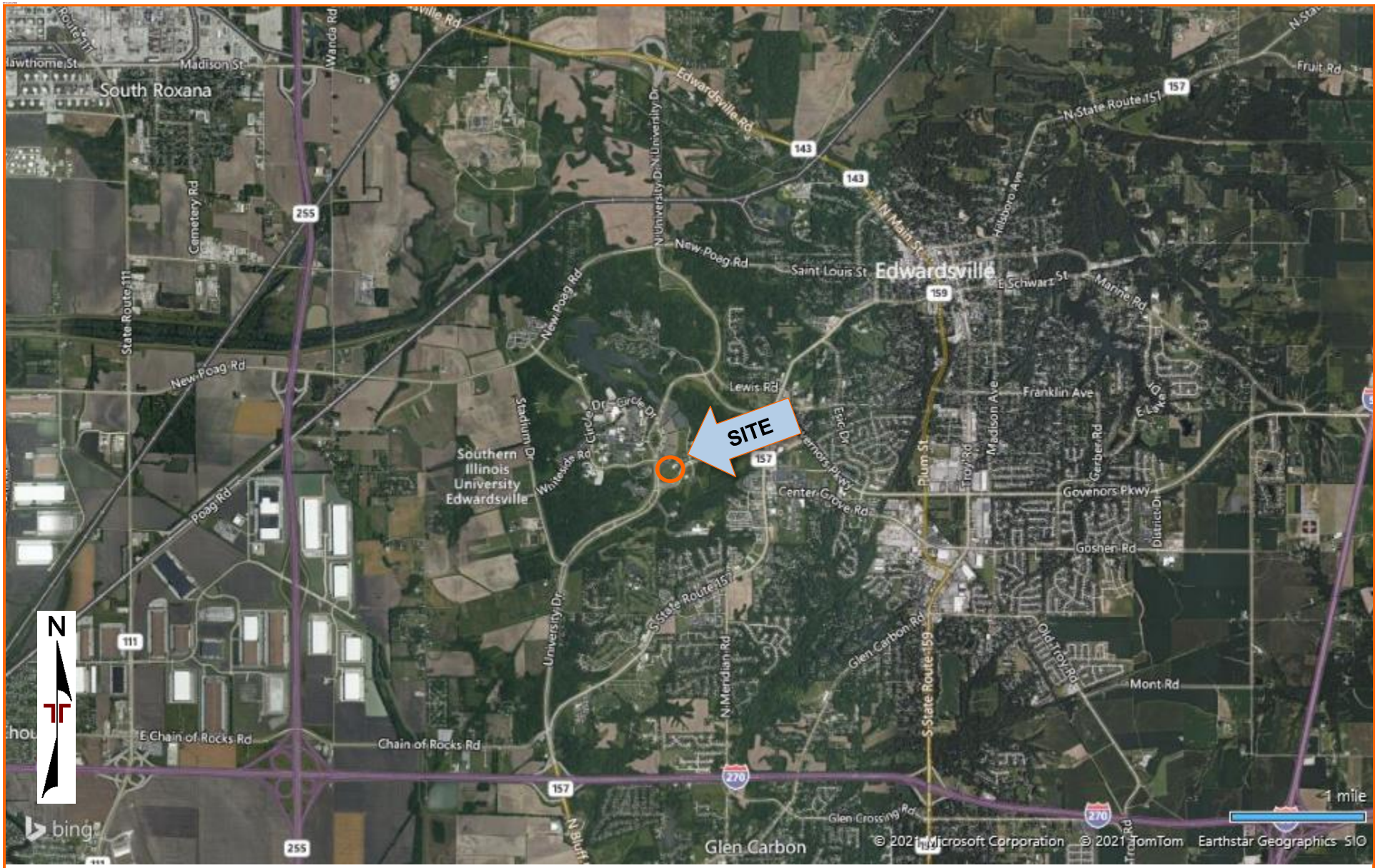


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

EXPLORATION PLAN

SIUE Health Sciences Building ■ Edwardsville, Illinois
September 15, 2021 ■ Terracon Project No. 15215038

