GEOTECHNICAL EVALUATION REPORT

GREENFIELD SITE DEVELOPMENT
LOUISVILLE, KENTUCKY

SME Project Number: 102074.00
March 19, 2026

RECEIVED May 22, 2026 Planning and Design 26-ZONE-0056

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March 19, 2026

Mr. Rob Candler, PE
Director, Industrial Design Studio
Luckett & Farley
737 South Third Street
Louisville, Kentucky 40202

Via E-Mail: rcandler@luckett-farley.com

RE: Geotechnical Evaluation and Karst Reconnaissance Survey Report
Greenfield Site Development
Collins Lane
Louisville, Kentucky 40245
SME Project No. 102074.00

Dear Mr. Candler:

We have completed our geotechnical evaluation and karst reconnaissance survey for the referenced project. This report presents the results of our observations and analyses, our geotechnical recommendations, our pavement design recommendations, and a discussion of potential construction considerations based on our karst reconnaissance survey and the information disclosed by the borings.

We appreciate this opportunity to be of service. If you have questions or require additional information, please contact me.

Sincerely,

SME

Wesley J. Hemp, PE, PG, BC.CE, LEED AP
Project Manager

Enclosure: SME Geotechnical Evaluation Report; Dated March 19, 2026

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1. INTRODUCTION

This report presents the results of the geotechnical evaluation and karst reconnaissance survey performed by SME for the proposed Greenfield Site Development. This evaluation was conducted in general accordance with the scope of services outlined in SME Proposal No. P04542.25, dated November 13, 2025. Our services for this evaluation were authorized by Mr. Rob Candler with Luckett & Farley (L&F) on November 21, 2025.

SME received the following information which was used in the evaluation and preparation of this report:

- A site plan titled “Advanced Site Plan”, (Exhibit A) prepared by L&F, dated September 10, 2025. The site plan also included the requested locations for 64 borings.
- A .dwg file titled "3607-TOPO BASE”, which included a preliminary topographic survey of the site prepared by Sabak, Wilson & Lingo, Inc., dated December 24, 2025.
- A markup of the previously referenced preliminary topographic survey, prepared by L&F, which included the requested location and depth for two infiltration tests.

SME completed 64 borings (B1 through B64) at the project site between December 19, 2025 and January 23, 2026. SME also completed nine offset borings (B8A, B16A, B20A, B25A, B32A, B41A, B42A, B51A, and B63A) at the project site between January 21 and 23, 2026 for the collection of Shelby Tube, bulk bucket, and bulk bag samples. The offset borings were generally performed within 5 feet (lateral distance) of their respective counterpart boring. SME performed two infiltration tests (IT1 and IT2) at the project site on January 22, 2026. Refer to the boring logs included in Appendix A for the specific depth of each individual boring. The approximate boring locations are depicted on Image No. 1 and on the Boring Location Diagrams located in Appendix A (Figure Nos. 1 and 2). Soil descriptions and the field and laboratory test results are presented on the boring logs. Exploration and laboratory testing procedures are presented in Section 4.

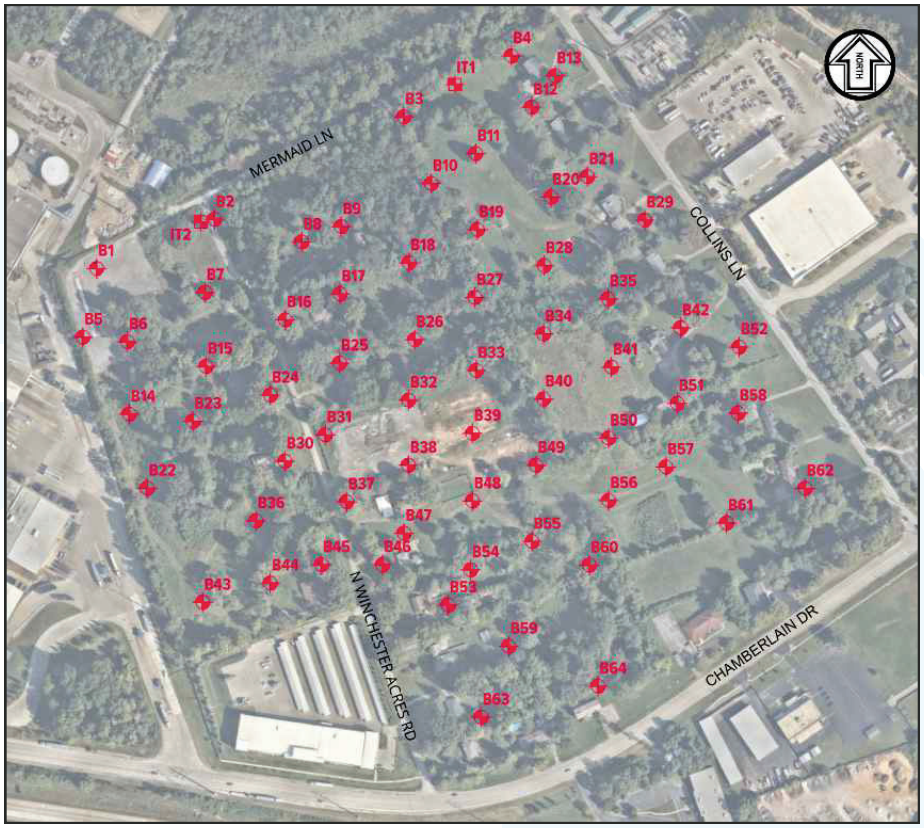

IMAGE NO. 1: Excerpt from Figure No. 1 in Appendix A – Boring Location Diagram

1.1 SITE CONDITIONS

The project site is located in Louisville, Kentucky. The site encompasses approximately 71 acres and is bordered to the north by Mermaid Lane, to the east by Collins Lane, to the south by Chamberlain Lane, and to the west by the Ford Kentucky Truck Plant (KTP) facility. The site is partially bisected by North Winchester Acres Road.

We understand the project site was primarily utilized as agricultural farmland from as early as 1949, until the early 1970's through the early 1980's, when single family residential developments were constructed throughout the project site. From then until the time of our field exploration, the site consisted primarily of single-family residential developments. The residential developments were demolished or were in the process of being demolished at the time of our field exploration. We understand that, at the time this report was prepared, all of the residential developments have been demolished. Excluding the previous residential home sites, the site is primarily grassy green space with sporadic partially to heavily wooded areas. The demolished home sites were observed to consist of exposed subgrade without grass cover, or exposed fill soils used to backfill the excavations where below grade features associated with the previous developments were presumably removed. A pond was observed on the northeastern portion of the site during our field exploration.

1.2 PROJECT DESCRIPTION

We understand the project consists of the design and construction of a new 1,600,000 square foot manufacturing building, site pavements, a stormwater retention basin, and associated infrastructure. We assume the building will be a single-story, high-bay, slab-on-grade structure, but we understand that the building will also include below-grade pits of varying sizes and depths. We understand the development may also include an overhead trestle used to transport materials from the new development to the adjoining KTP facility. Based on information provided to SME by L&F, we understand that maximum column loads for the facility will be on the order of about 300 kips.

Based on our review of the provided topographic survey, we estimate that existing ground surface elevations across the site range from about elevation 720 feet to 770 feet and generally increases from north to south. We understand the proposed finish floor elevation (FFE) of the facility will be elevation 752 feet. Based on the provided topographic survey and the approximate proposed building pad as indicated on the referenced site plan, we have assumed that earthwork of up to about 13 feet of cut and up to about 30 feet of grade-raise fill will be required to establish the proposed FFE, with deeper excavations required for the below-grade pits. No further information regarding proposed grading or below-grade pits was provided at the time this report was prepared.

Based on the referenced site plan, we anticipate the southernmost paved parking area and associated driving lanes will be subject to primarily passenger vehicle usage, with occasional delivery vehicle traffic. We understand the southernmost parking area will have two entry/exit drives, including one extending west from Collins Lane, and one extending east from North Winchester Acres Road. We have assumed the southernmost parking area will be hot-mix-asphalt (HMA) pavement. We have assumed the pavement surrounding the building will be Portland cement concrete (PCC) and will be primary trafficked by heavy truck traffic including fully-loaded semi-trucks (and forklifts).

The recommendations of this report are based on the information provided above and the results of the field and laboratory evaluation. Contact SME if the final design information is different than discussed herein.

2. KARST SURVEY

2.1 KARST DEVELOPMENT

Karst topography is characterized by pinnacled, fissured, and/or cavernous bedrock topography caused by dissolution of the rock by chemical weathering. Sinkholes, sinking streams, springs, and caves (among other features) are associated with karst terrain.

This phenomenon occurs in carbonate rocks (e.g., limestone and dolomite) or evaporites (e.g., gypsum) that are considered relatively dense, soluble, and located in geographic regions that receive abundant rainfall. The overlying soils typically consist of residual clay deposits weathered from the underlying rock but can be infilled with fine-grained soils via erosion or other transport mechanisms. Buried sinkhole features, which have been infilled (naturally or artificially), are difficult to characterize or identify visually from the surface, and can be better evaluated by excavation, drilling test borings, and/or geophysical ground imaging.

Abundant rainfall within a geographic region over time is required for karst features to develop. The weathering within the underlying bedrock occurs over thousands or tens of thousands of years. In fact, the mean rate of surface lowering on limestone ranges from less than 0.005 millimeters per year in arctic terrains with little soil to greater than 0.1 millimeters per year in wet equatorial regions. However, quicker rates of greater than 5 millimeters per year have been observed at some tropical islands (Waltham, Bell, and Culshaw, 2005). Conversely, an actual sinkhole dropout can occur in a short period of time (i.e., hours to days) due to washing/raveling of the overburden soils through the fissured bedrock. This raveling may occur due to fluctuations in surface and/or subsurface drainage patterns, or changes in groundwater elevation.

Sinkholes can also form where cave roofs are relatively thin, and collapse under the weight of soil and rock overburden (and/or additional loads resulting from new construction). Engineering works and site development can result in acceleration of incipient sinkhole development or encourage new sinkhole formation.

The subsidence referred to is the motion of the earth or ground surface as it shifts downward relative to a datum. There are several types of subsidence, which frequently occur in karst terrain. Locally, sinkholes typically form near the surface of the rock where dissolution of limestone by flowing water within the rock causes the creation of voids. If the roofs of these voids (made of either rock or soil) become weak enough, they can collapse either gradually or suddenly, and the overlying rock and/or soil will fall into the void, causing subsidence at the surface (i.e., dropout, caprock, and collapse sinkholes). Dissolution (doline) sinkholes are also common but are typically less obvious due to the slower rate of subsidence. Subsidence of this type can vary from less than a few feet to a few hundred feet in diameter.

Swell and swale topography (e.g., undulating hills intermixed with shallow depressions) are also characteristic of karst, with localized depressions typically being the result of subsidence related to sinkhole activity. The figure below is characteristic of features associated with karst terrain.

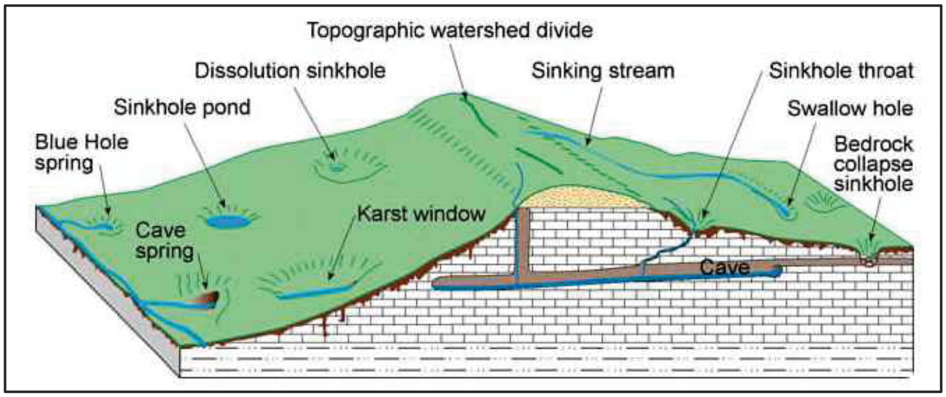

IMAGE NO 2: Karst Terrain Features (1)

(1) Kentucky Geological Survey. (2026). Retrieved from https://www.uky.edu/KGS/karst/

2.2 MAP AND LITERATURE REVIEW

Our research for the subject site included review of available geologic maps, geological literature, soils data, and historical and aerial topographic maps to develop a better understanding of native soil and rock conditions near the site, along with possible changes in ground surface topography related to development of sinkholes or other karst features. SME also contacted a local cave exploration group (“cavers”) regarding possible documentation of identified cave or cavern features within the project vicinity. Site research included a review of the following items:

- United States Department of Agriculture (USDA) National Resource Conservation Services (NRCS) web soil survey map.
- 7.5-minute series Geological Quadrangle Map (Anchorage, 1971) developed by the United States Geological Survey (USGS) in cooperation with the Kentucky Geological Survey (KGS).
- Online Kentucky Geologic Map Service (including detailed geologic unit map, karst potential map, and water well and springs map).
- Review of available data on the Louisville/Jefferson County Information Consortium (LOJIC) website.
- Submission inquiry to the Kentucky Speleological Survey (KSS) regarding documented cave systems and/or cave openings.
- Historical aerial photographs obtained between 1949 and 2025.
- Historical topographic maps obtained between 1905 and 2022.

2.2.1 SURFICIAL GEOLOGY

Information obtained from the USDA Web Soil Survey indicates the near-surface natural soils consist predominantly of urban land – Alfic Udarents – Crider complex (UmC) and Alfic Udarents – Nicholson complex (UmC), 0 to 12 percent slopes; and urban land – Udorthents complex (UahC), 0 to 12 percent slopes. Bedford silt loam (BrB), 2 to 6 percent slopes is mapped in the southwestern corner of the project site. The Alfic Udarents – Crider Complex consists of thin, fine-silty loess over clayey residuum weathered from limestone and dolomite. The Alfic Udarents – Nicholson Complex consists of thin, fine-silty loess over clayey residuum weathered from limestone. The Bedford silt loam consists of noncalcareous loess over loamy noncalcareous loess over clayey residuum weathered from limestone. Please refer to the excerpt of the USDA Soil Survey Map below for more information.

IMAGE NO. 3: USDA Web Soil Survey Map (1)

(1) USDA Web Soil Survey. (2026). United States Department of Agriculture – Natural Resource Conservation Service. Retrieved from https://websoilsurvey.sc.egov.usda.gov/

2.2.2 BEDROCK GEOLOGY

Our review of the referenced geological literature indicates the project site is in the Bluegrass Physiographic Region, in the Outer Bluegrass Area. The Bluegrass includes both the Outer Blue Grass and Inner Bluegrass and is located in the central part of the state and is known for gently rolling fields underlain by thick-bedded limestone that boasts sinkholes, sinking streams, springs, and caves along with massive gorges of limestone and dolomite. Refer to the image below depicting physiographic regions in Kentucky.

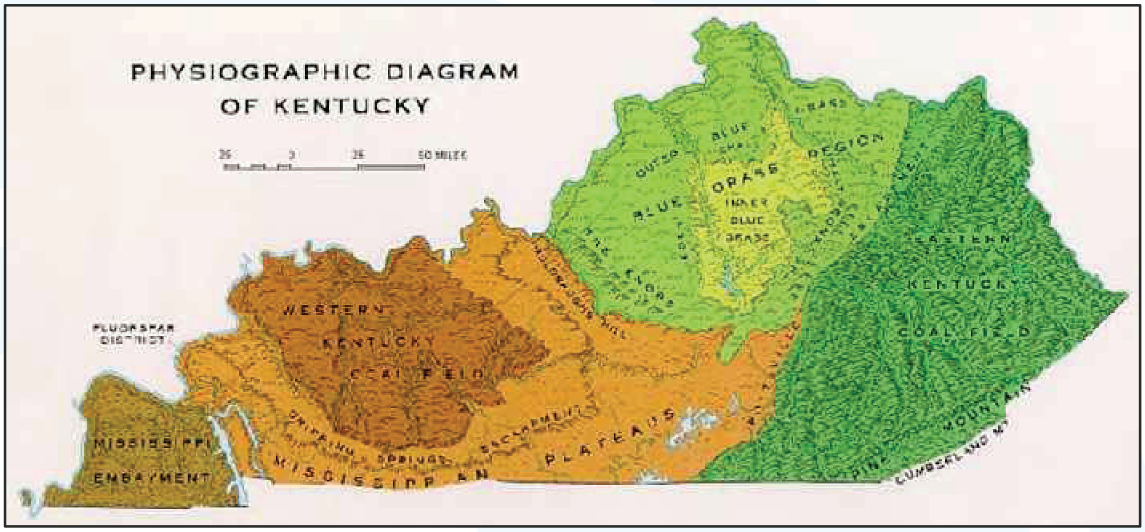

IMAGE NO. 4: Physiographic Map Of Kentucky (1)

(1) Kentucky Geological Survey. (2026). Retrieved from https://www.uky.edu/KGS/geoky/physiographic.htm

The referenced geologic mapping indicates the underlying rock is predominantly composed of middle Silurian-age dolomitic limestone and dolomite belonging to the Louisville Limestone Formation, and middle to upper Devonian-age limestone belonging to the Sellersburg Limestone Formation (of which the Beechwood Limestone and Silver Creek Limestones are members) and Jeffersonville Limestone Formation.

The Louisville Limestone is described as yellowish gray to light olive gray, finely crystalline, pyritic, and thin to very thin bedded in the upper part. The limestone bedding is defined by stylolites. Discontinuous chert layers are common in the uppermost few feet. Sinkholes are known to develop in the upland areas.

The Beechwood Limestone is described as light gray to greenish gray and weathers moderate yellowish brown to light olive gray. The formation consists of coarse to very coarse fossil fragments and whole fossils. The formation is also described as cherty. The Silver Creek Limestone is described as olive gray to light greenish gray and weathers light yellowish gray. The formation is crypto grained to micro grained and has scattered lenses of very fine to medium fossil fragments.

The Jeffersonville formation is described as olive-gray, brownish-gray, or medium to light gray and weathers pale yellowish brown to light yellowish gray. The formation consists of fine to very coarse fossil fragments.