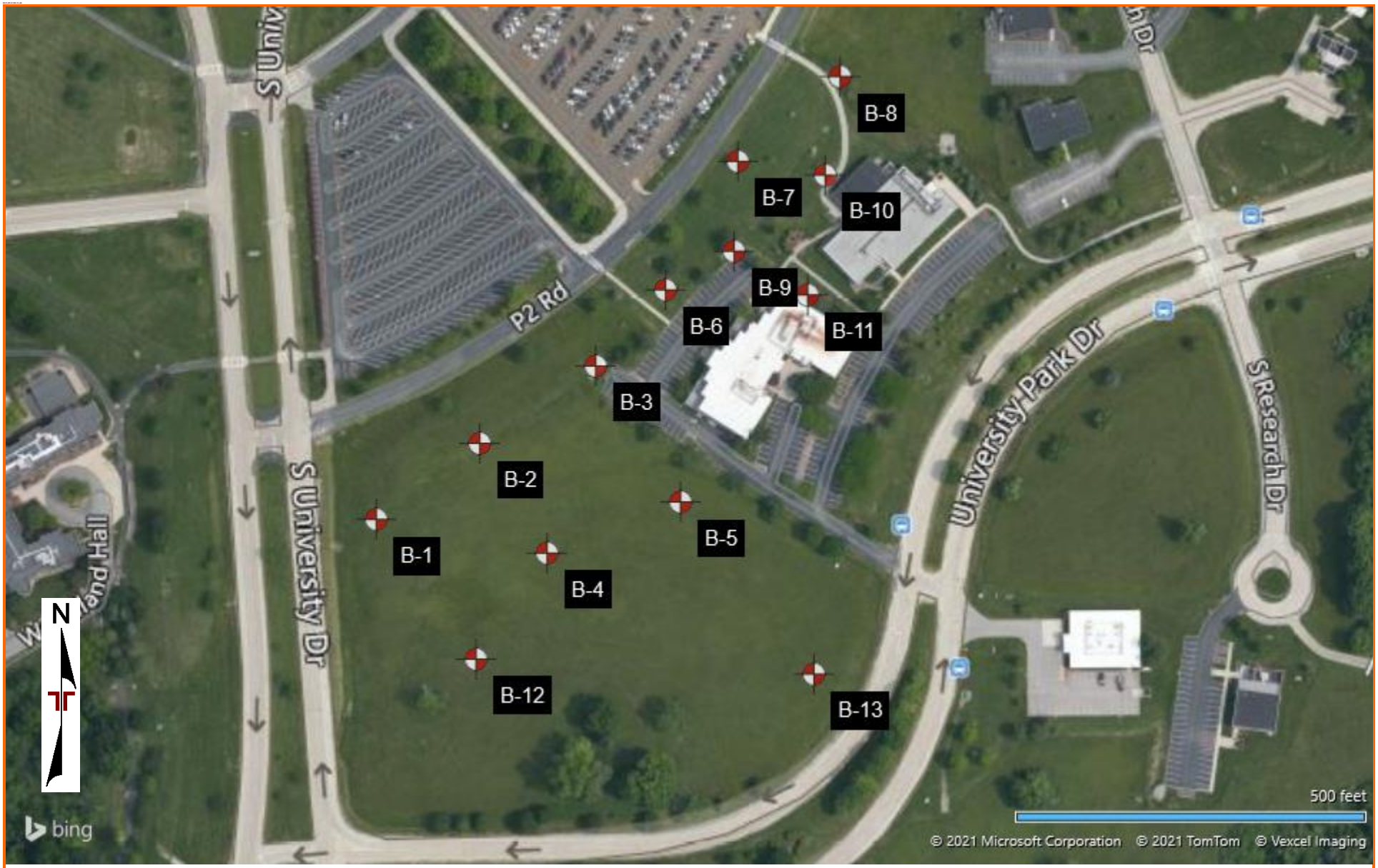


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

COAL MINE MAP

SIUE Health Sciences Building ■ Edwardsville, Illinois

September 15, 2021 ■ Terracon Project No. 15215038

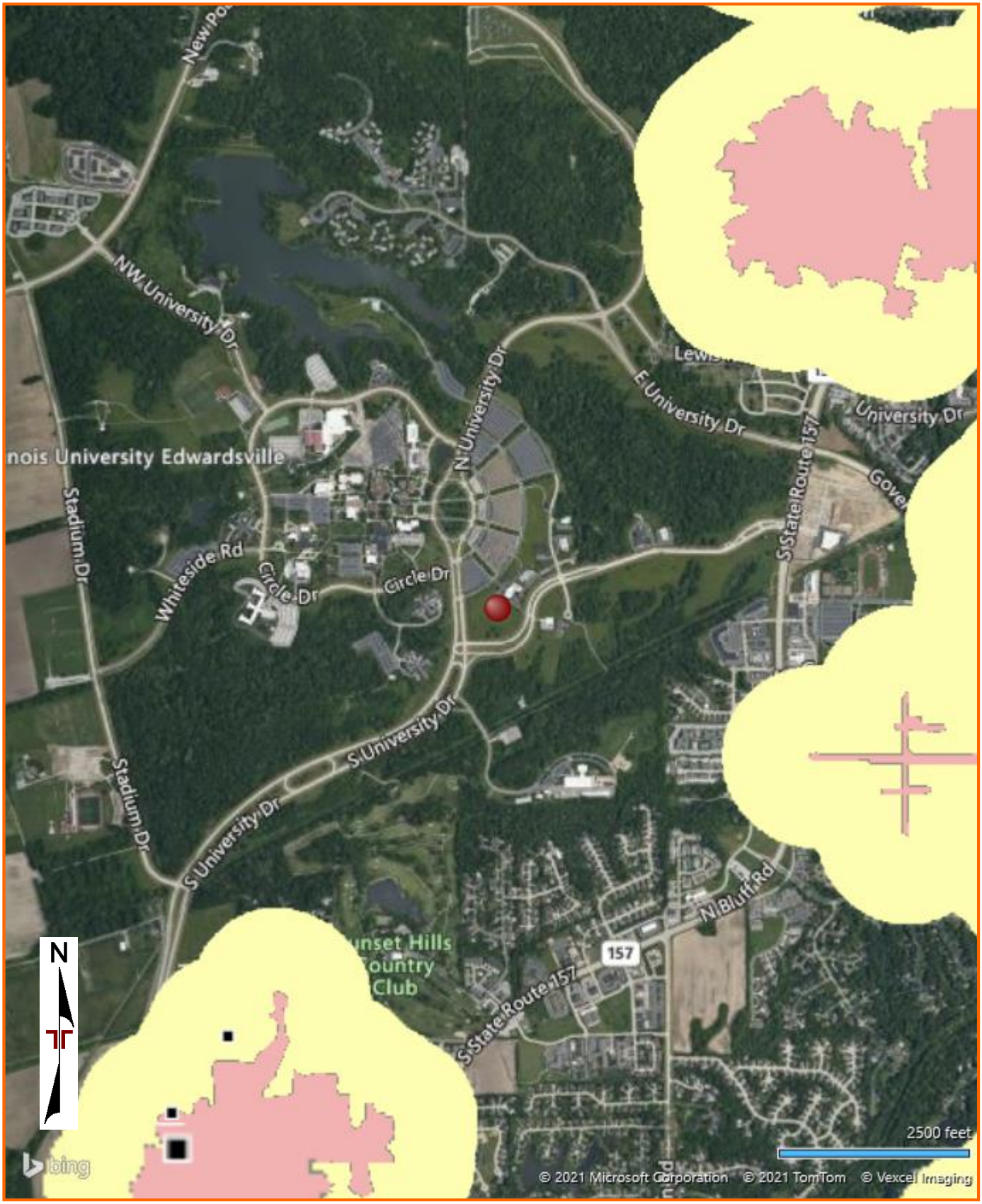


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

COAL MINE MAP COURTESY OF THE ILLINOIS STAE GEOLOGIC SURVEY

EXPLORATION RESULTS

Contents:

Boring Logs (B-1 through B-13)
GeoModel

Note: All attachments are one page unless noted above.

BORING LOG NO. B-1

PROJECT: SIUE Health Sciences Building

CLIENT: Hellmuth Obata Kassabaum Inc (HOK)
St. Louis, MO

SITE: University Park Drive
Edwardsville, IL

LOCATION See Exploration Plan

Latitude: 38.7896° Longitude: -89.9936°

Approximate Surface Elev.: 560 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	MODEL LAYER	DESCRIPTION
0.2	560+/-		**ROOT ZONE**, approx. 2"
			LEAN CLAY (CL), with silt, brown, medium stiff to stiff
12.0	548+/-	2	**LEAN CLAY (CL)**, trace silt, gray, soft to medium stiff

DEPTH (Ft.)	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
	10	3-4-5 N=9	1		25.4		
5	12	2-3-3 N=6	2		26.8		34-23-11
	20		3	1450	26.8	105	
10	13	1-3-2 N=5	4		27.9		
15	14	1-2-2 N=4	5		24.9		
20	16	1-1-2 N=3	6		28.0		
25	17	1-2-2 N=4	7		28.0		

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
0 to 13.5 feet: Hollow-Stem Augers
13.5 to 80 feet: Mud Rotary

Abandonment Method:
Boring backfilled with auger cuttings and bentonite chips upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were obtained from Google Earth.

Notes:

WATER LEVEL OBSERVATIONS

None observed prior to introducing drilling fluid

Terracon
11600 Lilburn Park Rd
Saint Louis, MO

Boring Started: 08-20-2021
Boring Completed: 08-20-2021
Drill Rig: 603
Driller: SZ
Project No.: 15215038

BORING LOG NO. B-1

PROJECT: SIUE Health Sciences Building

CLIENT: Hellmuth Obata Kassabaum Inc (HOK)
St. Louis, MO

SITE: University Park Drive
Edwardsville, IL

LOCATION See Exploration Plan

Latitude: 38.7896° Longitude: -89.9936°

Approximate Surface Elev.: 560 (Ft.) +/-

DEPTH ELEVATION (Ft.)

MODEL LAYER	DEPTH	ELEVATION (Ft.)	DESCRIPTION
2	27.0	533+/-	**LEAN CLAY (CL)**, trace silt, gray, soft to medium stiff *(continued)*
3	37.0	523+/-	**SANDY LEAN CLAY (CL)**, gray and brown, soft to medium stiff
			SANDY LEAN CLAY (CL), trace gravel, brown and gray, stiff to hard

DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	WATER CONTENT (%)
30	X	17	1-2-2 N=4	8	26.2
35	X	18	1-1-1 N=2	9	20.7
40	X	18	4-6-5 N=11	10	15.1
45	X	16	3-3-5 N=8	11	14.0
50	X	15	9-12-14 N=26	12	13.6

WATER LEVEL OBSERVATIONS | UNCONFINED COMPRESSIVE STRENGTH (psf) | DRY UNIT WEIGHT (pcf) | ATTERBERG LIMITS LL-PL-PI

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
0 to 13.5 feet: Hollow-Stem Augers
13.5 to 80 feet: Mud Rotary

Abandonment Method:
Boring backfilled with auger cuttings and bentonite chips upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were obtained from Google Earth.

Notes:

WATER LEVEL OBSERVATIONS

None observed prior to introducing drilling fluid

Terracon
11600 Lilburn Park Rd
Saint Louis, MO

Boring Started: 08-20-2021 | Boring Completed: 08-20-2021
Drill Rig: 603 | Driller: SZ
Project No.: 15215038

BORING LOG NO. B-1

PROJECT: SIUE Health Sciences Building

CLIENT: Hellmuth Obata Kassabaum Inc (HOK)
St. Louis, MO

SITE: University Park Drive
Edwardsville, IL

LOCATION See Exploration Plan

Latitude: 38.7896° Longitude: -89.9936°

Approximate Surface Elev.: 560 (Ft.) +/-

DEPTH ELEVATION (Ft.)

MODEL LAYER	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
3		**SANDY LEAN CLAY (CL)**, trace gravel, brown and gray, stiff to hard *(continued)*									
		55		X	15	7-18-11 N=29	13		13.0		
		60		X	16	7-9-10 N=19	14		19.7		
		65		X	17	14-17-17 N=34	15		15.4		
		70		X	14	3-6-7 N=13	16		15.4		
		75		X	15	6-7-7 N=14	17		15.0		

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
0 to 13.5 feet: Hollow-Stem Augers
13.5 to 80 feet: Mud Rotary

Abandonment Method:
Boring backfilled with auger cuttings and bentonite chips upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were obtained from Google Earth.

Notes:

WATER LEVEL OBSERVATIONS

None observed prior to introducing drilling fluid

Terracon
11600 Lilburn Park Rd
Saint Louis, MO

Boring Started: 08-20-2021 | Boring Completed: 08-20-2021
Drill Rig: 603 | Driller: SZ
Project No.: 15215038

BORING LOG NO. B-1

PROJECT: SIUE Health Sciences Building

CLIENT: Hellmuth Obata Kassabaum Inc (HOK)
St. Louis, MO

SITE: University Park Drive
Edwardsville, IL

LOCATION See Exploration Plan

Latitude: 38.7896° Longitude: -89.9936°

Approximate Surface Elev.: 560 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
3		**SANDY LEAN CLAY (CL)**, trace gravel, brown and gray, stiff to hard *(continued)*											
						X	16	3-6-7 N=13	18		12.9		
		80.0	480+/-	80									
		Boring Terminated at 80 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
0 to 13.5 feet: Hollow-Stem Augers
13.5 to 80 feet: Mud Rotary

Abandonment Method:
Boring backfilled with auger cuttings and bentonite chips upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were obtained from Google Earth.

Notes:

WATER LEVEL OBSERVATIONS

None observed prior to introducing drilling fluid

Terracon
11600 Lilburn Park Rd
Saint Louis, MO

Boring Started: 08-20-2021	Boring Completed: 08-20-2021
Drill Rig: 603	Driller: SZ
Project No.: 15215038	

BORING LOG NO. B-2

PROJECT: SIUE Health Sciences Building

CLIENT: Hellmuth Obata Kassabaum Inc (HOK)
St. Louis, MO

SITE: University Park Drive
Edwardsville, IL

LOCATION See Exploration Plan

Latitude: 38.7899° Longitude: -89.9931°

Approximate Surface Elev.: 566 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	MODEL LAYER	DESCRIPTION
0.2	566+/-		**ROOT ZONE**, approx. 2"
		2	**FAT CLAY (CH)**, trace sand, brown, medium stiff to stiff
6.0	560+/-		**LEAN CLAY (CL)**, with silt, brown and gray, soft to medium stiff

DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
		10	2-3-4 N=7	1		22.7		58-21-37
5		9		2	3870	25.9	104	
		17	1-1-2 N=3	3		26.0		
10		14	1-2-3 N=5	4		26.4		
		15	1-2-2 N=4	5		28.6		
15								
		14	1-1-2 N=3	6		27.4		
20								
		13	1-2-2 N=4	7		28.0		
25								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow-Stem Augers

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were obtained from Google Earth.

Notes:

WATER LEVEL OBSERVATIONS

None observed during or after drilling

Terracon
11600 Lilburn Park Rd
Saint Louis, MO

Boring Started: 08-19-2021
Boring Completed: 08-19-2021
Drill Rig: 603
Driller: SZ
Project No.: 15215038

BORING LOG NO. B-2

PROJECT: SIUE Health Sciences Building

CLIENT: Hellmuth Obata Kassabaum Inc (HOK)
St. Louis, MO

SITE: University Park Drive
Edwardsville, IL

LOCATION See Exploration Plan

Latitude: 38.7899° Longitude: -89.9931°

Approximate Surface Elev.: 566 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
2		**LEAN CLAY (CL)**, with silt, brown and gray, soft to medium stiff *(continued)*											
		30.0	536+/-			X	15	1-2-2 N=4	8		28.4		
		Boring Terminated at 30 Feet		30									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow-Stem Augers

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were obtained from Google Earth.

Notes:

WATER LEVEL OBSERVATIONS

None observed during or after drilling

Terracon
11600 Lilburn Park Rd
Saint Louis, MO

Boring Started: 08-19-2021
Boring Completed: 08-19-2021
Drill Rig: 603
Driller: SZ
Project No.: 15215038

BORING LOG NO. B-3

PROJECT: SIUE Health Sciences Building

CLIENT: Hellmuth Obata Kassabaum Inc (HOK)
St. Louis, MO

SITE: University Park Drive
Edwardsville, IL

LOCATION See Exploration Plan

Latitude: 38.7902° Longitude: -89.9925°

Approximate Surface Elev.: 569 (Ft.) +/-

MODEL LAYER	DEPTH	ELEVATION (Ft.)	Description
1	0.2	569+/-	**ROOT ZONE**, approx. 2"
1			**FILL - LEAN CLAY**, trace silt and sand, brown
1	6.0	563+/-	
2			**FAT CLAY (CH)**, trace sand, gray with brown, stiff
2	9.0	560+/-	
2			**LEAN CLAY (CL)**, with silt, brown and gray, soft to medium stiff
2	22.0	547+/-	
2			**LEAN CLAY (CL)**, with organics and silt, dark gray, soft to medium stiff

DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
		10	4-6-5 N=11	1		20.4		
5		9	4-5-6 N=11	2		22.8		
		9		3	3610	27.8	98	
10		17	1-2-2 N=4	4		26.6		
15		16	1-1-2 N=3	5		28.3		
20		16	1-1-2 N=3	6		26.7		
25		14	2-2-2 N=4	7		41.1		

WATER LEVEL OBSERVATIONS

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow-Stem Augers

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were obtained from Google Earth.

Notes:

WATER LEVEL OBSERVATIONS

None observed during or after drilling

Terracon
11600 Lilburn Park Rd
Saint Louis, MO

Boring Started: 08-19-2021
Boring Completed: 08-19-2021
Drill Rig: 603
Driller: SZ
Project No.: 15215038

BORING LOG NO. B-3

PROJECT: SIUE Health Sciences Building

CLIENT: Hellmuth Obata Kassabaum Inc (HOK)
St. Louis, MO

SITE: University Park Drive
Edwardsville, IL

LOCATION See Exploration Plan

Latitude: 38.7902° Longitude: -89.9925°

Approximate Surface Elev.: 569 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
2		**LEAN CLAY (CL)**, with organics and silt, dark gray, soft to medium stiff *(continued)*											
		27.0	542+/-										
		LEAN CLAY (CL), with silt, gray, soft to medium stiff											
						X	14	1-1-2 N=3	8		26.4		
				30									
						X	15	1-2-2 N=4	9		26.7		
				35									
		37.0	532+/-										
		LEAN CLAY (CL), brownish gray, soft to medium stiff											
						X	17	1-2-2 N=4	10		24.3		
				40									
		42.0	527+/-										
4		**SANDY LEAN CLAY (CL)**, gray and brown, soft to medium stiff											
						X	18	1-2-2 N=4	11		20.1		
				45									
						X	18	2-3-4 N=7	12		13.9		
		50.0	519+/-	50									
		Boring Terminated at 50 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow-Stem Augers

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were obtained from Google Earth.

Notes:

WATER LEVEL OBSERVATIONS

None observed during or after drilling

Terracon
11600 Lilburn Park Rd
Saint Louis, MO

Boring Started: 08-19-2021
Boring Completed: 08-19-2021
Drill Rig: 603
Driller: SZ
Project No.: 15215038

BORING LOG NO. B-4

PROJECT: SIUE Health Sciences Building

CLIENT: Hellmuth Obata Kassabaum Inc (HOK)
St. Louis, MO

SITE: University Park Drive
Edwardsville, IL

LOCATION See Exploration Plan

Latitude: 38.7895° Longitude: -89.9928°

Approximate Surface Elev.: 567 (Ft.) +/-

MODEL LAYER	DEPTH	ELEVATION (Ft.)	DESCRIPTION
1	0.2	567+/-	**ROOT ZONE**, approx. 2"
			FILL - FAT CLAY, brown
	3.0	564+/-	
2			**FAT CLAY (CH)**, brown and gray, medium stiff
	9.0	558+/-	
			FAT CLAY (CH), brownish gray, medium stiff
	12.0	555+/-	
			LEAN CLAY (CL), trace silt, brown and gray, soft to medium stiff

DEPTH (Ft.)	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
	9	3-4-5 N=9	1		20.9		
5	7	3-3-4 N=7	2		23.7		
	17		3	1650	23.3	108	
10	9	2-3-3 N=6	4		28.6		
15	12	1-2-3 N=5	5		26.6		
20	16	1-2-3 N=5	6		26.7		
25	14	1-1-2 N=3	7		27.9		

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow-Stem Augers

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were obtained from Google Earth.