The overlying soils generally consist of materials weathered from the underlying rock. Please refer to the site geology map obtained from KGS below for more information.

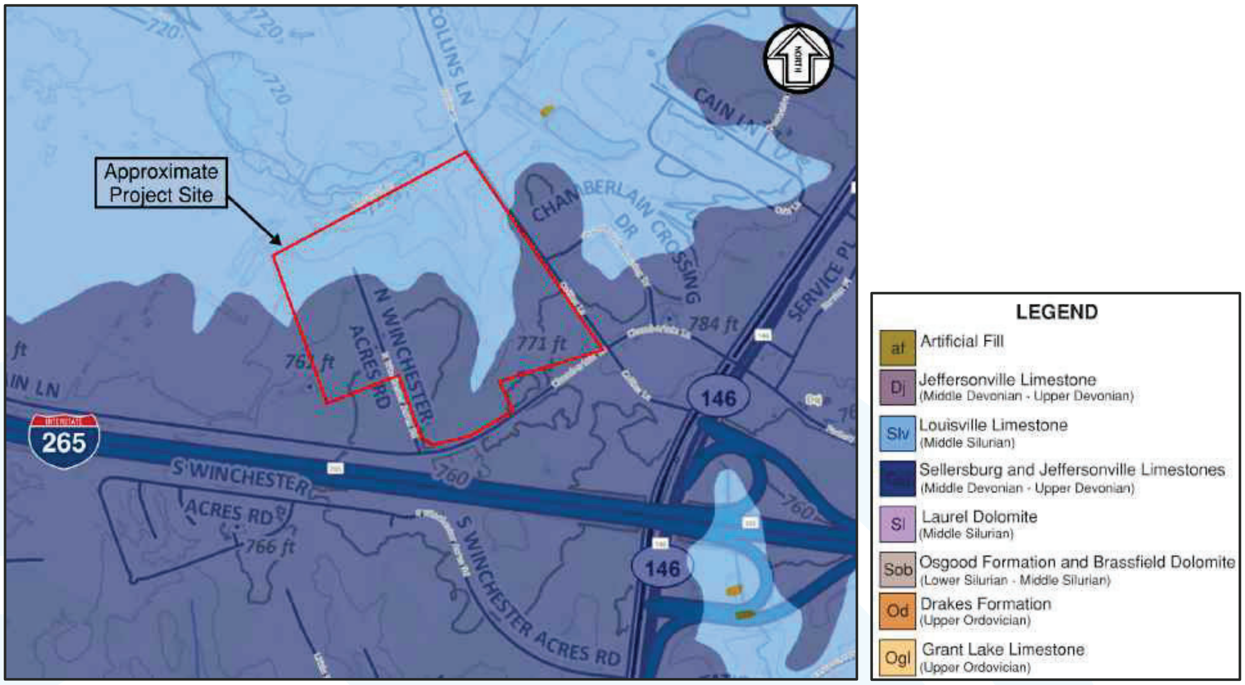

IMAGE NO. 5: Geologic Map (1)

(1) Kentucky Geological Survey. (2026). Kentucky Geologic Map Information Service. Retrieved from https://www.kgs.uky.edu.

2.2.3 DATA INQUIRY REQUEST

SME submitted an inquiry to KSS on January 14, 2026, regarding potential for cave-related activity within the project area. KSS is a non-profit organization of cavers that function as gathers, archivists, and curators of cave and karst data for the State of Kentucky. Please visit www.ksscaves.org for more information regarding KSS. Refer to Section 2.2.4.3 for additional for more information regarding caves and our data inquiry request.

2.2.4 KARST CONDITIONS

2.2.4.1 KARST POTENTIAL INDEX

The KGS has developed a generalized mapping tool to rate the general karst potential for the state of Kentucky. This tool, which is a feature of the online Kentucky Geologic Map Service, provides a color-coding scheme for relative karst potential. Purple indicates areas of “intense” karst potential, while light blue indicates an area “prone” to karst development. White represents areas considered non-karst. This tool can be utilized to rate the general karst potential for a project site for preliminary risk assessment or for use in development of subsurface evaluation programs. Further discussion and application of this tool is discussed below in Section 2.2.4.2.

2.2.4.2 SINKHOLE CONSIDERATIONS

There are six official classifications of sinkholes of which are determined by both the geological conditions and the mechanism of sinkhole development. These six general classifications are illustrated on the image below. Note that many sinkholes are formed by a combination of the mechanisms shown on the referenced image.

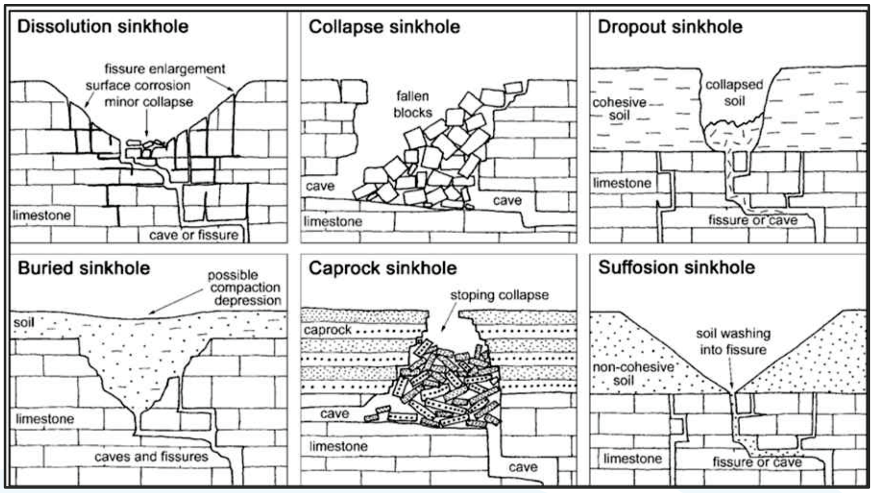

IMAGE NO. 6: Sinkhole Classifications And Formation (1)

(1) Adapted from “Engineering Classification of Karst Ground Conditions,” by A.C. Waltham & P.G. Fookes, 2003, Quarterly Journal of Engineering Geology and Hydrology, 36, P. 106. Copyright 2003 by the Geological Society of London.

Based on our understanding of the site geology and previous experience in the general area, sinkholes nearby the general project area are typically categorized as “dropout,” “doline/ dissolution,” or “collapse” sinkholes. Buried sinkholes may be encountered where significant undulation of the underlying limestone surface exists.

Our review of the current Karst Potential Map indicates that the project site is located in an area of “intense” karst potential. Refer to the KGS Karst Potential Map below for additional information.

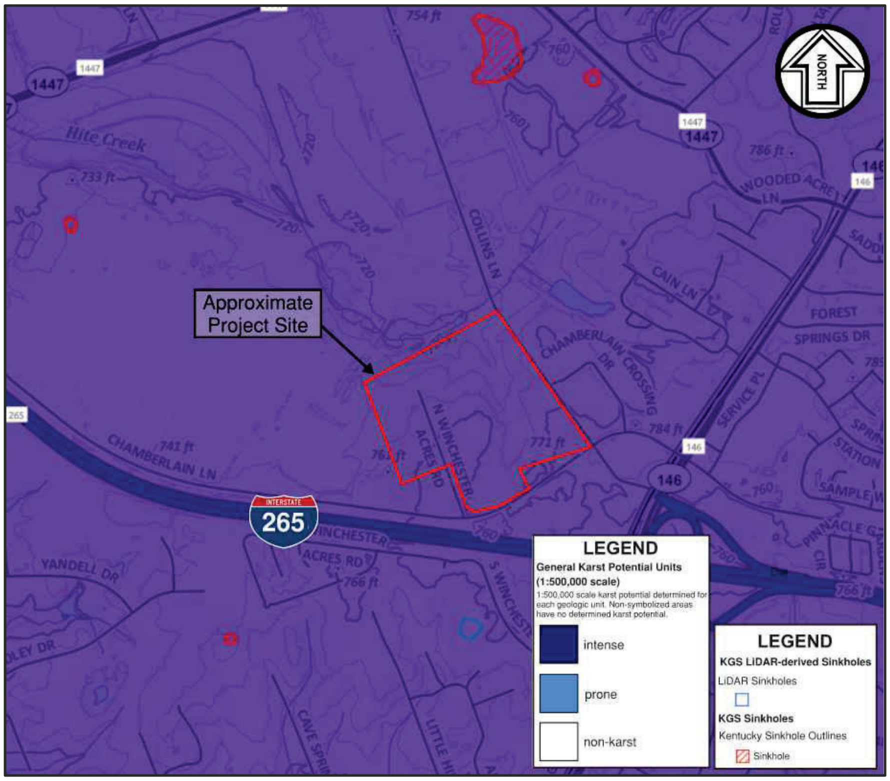

IMAGE NO. 7: Karst Potential Map (1)

(1) Kentucky Geological Survey. (2026). Kentucky Geologic Map Information Service. Retrieved from https://www.kgs.uky.edu.

KGS estimates the accuracy of LiDAR detected sinkholes (shown by a blue outline on the map) is greater than 85 percent based upon limited field verification. Statewide sinkholes are defined by a red-hashed zone. Note that the KGS map is a generalized tool for identifying sinkhole features and should not be considered as a suitable replacement for “boots on the ground” site evaluation, even when considering the estimated accuracy. KGS has recently upgraded their mapping tool which considers information obtained from other agencies (including local City and County Governments).

Site topography (represented by 2-foot contour intervals) on the LOJIC map suggests the presence of subsidence or depressions that are not identified by KGS. These features are outlined in blue in the image below. These mapped features are categorized as “Intermediate Depressions” and “Index Depressions” according to LOJIC mapping. Shallow nuanced karst features are difficult to identify in the field, especially across relatively large sites. However, the contour outlines at the locations of these presumed intermediate depressions are closed. This suggests that these features are likely doline sinkholes (i.e., subsidence sinkholes) since surface water runoff would be expected to accumulate in these areas and infiltrate through the ground. Further assessment of these features should be considered.

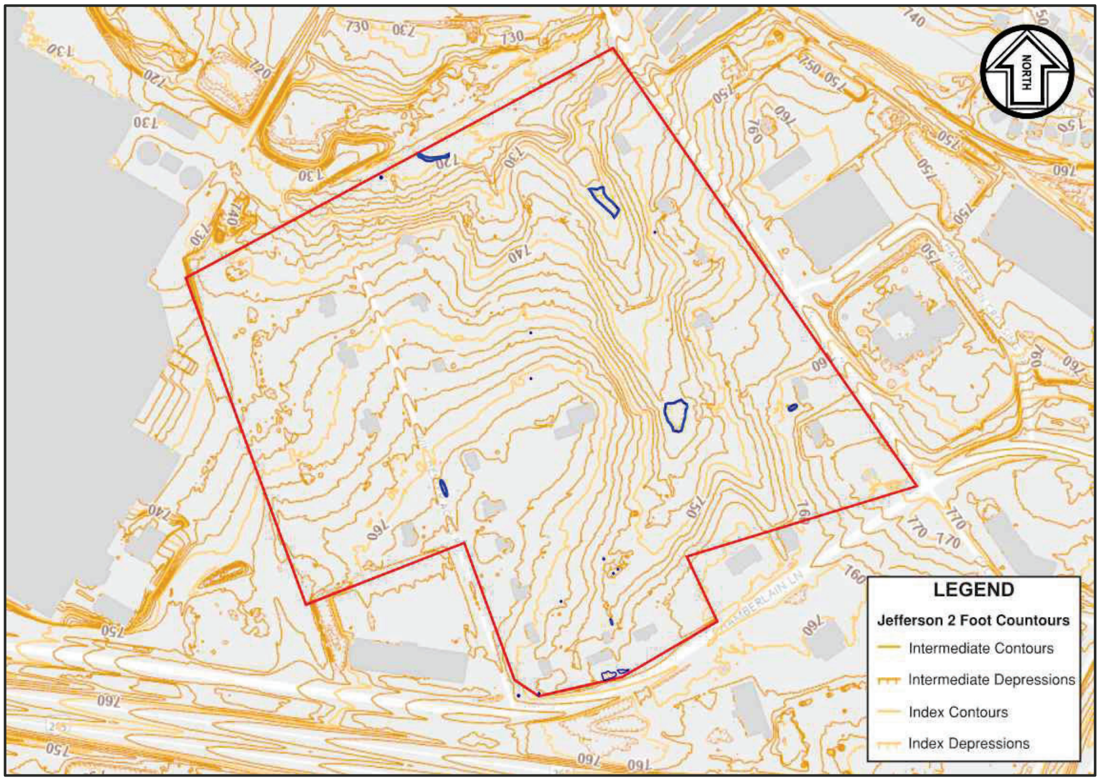

IMAGE NO. 8: Louisville Lojic Map Two-Foot Contours (1)

(1) LOJIC Online. (2026). Louisville/Jefferson County Information Consortium. Retrieved from https://www.lojic.org

The above-referenced maps reflect the generalized existing site topography and documented sinkholes. Changes in site topography, including development of new sinkholes or absence of old sinkholes, may be observed when comparing newer geologic maps to older maps. It is possible that previous site grading activities may have covered up surficial evidence of existing or incipient sinkholes within this site.

2.2.4.3 CAVE CONSIDERATIONS

Caves are defined as a natural void in the ground (e.g., in limestone rock) that is large enough for a person to enter. A cavern is a series of connected caves. In Kentucky, caves and caverns exist within the underlying rock mass in areas of karst terrain. There are over 5,100 known caves in Kentucky.

Cave entrances are not always obvious or may not be present at all. Many cave openings are formed by engineering works (e.g., excavation or mining), or in some cases, the result of sinkhole roof collapse.

Caves and caverns can exist within the underlying rock mass in areas of karst terrain and can vary in size, dimension, and orientation. Generally, more pronounced, or larger caves are prevalent where karst is more well developed or "mature." This phenomenon can be observed in the image below, which provides a summary of engineering classification of karst topography classification based on presence of karst features. Based on published literature (Waltham & Fookes) which considers karst classification throughout the world, karst in Kentucky classifies as "Mature Karst kIII."

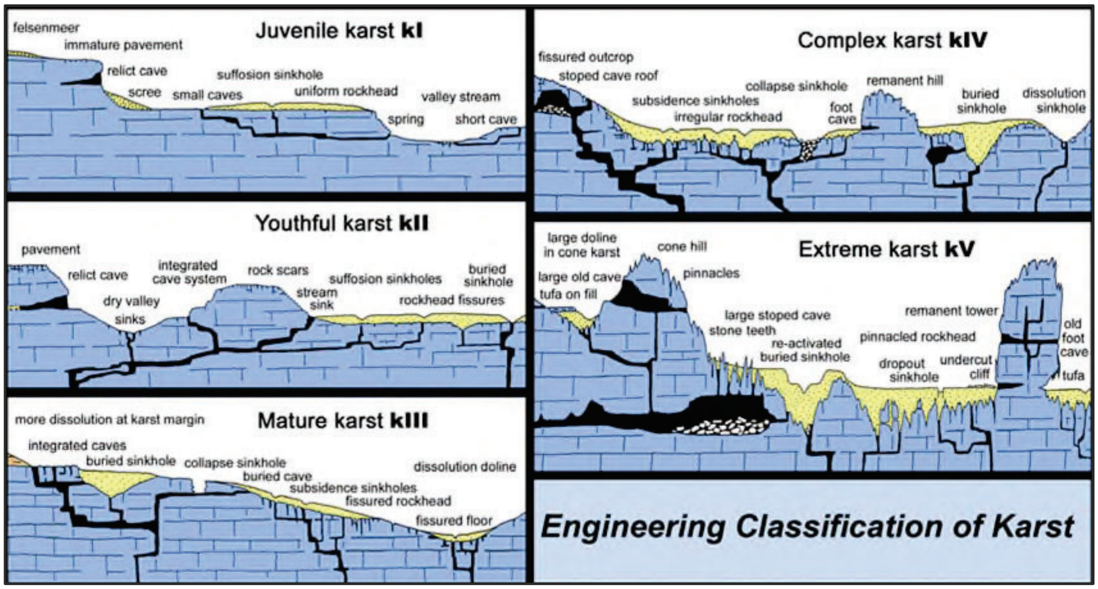

IMAGE NO. 9: Engineering Classification Of Karst (1)

(1) Adapted from “Engineering Classification of Karst Ground Conditions,” by A.C. Waltham & P.G. Fookes, 2003, Quarterly Journal of Engineering Geology and Hydrology, 49, P. 110. Copyright 2003 by the Geological Society of London.

The database search performed by KSS indicated that there are no known caves on the project site at the time the request was fulfilled on January 21, 2026. According to the KSS database, the closest cave is located approximately 500 feet northwest of the northern boundary of the project site. The cave is referred to as Cave Spring Cave, according to the KSS database. KSS advised that LiDAR data indicates the presence of a spring approximately 300 feet northwest of the Cave Spring Cave location. No further information regarding the cave was available in the KSS database. Refer to the image below for the approximate location of Cave Spring Cave, which is shown in yellow.