Notes:

WATER LEVEL OBSERVATIONS

None observed during or after drilling

Terracon
11600 Lilburn Park Rd
Saint Louis, MO

Boring Started: 08-19-2021
Boring Completed: 08-19-2021
Drill Rig: 603
Driller: SZ
Project No.: 15215038

BORING LOG NO. B-4

PROJECT: SIUE Health Sciences Building

CLIENT: Hellmuth Obata Kassabaum Inc (HOK)
St. Louis, MO

SITE: University Park Drive
Edwardsville, IL

LOCATION See Exploration Plan

Latitude: 38.7895° Longitude: -89.9928°

Approximate Surface Elev.: 567 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
2		**LEAN CLAY (CL)**, trace silt, brown and gray, soft to medium stiff *(continued)*											
		30.0	537+/-			X	18	1-2-2 N=4	8		27.4		
		Boring Terminated at 30 Feet		30									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow-Stem Augers

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were obtained from Google Earth.

Notes:

WATER LEVEL OBSERVATIONS

None observed during or after drilling

Terracon
11600 Lilburn Park Rd
Saint Louis, MO

Boring Started: 08-19-2021	Boring Completed: 08-19-2021
Drill Rig: 603	Driller: SZ
Project No.: 15215038	

BORING LOG NO. B-5

PROJECT: SIUE Health Sciences Building

CLIENT: Hellmuth Obata Kassabaum Inc (HOK)
St. Louis, MO

SITE: University Park Drive
Edwardsville, IL

LOCATION See Exploration Plan

Latitude: 38.7897° Longitude: -89.9921°

Approximate Surface Elev.: 571 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	MODEL LAYER	DESCRIPTION
0.2	571+/-	1	**ROOT ZONE**, approx. 2"
		1	**FILL - FAT CLAY**, brown
3.0	568+/-	2	**LEAN CLAY (CL)**, with silt, brown and gray, soft to stiff

DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
			10	2-2-3 N=5	1		22.1		
5			11	1-2-2 N=4	2		20.5		
			22		3	1790	26.4	107	
10			13	4-5-5 N=10	4		25.8		
15	▽		15	1-2-2 N=4	5		26.9		
20			14	1-1-3 N=4	6		26.3		
25			6	1-1-1 N=2	7		30.1		

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
0 to 13.5 feet: Hollow-Stem Augers
13.5 to 80 feet: Mud Rotary

Abandonment Method:
Boring backfilled with auger cuttings and bentonite chips upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were obtained from Google Earth.

Notes:

WATER LEVEL OBSERVATIONS

▽ *14 feet during drilling*

Terracon
11600 Lilburn Park Rd
Saint Louis, MO

Boring Started: 08-19-2021 | Boring Completed: 08-19-2021
Drill Rig: 603 | Driller: SZ
Project No.: 15215038

BORING LOG NO. B-5

PROJECT: SIUE Health Sciences Building

CLIENT: Hellmuth Obata Kassabaum Inc (HOK)
St. Louis, MO

SITE: University Park Drive
Edwardsville, IL

LOCATION See Exploration Plan

Latitude: 38.7897° Longitude: -89.9921°

Approximate Surface Elev.: 571 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DESCRIPTION
2				**LEAN CLAY (CL)**, with silt, brown and gray, soft to stiff *(continued)*
		32.0	539+/-	
3				**SANDY LEAN CLAY (CL)**, gray, soft
		42.0	529+/-	
				SANDY LEAN CLAY (CL), trace gravel, brown and gray, stiff to hard

DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
30		X	14	1-2-2 N=4	8		26.2		
35		X	18	1-1-1 N=2	9		22.3		
40		X	18	1-1-1 N=2	10		21.5		
45		X	16	6-5-7 N=12	11		13.1		
50		X	15	3-5-6 N=11	12		12.3		

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
0 to 13.5 feet: Hollow-Stem Augers
13.5 to 80 feet: Mud Rotary

Abandonment Method:
Boring backfilled with auger cuttings and bentonite chips upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were obtained from Google Earth.

Notes:

WATER LEVEL OBSERVATIONS

14 feet during drilling

Terracon
11600 Lilburn Park Rd
Saint Louis, MO

Boring Started: 08-19-2021
Boring Completed: 08-19-2021
Drill Rig: 603
Driller: SZ
Project No.: 15215038

BORING LOG NO. B-5

PROJECT: SIUE Health Sciences Building

CLIENT: Hellmuth Obata Kassabaum Inc (HOK)
St. Louis, MO

SITE: University Park Drive
Edwardsville, IL

LOCATION See Exploration Plan

Latitude: 38.7897° Longitude: -89.9921°

Approximate Surface Elev.: 571 (Ft.) +/-

DEPTH ELEVATION (Ft.)

MODEL LAYER	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
3		**SANDY LEAN CLAY (CL)**, trace gravel, brown and gray, stiff to hard *(continued)*									
		55		X	14	15-23-24 N=47	13		9.4		
		60		X	14	4-6-8 N=14	14		14.7		
		65		X	14	6-7-8 N=15	15		14.5		
		70		X	12	10-10-11 N=21	16		13.2		
		75		X	14	5-7-9 N=16	17		13.2		

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
0 to 13.5 feet: Hollow-Stem Augers
13.5 to 80 feet: Mud Rotary

Abandonment Method:
Boring backfilled with auger cuttings and bentonite chips upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were obtained from Google Earth.

Notes:

WATER LEVEL OBSERVATIONS

14 feet during drilling

Terracon
11600 Lilburn Park Rd
Saint Louis, MO

Boring Started: 08-19-2021 | Boring Completed: 08-19-2021

Drill Rig: 603 | Driller: SZ

Project No.: 15215038

BORING LOG NO. B-5

PROJECT: SIUE Health Sciences Building

CLIENT: Hellmuth Obata Kassabaum Inc (HOK)
St. Louis, MO

SITE: University Park Drive
Edwardsville, IL

LOCATION See Exploration Plan

Latitude: 38.7897° Longitude: -89.9921°

Approximate Surface Elev.: 571 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
3		**SANDY LEAN CLAY (CL)**, trace gravel, brown and gray, stiff to hard *(continued)*											
						X	13	5-9-10 N=19	18		12.3		
		80.0	491+/-	80									
		Boring Terminated at 80 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
0 to 13.5 feet: Hollow-Stem Augers
13.5 to 80 feet: Mud Rotary

Abandonment Method:
Boring backfilled with auger cuttings and bentonite chips upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were obtained from Google Earth.

Notes:

WATER LEVEL OBSERVATIONS

14 feet during drilling

Terracon
11600 Lilburn Park Rd
Saint Louis, MO

Boring Started: 08-19-2021	Boring Completed: 08-19-2021
Drill Rig: 603	Driller: SZ
Project No.: 15215038	

BORING LOG NO. B-6

PROJECT: SIUE Health Sciences Building

CLIENT: Hellmuth Obata Kassabaum Inc (HOK)
St. Louis, MO

SITE: University Park Drive
Edwardsville, IL

LOCATION See Exploration Plan

Latitude: 38.7905° Longitude: -89.9922°

Approximate Surface Elev.: 571 (Ft.) +/-

MODEL LAYER	DEPTH	ELEVATION (Ft.)	DESCRIPTION
	0.2	571+/-	**ROOT ZONE**, approx. 2"
1			**FILL - LEAN CLAY**, trace sand and gravel, brown
	3.0	568+/-	
1			**FILL - LEAN CLAY**, trace silt, brown and gray
	6.0	565+/-	
2			**FAT CLAY (CH)**, trace sand, brown, stiff
	9.0	562+/-	
2			**LEAN CLAY (CL)**, with silt, brown and gray, soft to medium stiff
	22.0	549+/-	
2			**LEAN CLAY (CL)**, with organics and silt, dark gray, soft to medium stiff

DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
		8	5-6-6 N=12	1		17.7		
5		12	5-6-7 N=13	2		17.1		
		10		3	3550	27.0	101	
10		11	1-2-2 N=4	4		25.3		56-21-35
15		14	1-2-2 N=4	5		24.9		
20		16	1-1-2 N=3	6		26.9		
25		15	1-2-2 N=4	7		40.4		

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow-Stem Augers

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were obtained from Google Earth.

Notes:

WATER LEVEL OBSERVATIONS

None observed during or after drilling

Terracon
11600 Lilburn Park Rd
Saint Louis, MO

Boring Started: 08-18-2021
Boring Completed: 08-18-2021
Drill Rig: 603
Driller: SZ
Project No.: 15215038

BORING LOG NO. B-6

PROJECT: SIUE Health Sciences Building

CLIENT: Hellmuth Obata Kassabaum Inc (HOK)
St. Louis, MO

SITE: University Park Drive
Edwardsville, IL

LOCATION See Exploration Plan

Latitude: 38.7905° Longitude: -89.9922°

Approximate Surface Elev.: 571 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
2		**LEAN CLAY (CL)**, with organics and silt, dark gray, soft to medium stiff *(continued)*											
		27.0	544+/-										
		LEAN CLAY (CL), with silt, gray, soft to medium stiff											
		30.0	541+/-			X	16	1-2-2 N=4	8		27.2		
		Boring Terminated at 30 Feet		30									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow-Stem Augers

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were obtained from Google Earth.

Notes:

WATER LEVEL OBSERVATIONS

None observed during or after drilling

Terracon
11600 Lilburn Park Rd
Saint Louis, MO

Boring Started: 08-18-2021
Boring Completed: 08-18-2021
Drill Rig: 603
Driller: SZ
Project No.: 15215038

BORING LOG NO. B-7

PROJECT: SIUE Health Sciences Building

CLIENT: Hellmuth Obata Kassabaum Inc (HOK)
St. Louis, MO

SITE: University Park Drive
Edwardsville, IL

LOCATION See Exploration Plan

Latitude: 38.7910° Longitude: -89.9918°

Approximate Surface Elev.: 570 (Ft.) +/-

MODEL LAYER	DEPTH	ELEVATION (Ft.)	Description
	0.2	570+/-	**ROOT ZONE**, approx. 2"
1			**FILL - FAT CLAY**, trace sand, brown
	3.0	567+/-	
1			**FILL - LEAN CLAY**, trace silt, brown and gray
	6.0	564+/-	
2			**FAT CLAY (CH)**, trace sand, brown and gray, medium stiff
	12.0	558+/-	
2			**LEAN CLAY (CL)**, with silt, brown and gray, soft to medium stiff
	22.0	548+/-	
4			**ORGANIC CLAY (OL)**, dark gray, medium stiff

DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
		X	8	3-4-5 N=9	1		20.7		
5		X	12	6-9-13 N=22	2		20.5		39-21-18
		X	16	3-3-4 N=7	3		27.2		
10		X	16	2-3-4 N=7	4		26.5		
15		X	14	3-3-3 N=6	5		25.0		
20		X	10	1-2-2 N=4	6		31.2		
25		X	14	1-2-3 N=5	7		48.4		

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow-Stem Augers

Abandonment Method:
Boring backfilled with auger cuttings and bentonite chips upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were obtained from Google Earth.

Notes:

WATER LEVEL OBSERVATIONS

None observed during or after drilling

Terracon
11600 Lilburn Park Rd
Saint Louis, MO

Boring Started: 08-19-2021
Boring Completed: 08-19-2021
Drill Rig: 603
Driller: SZ
Project No.: 15215038

BORING LOG NO. B-7

PROJECT: SIUE Health Sciences Building

CLIENT: Hellmuth Obata Kassabaum Inc (HOK)
St. Louis, MO

SITE: University Park Drive
Edwardsville, IL

LOCATION See Exploration Plan

Latitude: 38.7910° Longitude: -89.9918°

Approximate Surface Elev.: 570 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DESCRIPTION
4		27.0	543+/-	**ORGANIC CLAY (OL)**, dark gray, medium stiff *(continued)*
2		37.0	533+/-	**LEAN CLAY (CL)**, with silt, gray, medium stiff
		42.0	528+/-	**LEAN CLAY (CL)**, trace silt, gray, medium stiff
		47.0	523+/-	**FAT CLAY (CH)**, gray, medium stiff
3		50.0	520+/-	**SANDY LEAN CLAY (CL)**, trace gravel, gray, medium stiff
				Boring Terminated at 50 Feet

DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
30		X	14	2-3-4 N=7	8		27.5		
35		X	15	2-3-3 N=6	9		24.7		
40		X	17	2-3-3 N=6	10		25.4		
45		X	16	2-3-3 N=6	11		23.9		
50		X	18	2-3-3 N=6	12		20.4		

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow-Stem Augers

Abandonment Method:
Boring backfilled with auger cuttings and bentonite chips upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were obtained from Google Earth.

Notes:

WATER LEVEL OBSERVATIONS

None observed during or after drilling

Terracon
11600 Lilburn Park Rd
Saint Louis, MO

Boring Started: 08-19-2021
Boring Completed: 08-19-2021
Drill Rig: 603
Driller: SZ
Project No.: 15215038

BORING LOG NO. B-8

PROJECT: SIUE Health Sciences Building

CLIENT: Hellmuth Obata Kassabaum Inc (HOK)
St. Louis, MO

SITE: University Park Drive
Edwardsville, IL

LOCATION See Exploration Plan

Latitude: 38.7913° Longitude: -89.9913°

Approximate Surface Elev.: 564 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
		0.2	564+/-										
1		**ROOT ZONE**, approx. 2"											
		FILL - LEAN CLAY, with silt, brown and gray				X	10	3-4-5 N=9	1		20.6		
		3.0	561+/-										
2		**LEAN CLAY (CL)**, with silt, gray with brown, medium stiff				X	12	3-3-3 N=6	2		23.4		32-22-10
		6.0	558+/-	5									
		FAT CLAY (CH), trace sand, gray, stiff				■	12		3	2280	25.9	102	
		9.0	555+/-										
		LEAN CLAY (CL), with silt, gray and brown, soft to medium stiff		10		X	14	1-2-2 N=4	4		31.2		
				15		X	15	1-2-2 N=4	5		26.9		
				20		X	14	1-2-2 N=4	6		25.8		
				25		X	14	1-2-2 N=4	7		26.2		

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
0 to 9 feet: Hollow-Stem Augers
9 to 80 feet: Mud Rotary

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were obtained from Google Earth.

Notes:

WATER LEVEL OBSERVATIONS

None observed prior to introducing drilling fluid

Terracon
11600 Lilburn Park Rd
Saint Louis, MO

Boring Started: 08-19-2021 | Boring Completed: 08-19-2021
Drill Rig: 603 | Driller: SZ
Project No.: 15215038

BORING LOG NO. B-8

PROJECT: SIUE Health Sciences Building

CLIENT: Hellmuth Obata Kassabaum Inc (HOK)
St. Louis, MO

SITE: University Park Drive
Edwardsville, IL

LOCATION See Exploration Plan

Latitude: 38.7913° Longitude: -89.9913°

Approximate Surface Elev.: 564 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	MODEL LAYER	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
		2											
				30			16	1-2-2 N=4	8		27.8		
				35			16	1-2-2 N=4	9		30.5		
37.0	527+/-												
		4		40			14	1-1-1 N=2	10		20.7		
42.0	522+/-												
				45			15	14-14-13 N=27	11		9.6		
47.0	517+/-												
				50			16	6-9-11 N=20	12		12.3		

LEAN CLAY (CL), with silt, gray and brown, soft to medium stiff *(continued)*

SANDY LEAN CLAY (CL), trace gravel, brown and gray, soft

CLAYEY SAND (SC), trace gravel, brown and gray, medium dense

SANDY LEAN CLAY (CL), gray, stiff to very stiff

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
0 to 9 feet: Hollow-Stem Augers
9 to 80 feet: Mud Rotary

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were obtained from Google Earth.