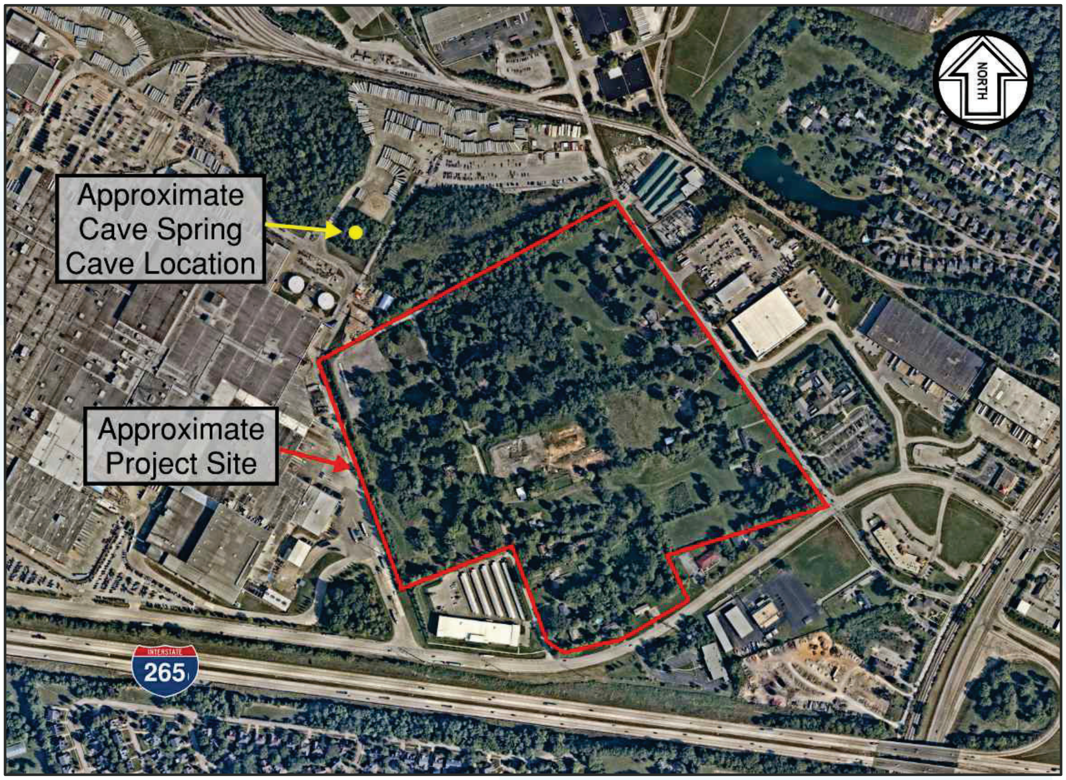

IMAGE NO. 10: KSS Data Request Response – Cave Spring Cave

Generalized mapping tools from KSS depict the number of identified caves per county in Kentucky, as well as cave density/spatial cave distribution (i.e., number of identified caves within a certain defined area). Review of the available mapping indicates 69 cave openings have been documented within Jefferson County as of September 6, 2023. Note that KSS only considers karst voids having a length or depth of at least 30 feet as caves.

Please refer to the images below obtained from the KSS website. These figures have been modified from the original version, as the boundary for Jefferson County is outlined in red.

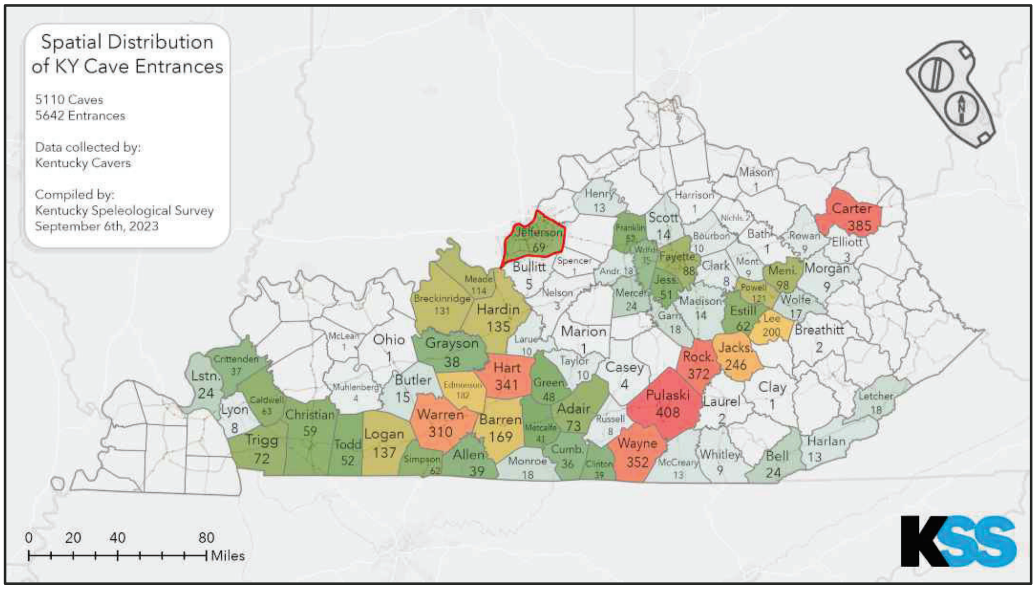

IMAGE NO. 11: Spatial Distribution Of KY Cave Entrances (1)

(1) Kentucky Speleological Survey. (2023). “Spatial Distribution of KY Cave Entrances.” Retrieved from http://kss.caves.org/kentucky-caves/

The images below depict relative cave density as a function of color. Closer review of the images indicates the project site is located within an area identified as having relatively lower cave density (indicated by the cooler shaded colors). Note that “lower” cave density does not necessarily indicate low karst potential.

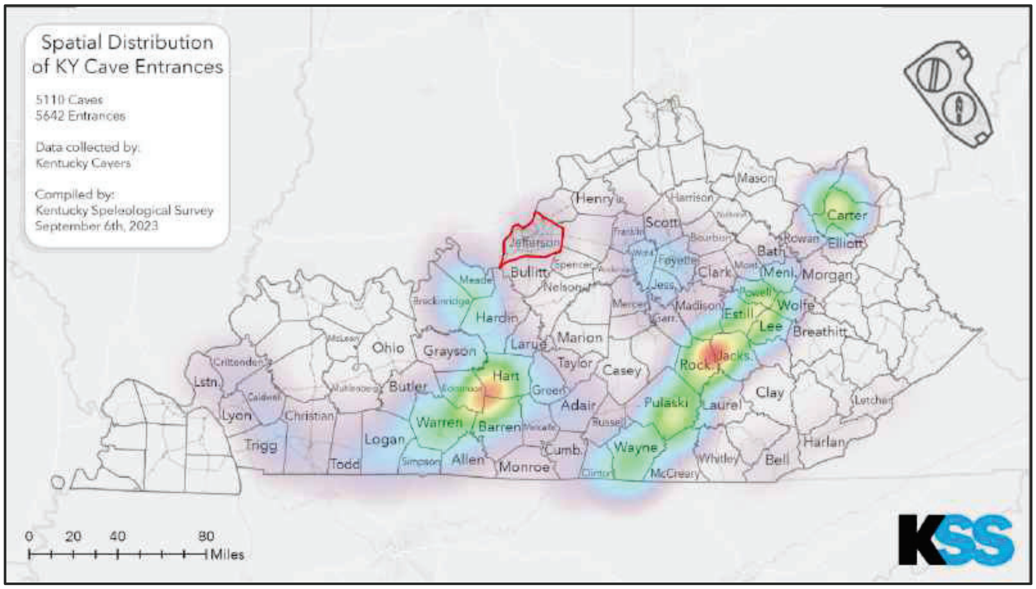

IMAGE NO. 12: Spatial Distribution Of KY Cave Entrances (1)

(1) Kentucky Speleological Survey. (2023). “Spatial Distribution of KY Cave Entrances.” Retrieved from http://kss.caves.org/kentucky-caves/

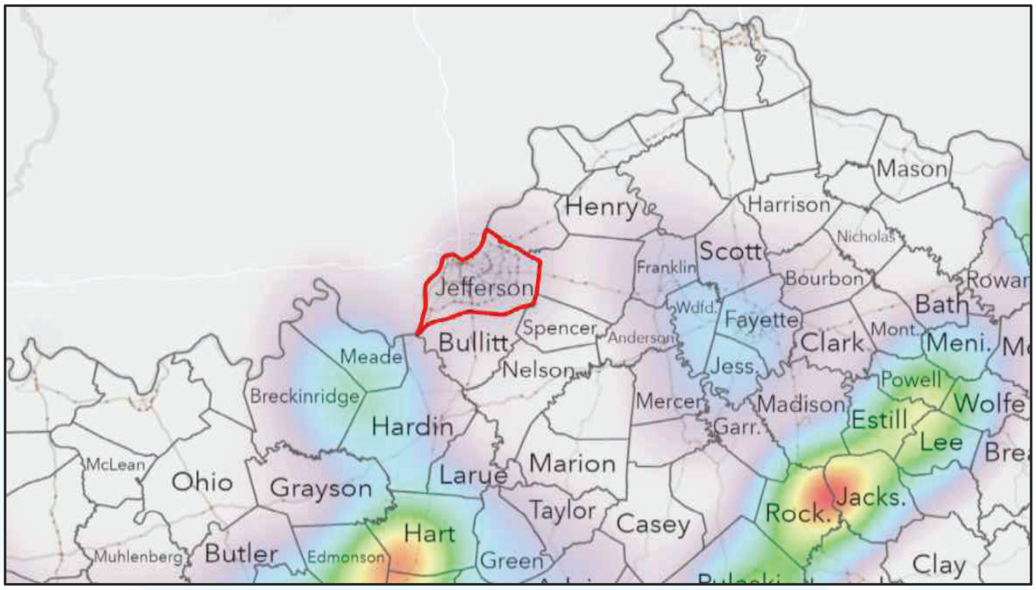

IMAGE NO. 13: Spatial Distribution Of KY Cave Entrances (Modified) (1)

(1) Kentucky Speleological Survey. (2023). “Spatial Distribution of KY Cave Entrances.” Retrieved from http://kss.caves.org/kentucky-caves/

2.2.4.4 SPRINGS AND STREAMS

Springs, which result from groundwater under hydraulic pressure head (due to change in elevation) are commonly associated with karst topography. The fissured and fractured nature of karst-susceptible rock formations act as conduits for spring water flow. Our review of the Kentucky Groundwater Repository Water Wells and Springs Map indicated the presence of one identified spring feature on the project site. Please refer to the image below for more information. The approximate site boundary is shown in red, and the onsite mapped spring feature is circled in purple. The indicated spring feature is located in the general vicinity of the existing pond near the northeast corner of the project site.

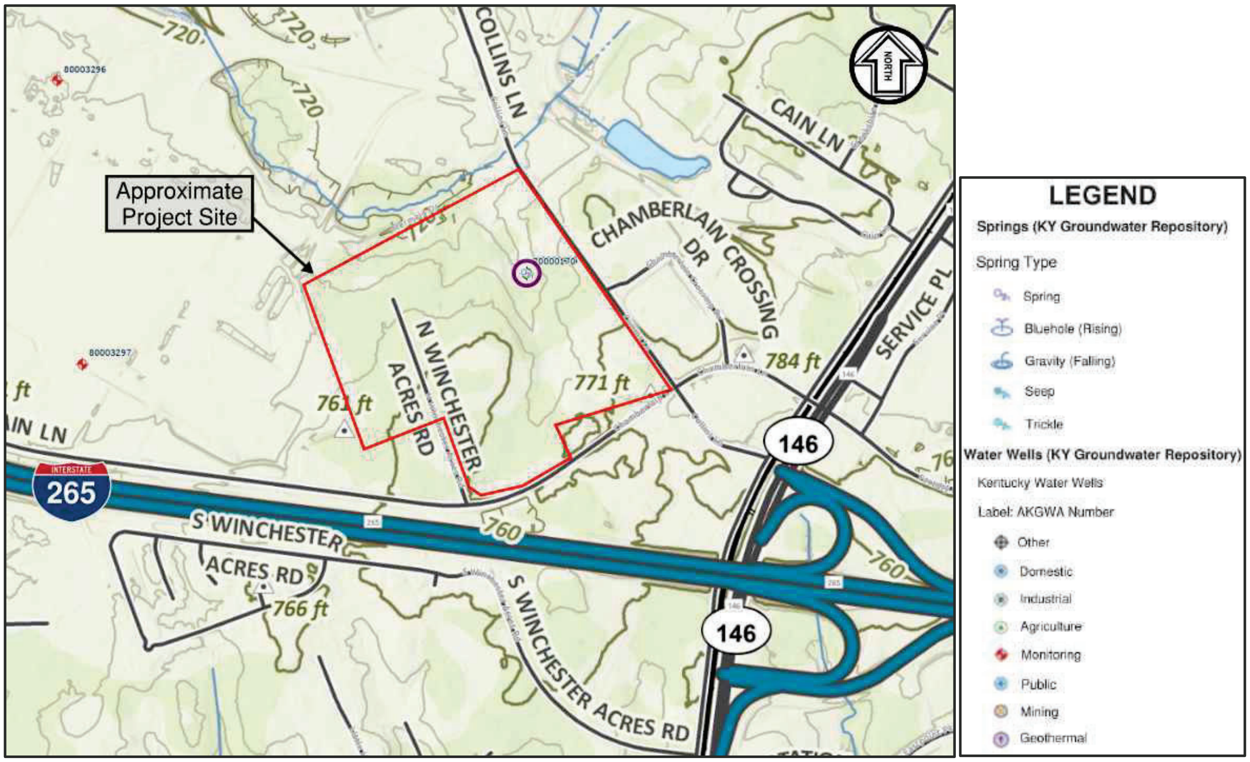

IMAGE NO. 14: Water Wells And Springs Map (1)

(1) Kentucky Geological Survey. (2026). Kentucky Geologic Map Information Service. Retrieved from https://www.kgs.uky.edu

Furthermore, a stream identified as “Hite Creek” is located north of Mermaid Lane, of which the southern edge of the roadway pavement was considered the northern boundary of the project site. Information obtained from LOJIC indicates Hite Creek is an intermittent stream as defined by the USGS.

2.2.4.5 KARST BASINS AND DYE TRACES

Additionally, our review of the Karst Basins and Dye Traces Map did not indicate the presence of identified karst groundwater basins or dye traces (dye injection, dye recovery, and or groundwater flow paths) on the project site.

2.2.5 TOPOGRAPHIC MAP AND HISTORICAL PHOTOGRAPH REVIEW

Available topographic maps from 1905 to 2022 and available historical aerial images between 1949 and 2025 were reviewed in preparation of this report. Topographic maps and historic aerial images for which no obvious changes in site topography or assumed karst activity were observed were excluded from this report. Please refer to Appendix A for topographic maps and historic aerial images referenced in this report. The approximate project site boundary is outlined in red on the figures included in Appendix A.

2.2.5.1 HISTORICAL TOPOGRAPHIC MAP REVIEW

The selected topographic maps were chosen based on distinct changes in site topography observed on the specific maps. However, the level of details varied between maps and the reviewed older maps are generally poorer quality.

Review of the historical topographic maps from the referenced time periods did not depict or indicate the presence of closed depressions or obvious site sinkhole related activity (as discussed in this report) on the project site. Additionally, sinkholes or other possible karst features that were identified and/or observed in the field (see Section 2.3.2) were not depicted on the historical topographic maps. Please refer to Appendix A for site topographic map images from various time periods.

2.2.5.2 HISTORICAL PHOTOGRAPH REVIEW

Changes in tree canopy, vegetation, agricultural activities, and surrounding development etc. were observed in the reviewed photographs, but discussion regarding changes in site features is limited to association with potential karst activity. Highlights of our review of historical photographs are as follows:

- An irregularly shaped area of lighter shading (when compared to the surrounding area) was observed in the area of the existing pond (i.e., on the northeast portion of the site) in the 1949 and 1955 images.
- On the 1960 aerial, the irregularly shaped area is evident, appearing lighter than the surrounding vegetation, and it appears to be larger when compared to the previous aerials.
- On the 1971 aerial, the irregularly shaped area is less visible, and generally appears consistent with the shape and orientation of the existing pond. Three additional oval shaped areas of lighter shading (when compared to the surrounding areas) are visible on the central and southeastern portions of the site. One is visible on the central portion and two are visible on the southeastern portion of the site. These oval shaped features are also visible on the 1986 and 1993 aerials and are assumed to be fenced areas for livestock.
- No obvious features associated with possible karst related activity were observed on the project site on the 2001, 2015, 2019, and 2025 aerials.

2.3 VISUAL RECONNAISSANCE EVALUATION

2.3.1 VISUAL RECONNAISSANCE PRODECURE

The visual reconnaissance procedure consisted of two engineers specializing in geotechnical engineering traversing the project site. This visual evaluation was performed by Ms. Alex Dodson, EI on December 17, 2025. Ms. Dodson traversed the parcel to search for visual indicators of potential karst activity.

The visual survey was initiated at the northern boundary of the project site. Ms. Dodson traversed the property from north to south until the southern property boundary was reached. This procedure was repeated multiple times, with each line staggered from the previous.

2.3.2 VISUAL OBSERVATIONS

In general, the closed contour depressions identified from the LOJIC map were not readily observed in the field. The pond was observed during the site exploration. Please refer to the table and images (with the approximate feature location shown in yellow) below for more information regarding the location of a feature observed during this evaluation. Note that other subsidence areas not noted in this report may exist across the site and/or historical sinkholes may have been obscured over time due to farming operations, site grading, or in-filling. Further note that only limited visual observations could be made for this evaluation, due to the presence of fallen leaves, heavy brush/ vegetative growth, and the observed disturbance of portions of the site to facilitate the demolition of existing site features.

SINKHOLE/SUBSIDENCE/KARST FEATURE LOCATION

FEATURE NO.	DESCRIPTION	APPROXIMATE COORDINATES	
		LATITUDE (DEGREES NORTH)	LONGITUDE (DEGREES WEST)
1	Irregular subsidence area, 5-foot diameter x 2-feet deep. Observed to retain water.	38.29018	-85.52394

The figure below includes the approximate location of the observed depression, which is shown in yellow. The approximate project site boundary is outlined in red. Imagery obtained from Nearmap, dated September 13, 2025, was utilized as the base map. It is assumed that this depression is associated with rutting, due to the feature being located directly adjacent to observed tire rutting within a presumed pathway that is presumably utilized by vehicles or machinery.

IMAGE NO. 15: Observed Feature Location Map

2.3.3 CONCLUSIONS AND PROPOSED SITE DEVELOPMENT

In general, the site has a comparable risk of sinkhole development prior to, during, or post-construction as other developments in the general surrounding area.

We did not observe evidence of drop out sinkhole activity, which is typically characterized by exposed vertical to subvertical soil walls within a depressed area. Dropout sinkholes, which are known to occur in karst dominated areas, are caused by washing or raveling of underlying soils through the fractured limestone rock. A soil arch of unraveled soil is left in place, eventually collapsing abruptly over some period. Doline or dissolution sinkholes subside much more slowly compared to dropout sinkholes and any collapse within the features is generally minor. Therefore, determining whether a doline is active (i.e., continuing to subside) is difficult to do as there is typically no evidence of collapse or ruptured ground.