Notes:

WATER LEVEL OBSERVATIONS

None observed prior to introducing drilling fluid

Terracon
11600 Lilburn Park Rd
Saint Louis, MO

Boring Started: 08-19-2021 | Boring Completed: 08-19-2021
Drill Rig: 603 | Driller: SZ
Project No.: 15215038

BORING LOG NO. B-8

PROJECT: SIUE Health Sciences Building

CLIENT: Hellmuth Obata Kassabaum Inc (HOK)
St. Louis, MO

SITE: University Park Drive
Edwardsville, IL

LOCATION See Exploration Plan

Latitude: 38.7913° Longitude: -89.9913°

Approximate Surface Elev.: 564 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
4				**SANDY LEAN CLAY (CL)**, gray, stiff to very stiff *(continued)*										
					55		X	16	4-7-8 N=15	13		13.0		
		57.0	507+/-											
				CLAYEY SAND (SC), trace gravel, gray, medium dense to dense										
					60		X	9	16-18-18 N=36	14		14.4		
					65		X	0	8-9-11 N=20	15				
		67.0	497+/-											
				SANDY LEAN CLAY (CL), trace gravel, gray										
					70		X	11	3-5-6 N=11	16		13.9		
		74.0	490+/-											
				CLAYEY SAND (SC), trace gravel, gray, dense to very dense	75		X	18	31-45-50/6"	17		11.7		

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
0 to 9 feet: Hollow-Stem Augers
9 to 80 feet: Mud Rotary

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were obtained from Google Earth.

Notes:

WATER LEVEL OBSERVATIONS

None observed prior to introducing drilling fluid

Terracon
11600 Lilburn Park Rd
Saint Louis, MO

Boring Started: 08-19-2021	Boring Completed: 08-19-2021
Drill Rig: 603	Driller: SZ
Project No.: 15215038	

BORING LOG NO. B-8

PROJECT: SIUE Health Sciences Building

CLIENT: Hellmuth Obata Kassabaum Inc (HOK)
St. Louis, MO

SITE: University Park Drive
Edwardsville, IL

LOCATION See Exploration Plan

Latitude: 38.7913° Longitude: -89.9913°

Approximate Surface Elev.: 564 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
4		**CLAYEY SAND (SC)**, trace gravel, gray, dense to very dense *(continued)*											
						X	18	15-23-28 N=51	18		11.3		
		80.0	484+/-	80									
		Boring Terminated at 80 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
0 to 9 feet: Hollow-Stem Augers
9 to 80 feet: Mud Rotary

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were obtained from Google Earth.

Notes:

WATER LEVEL OBSERVATIONS

None observed prior to introducing drilling fluid

Terracon
11600 Lilburn Park Rd
Saint Louis, MO

Boring Started: 08-19-2021	Boring Completed: 08-19-2021
Drill Rig: 603	Driller: SZ
Project No.: 15215038	

BORING LOG NO. B-9

PROJECT: SIUE Health Sciences Building

CLIENT: Hellmuth Obata Kassabaum Inc (HOK)
St. Louis, MO

SITE: University Park Drive
Edwardsville, IL

LOCATION See Exploration Plan

Latitude: 38.7907° Longitude: -89.9918°

Approximate Surface Elev.: 570 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
		0.2	570+/-										
		ROOT ZONE, approx. 2"											
		FAT CLAY (CH), trace sand, brown and gray, medium stiff											
						X	13	2-2-3 N=5	1		27.7		
				5			20		2	1010	27.0	99	
		6.0	564+/-										
		LEAN CLAY (CL), with silt, brown and gray, soft to medium stiff											
						X	18	2-2-2 N=4	3		25.7		
				10		X	18	2-3-3 N=6	4		24.8		
2													
				15		X	16	1-1-1 N=2	5		25.8		
		17.0	553+/-										
		LEAN CLAY (CL), with silt and organics, dark gray, medium stiff											
				20		X	14	1-2-3 N=5	6		45.9		
		22.0	548+/-										
		LEAN CLAY (CL), trace silt, gray, soft to medium stiff											
				25		X	16	1-1-1 N=2	7		26.9		

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow-Stem Augers

Abandonment Method:
Boring backfilled with auger cuttings and bentonite chips upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were obtained from Google Earth.

Notes:

WATER LEVEL OBSERVATIONS

None observed during or after drilling

Terracon
11600 Lilburn Park Rd
Saint Louis, MO

Boring Started: 08-18-2021
Boring Completed: 08-18-2021
Drill Rig: 603
Driller: SZ
Project No.: 15215038

BORING LOG NO. B-9

PROJECT: SIUE Health Sciences Building

CLIENT: Hellmuth Obata Kassabaum Inc (HOK)
St. Louis, MO

SITE: University Park Drive
Edwardsville, IL

LOCATION See Exploration Plan

Latitude: 38.7907° Longitude: -89.9918°

Approximate Surface Elev.: 570 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
2		**LEAN CLAY (CL)**, trace silt, gray, soft to medium stiff *(continued)*											
		30.0	540+/-			X	16	2-3-3 N=6	8		24.9		
		Boring Terminated at 30 Feet		30									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow-Stem Augers

Abandonment Method:
Boring backfilled with auger cuttings and bentonite chips upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were obtained from Google Earth.

Notes:

WATER LEVEL OBSERVATIONS

None observed during or after drilling

Terracon
11600 Lilburn Park Rd
Saint Louis, MO

Boring Started: 08-18-2021	Boring Completed: 08-18-2021
Drill Rig: 603	Driller: SZ
Project No.: 15215038	

BORING LOG NO. B-10

PROJECT: SIUE Health Sciences Building

CLIENT: Hellmuth Obata Kassabaum Inc (HOK)
St. Louis, MO

SITE: University Park Drive
Edwardsville, IL

LOCATION See Exploration Plan

Latitude: 38.7910° Longitude: -89.9914°

Approximate Surface Elev.: 570 (Ft.) +/-

MODEL LAYER	DEPTH	ELEVATION (Ft.)	DESCRIPTION
	0.2	570+/-	**ROOT ZONE**, approx. 2"
1			**FILL - LEAN CLAY**, with silt, brown and gray
	3.0	567+/-	
1			**FILL - FAT CLAY**, trace sand, brown and gray
	6.0	564+/-	
2			**LEAN CLAY (CL)**, trace silt, brown and gray, soft to medium stiff
	17.0	553+/-	
2			**LEAN CLAY (CL)**, with silt, gray, soft to medium stiff

DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
		9	6-7-8 N=15	1		16.5		
5		8	4-5-6 N=11	2		18.3		
		20		3	1200	27.5	110	
10		12	2-2-3 N=5	4		25.2		
15		14	2-2-2 N=4	5		27.8		
20		11	1-2-2 N=4	6		31.8		
25		12	2-3-3 N=6	7		24.2		

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow-Stem Augers

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were obtained from Google Earth.

Notes:

WATER LEVEL OBSERVATIONS

None observed during or after drilling

Terracon
11600 Lilburn Park Rd
Saint Louis, MO

Boring Started: 08-18-2021
Boring Completed: 08-18-2021
Drill Rig: 603
Driller: SZ
Project No.: 15215038

BORING LOG NO. B-10

PROJECT: SIUE Health Sciences Building

CLIENT: Hellmuth Obata Kassabaum Inc (HOK)
St. Louis, MO

SITE: University Park Drive
Edwardsville, IL

LOCATION See Exploration Plan

Latitude: 38.7910° Longitude: -89.9914°

Approximate Surface Elev.: 570 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
2		**LEAN CLAY (CL)**, with silt, gray, soft to medium stiff *(continued)*											
		30.0	540+/-			X	15	1-1-2 N=3	8		27.9		
		Boring Terminated at 30 Feet		30									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow-Stem Augers

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were obtained from Google Earth.

Notes:

WATER LEVEL OBSERVATIONS

None observed during or after drilling

Terracon
11600 Lilburn Park Rd
Saint Louis, MO

Boring Started: 08-18-2021	Boring Completed: 08-18-2021
Drill Rig: 603	Driller: SZ
Project No.: 15215038	

BORING LOG NO. B-11

PROJECT: SIUE Health Sciences Building

CLIENT: Hellmuth Obata Kassabaum Inc (HOK)
St. Louis, MO

SITE: University Park Drive
Edwardsville, IL

LOCATION See Exploration Plan

Latitude: 38.7905° Longitude: -89.9915°

Approximate Surface Elev.: 576 (Ft.) +/-

DEPTH	ELEVATION (Ft.)
0.2	576+/-
3.0	573+/-

MODEL LAYER	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
1				**ROOT ZONE**, approx. 2"					
1				**FILL - LEAN CLAY**, with sand, brown					
1		X	6	5-5-4 N=9	1		18.5		
2				**LEAN CLAY (CL)**, with silt, brown and gray, soft to medium stiff					
2	5	X	0	2-2-2 N=4	2		28.9		
2		■	20		3	1480	26.1	109	
2	10	X	15	2-2-2 N=4	4		25.2		
2	15	X	14	1-2-0 N=2	5		26.1		
2	20	X	14	1-1-1 N=2	6		30.7		
2	25	X	13	1-1-1 N=2	7		28.4		

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
0 to 13.5 feet: Hollow-Stem Augers
13.5 to 80 feet: Mud Rotary

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were obtained from Google Earth.

Notes:

WATER LEVEL OBSERVATIONS

None observed during or after drilling

Terracon
11600 Lilburn Park Rd
Saint Louis, MO

Boring Started: 08-19-2021
Boring Completed: 08-19-2021
Drill Rig: 603
Driller: SZ
Project No.: 15215038

BORING LOG NO. B-11

PROJECT: SIUE Health Sciences Building

CLIENT: Hellmuth Obata Kassabaum Inc (HOK)
St. Louis, MO

SITE: University Park Drive
Edwardsville, IL

LOCATION See Exploration Plan

Latitude: 38.7905° Longitude: -89.9915°

Approximate Surface Elev.: 576 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	MODEL LAYER	GRAPHIC LOG	DESCRIPTION
		2		**LEAN CLAY (CL)**, with silt, brown and gray, soft to medium stiff *(continued)*
37.0	539+/-	2		**LEAN CLAY (CL)**, trace sand, gray, soft to medium stiff
47.0	529+/-			**CLAYEY SAND (SC)**, trace gravel, gray, medium dense

DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
30		X	16	1-1-2 N=3	8		28.3		
35		X	15	1-2-2 N=4	9		27.1		
40		X	14	1-2-2 N=4	10		25.5		
45		X	10	2-2-3 N=5	11		21.9		
50		X	18	12-12-12 N=24	12		12.9		

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
0 to 13.5 feet: Hollow-Stem Augers
13.5 to 80 feet: Mud Rotary

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were obtained from Google Earth.

Notes:

WATER LEVEL OBSERVATIONS

None observed during or after drilling

Terracon
11600 Lilburn Park Rd
Saint Louis, MO

Boring Started: 08-19-2021
Boring Completed: 08-19-2021
Drill Rig: 603
Driller: SZ
Project No.: 15215038

BORING LOG NO. B-11

PROJECT: SIUE Health Sciences Building

CLIENT: Hellmuth Obata Kassabaum Inc (HOK)
St. Louis, MO

SITE: University Park Drive
Edwardsville, IL

LOCATION See Exploration Plan

Latitude: 38.7905° Longitude: -89.9915°

Approximate Surface Elev.: 576 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
2 3		52.0	524+/-										
		LEAN CLAY (CL), trace gravel, gray, medium stiff											
				55		X	15	1-3-3 N=6	13		13.8		
		57.0	519+/-										
		CLAYEY SAND (SC), trace gravel, gray, very dense											
						X	10	35-50/6"	14		10.2		
				60									
		62.0	514+/-										
		SANDY LEAN CLAY (CL), gray, stiff to very stiff											
3						X	18	9-11-11 N=22	15		13.1		
				65									
						X	16	4-7-9 N=16	16		14.8		
				70									
						X	17	3-5-7 N=12	17		14.3		
				75									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
0 to 13.5 feet: Hollow-Stem Augers
13.5 to 80 feet: Mud Rotary

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were obtained from Google Earth.

Notes:

WATER LEVEL OBSERVATIONS

None observed during or after drilling

Terracon
11600 Lilburn Park Rd
Saint Louis, MO

Boring Started: 08-19-2021
Boring Completed: 08-19-2021
Drill Rig: 603
Driller: SZ
Project No.: 15215038

BORING LOG NO. B-11

PROJECT: SIUE Health Sciences Building

CLIENT: Hellmuth Obata Kassabaum Inc (HOK)
St. Louis, MO

SITE: University Park Drive
Edwardsville, IL

LOCATION See Exploration Plan

Latitude: 38.7905° Longitude: -89.9915°

Approximate Surface Elev.: 576 (Ft.) +/-

DEPTH ELEVATION (Ft.)

MODEL LAYER	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
3		**SANDY LEAN CLAY (CL)**, gray, stiff to very stiff *(continued)*										
						16	4-7-8 N=15	18		14.9		
		80.0 496+/-	80									
		Boring Terminated at 80 Feet										

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
0 to 13.5 feet: Hollow-Stem Augers
13.5 to 80 feet: Mud Rotary

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were obtained from Google Earth.

Notes:

WATER LEVEL OBSERVATIONS

None observed during or after drilling

Terracon
11600 Lilburn Park Rd
Saint Louis, MO

Boring Started: 08-19-2021 | Boring Completed: 08-19-2021

Drill Rig: 603 | Driller: SZ

Project No.: 15215038

BORING LOG NO. B-12

PROJECT: SIUE Health Sciences Building

CLIENT: Hellmuth Obata Kassabaum Inc (HOK)
St. Louis, MO

SITE: University Park Drive
Edwardsville, IL

LOCATION See Exploration Plan

Latitude: 38.7891° Longitude: -89.9931°

Approximate Surface Elev.: 563 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
		0.2	563+/-										
		ROOT ZONE, approx. 2"											
		LEAN CLAY (CL), trace silt, light brown, medium stiff				X	11	2-3-3 N=6	1		25.6		
		3.0	560+/-										
2		**LEAN CLAY (CL)**, with silt, brown and gray, soft to medium stiff		5		X	11	2-1-2 N=3	2		26.1		32-23-9
						X	12	2-3-3 N=6	3		25.5		
				10		X	17	1-2-2 N=4	4		28.7		
		10.5	552.5+/-										
		Boring Terminated at 10.5 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow-Stem Augers

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were obtained from Google Earth.

Notes:

WATER LEVEL OBSERVATIONS

None observed during or after drilling

Terracon
11600 Lilburn Park Rd
Saint Louis, MO

Boring Started: 08-19-2021	Boring Completed: 08-19-2021
Drill Rig: 603	Driller: SZ
Project No.: 15215038	

BORING LOG NO. B-13

PROJECT: SIUE Health Sciences Building

CLIENT: Hellmuth Obata Kassabaum Inc (HOK)
St. Louis, MO

SITE: University Park Drive
Edwardsville, IL

LOCATION See Exploration Plan

Latitude: 38.7890° Longitude: -89.9914°

Approximate Surface Elev.: 576 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
		0.2	576+/-										
2		**ROOT ZONE**, approx. 2"											
		LEAN CLAY (CL), brown, medium stiff to stiff				X	14	3-4-4 N=8	1		24.5		
				5		X	10	2-3-3 N=6	2		24.7		44-22-22
		6.0	570+/-										
		LEAN CLAY (CL), trace silt, brown and gray, medium stiff				X	14	2-3-3 N=6	3		28.5		
				10		X	14	1-2-3 N=5	4		26.6		
		10.5	565.5+/-										
		Boring Terminated at 10.5 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow-Stem Augers

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were obtained from Google Earth.