The exhibit below provides a visual representation of the referenced sinkhole types, along with four other primary sinkhole types. Note that some identified sinkholes may share characteristics of more than one general sinkhole classification type. It is possible that any of the six possible sinkhole types shown below could exist or occur at the project site.

Do not construct over active or possible sinkholes without further exploration, analysis, and remediation. Sinkhole features identified within structural areas (i.e., building or pavements) will require remediation during construction or utilization of alternative foundation systems as directed by the Geotechnical Engineer of Record. We recommend identified and suspected sinkhole features be evaluated prior to construction to determine impacts on the proposed development.

Further characterization of identified anomalies can be performed by performing test borings, excavations, and/or and geophysical surveys.

In general, risk of catastrophic sinkhole collapse for three of the most common sinkhole types encountered locally (dissolution/doline, dropout, and buried sinkholes) can be reduced where structures are supported (typically by robust deep foundations) directly on/within the competent rock stratum, thereby reducing possible settlement movements attributed to soil raveling.

There is inherent risk associated with development on karst terrain as indicated by karst maps and the identified surface features. Other identified possible karst features that have not yet been identified may require additional characterization prior to construction. Furthermore, changes in the natural surface water drainage pattern (which often occurs during site grading) has been known to initiate sinkhole activity.

The findings, conclusions, and recommendations provided in this report are based on our review of the provided project documents, and our site visit. SME can provide general guidance regarding additional evaluation, sinkhole exploration, and general remedial methodologies if desired.

3. SUBSURFACE CONDITIONS

3.1 SOIL CONDITIONS

Refer to the boring logs for the soil and rock conditions at the specific boring locations. In summary, the soil conditions observed at the borings generally consisted of surficial materials (where encountered) over existing fill or natural clays, overlying limestone rock extending to the explored depths of the borings. A generalized soil profile is described below.

Stratum 1: Surficial Materials – Refer to the table below for a summary of the surficial material type and approximate thickness.

SUMMARY OF SURFICIAL MATERIAL TYPE AND APPROXIMATE THICKNESS

BORING NO.	SURFICIAL MATERIAL AND APPROXIMATE THICKNESS	BORING NO.	SURFICIAL MATERIAL AND APPROXIMATE THICKNESS
B1	7 Inches of Gravel and Asphalt Millings	B33	6 Inches of Topsoil
B2	12 Inches of Gravel and Asphalt Millings	B34	5 Inches of Topsoil
B3	4 Inches of Topsoil	B35	5.5 Inches of Topsoil
B4	7.5 Inches of Topsoil	B36	6.5 Inches of Topsoil
B5	6 Inches of Gravel and Asphalt Millings	B37	6 Inches of Topsoil
B6	7 Inches of Topsoil	B38	6 Inches of Topsoil
B7	7 Inches of Topsoil	B39	(7)
B8/B8A	4.5 Inches of Topsoil	B40	8 Inches of Topsoil
B9	5.5 Inches of Topsoil	B41/B41A	6 Inches of Topsoil
B10	8 Inches of Topsoil	B42/B42A	8 Inches of Topsoil
B11	11.5 Inches of Topsoil	B43	6 Inches of Topsoil

BORING NO.	SURFICIAL MATERIAL AND APPROXIMATE THICKNESS	BORING NO.	SURFICIAL MATERIAL AND APPROXIMATE THICKNESS
B12	10 Inches of Topsoil	B44	8 Inches of Topsoil
B13	8 Inches of Topsoil	B45	6 Inches of Topsoil
B14	10.5 Inches of Topsoil	B46	6 Inches of Topsoil
B15	7.5 Inches of Topsoil	B47	10 Inches of Topsoil
B16/B16A	8 Inches of Topsoil	B48	8.5 Inches of Topsoil
B17	12 Inches of Topsoil	B49	7 Inches of Topsoil
B18	12 Inches of Topsoil	B50	5.5 Inches of Topsoil
B19	12 Inches of Topsoil	B51/B51A	5 Inches of Gravel
B20/B20A	12 Inches of Topsoil	B52	8.5 Inches of Topsoil
B21	8 Inches of Topsoil	B53	(1)
B22	9.5 Inches of Topsoil	B54	6 Inches of Topsoil
B23	6 Inches of Topsoil	B55	8 Inches of Topsoil
B24	10 Inches of Topsoil	B56	6 Inches of Topsoil
B25/B25A	6 Inches of Topsoil	B57	6 Inches of Topsoil
B26	7.5 Inches of Topsoil	B58/B58A	10 Inches of Topsoil
B27	8 Inches of Topsoil	B59	6 Inches of Topsoil
B28	10.5 Inches of Topsoil	B60	2 Inches of Topsoil
B29	5 Inches of Topsoil	B61	8 Inches of Topsoil
B30	5 Inches of Topsoil	B62	(1)
B31	7 Inches of Topsoil	B63/B63A	8.5 Inches of Topsoil
B32/B32A	8 Inches of Topsoil	B64	(1)

NOTES:

1. Indicates that surficial materials were likely stripped during site demolition/ clearing prior to boring completion.

Stratum 2: Existing Fill – Existing clay fill or possible clay fill was encountered in borings B15, B24, B38, B42, B45, and B46. The existing fill materials generally consisted of lean clay (CL). Existing lean to fat clay (CL/CH) possible fill was encountered in boring B45. Occasional to frequent roots and trace asphalt or limestone fragments were encountered in some of the recovered samples. The clay fill was generally very soft to hard. The fill extended to depths ranging from approximately 2 to 8 feet deep, or between approximate elevations 741.5 to 763 feet. Refer to the table below for a summary of the vertical extent of existing fill.

EXISTING FILL APPROXIMATE VERTICAL EXTENT (DEPTH AND ELEVATION)

BORING NO.	APPROXIMATE VERTICAL DEPTH OF EXISTING FILL (FEET)	APPROXIMATE ELEVATION OF EXISTING FILL (FEET)
B15	5	741.5
B24	5	746.5
B38	2	760
B42	6	745
B45	8	753.5
B46	2	763

Stratum 3: Natural Clays – Natural lean clays (CL), silty clays (CL/ML), lean to fat clays (CL/CH), and/or fat clays (CH) were encountered underlying the surficial materials, existing fill, or beginning at the existing ground surface where surficial materials were not encountered. The natural clays were generally very soft to hard with varying amounts of limestone fragments, gravel, sand, and/or black oxide nodules.

Loss-on-ignition (LOI) testing performed on a sample obtained from boring B3 indicated an organic content of about 4 percent in the tested sample. The LOI results indicate the tested samples are slightly to moderately organic. In general, soils have organic contents exceeding about 4 percent are considered significant and are highly compressive under loading. The table below summarizes the results of the LOI tests.

LOI TEST SUMMARY

BORING NO.	DEPTH RANGE (FEET)	MOISTURE CONTENT (PERCENT)	LOI RESULT (PERCENT)
B3	2 – 4	31	4.0

Five particle size distribution and eight Atterberg limits tests were performed on select samples, the results are summarized in the table below.

SUMMARY OF PARTICLE SIZE AND ATTERBERG LIMITS TEST RESULTS

BORING NO.	SAMPLE DEPTH (FEET)	ATTERBERG LIMITS			PERCENT GRAVEL	PERCENT SAND	PERCENT SILT	PERCENT CLAY	USCS
		LL	PL	PI					
B9	2 – 7	55	22	33	0.5	8.3	45.2	46	CH
B14	2 – 7	34	21	13	0	7.5	64.5	28	CL
B18	8 – 10	47	23	24	Not Performed				CL
B29	2 – 7	50	22	28	0.8	7.4	50.4	41.4	CL/CH
B32	5 – 7	47	22	25	0	3.7	55.7	40.6	CL
B45	8 – 10	53	23	30	0.1	3.8	50.3	45.8	CH
B50	2 – 3	61	25	36	Not Performed				CH
B63	8 – 10	51	23	28	Not Performed				CH

Twelve natural density (unit weight) determination tests were run on select samples. The results are summarized in the table below. Note that some of the samples are either fictitiously high or low in regard to recorded moist and dry unit weight values. This discrepancy is likely attributed to remolding of the samples during split spoon sampling and/or poor sample quality.

SUMMARY OF UNIT WEIGHT DATA

BORING NO.	SAMPLE DEPTH (FEET)	MOISTURE CONTENT (PERCENT)	MOIST UNIT WEIGHT (PCF)	DRY UNIT WEIGHT (PCF)
B3	2 – 4	23	121.5	98.6
B6	2 – 4	21	115.6	95.5
B7	18.5 – 20	40	111.8	80.2
B12	2 – 4	25	134.3	107.5
B23	2 – 4	23	119.3	97.1
B27	5 – 7	26	122.3	97.2
B39	23.5 – 25	45	114.6	78.8
B41	5 – 7	20	102.3	85.3
B44	28.5 – 30	37	99.4	72.5
B46	28.5 – 30	27	105.3	82.9
B51	2 – 4	22	121.2	99.4
B63	13.5 – 15	26	113.8	90.3

Four Standard Proctor compaction tests were performed on recovered bulk samples. Two of the compaction test specimens were then selected for laboratory California Bearing Ratio (CBR) testing. Refer to the table below for more information.

CBR AND PROCTOR LABORATORY TESTING RESULTS

BORING NO.	SAMPLE DEPTH (FEET)	MAXIMUM DRY DENSITY (PCF)	OPTIMUM MOISTURE (PERCENT)	PERCENT COMPACTION	CBR AT 0.1 INCH PENETRATION	CBR AT 0.2 INCH PENETRATION
B16	8 – 11	100.5	22.5	90	1.5	1.5
				95	7.5	5.9
				100	11.7	9.2
B25	2 – 5	104.3	20.7	Not Performed		
				Not Performed		
				Not Performed		
B32	10 – 12	99.7	22.9	90	1.8	1.4
				95	5.9	4.6
				100	8.8	7.1
B63	5 – 10	107.4	19.2	Not Performed		
				Not Performed		
				Not Performed		

One-dimensional consolidation testing was performed on Shelby tube specimens obtained from borings B32 and B41. Refer to Appendix B for consolidation test curve data.

3.2 ROCK CONDITIONS

Stratum 4: Rock – Weathered limestone was encountered at the borings below the soil profile. Please refer to the table below for a summary of top of rock and refusal depth and elevation at the boring locations.

SUMMARY OF TOP OF ROCK DEPTH AND ELEVATION AND REFUSAL/TERMINATION DEPTH AND ELEVATION

BORING NO.	APPROXIMATE GROUND SURFACE ELEVATION (1) (FEET)	APPROXIMATE TOP OF ROCK DEPTH (2) (FEET)	APPROXIMATE TOP OF ROCK ELEVATION (1) (FEET)	APPROXIMATE REFUSAL DEPTH (2) (FEET)	APPROXIMATE REFUSAL ELEVATION (1) (FEET)
B1	739	24.5	714.5	25 (3)	714.0 (3)
B2	729.5	12.5	717.0	12.5 (3) (5) (6)	717.0 (3) (5) (6)
B3	721	7.6	713.4	7.9 (4)	713.1 (4)
B4	722	1.5	720.5	1.6 (4)	720.4 (4)
B5	742.5	26	716.5	26.2 (4)	716.3 (4)
B6	745	24	721.0	24.4 (3) (6)	720.6 (3) (6)
B7	739.5	19.5	720.0	19.9 (4)	719.6 (4)
B8	741	16.1	724.9	16.3 (4)	724.7 (4)
B9	738.5	16	722.5	16.2 (4)	722.3 (4)
B10	733	13.5	719.5	14 (3) (6)	719.0 (3) (6)
B11	730	8	722.0	8.6 (4)	721.4 (4)
B12	732	9.2	722.8	9.2 (3) (5) (6)	722.8 (3) (5) (6)
B13	733	9.9	723.1	10.4 (4)	722.6 (4)
B14	743	20.7	722.3	20.9 (4)	722.1 (4)
B15	746.5	24.5	722.0	24.8 (4)	721.7 (4)
B16	747	23	724.0	24.5 (3) (6)	722.5 (3) (6)
B17	746	21.5	724.5	21.6 (4)	724.4 (4)
B18	735.5	12.5	723.0	12.8 (4)	722.7 (4)
B19	739	14	725.0	14.1 (4)	724.9 (4)
B20	730	4.3	725.7	4.5 (4)	725.5 (4)
B21	740	12.5	727.5	12.5 (3) (5) (6)	727.5 (3) (5) (6)
B22	747	24	723.0	24.4 (4)	722.6 (4)
B23	747.5	22.5	725.0	22.5 (3) (5) (6)	725.0 (3) (5) (6)
B24	751.5	26.2	725.3	26.6 (4)	724.9 (4)
B25	751	24	727.0	24.2 (4)	726.8 (4)
B26	748	19.5	728.5	19.9 (4)	728.1 (4)

BORING NO.	APPROXIMATE GROUND SURFACE ELEVATION (1) (FEET)	APPROXIMATE TOP OF ROCK DEPTH (2) (FEET)	APPROXIMATE TOP OF ROCK ELEVATION (1) (FEET)	APPROXIMATE REFUSAL DEPTH (2) (FEET)	APPROXIMATE REFUSAL ELEVATION (1) (FEET)
B27	744.5	18	726.5	18 (3) (5) (6)	726.5 (3) (5) (6)
B28	732	3	729.0	3.3 (4)	728.7 (4)
B29	749	14.5	734.5	14.8 (4)	734.2 (4)
B30	754	27.5	726.5	27.7 (4)	726.3 (4)
B31	755.5	27.5	728.0	27.5 (3) (5)	728.0 (3) (5)
B32	755	26	729.0	26 (3) (5) (6)	729.0 (3) (5) (6)
B33	755.5	25.5	730.0	25.6 (4)	729.9 (4)
B34	742	10.4	731.6	10.6 (4)	731.4 (4)
B35	738	5.5	732.5	6.3 (4)	731.7 (4)
B36	754.5	26.5	728.0	26.7 (4)	727.8 (4)
B37	760.5	29	731.5	29.3 (4)	731.2 (4)
B38	762	30	732.0	30.2 (4)	731.8 (4)
B39	760.5	26	734.5	26 (3) (5)	734.5 (3) (5)
B40	753	16.8	736.2	17 (4)	736.0 (4)
B41	741.5	7.4	734.1	7.7 (4)	733.8 (4)
B42	751	13.6	737.4	13.7 (3) (6)	737.3 (3) (6)
B43	757.5	29	728.5	29.2 (4)	728.3 (4)
B44	759.5	30.7	728.8	30.8 (4)	728.7 (4)
B45	761.5	31.3 (5)	730.2	31.3 (3) (5) (6)	730.2 (3) (5) (6)
B46	765	30	735.0	31.5 (4)	733.5 (4)
B47	765	29.8	735.2	30 (4)	735.0 (4)
B48	765	27.2 (5)	737.8	27.2 (4) (5)	737.8 (4) (5)
B49	761	21.9 (5)	739.1	21.9 (3) (5) (6)	739.1 (3) (5) (6)
B50	742	3.5	738.5	4 (3)	738.0 (3)
B51	751	11.3	739.7	11.4 (4)	739.6 (4)
B52	755	12.4	742.6	12.6 (4)	742.4 (4)
B53	764	28.7	735.3	28.9 (4)	735.1 (4)

BORING NO.	APPROXIMATE GROUND SURFACE ELEVATION (1) (FEET)	APPROXIMATE TOP OF ROCK DEPTH (2) (FEET)	APPROXIMATE TOP OF ROCK ELEVATION (1) (FEET)	APPROXIMATE REFUSAL DEPTH (2) (FEET)	APPROXIMATE REFUSAL ELEVATION (1) (FEET)
B54	762	23.5	738.5	24 (3) (6)	738.0 (3) (6)
B55	758.5	18.5	740.0	18.6 (4)	739.9 (4)
B56	745	5.5	739.5	5.7 (4)	739.3 (4)
B57	746	6.5	739.5	6.9 (4)	739.1 (4)
B58/B58A	757	16.9 (5)	740.1	16.9 (3) (5) (6)	740.1 (3) (5) (6)
B59	757.5	18 (5)	739.5	18 (3) (5) (6)	739.5 (3) (5) (6)
B60	749.5	8.5	741.0	8.9 (4)	740.6 (4)
B61	752	8.5	743.5	9.1 (3) (6)	742.9 (3) (6)
B62	768	23.6	744.4	23.7 (4)	744.3 (4)
B63	756	15	741.0	15.4 (4)	740.6 (4)
B64	757	15.3	741.7	15.5 (4)	741.5 (4)

NOTES:

1. Corresponding elevation based on estimated ground surface elevation approximated from the provided topographic survey. Elevations are rounded to the nearest half foot.
2. Refers to depth below existing ground surface.
3. Indicates auger refusal and boring termination (unless rock coring was performed, where noted).
4. Indicates sampler refusal and boring termination.
5. Indicates that weathered rock may have been penetrated prior to reaching refusal depth/elevation.
6. Indicates that 10 feet of rock coring was performed upon encountering auger refusal.

The limestone recovered from the split-spoon sampler was generally described as completely weathered, gray and/or brown, and hard. While the split-spoon sampler penetration ranged from less than one inch to greater than one foot through and sampled completely weathered rock, the sampling technique implemented should only be used to provide a general assessment of the underlying rock conditions due to the samples being reduced to powder and small fragments (and the minimal quantity of rock recovered). Note that rock depths where limestone is encountered can be highly variable over short lateral distances. Thus, it is possible that refusal may have been encountered on limestone boulders or “floaters” (i.e., rock contained within a matrix of soil) or on limestone pinnacles or “cutters”.

Ten feet of rock coring was performed in borings B2, B6, B10, B12, B16, B21, B23, B27, B32, B42, B45, B49, B54, B58A, B59, and B61 after encountering auger refusal. The recovered rock cores were generally described as highly weathered to slightly weathered limestone and were highly fractured to slightly fractured, and light gray to medium gray and/or bluish gray. The limestone was occasionally fossiliferous, vuggy, pitted, and occasionally contained styolites, calcite crystals, and oxide staining. Vertical fractures were also observed in some of the recovered rock cores.

Upon retrieving rock core specimens from the boreholes, the core recoveries (REC) and rock quality designation (RQD) were measured. RQD is a qualitative measurement of general rock quality that considers both core recovery and joint, fracture, and bedding plane spacing. RQD is determined by measuring the total length of core specimens that are at least twice the diameter of the core barrel utilized (e.g., a minimum of 4 inches since an NQ2 core barrel was utilized). The total length of the core specimens meeting the criteria are divided by the total core run, multiplied by 100, and expressed as a percentage. The relative rock quality based on RQD is shown in the table below.

RELATION OF RQD AND IN-SITU ROCK QUALITY (1)

RQD (PERCENT)	ROCK QUALITY
90-100	Excellent
75-90	Good
50-75	Fair
25-50	Poor
0-25	Very Poor

NOTES:

1. After Deere (1963)

The recovered rock core specimens were also evaluated utilizing the RMR (Rock Mass Rating) system developed by Z.T. Bieniawski to further evaluate the rock quality and estimate strength parameters. This method is considered more sophisticated than RQD alone in evaluating rock quality, and considers several variables including: strength of the intact rock, RQD, spacing of discontinuities, condition of discontinuities, and groundwater considerations. A certain rating (i.e., points) are allotted to each category, with more favorable conditions resulting in a higher rating, and a total value of 100 being the highest achievable rating. A deduction for the orientation of fractures based upon application (tunnels/mines, foundations, or slopes) can also be applied. The RMR is determined based upon the sum of the points for each category for a particular sample, which is then related to a relative qualitative description and can be correlated with soil strength parameters (i.e., cohesion and friction angle). Note selection of some ratings are based on individual judgement. Thus, it is conceivable that total ratings for a particular sample may vary from individual to individual.

RELATION OF RMR AND IN-SITU ROCK QUALITY (1)

RMR RATING	CLASS NO.	DESCRIPTION
81-100	I	Very Good
61-80	II	Good
41-60	III	Fair
21-40	IV	Poor
0-20	V	Very Poor

NOTES:

1. After Bieniawski (1979)

The GSI (Geological Strength Index) developed by E. Hoek and E.W. Brown is also used to evaluate overall quality and strengths of jointed rock masses. GSI is the correlation between the structure of the rock (intact rock to laminated or sheared rock) and the surface conditions of the rock (very good to very poor). The GSI along with several other parameters, including compressive strength, can be utilized to estimate shear strength parameters, such as cohesion and friction angle. Uniaxial unconfined compressive strength testing was performed on six rock core specimens to evaluate rock compressive strength.

Please refer to the table below for more information regarding our general assessment of rock quality based upon the referenced classification systems and for the uniaxial compressive strength test results.

SUMMARY OF ESTIMATED ROCK CORE CONDITIONS AND COMPRESSIVE STRENGTH

BORING NO.	SAMPLE DEPTH (FEET)	RECOVERY (PERCENT)	RQD EVALUATION (1)		GSI (2)	RMR EVALUATION (3)		COMPRESSIVE STRENGTH (PSI)
			RQD (PERCENT)	QUALITY		RATING	CLASS NO. AND DESCRIPTION	
B2	12.5 – 22.5	99	69	Fair	50 to 60	60	III Fair	Not Performed

BORING NO.	SAMPLE DEPTH (FEET)	RECOVERY (PERCENT)	RQD EVALUATION (1)		GSI (2)	RMR EVALUATION (3)		COMPRESSIVE STRENGTH (PSI)
			RQD (PERCENT)	QUALITY		RATING	CLASS NO. AND DESCRIPTION	
B6	24.4 – 34.4	100	48	Poor	45 to 55	56	III Fair	7,080 (25.9 to 26.2 feet) 7,570 (29.9 to 30.2 feet)
B10	14 – 19.7	97	15	Very Poor	35 to 45	47	III Fair	Not Performed
	19.7 – 24		83	Good	50 to 60	64	II Good	
B12	10 – 20	98	61	Fair	45 to 55	58	III Fair	7,280 (10.3 to 10.6 feet) 4,930 (16.9 to 17.2 feet)
B16	24.5 – 34.5	100	83	Good	45 to 55	62	II Good	Not Performed
B21	12.5 – 22.5	98	75	Fair to Good	50 to 60	63	II Good	Not Performed
B23	22.5 – 32.5	88	73	Fair	50 to 60	61	II Good	Not Performed
B27	18 – 28	97	66	Fair	40 to 50	56	III Fair	3,550 (18.4 to 18.7 feet) 3,930 (26.0 to 26.3 feet)
B32	27.5 – 37.5	100	67	Fair	45 to 55	50	III Fair	Not Performed
B42	13.6 – 23.6	100	73	Fair	40 to 50	51	III Fair	2,000 (16.6 to 16.9 feet) 1,790 (20.5 to 20.8 feet)
B45	33 – 43	98	76	Good	45 to 55	54	III Fair	3,660 (36.3 to 36.6 feet) 5,110 (40.1 to 40.4 feet)
B49	21.9 – 31.9	100	74	Fair	45 to 55	61	II Good	Not Performed
B54	24 – 34	98	75	Fair to Good	35 to 45	49	III Fair	Not Performed
B58A	16.9 – 26.9	98	47	Poor	35 to 45	50	III Fair	Not Performed

BORING NO.	SAMPLE DEPTH (FEET)	RECOVERY (PERCENT)	RQD EVALUATION (1)		GSI (2)	RMR EVALUATION (3)		COMPRESSIVE STRENGTH (PSI)
			RQD (PERCENT)	QUALITY		RATING	CLASS NO. AND DESCRIPTION	
B59	18 – 28	98	72	Fair	45 to 55	57	III Fair	Not Performed
B61	9.1 – 19.1	95	51	Fair	35 to 45	56	III Fair	Not Performed

NOTES:

2. After Deere (1963)
3. After Hoek and Brown (1997)
4. After Bieniawski (1979)

Please refer to the images below for the recovered rock core specimens. The top of each ten foot core run (RC) is located in the upper left hand corner of the rock core box in the images below. Note that breaks (either man made or presumably induced during the rock coring procedure) on the recovered rock cores are marked with continuous black lines. Please refer to the attached boring logs for additional information.

IMAGE NO. 16: Rock core collected from boring B2 (12.5 feet to 22.5 feet).

IMAGE NO. 17: Rock core collected from boring B6 (24.4 feet to 34.4 feet).

IMAGE NO. 18: Rock core collected from boring B10 (14 feet to 24 feet).

IMAGE NO. 19: Rock core collected from boring B12 (10 feet to 20 feet).

IMAGE NO. 20: Rock core collected from boring B16 (24.5 feet to 34.5 feet).

IMAGE NO. 21: Rock core collected from boring B21 (12.5 feet to 22.5 feet).

IMAGE NO. 22: Rock core collected from boring B23 (22.5 feet to 32.5 feet).

IMAGE NO. 23: Rock core collected from boring B27 (18 feet to 28 feet).

IMAGE NO. 24: Rock core collected from boring B32 (27.5 feet to 37.5 feet).

IMAGE NO. 25: Rock core collected from boring B42 (13.6 feet to 23.6 feet).

IMAGE NO. 26: Rock core collected from boring B45 (33 feet to 43 feet).

IMAGE NO. 27: Rock core collected from boring B49 (21.9 feet to 31.9 feet).

IMAGE NO. 28: Rock core collected from boring B54 (24 feet to 34 feet).

IMAGE NO. 29: Rock core collected from boring B58A (16.9 feet to 26.9 feet).

IMAGE NO. 30: Rock core collected from boring B59 (18 feet to 28 feet).

IMAGE NO. 31: Rock core collected from boring B61 (9.1 feet to 19.1 feet).

3.3 GROUNDWATER CONDITIONS

Groundwater was observed in the borings (where encountered) as summarized in the table below.

GROUNDWATER (G.W.) SUMMARY TABLE

BORING NO.	INITIAL DEPTH OF G.W. (feet) (1)	G.W. DEPTH UPON COMPLETION OF DRILLING (feet) (1)	INITIAL G.W. ELEVATION (feet) (2)	G.W. ELEVATION UPON COMPLETION OF DRILLING (feet) (2)
B5	25.5	(3)	717.0	(3)
B11	8.5	(3)	721.5	(3)
B13	10	(3)	723	(3)
B14	19	19.3	724	723.7
B24	26	24.8	725.5	726.7
B30	27	27	727	727
B32	23	(5)	732	(5)
B34	10	10.2	732	731.8
B35	5	4.3	733	733.7
B36	(4)	26.1	(4)	728.4
B42	13.5	(5)	737.5	(5)
B43	28	26.3	729.5	731.2
B44	-	24.1 (14 hours after drilling)	-	735.4 (14 hours after drilling)
B45	31	(3)	730.5	(3)
B46	30	29.8	735	735.2
B51	11	(3)	740	(3)
B53	28	26.3	736	737.7
B54	23	(5)	739	(5)
B56	5	4.8	740	740.2
B57	5.5	3.5	740.5	742.5
B60	8.5	(3)	741	(3)

NOTES:

1. Refers to depth below existing ground surface.
2. Corresponding elevation based on estimated ground surface elevation approximated from the provided topographic survey. Elevations are rounded to the nearest half foot.
3. Indicates that groundwater was not encountered above the borehole cave in depth.
4. Indicates that groundwater was not encountered.
5. Indicates that groundwater was not measured upon completion of drilling due to the performance of rock coring.

In cohesive soils (clays), a long time may be required for the groundwater level in the borehole to reach an equilibrium position. Therefore, the use of groundwater observation wells (piezometers) is necessary to accurately determine the hydrostatic groundwater level within cohesive soils as observed at this site.

Significant variance in groundwater depths/elevations and perched/trapped groundwater may be encountered at differing depths within the soil and/or rock profiles depending on soil stratigraphy at a particular location. Groundwater hydrogeology is further complicated by the presence of limestone rock below the soils. The underlying limestone rock is often characterized by open or clay-filled fracture zones which accommodate groundwater flow. In karstic limestone formations, the interconnection of fracture zones, voids, and solution conduits for which groundwater can flow is highly complex and unpredictable.

Refer to the Field Testing Procedures in Appendix B for additional information about groundwater level measurements. If more information regarding groundwater levels at this site is required, then we recommend performing additional subsurface assessment(s).

4. ANALYSIS AND RECOMMENDATIONS

The site has several important risks related to the geologic and geographic conditions. These risks include the underlying karst geology (i.e., fractured and possibly cavernous rock), and the presence of shrink swell soils.

Additionally, we are aware of the need for significant grade changes across the project site, based on our understanding that the proposed FFE of the building is elevation 752 feet, and that surrounding grades (including pavements) will be at or near elevation 752 feet. Based on the assumed grading, we estimate that up to about 30 feet of fill (with the greatest amount of fill required in the northeastern portion of the building pad) will be required within the proposed building footprint to achieve the proposed FFE. Note that this assumed fill depth is based on the approximate existing ground surface elevations estimated from the provided topographic survey within the approximate proposed building pad as indicated on the referenced site plan and the actual fill depth will depend on the final proposed building FFE, building location, and orientation. The weight of the new fill required to establish site grades will act as a load on the underlying soils which will result in both initial distortion settlement and longer-term consolidation settlement.

Each of these risks are discussed below along with general considerations to address or mitigate these risks during the preparation and development of the site.

4.1 SITE DEVELOPMENT CONSIDERATIONS

4.1.1 KARST AND SINKHOLES

The following sections provide a discussion of considerations for reducing risk associated with construction in karst terrain. Furthermore, we have provided discussion regarding possible implementation of a sinkhole monitoring system at strategic locations within the proposed building footprints. However, use of an early warning system is optional, and is discussed to provide the Owner with knowledge of available technologies. Note there are limitations associated with the technology (discussed below in Section 4.1.1.2) that should also be considered when determining if such a system is appropriate for this project.

4.1.1.1 PLANNING CONSIDERATIONS

As previously discussed, engineering works and site development can result in acceleration of incipient sinkhole development or encourage new sinkhole formation. These features may appear dormant in their existing state, but subsidence can be activated by changes in the natural surface drainage pattern due to construction works (e.g., changes in site grading and/or removal of vegetative surface cover), dewatering, and/or ground vibrations (such as those caused by construction activities). Subsidence caused by karst features can result in excessive and uneven settlement of structures and structural distress requiring underpinning or replacement of foundations, replacement of grade slabs and pavements, or other structural remedies.

The risks associated with constructing over karst terrain can be managed to a practical degree by implementing practices that minimize surface water intrusion into the subgrade. These include, but are not limited to:

- Direct surface water and water collected in downspouts away from structural areas.
- Construct quality joints for utilities to minimize water leakage. Seal joints outside the utilities with concrete or flowable fill. Consider encasing below-grade utilities in flowable fill to reduce the potential for sinkhole development should utility rupture occur.
- Do not install/use sprinkler systems next to foundation areas.

- Engage a local geotechnical engineer or engineering geologist to check the subgrade for indications of solution activity after cut areas are excavated to grade and before fill is placed in fill areas.
- Construct stormwater basins as far as practically possible away from structures and routinely monitor structures that impound water for possible leaks.

It should be noted that numerous developments of similar construction within the general project vicinity have been successfully constructed. Thus, in general, this site seems to be at no greater risk of karst development than the surrounding sites.

4.1.1.2 MONITORING CONSIDERATIONS

Instrumentation could be installed within the building footprint to provide continual, real-time monitoring for possible ground subsidence utilizing the SinkholeAlert system developed by G3 Group. A sinkhole monitoring system should be considered where foundations/slabs are designed as soil supported, particularly where the soil profile below the building is relatively deep and/or at locations supporting critical infrastructure or equipment.

This type of system consists of installing well casing with sensor probe implants attached to a cable at desired locations and depths. The sensor utilizes time-domain reflectometry technology to evaluate potential ground movements. The sensor is tripped in the event subsidence occurs below and at the sensor probe, which severs the wire connection and sends a signal to the monitoring device. The monitoring device connects to an alarm panel siren or other triggering device. Text messages and/or phone calls can be sent by the system in real-time to notify the Owner if ground subsidence is detected. A fee applies for monitoring services.

There are some limitations in utilization of this equipment. This technology performs optimally in sandy soils as opposed to clay soils (which generally dominate soil stratigraphy at this site) due to the differences in the way ground movements occur during dropout sinkhole formation. Additionally, the recommended horizontal probe sensor spacing is typically directly related to the depth to rock. Therefore, an impractical number of sensors would be required to cover the footprint of a facility with shallower rock conditions. Due to this, it is typically practical to install sensors in areas where the depth to rock is deep as previously discussed. Furthermore, this is a passive monitoring technique and does not provide protection from sinkhole related subsidence; it is merely an early detection system. Utilization of a sinkhole monitoring system is not considered a suitable replacement for remediation of identified sinkholes or other karst features.

We would be pleased to discuss options for monitoring subgrade conditions after construction as a proactive approach to the development's operations and maintenance program, if desired.

4.1.2 SHRINK/ SWELL SOILS

Eight Atterberg Limits test were performed on select samples. The results of the Atterberg Limits test indicated the tested soils had liquid limits (LL) ranging from 34 percent to 61 percent, plastic limits (PL) of 21 percent to 25 percent, and plasticity indices (PI) of 13 percent to 36 percent. Based on the results of the Atterberg Limits tests, highly plastic fat clays (CH) are expected to be present at and below the design bottom of the foundation, slab, and pavement levels, and may be encountered where on-site near-finished grade fill. It will be important to properly identify these during construction and then remediate these areas to minimize further soils movements that could be detrimental to the structures.

Shrink-swell soils (often referred to as "expansive" or "fat" clays) are common in the general project area. Construction over high plasticity soils is challenging, but not uncommon, particularly throughout Kentucky where such soils are common within the soil stratigraphy. Suspected borderline high-volume change potential soils classified as "lean to fat clay" (CL/CH) were encountered in the borings and may also be exposed depending on proposed site grading. With proper construction practices, we have observed numerous developments successfully constructed on these soils with years of favorable performance.

However, these soils can be problematic, typically only occurring after an extended period of time (e.g., years), since they can undergo significant volume changes with changes in moisture content due to natural conditions (i.e., seasonal fluctuations) or man-induced conditions (poor site grading/subgrade preparation, ruptured utility lines, etc.).

An increase in moisture content will lead to a volume increase ("swelling") and a decrease in moisture content will lead to a volume decrease ("shrinkage"). In isolated cases, this shrink-swell behavior can be severe in "CH" soils if these soils experience excessive variations in moisture content causing movements below slabs, pavements, foundations, etc. supported by these soils. These movements can result in damage to the structure (e.g., brick/masonry, walls, and interior finish cracking), out of square doors and/or window openings, and premature loss of serviceability of slabs and pavements. This risk for distress can be reduced by properly preparing subgrade soils and minimizing changes in soil moisture content of the clay subgrade.

We recommend the foundations or other structural elements (such as floor slabs, pavements, etc.) not bear directly on high plasticity clays soil due concerns regarding the susceptibility for these soils to experience volume change due to seasonal variation in soil moisture content. Where this soil type is encountered, remove (undercut) the subgrade as necessary and replace with a minimum of 3 feet of a low to non-expansive engineered fill (i.e., KYTC dense-graded aggregate [DGA] or lean clay) below the structural elements compacted per the requirements in Section 4.2.5 of this report. Chemical subgrade modification (i.e., cement or lime treatment) may also be considered for expansive clay mitigation. **Note that chemical treatment in soils where weathered limestone fragments (which are usually an indicator of larger cobble-sized rock within the soil matrix) were encountered in the borings may not be feasible and can damage the chemical mixing equipment.** Additional considerations and recommendations are provided in the following sections of this report.