Notes:

WATER LEVEL OBSERVATIONS

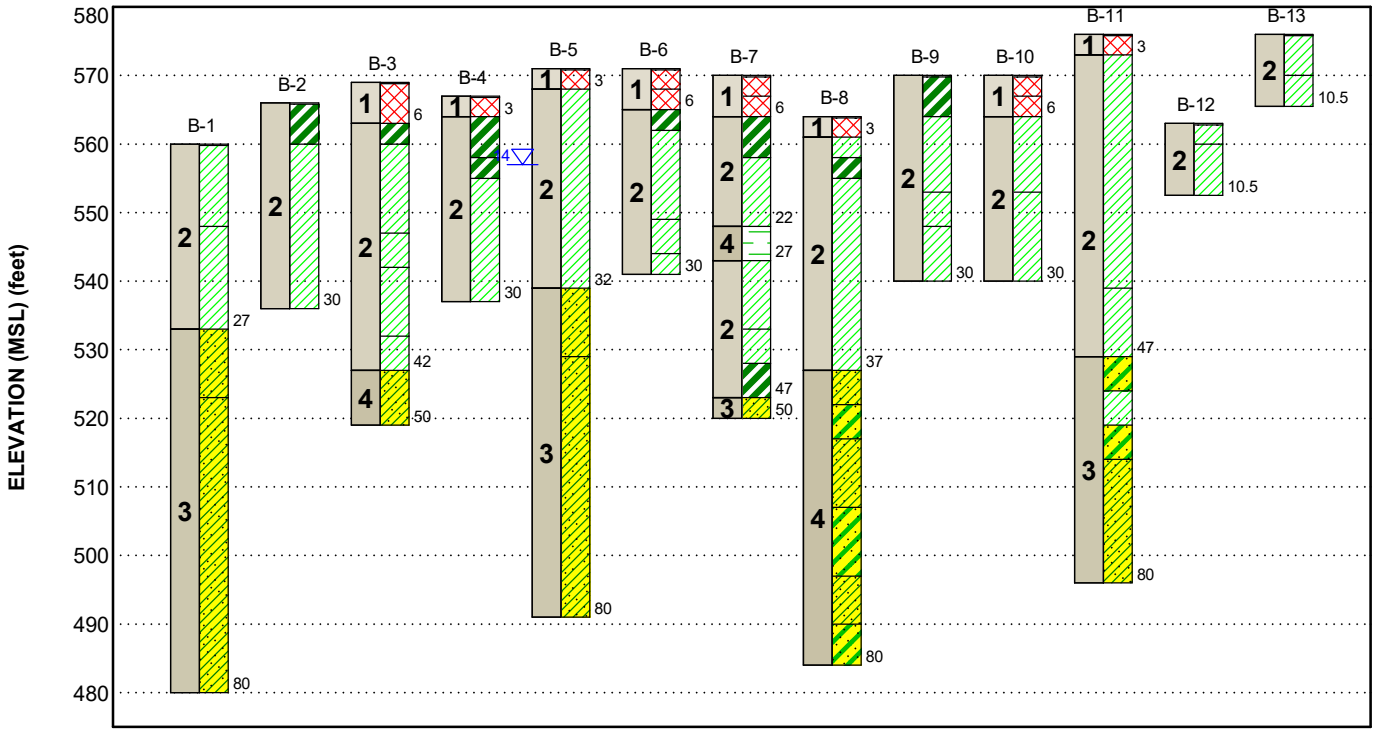
None observed during or after drilling

Terracon
11600 Lilburn Park Rd
Saint Louis, MO

Boring Started: 08-19-2021
Boring Completed: 08-19-2021
Drill Rig: 603
Driller: SZ
Project No.: 15215038

GEOMODEL

SIUE Health Sciences Building ■ Edwardsville, IL
Terracon Project No. 15215038



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	**Existing Fill**	Lean clay trace silt and sand, fat clay, lean clay trace sand and gravel, lean clay trace silt, fat clay trace sand, lean clay with silt, lean clay with sand
2	**Loess**	Lean clay with varying amounts of silt, fat clay trace sand, lean clay with organics and silt, lean clay, fat clay, lean clay trace sand
3	**Glacial Till**	Sandy lean clay, sandy lean clay trace gravel, clayey sand trace gravel, lean clay trace gravel
4	**Organic Soil**	Organic clay

LEGEND

- Topsoil
- Lean Clay
- Sandy Lean Clay
- Fat Clay
- Fill
- Organic Silt
- Clayey Sand

First Water Observation

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project. Numbers adjacent to soil column indicate depth below ground surface.

SUPPORTING INFORMATION

Contents:

Note: All attachments are one page unless noted above.

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS
SIUE Health Sciences Building ■ Edwardsville, IL
Terracon Project No. 15215038

SAMPLING	WATER LEVEL	FIELD TESTS
Shelby Tube Split Spoon	**Water Initially Encountered** **Water Level After a Specified Period of Time** **Water Level After a Specified Period of Time** **Cave In Encountered** Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.	**N** Standard Penetration Test Resistance (Blows/Ft.) **(HP)** Hand Penetrometer **(T)** Torvane **(DCP)** Dynamic Cone Penetrometer **UC** Unconfined Compressive Strength **(PID)** Photo-Ionization Detector **(OVA)** Organic Vapor Analyzer

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification as noted on the soil boring logs is based Unified Soil Classification System. Where sufficient laboratory data exist to classify the soils consistent with ASTM D2487 "Classification of Soils for Engineering Purposes" this procedure is used. ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" is also used to classify the soils, particularly where insufficient laboratory data exist to classify the soils in accordance with ASTM D2487. In addition to USCS classification, coarse grained soils are classified on the basis of their in-place relative density, and fine-grained soils are classified on the basis of their consistency. See "Strength Terms" table below for details. The ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

LOCATION AND ELEVATION NOTES

Exploration point locations as shown on the Exploration Plan and as noted on the soil boring logs in the form of Latitude and Longitude are approximate. See Exploration and Testing Procedures in the report for the methods used to locate the exploration points for this project. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance		CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
Descriptive Term (Density)	**Standard Penetration or N-Value Blows/Ft.**	**Descriptive Term (Consistency)**	**Unconfined Compressive Strength Qu, (psf)**	**Standard Penetration or N-Value Blows/Ft.**
Very Loose	0 - 3	Very Soft	less than 500	0 - 1
Loose	4 - 9	Soft	500 to 1,000	2 - 4
Medium Dense	10 - 29	Medium Stiff	1,000 to 2,000	4 - 8
Dense	30 - 50	Stiff	2,000 to 4,000	8 - 15
Very Dense	> 50	Very Stiff	4,000 to 8,000	15 - 30
		Hard	> 8,000	> 30

RELEVANCE OF SOIL BORING LOG

The soil boring logs contained within this document are intended for application to the project as described in this document. Use of these soil boring logs for any other purpose may not be appropriate.

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]					Soil Classification	
					Group Symbol	Group Name [B]
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:**	Cu ≥ 4 and 1 ≤ Cc ≤ 3 [E]		GW	Well-graded gravel [F]
			Cu < 4 and/or [Cc<1 or Cc>3.0] [E]		GP	Poorly graded gravel [F]
		Gravels with Fines:	Fines classify as ML or MH		GM	Silty gravel [F, G, H]
			Fines classify as CL or CH		GC	Clayey gravel [F, G, H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:**	Cu ≥ 6 and 1 ≤ Cc ≤ 3 [E]		SW	Well-graded sand [I]
			Cu < 6 and/or [Cc<1 or Cc>3.0] [E]		SP	Poorly graded sand [I]
		Sands with Fines:	Fines classify as ML or MH		SM	Silty sand [G, H, I]
			Fines classify as CL or CH		SC	Clayey sand [G, H, I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots on or above "A"		CL	Lean clay [K, L, M]
			PI < 4 or plots below "A" line [J]		ML	Silt [K, L, M]
		Organic:	Liquid limit - oven dried / Liquid limit - not dried	< 0.75	OL	Organic clay [K, L, M, N]
						Organic silt [K, L, M, O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line		CH	Fat clay [K, L, M]
			PI plots below "A" line		MH	Elastic Silt [K, L, M]
		Organic:	Liquid limit - oven dried / Liquid limit - not dried	< 0.75	OH	Organic clay [K, L, M, P]
						Organic silt [K, L, M, Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor				PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.