We recommend implementing moisture control and drainage details that can further reduce the potential for shrink-swell activity. Some examples include:

- Prepare subgrade soils during site earthwork operations as recommended in this report.
- Protect exposed subgrades from desiccation via placement of sacrificial gravel base layer or leave subgrade elevation cut high until just prior to floor slab or pavement construction.
- Isolate utility stickups through slabs to accommodate potential movements.
- Downspouts and overflow pipes must be properly discharged so that water does not accumulate near (within at least 10 feet of) the foundation areas. Where releasing water from downspouts and/or overflow pipes onto the ground, site grades need to be designed so that surface runoff is directed away from the foundation and structural areas.
- Planting of trees where shrink/swell soils are present is particularly problematic, as tree roots tend to grow in the direction of a water source and thereby reducing soil moisture content. This can lead to drying and shrinkage of the fat clay soils. Soil shrinkage adjacent to building foundations can manifest as settlement due to volume changes in the underlying soils. Therefore, we recommend trees not be planted directly adjacent to proposed structures.

4.1.2.1 POTENTIAL VERTICAL RISE

A subgrade volume change evaluation was performed to evaluate the possible expansion capability of the existing clay soils. This evaluation included performance of potential vertical rise (PVR) for the near-surface, fat clay subgrade in accordance with TxDOT Designation: Tex-124-E. Data obtained from Particle Size Analysis, Atterberg Limits, Unit Weight, and moisture content testing were used in the calculation to estimate predicted free swell and total swell under loading as part of the PVR study.

The soil subgrade strata were divided into a convenient number of layers (about 2 feet for the analyzed stratum) per the PVR procedure. Each layer was analyzed individually for swell. The results were summed to obtain the total PVR (heave). PVR was analyzed assuming the encountered subsurface conditions at boring B45 based on the assumption that fat clay soil would be exposed at the slab and pavement bearing elevation (i.e., near elevation 752 feet) and based on the assumption that the thickest profile of fat clay soil would remain below the slab/ pavement at or near this location. Consequently, we estimate the greatest PVR would be expected at and near this location (assuming ample exposure to a water source is provided). The entire soil profile extending to bedrock was considered for the purposes of this evaluation.

We did not analyze PVR for foundations for this project due to our understanding that the proposed building will be supported on drilled piers bearing in rock. Although we understand some equipment and machinery structures may be supported on shallow foundations, we did not analyze PVR for this scenario due to the limited information available regarding these proposed equipment structures and foundations at the time this report was prepared. We recommend performance of a PVR analysis once these locations and anticipated loading are determined.

Our assessment of potential vertical rise in an unrestrained condition indicates a maximum vertical rise (swell) of approximately 1.8 inches may occur where highly plastic fat clay (CH) soils are exposed and subsequently wetted (due to inclement weather, poor drainage, ruptured utilities, etc.).

Furthermore, our analyses (which considered loading due to overburden pressure of the proposed floor slab/ heavy duty PCC pavement section and standard-duty HMA pavement section) estimated PVR values of about 0.75 inches. While these values are considered more tolerable in comparison to the unrestrained condition, we anticipate risk of distress, particularly in pavement areas (which would likely be more significantly impacted than interior building slabs due to less risk of exposure to moisture) due to expected drainage within the aggregate base course and lower overburden weight to resist swell.

Please note that the estimated PVR value for the slab and heavy-duty PCC pavement section assumed a concrete slab thickness of about 10 inches underlain by approximately 6 inches of aggregated base and the PVR value for the standard-duty pavement section assumed an HMA thickness of about 5 inches underlain by about 6 inches of aggregate. The recommended pavement sections have not been determined at the time this report was prepared and therefore, these PVR estimates should be considered preliminary. An increase in PVR would be expected if thinner slab/ pavement sections and lower pressures are expected. Please contact SME if this condition is expected so we can re-evaluate our analyses.

In addition to performance of the PVR study to evaluate soil expansion potential, we reviewed the Atterberg Limits test results for the purpose of providing a generalized assessment of likely clay mineralogy. Different clay minerals have varying capacity and potential for expansion. Based upon this cursory evaluation, the tested samples plot near the zone on the soil plasticity chart typically associated with soil mineralogy dominated by illite (indicated by red circles on the image below, based upon published data from Mitchell, 1976) a clay mineral that does not typically exhibit significant volume change compared to soils dominated by smectite mineralogy. While performance of additional testing would be required to characterize clay mineralogy (i.e., x-ray powder diffraction), this preliminary assessment of swell potential corroborates results for the PVR analyses.

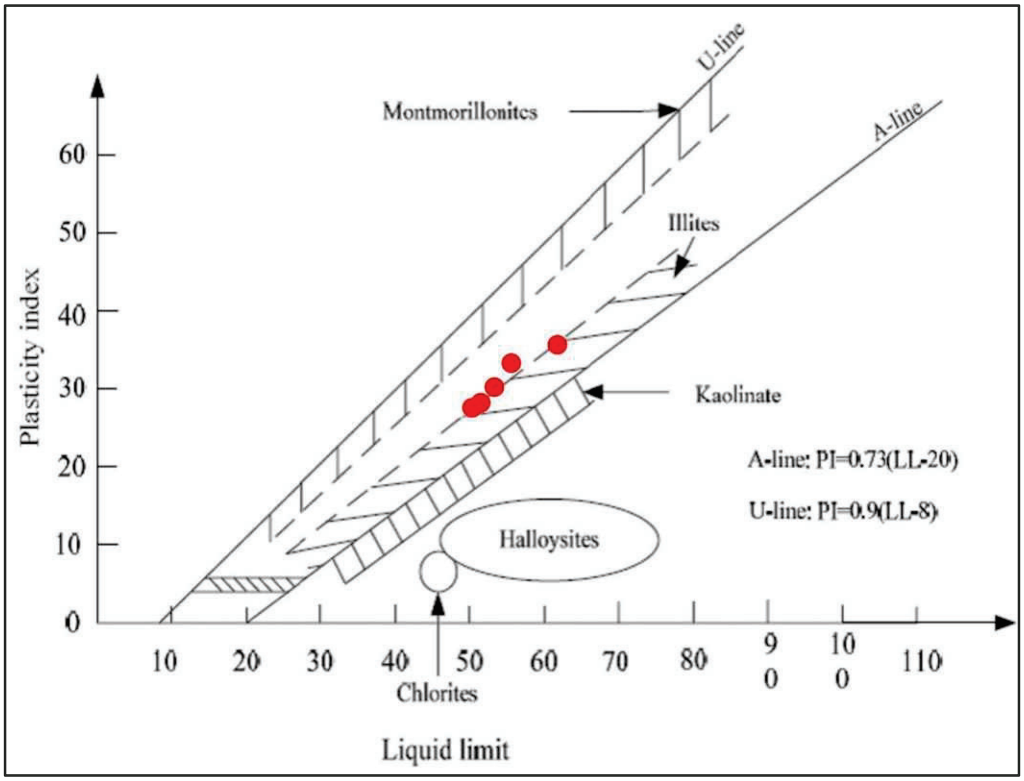

IMAGE NO. 32: Common Clay Mineral's on Casagrande's Plasticity Chart

4.1.3 GLOBAL SETTLEMENT CONSIDERATIONS

The weight of the new fill required to establish site grades will act as a load on the underlying soils. This load will result in both initial distortion settlement and longer-term consolidation settlement. The distortion settlement component occurs quickly after fill placement but is usually small compared to the consolidation settlement component. Consolidation settlement occurs when a load (such as the weight of the new fill and structure loads [if soil supported]) compresses the underlying cohesive soils by squeezing the water out of pore spaces. With clay soils, this type of settlement often continues over a period of years after the new load is applied.

As part of our global settlement analysis, we analyzed consolidation settlement for the following cases: where the anticipated maximum amount of fill within the building pad is anticipated, where the thickest profile of very soft and/or soft clay was encountered in the borings (with consideration given to where the most amount of fill would be required at these locations), and where the thickest overall soil profile (i.e., deepest depth to rock [based on the borings]) would be located after establishing a FFE of 752 feet.

Based on our analyses, we estimate that up to about 1 to 3.5 inches of settlement could result from the weight of fill placed over the soils. Note the amount of consolidation settlement will vary across the site as the thickness of new fill and the thickness of the soft soil profile varies. **Furthermore, our estimation of fill thicknesses used in our analysis assumes a constant final subgrade elevation of 752 feet, which is the approximate FFE for the proposed building based on our discussions with L&F. A grading plan was not available at the time of this report, which necessitated use of the building FFE in our settlement analyses. We understand that actual site grading will likely differ (especially outside of the building limits) and our settlement analyses will require revision once this information has been provided.**

The image below provides a preliminary visual representation of the anticipated earthwork (cut and/or fill) required to establish a FFE of 750 feet across the project site, which is outlined in red. The green shaded colors indicate general areas of the greatest anticipated fill, while the light pink to whitish colors indicate general areas of the greatest anticipated cut. Note that this figure utilized existing topography from the provided topographic survey and should therefore be considered approximate. This figure is intended to provide a general understanding of earthwork in probable areas of focus for settlement monitoring.

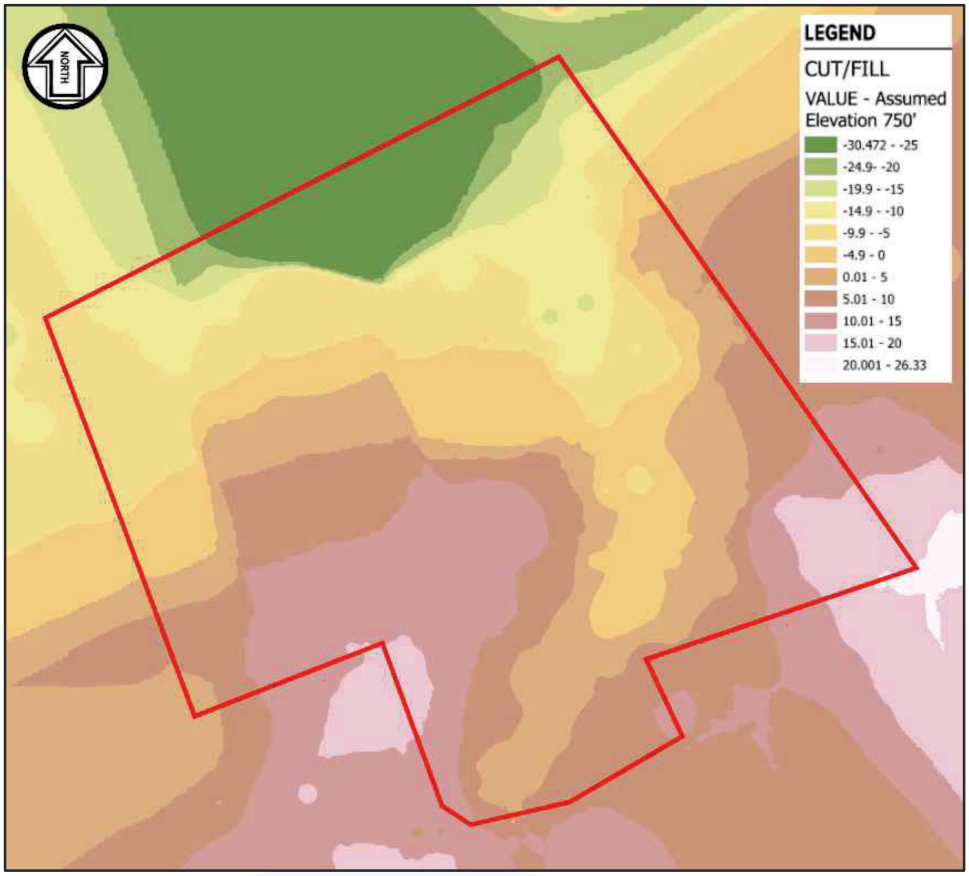

IMAGE NO. 33: Preliminary Visual Representation of Earthwork for Settlement Monitoring (Assumes FFE of 750 feet)

The time required for the consolidation component of settlement to occur is related to the consolidation characteristics of the clay and the length of the drainage path, which is the distance water must travel through the clay to encounter a drainage outlet such as granular fill overlying the clay or underlying weathered limestone. Our preliminary assessment of time rates for primary consolidation indicates that primary consolidation will be achieved in approximately 1 to 4 ½ months without utilization of preloading or wick drains (discussed further below.) Note that our estimation of settlement does not include the settlement of the grade-raise fill (which is expected to be minimum, provided the fill is placed in controlled lifts and monitored by SME). **Furthermore, our estimations for settlement do not include application of foundation loads (as we understand that rock supported deep foundations will be utilized) or floor slab loading, which was not provided at the time of this report but should be analyzed to further analyze and revise settlement and associated time rate estimations.** Additional settlement due to foundation loads is discussed in Section 4.3.

The results of the laboratory consolidation tests were utilized in our analyses. In the consolidation test, an undisturbed sample of clay is saturated and subjected to incrementally staged loading while the compression of the soil sample is measured. Each stage of loading initiates a period of primary compression where the rate of settlement is more rapid, which then transitions to secondary compression during which the rate of settlement is much slower. This behavior is similar to what will occur at the site after placement of the proposed fill. The test data is then reduced and can be used to calculate the estimated settlement and estimated time for the settlement to occur, based on the subsurface conditions at the site and the proposed loading.

Delaying construction after the placement of the fill to allow for consolidation settlement is not expected to be a realistic approach. However, there are several proactive measures that can be taken to address these settlements in a shorter time frame. Two options are discussed below which could be considered for the project.

- **Preloading** - Utilization of preloading (i.e., adding temporary additional fill above the elevations required to establish design final site grades) could be considered to increase the effective rate of consolidation settlement. However, the feasibility of implementing a cost-effective preloading program is contingent upon the amount of temporary fill material available that can be readily obtained on site. For this reason, we recommend using wick drains in concert with preloading to expedite consolidation of the clays.

- **Wick Drains** - Wick drains, which are also known as prefabricated vertical drains (PVDs), are prefabricated geotextile-wrapped plastic strips that facilitate drainage. These strips have molded plastic channels that act as a vertical drainage path to remove pore water from compressible soils, thereby increasing the rate of consolidation. The drains are installed using a hollow mandrel using a vibratory hammer or static weight to the design depth. Drains are installed in a pre-determined arrangement that considers the site geometry, soil characteristics, and project schedule. The wick drains would effectively aid in accelerating the time for water to travel to the drainage blanket and away from the fill area. Wick drains are most effective when utilized in combination with preloading.

  Please refer to the images below which provide visual representation of wick drain installation and function in conjunction with a preloading program.

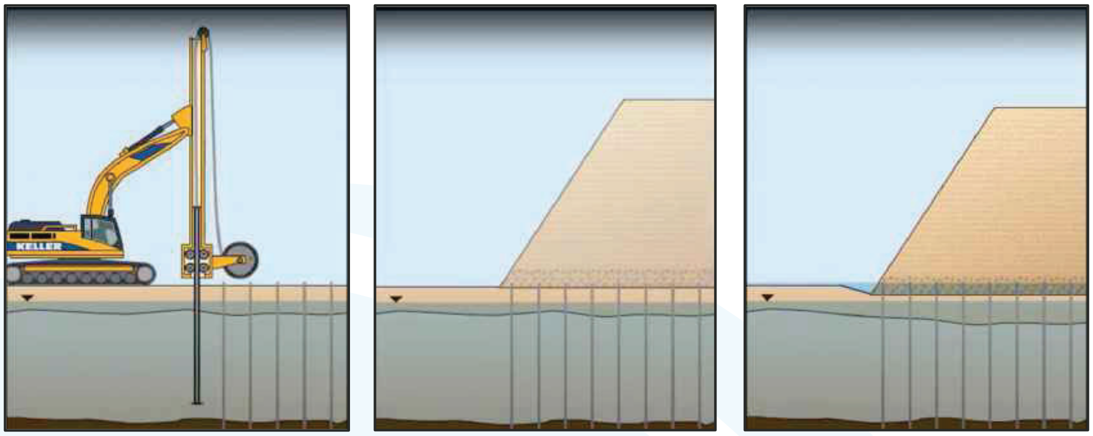

IMAGE NO. 34: Wick Drains and Preloading (1)

(1) Keller Group. (2026). Video clip images obtained from https://www.keller-na.com/expertise/techniques/wick-drains

Note that not all of the site may benefit from preloading. The surcharge materials can be placed in stages and reused to limit the total volume of additional materials required. Due to the many variables involved with the site conditions, the actual rate of settlement may be slower or faster than expected. Therefore, the amount and rate of settlement should be monitored at multiple points and the surcharge program adjusted (i.e., time and/or surcharge heights) as needed.

Prior to placement of grade raise fill in surcharge areas, we recommend the fill area be fine-graded and sloped in a manner to encourage positive drainage away from the fill area. A drainage blanket composed of open-graded crushed aggregate having a minimum thickness of 18 inches should be placed between the natural soils and new grade-raise fill. This crushed aggregate drainage blanket will facilitate drainage of water away from the fill area during the settlement monitoring period.

Implementation of settlement plates along with settlement stakes will be necessary for monitoring settlement (in addition to monitoring the lateral [x,y] movement of the settlement plate) during the preloading period. Settlement plates should be constructed in accordance with the Kentucky

Transportation Cabinet (KYTC) Standard Drawing No. RGX-015-03 titled “Settlement Platform” dated December 1, 2015. Refer to the image below excerpted from the KYTC 2025 Standard Drawings database.

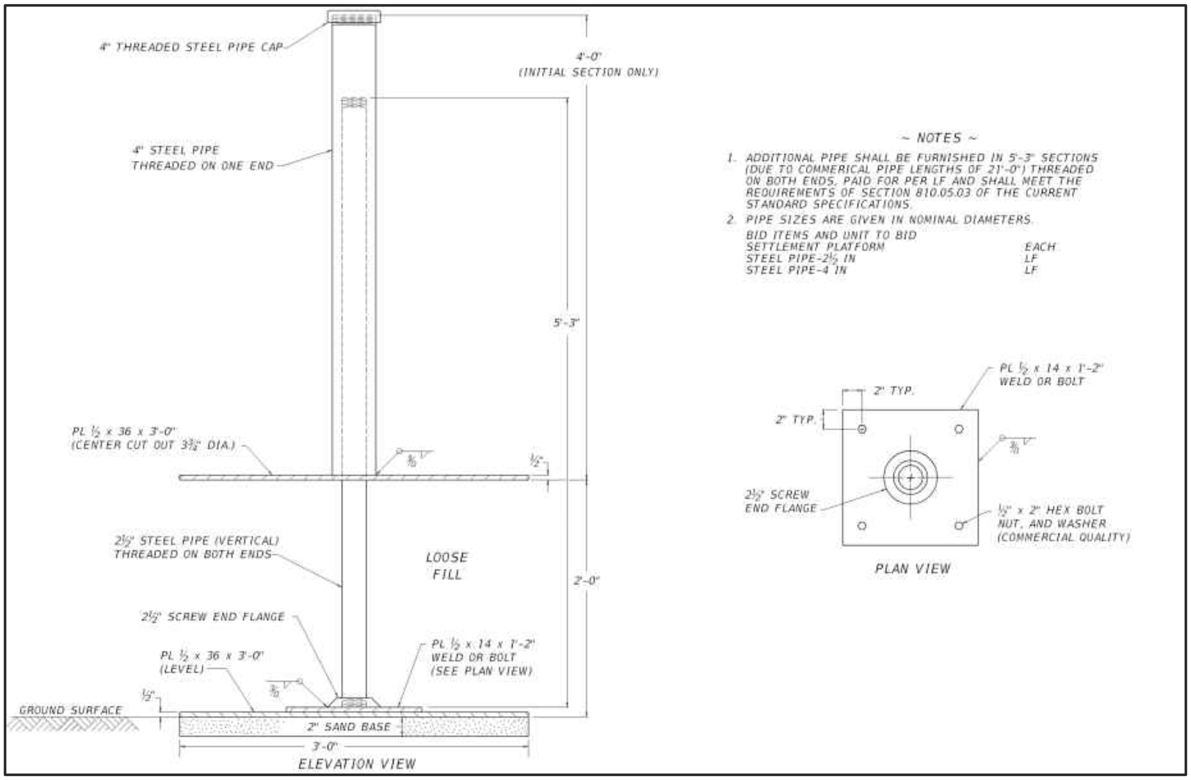

IMAGE NO. 35: Settlement Plate Detail (Modified From KYTC Standard Drawing No. Rgx-015-03)

Locate and erect settlement plates as directed by SME. The project surveyor shall monitor the settlement plates on a weekly basis and report the results to the Geotechnical Engineer. The Geotechnical Engineer will monitor the rate of settlement and provide guidance regarding initiation of construction operations in the monitored fill area. The contractor is responsible for installing, clearly marking, and protecting the settlement plates during the prescribed monitoring period. Construction operations can resume in an area of interest after at least four consecutive readings of 0.01 feet or less of settlement are achieved. Settlement stakes should be constructed at the subgrade surface near settlement plates in the event settlement plates become damaged during construction.

SME can provide more information regarding estimated settlement, time rates, and settlement placement monitoring criteria upon request.

4.2 SITE PREPARATION AND EARTHWORK

4.2.1 EXISTING FILL CONSIDERATIONS

The existing clay fill and possible fill soils encountered at the borings varied from lean clay to lean to fat clay with depths ranging from about 2 to 8 feet, or between approximate elevations 741.5 to 763. The relative density of the existing fill generally ranged from very soft to hard. Based on the condition and depths of the fill observed in the borings, the existing fill and possible fill soils are not considered suitable for support of the proposed foundations, slabs, or pavements.

There are inherent risks of greater than typical settlement and poor structural performance associated with constructing structures and pavements over undocumented fills. We believe the associated risks at this site could include visible cracking and differential movements of pavements and slabs on-grade and differential movement of foundations, which could result in out of square framing, windows, doors, and cracking of veneer. These risks can be significantly reduced by removing the fill from beneath structures and replacing it with engineered fill.

Evaluation of the existing fill during construction must be conducted by SME and may include probing the existing fill areas with a hand-auger, testing several feet below the subgrade surface using a cone penetrometer, observing the condition of the fill in shallow test pits and in foundation excavations, and observing the response of the surface of the fill when subjected to a proofroll. It will be necessary to further evaluate suspect materials observed during the evaluation and testing processes. The contractor needs to be prepared to assist SME by excavating test pits, as needed.

The following report sections assume that the existing fill will be undercut from below foundations, slabs, and pavements and replaced with engineered fill.

4.2.2 CHEMICAL TREATMENT CONSIDERATIONS

Soil treatment using “chemical soil drying”, modification, or stabilization could be considered for the project site. Chemical treatment can utilize various chemical agents (e.g., quicklime, hydrated lime, lime kiln dust, fly ash, or cement) depending upon soil type and intended purpose. Chemical drying is utilized to reduce the effective soil moisture content within acceptable tolerances to meet stability, moisture, and density requirements. Chemical modification typically requires additional chemical agent and is utilized to reduce soil plasticity and may or may not result in a semi-permanent strengthened subgrade. Chemical stabilization is utilized for all situations previously described and when improved, long-term subgrade strength is achieved.

The effects of ground stabilization are considered semi-permanent and can last for decades. Performing chemical subgrade stabilization can reduce the amount of required undercutting, while reducing the moisture sensitivity of the subgrade. Chemical stabilization improves the subgrade stability and provides a stable working platform. Chemical stabilization also mitigates the risk of canceled workdays due to wet weather conditions, and will reduce unanticipated costs and delays associated with moisture conditioning wet soils or removing and replacing disturbed soils, as the stabilized subgrade is less susceptible to disturbance and softening due to rain events, even when trafficked by construction equipment. Furthermore, construction of chemically stabilized subgrade could result in a reduction in the proposed design floor slab thickness and/or pavement section thicknesses. The stabilization could also provide some additional benefit, such as providing additional slab support in the event of dropout sinkhole activity. Additional laboratory testing including evaluation for sulfates, pH, plasticity, and compressive strength (at minimum) is required if chemical stabilization/modification is considered.

The chemical stabilization is intended to modify the clay soils to reduce the frost susceptibility of the subgrade and mitigate premature pavement distress due to frost action. Chemical stabilization can also reduce the effective plasticity index of high or moderate plasticity soils (and, thus, reduce the ability for seasonal volume changes), and condition the soil structure to better absorb moisture and facilitate compaction. Underdrains should be installed after chemical stabilization to facilitate subsurface drainage. In the case of deeper site utilities, clay caps should be installed over the top of trench backfill prior to chemical stabilization, so the caps can be chemically treated at the same time the rest of the treatment area.

Chemical stabilization and modification are most effective when the ambient air and ground temperature is at least 40 degrees and rising. Thus, chemical stabilization and modification is less commonly performed during the winter months. Furthermore, we recommend that chemical stabilization and modification occur within each successive lift of fill placed above a stabilized lift. Our experience has shown that chemically altered soils are relatively impermeable, and soil fill placed above chemically altered soils can become oversaturated during periods of inclement weather due to lack of percolation through the treated soils.

Note that chemical treatment in soils where weathered limestone or chert fragments (which are usually an indicator of larger cobble-sized rock within the soil matrix) were encountered in the borings may not be feasible and can damage the chemical mixing equipment.

SME would be pleased to assist in developing a mix design to determine the type and amount of additive(s) required to achieve the desired results based on the soil conditions at the site, as well as assist in developing specifications to be incorporated in the project manual for bidding purposes.

4.2.3 GENERAL SITE SUBGRADE PREPARATION

Clear the proposed development area of existing vegetation, such as brush, grass, roots (including roots mats), topsoil, existing fill soils and other unsuitable materials. During site stripping, remove organic soils (e.g., soils with greater than four percent organics content or containing significant fibrous material/root mats) while leaving soils with negligible organic content in-place. Topsoil removal should not be based on soil color but rather based on organic content. It is possible that organic soils extend deeper within the plow zone due to the site being previously utilized for agricultural purposes. Clearing must extend a minimum of 5 feet beyond the proposed construction areas.

Reroute any existing utilities that are within the building footprint to outside of the building area. Remove abandoned utilities and backfill the resulting excavations with engineered fill. If it is necessary for existing utilities to be abandoned in-place, the utilities must not conflict with the proposed construction, they must be fully grouted, and the suitability of the existing backfill must be verified for structural support. Do not abandon utilities in-place within the zone of influence of proposed foundations, slabs, or pavements.

Based on the borings, we expect clays will be the primary soil type exposed after clearing and stripping the project site. The on-site subgrade clays soils are highly sensitive to disturbances during construction and the overall success of the subgrade preparation during mass earthwork operations will directly affect the suitability of foundation, slab, and pavement bearing soils. As such, take care during site earthwork operations to prepare the subgrade for support of the building slab-on-grade and site pavements.

After stripping surficial materials and removing deleterious materials, after cuts are made to design subgrade levels, but prior to filling, we recommend the subgrade be subjected to a comprehensive proof-rolling program in the presence of SME. The purpose of proof-rolling is to locate areas of unsuitably soft/loose or disturbed subgrade. We recommend proof-rolling be performed with a fully loaded, tandem-axle dump truck or other pneumatic-tire construction equipment. Areas of unsuitable subgrade (for placement of new fill) revealed during proof-rolling must be undercut and replaced with engineered fill. In areas not accessible to proof-rolling equipment we recommend the exposed subgrade be evaluated by SME with hand-operated equipment such as dynamic cone penetrometers and hand augers.

The exposed subgrade soils are highly sensitive to disturbances, particularly after periods of wet weather and during times of colder weather. To reduce the amount of potential subgrade improvements required at this site, we recommend the contractor establish positive site drainage as soon as possible and remove ponded water from exposed and prepared subgrades. Subgrade disturbance during construction will likely be a significant factor at this site and a significant amount of subgrade improvement could be required to achieve a stable working platform for construction. If the subgrade is exposed to water, it may be necessary to improve the disturbed subgrade or remove and replace the soils with engineered fill or crushed aggregate as discussed in Section 4.2.5 below. Placement of crushed aggregate (using a woven geotextile for separation) is a traditional treatment to protect easily disturbed subgrades. We recommend including a contingency in the construction budget for subgrade stabilization, particularly if the earthwork will occur during times of unfavorable weather (wet and/or cold conditions).

After the exposed subgrade is evaluated (as described above) and improved as necessary, engineered fill may be placed on the exposed subgrade to establish final design subgrade levels. See Section 4.2.5 of this report for materials and compaction requirements for engineered fill.

4.2.4 SUBGRADE PREPARATION FOR SLABS

Assuming a FFE of elevation 752 feet, we estimate that the floor slab will be supported on a combination of natural clays and engineered fill soils. SME was not provided with specific floor slab loads for the structure at the time this report was prepared.

Three options have been provided regarding support for floor slabs, each with their own associated level of risk. The Owner should consider the advantages of each option as well as risk tolerance. Note that recommendations provided in Section 4.2.4.4 apply regardless of the selected slab support methodology.

4.2.4.1 OPTION 1 – STRUCTURAL FLOOR SLAB

A conservative approach for floor slab support would consist of utilizing a thickened and heavily reinforced structural slab rigidly connected to the drilled pier foundations. The structural slab would carry the load directly and transfer to the drilled pier elements, thereby requiring less support from the underlying subgrade in the event of sinkhole dropout, or due to consolidation settlement of the underlying subgrade. This may include either a BRAB (Building Research and Advisory Board) Type III Post-Tensioned Slab (with or without thickened ribs) or a Type IV Mat Foundation designed for minimal flexure for areas with heavier localized loads. Similarly, a conventional slab supported on grade beams spanning between and rigidly connected to drilled piers could be considered, provided the slab can span between grade beams in the event of loss of support.

This type of floor slab system is considered more robust compared to the options discussed below, albeit at a higher price.

4.2.4.2 OPTION 2 – CONVENTIONAL SLAB ON RIGID INCLUSIONS (RIS)

Conventional floor slabs can be supported on a Rigid Inclusion (RI) ground improvement system to mitigate potential settlement of soft natural soils, grade-raise, fill, and/or potential sinkhole related activity. Rigid inclusions are further discussed in Section 4.3.4.2.

4.2.4.3 OPTION 3 – COVENTIONAL SLAB ON GRADE

A less conservative approach (which carries higher relative risk for poor performance) for floor slab construction would consist of supporting the slabs on natural clay subgrade, or on engineered fill placed over the natural clay subgrade. This option is the most cost-effective of the options discussed but is considered the highest risk when considering the karst terrain and the possible global settlement.

Our analysis of consolidation settlement (as discussed in Section 4.1.3) indicates that up to about 1 ¼ to 3 inches of settlement could occur below the floor slab unless the slab is supported on RIs or a structural slab is utilized, assuming floor slabs areas are not exposed to preloading as previously discussed. At the time this report was prepared, SME was not provided with anticipated slab loads and therefore, settlement associated with slab loading was not analyzed. SME must revise our settlement analyses once this information has been provided.

4.2.4.4 GENERAL SLAB SUPPORT CONSIDERATIONS

We recommend the slab-on-grade subgrade soils be protected from frost action during winter construction. Frozen soils must be thawed and compacted, or removed and replaced prior to slab-on-grade construction. Prior to concrete placement for slabs, the subgrade needs to again be observed and tested to identify areas of subgrade that were disturbed during construction activities and to verify subgrade conditions are suitable for slab support. We recommend proof-rolling the final subgrade. If proof-rolling is not feasible because of access constraints, SME must observe and test the exposed subgrade using density in-place meters and/or other hand-operated equipment, such as hand augers and cone penetrometers. Unsuitable subgrade indicated by SME needs to be removed and replaced with engineered fill or chemical modification could also be considered.

Fat clays encountered during construction must be undercut a minimum of 3 feet below the bottom of the slab (i.e., a minimum of 3 feet of low to non-expansive soils must be present below the bottom of the slab). Similarly, we recommend that fat clay fill soils be placed no closer vertically than 3 feet below floor slabs. Consideration could be given to revising this criteria where interior building areas will be elevated in comparison to adjacent exterior grades and building pad areas are protected from near-surface water infiltration that could induce subgrade volume change.

Moderately plastic (CL/CH) soils may remain in-place below slabs provided (a.) some risk of premature loss of serviceability is acceptable and (b.) the in-situ moisture content for the exposed soils (minimum depth of 1-foot) is maintained within optimum and two percent above the optimum moisture content as determined by the Standard Proctor test (ASTM D 698). Delineation and remediation of near-surface highly plastic (CH) clay soil is critical for proper slab performance.

Where encountered, undercutting and replacement of soft soils will be required. Depending on weather conditions at the time of construction, chemical modification or stabilization of the subgrade could be considered to manage high moisture contents within the clays and reduce shrink/swell potential. Limitations of utilization of chemically treating soils was previously addressed in Section 4.2.2 of this report. Additionally, geogrid could be utilized to limit the amount of undercutting required to achieve a stable subgrade for floor slab support (but will not provide sufficient resistance to shrink/swell soils).

We recommend a subgrade modulus of 150 pci to design floor slabs supported on properly prepared subgrade and subbase course as described herein. This value of subgrade modulus is based on correlations with soil type from plate load tests and is the ratio of load in pounds per square-inch to a 0.05-inch deflection of a 30-inch-diameter bearing plate, and assumes fat clays are addressed as previously described. An increased subgrade modulus can be considered if the entire slab area is supported on a chemically stabilized subgrade.

We recommend a slab subbase consisting of a minimum of 6 inches of an approved KTYC DGA to provide a leveling surface for construction of slabs, and a moisture capillary break between the slabs and the underlying clays. The thickness of dense-graded aggregate may need to be increased based on the floor loads for the slabs (which was not provided to SME at the time this report was prepared) and to protect the subgrade from disturbance during construction. When determining the aggregate thickness, consider the time of year, the condition of subgrade soils during construction, and the type and volume of construction equipment to traffic the prepared subgrade. The aggregate must also be compacted per Section 4.2.5 of this report.

Place a vapor retarder below floor slabs to receive an impermeable floor finish/seal or a floor covering which would retard vapor transmission. The location of the vapor retarder (relative to the subbase) needs to be determined by the design Architect/Engineer based on the intended floor usage, planned finishes, and ACI recommendations.

Separate floor slabs by isolation joints from structural walls and columns to permit relative movement. Allow a minimum of 6 inches of engineered fill between the bottom of the slab and the top of shallow foundations below.

4.2.5 ENGINEERED FILL REQUIREMENTS

Fill placed within the construction area must be free of frozen soil, organics, construction debris, particle sizes that will hinder compaction, or other deleterious materials. Materials utilized as engineered grade-raise fill or structural backfill should generally have a liquid limit of no greater than 45 percent, a plastic limit of no greater than 20 percent, a plasticity index of no greater than 25, a maximum dry density of no less than 100 pounds per cubic foot (pcf), and an organic content of less than 4 percent. To meet these requirements, we recommend any imported or on-site borrow material consist of lean clay (CL) per the Unified Soils Classification System, KYTC DGA, or chemically modified soils. Utilization of alternative fill materials may be considered but should be reviewed and accepted by the project geotechnical engineer. Do not reuse existing fill or possible existing fill soils as engineered fill. On-site highly plastic soils can be chemically modified to meet plasticity requirements and lean to fat clay (CL/CH) soils can be utilized as previously discussed in this report.

Portions of the on-site lean clays are suitable for use as fill but will likely require moisture conditioning (drying) based upon the test borings. The need for, and extent of, moisture conditioning will be affected by seasonal weather conditions at the time the earthwork is performed, and the condition of the site soils.

The project specifications should include provisions for moisture conditioning of soils to be placed and compacted on-site as engineered fill. Contractors should anticipate the need for moisture conditioning and structure their bids accordingly.

Compact engineered fill placed below foundations, floor slabs, and pavements to a minimum of 100 percent of the maximum dry density as determined in accordance with the Standard Proctor test (ASTM D 698). Fill adjacent to and over foundations should be compacted to 98 percent of the standard Proctor maximum dry density. Fill 1 foot or greater below the floor slabs and pavements must be compacted to at least 98 percent of the standard Proctor. This requirement should be further reduced to 95 percent of the Standard Proctor for fat clays placed below exterior pavement areas.

The fill must be spread in level layers not exceeding 9 inches in loose thickness. For areas where smaller walk-behind or hand compactors are required or utilized, the loose lift thickness should be reduced to a lift thickness appropriate for the type of equipment utilized. Granular fill should be compacted with a smooth drum vibratory roller or vibratory plate compactors including either walk-behind types, or plate compactors mounted on a backhoe or excavator (hoe-pac). Compact granular fill at a moisture content ranging from the optimum moisture content to about three percent below optimum. Clay fill should be compacted using a sheepsfoot roller, or a pneumatic type compactor, at a moisture content ranging from two percent below to two percent above the optimum moisture content. Highly expansive clay soils can be used as grade-raise structural fill provided that the fill is placed no closer than 3 feet (vertically or horizontally) of foundations or floors slabs, and/or concrete pavements, and provided the fill is placed between the optimum and 2 percent above the optimum moisture content. This requirement for a buffer zone between highly plastic clay and flexible asphalt pavements (i.e., HMA) can be reduced to 12 inches. Compaction requirements for clay must be modified as previously discussed for moderately to highly plastic (CL/CH) fill placed within 2 feet of the finished subgrade.

If necessary, coarse crushed aggregate used to backfill undercuts or to stabilize subgrades should consist of a well-graded crushed natural aggregate consistent of KYTC DGA or crushed stone base (CSB). Mechanical stabilization (geogrid) can also be considered in conjunction with crushed aggregate to reduce undercuts. In cases where granular engineered fill will be placed over the coarse crushed aggregate, the surface of the coarse crushed material must be covered with a suitable non-woven geotextile (e.g., Mirafi® 160N or 180N) to prevent migration of the granular materials into the coarser crushed aggregate.

4.3 FOUNDATIONS

Based on limited information initially provided by L&F, we understand that the FFE for the proposed building was planned to be within the range of elevation 730 feet to 750 feet and that column loads are not expected to exceed 300 kips and wall loads will not exceed 8 kips per lineal foot.

Subsequent to receiving this information and release of SME Geotechnical Memorandum No. 4 dated February 20, 2026, SME was advised that the FFE of the structure would likely be elevation 752 feet. However, SME has not been provided with a site grading plan or anticipated structural loads at the time this report was prepared. Due to the possibility that the anticipated FFE may change, our recommendations provided below are consistent with those previously provided in Geotechnical Memorandum No. 4.

4.3.1 GENERAL FOUNDATION SELECTION CONSIDERATIONS

The proposed building can be supported on shallow foundations, although it should be noted that inherent risk exists with constructing shallow foundations in karst terrain. Note the risk of karst related subsidence is directly proportional to the rock depth below a structure at the location of a karst feature. Thus, areas with a deeper soil profile (either naturally occurring or related to grade-raise fill placement) pose greater relative risk to proposed structures and other infrastructure.

A quantitative risk of potential for future sinkhole and karst-related activity is difficult to provide without additional characterization (i.e., additional borings, additional rock cores, and geophysical surveys).

However, the relative risk of supporting the structure on shallow foundations is likely no greater than that of adjacent developments constructed on terrain of similar geology. The risk of further sinkhole development and karst activity cannot be eliminated but can be reduced by implementing measure and mitigation techniques outlined in this report. At a minimum, remediation of identified (in this report or encountered during construction) sinkholes or other karst features and thorough inspection of the subgrade must be completed prior to placement of engineered fill and construction of foundations.

While shallow foundations are more cost effective than deep foundations, there are some advantages to utilizing a deep foundation system considering the site conditions. These advantages include reduction in risk associated with constructing on karst terrain, elimination of soil shrink/swell concerns below foundations, and reduced settlement potential due to the anticipated amount of fill required to establish a FFE greater than elevation 730 feet. **Foundation selection should be made based on the Owner's risk tolerance for supporting the structure over karst terrain, shrink/swell soils, and the possible increased risk of excess settlement due to fill placement.**

Furthermore, it should be noted that there is risk associated with poor foundation performance when supporting structures on only shallow foundations where stringent settlement criteria applies or where vibratory and/or impact loading is anticipated. At the time this report was prepared, SME was not made aware of any equipment or structures where stringent settlement criteria applies or where vibratory and/or impact loading is anticipated.

The recommendations in the following sections are based on the limited project information provided to SME, information obtained from the borings, and assumptions made by SME. Please contact SME if assumptions stated in the following sections are inaccurate so that we can adjust our recommendations, as necessary.

4.3.2 SUBGRADE VERIFICATION

Geotechnical foundation design recommendations are provided based on widely spaced, small diameter borings covering a relatively small area of the site. On-site observations and testing of the foundation subgrades are critical to verify the subgrade exposed at the foundation bearing surface is consistent with the borings and is suitable for the design bearing pressure. By preparing this geotechnical evaluation report, SME is best suited to observe and test foundation subgrades during construction and to verify the geotechnical recommendations of this report and the geotechnical related design requirements of this project are incorporated into the construction. **The recommendations of this report assume SME will further evaluate the bearing soils during construction.**

4.3.3 SHALLOW FOUNDATIONS – MAIN BUILDING STRUCTURE

4.3.3.1 SPREAD FOOTINGS

Shallow spread foundations are generally considered suitable for the proposed structure, provided the recommendations provided in this report are adhered to and the risks discussed previously are acceptable to the owner. Since the proposed FFE has not been finalized at the time this report was prepared, we have presented alternatives for several possible FFEs and foundation bearing scenarios as outlined below. Please note that the earthwork cut/fill depths discussed below are based on the approximate existing ground surface elevations estimated from the provided topographic survey within the approximate proposed building pad as indicated on the referenced site plan. Therefore, these estimates may be inaccurate, and will depend on the actual proposed building FFE, building location, and orientation.

- **FFE Below 752 and above 740 Feet** – We understand that earthwork of up to about 13 feet of cut and up to about 30 feet of grade-raise fill will be required to establish a proposed FFE of 752 feet. Assuming a FFE of 752 feet (and a typical foundation bearing elevation of about 750 feet), we anticipate shallow spread footings will bear on natural medium to very stiff clays or engineered fill. We preliminarily recommend soil-supported foundations bearing at about elevation 750 feet (based on an FFE of 752 feet) be designed utilizing a maximum net allowable soil bearing pressure of **1,500** pounds per square foot (psf) for foundations bearing on natural stiff lean clay or engineered fill overlying the same. Some localized undercutting of near-surface soft clays should be expected.

- **FFE Below 740 Feet and above 730 Feet** – We understand that earthwork of up to about 25 feet of cut and up to about 18 feet of grade-raise fill will be required to establish a proposed FFE of 740 feet. Assuming a FFE of 740 feet (and a typical foundation bearing elevation of about 738 feet), we anticipate shallow spread footings will generally bear on natural clays or engineered fill but do anticipate that weathered (and possibly sound) limestone will be exposed in some foundation excavations. We preliminarily recommend soil-supported foundations bearing at about elevation 738 feet be designed utilizing a maximum net allowable soil bearing pressure of **2,500** psf for foundations bearing on medium to natural stiff lean clay or engineered fill overlying the same. Some localized undercutting of near-surface soft clays should be expected, although we estimate less undercutting to remove soft soils will be required in comparison to foundations bearing above elevation 740 feet.
- **FFE 730 Feet** – We understand that earthwork of up to about 35 feet of cut and up to about 8 feet of grade-raise fill will be required to establish a proposed FFE of 730 feet. Significant rock removal of up to about 14.5 feet may be required at some locations to establish a FFE of 730 feet. Assuming a FFE of 730 feet, we anticipate shallow spread footings will generally bear on limestone. We preliminarily recommend foundations be designed utilizing a maximum net allowable bearing pressure of **10,000** psf for foundations bearing on sound limestone (or lean concrete after undercutting to weathered to sound limestone as described below) as verified during foundation construction.

The recommended design bearing pressures will achieve a global safety factor of 3 or more for general shear failure.

We preliminarily estimate that maximum settlement for soil-supported shallow spread footings is not expected to exceed 1 inch and differential settlements are estimated to be less than one-half of the total settlement, provided that foundations are constructed and observed in accordance with this report. The ability of the structure to withstand differential settlement will partially be controlled by the column bay spacing and distance between spread footing elements. More stringent differential settlement requirements may apply to relatively closely spaced columns.

Due to the anticipated amount of fill placement required in some areas to achieve a FFE of 752 feet, we estimate that excessive settlement (i.e., up to about 5 inches) may be observed at some locations due to compression of the exposed soil subgrade (and possibly within the grade-raise fill) in deeper fill areas if adequate time is not provided for the consolidation settlement to occur prior to foundation construction, or if near-surface soft soils are not properly remediated prior to fill placement.

We preliminarily estimate that maximum settlement for footings supported on sound limestone is not expected to exceed 0.5 inch and differential settlements are estimated to be less than one-half of the total settlement. The preliminary settlement estimates included in this memorandum are based on the boring information, the design maximum net allowable bearing pressures, the anticipated design structural loads, our experience with similar structures and soil conditions, and field verification of suitable bearing soils by SME.

4.3.3.2 GENERAL SOIL BEARING SHALLOW FOUNDATION CONSIDERATIONS

Note that very soft or soft clays were encountered in most of the borings performed. The near-surface soft soils generally extended to depths of approximately 2 to 5 feet deep, but soft clays were also frequently encountered above the weathered rock surface. Subgrade improvement consisting of undercutting and replacement with suitable engineered fill will be required to remediate soft soils exposed in foundation excavations, and to provide suitable support for foundations.

Existing fill must be undercut entirely from below foundations. We anticipate that additional undercuts to remove existing fill from below foundations will be required if a FFE of 752 feet is proposed. We anticipate that existing fill will generally be removed during mass-site grading if a FFE of 740 feet or lower is proposed. However, based on our understanding of the previous usage of the site, there is potential for encountering existing fill with varying depths between and away from the borings locations.

Due to the variability of the subsurface conditions across the site, we anticipate that highly plastic fat clays will be exposed at the foundation bearing elevation regardless of the proposed FFE. Any encountered fat clay (CH) soils must be undercut to a minimum depth of three feet below the bottom of the foundation bearing elevation and backfilled with engineered fill.

Based on our borings and our understanding of the varying nature of the underlying limestone rock surface, we expect that rock will be encountered in some foundation excavations for foundations bearing between Elevation 752 feet and above elevation 730 feet depending on the proposed site grading. We do not recommend supporting foundations on a combination of rock and on soil. For soil-supported foundations, rock encountered at the footing level should be undercut a minimum of 2 feet below the footing subgrade level and backfilled with engineered fill to minimize hard spots (and development of excessive bending stresses) where foundations transition between footings supported on rock/soil. Guidance for foundations designed as rock bearing is described below.

Once each foundation area is exposed, SME must observe and test foundation subgrade conditions to verify suitable conditions are encountered or improvements are performed, as needed, prior to foundation construction. SME will utilize a test method capable of testing the soils several feet below the design bearing level. Unsuitable soils must be mechanically improved (i.e., compacted) in-place. Where unsuitable soils cannot be mechanically improved in-place, deepen the foundation excavations (undercut unsuitable soils) to encounter suitable bearing material below. Foundations can then be constructed to bear directly at this lower level where suitable subgrade is encountered, or the design bearing level can be reestablished with engineered fill.

4.3.3.3 GENERAL ROCK BEARING SHALLOW FOUNDATION CONSIDERATIONS

Assuming a proposed FFE of 730 feet, we anticipate that some undercutting of natural clays will be required to expose the weathered limestone rock surface. Additionally, some over-excavation and removal of material within the rock disintegration zone (RDZ) may be necessary to remove highly fractured rock near the soil/rock interface.

The exposed rock at the bearing elevation may be rough and difficulty may be encountered during placement of reinforcement steel. If this condition occurs, the excavation should continue to a depth just below the design bearing elevation. A leveling pad/mud mat consisting of high strength lean concrete having a minimum 28-day compressive strength of 2,500 psi (pounds per square inch) can be placed up to the bearing elevation to provide a uniform bearing surface and accommodate reinforcement steel placement prior to foundation construction. Compacted crushed stone aggregate, soils, or excavated rock are not suitable for use below spread footing foundations.

Once each foundation area is exposed, SME must observe and test foundation subgrade conditions to verify suitable conditions are encountered or improvements are performed, as needed, prior to foundation construction. Upon excavating the foundations and prior to placement of a concrete leveling mat/mud mat (if required), we recommend a minimum of one test hole be performed every 25 feet along the alignment of wall footings, and in each individual column location, using an air-rotary drill to probe for clay seams, voids, or other discontinuities within the underlying rock mass. Test holes should extend to a minimum depth of 5 feet or one-half footing width (B/2), whichever is greater, below the bearing elevation. If vertical joints or other rock defects are observed at the exposed bearing surface, the material may be excavated until sound rock is encountered or work may be temporarily halted until the geotechnical engineer has reviewed the rock condition. Placement of “dental” concrete may be considered at the discretion of the geotechnical engineer in-lieu of over-excavation and replacement. The presence of horizontal joints can lead to excessive settlement; therefore, removal of rock containing appreciable horizontal joints (clay filled or open) will be necessary.

4.3.3.4 GENERAL SHALLOW FOUNDATION CONSIDERATIONS

Expansive clays should not be placed within 3 feet of foundations or foundation stem walls (even when foundations are rock supported) due to potential for vertical and/or lateral expansion/movements.

Oversize undercuts that are backfilled with engineered fill to the design bearing level laterally by extending excavations outward on a two vertical to one horizontal slope from the edge of the foundation as shown on the image below. However, excavations through rock may be vertical provided the rock is sound and no inclined bedding planes (or other features that would indicate instability) are observed in the exposed rock faces.

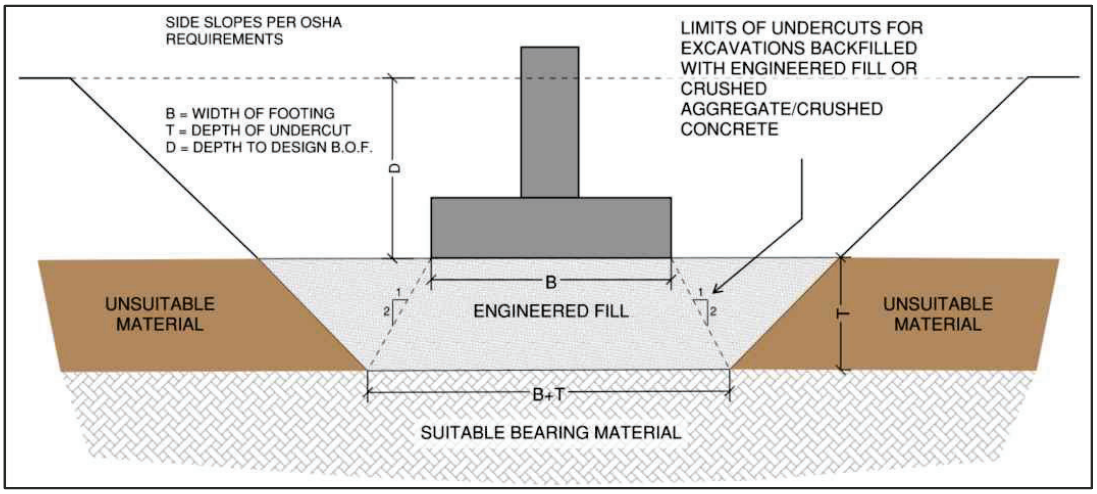

IMAGE NO. 36: Foundation Undercutting Diagram

Exterior foundations must have a minimum embedment of 24 inches below the lowest adjacent exterior grade in unheated areas for protection against frost movement during normal winters. Interior foundations in heated areas can be constructed at shallower levels on suitable soils. Footing trenches need to be excavated to a level bearing surface, cleaned of mud and loose cuttings, and protected against water accumulation from rainfall, surface drainage, or excavation sidewall seepage prior to placing concrete.

Place foundation concrete as soon as foundation excavations have been completed, and the design bearing pressure is verified to reduce the potential for disturbance of the foundation subgrade. In cases where the excavation will remain exposed for a longer time period, protect the subgrade soils with a concrete mud mat and protect the bearing soils from freezing if the work is performed during seasonally cold weather.

For frost heave considerations, vertical excavation sidewalls must be maintained during foundation concrete placement and the side walls must not be allowed to “mushroom out” near the top. If vertical earthen sidewalls cannot be maintained, it will be necessary to slope back the foundation excavations and form foundation sidewalls to maintain vertical faces for foundations and reduce the potentially adverse effects resulting from frost heave.

Use a minimum width of 18 inches to design continuous (wall) foundations and a minimum dimension of 30 inches to design isolated (column) foundations for bearing capacity and settlement considerations. In some cases, the minimum recommended foundation sizes, and not the design bearing pressure, may govern the sizes of the foundations.

4.3.4 DEEP AND INTERMEDIATE FOUNDATIONS – MAIN BUILDING STRUCTURE

4.3.4.1 OPTION 1 - DRILLED PIER FOUNDATIONS

The building and equipment structures could be supported on a deep foundation system consisting of drilled piers (caissons). Drilled piers are commonly utilized to transfer loads to a more substantial bearing stratum (rock) and mitigate risk associated with potential karst activity and problematic soils (i.e., shrink/swell soils). This is due to the piers being relatively large diameter, heavily reinforced, socketed into rock, and directly tied into structure columns or pile caps. Drilled piers are also often utilized where structural loads are exceptionally heavy (e.g., greater than 250 kips), where site soils are of relatively lower strength, where a strong bearing media (such as rock) is encountered at depth, and/or where stringent foundation settlement criteria is required. Drilled piers can also be considered for critical structures that will induce significant impact or vibratory loads on their foundations. **Due to these reasons, we recommend that drilled piers be utilized to support equipment/structures that are subject to impact loads and/or that have stringent settlement criteria, at minimum, and/or where risks associated with karst related subsidence are not tolerable.**

Structure floor slabs could also be rigidly connected to the foundations, thereby transferring structural loading to the underlying rock and reducing risk associated with poor slab performance related to potential karst activity and/or shrink/swell soils.

We recommend extending the drilled piers to bear in competent limestone bedrock, by socketing the piers a minimum of 2 feet into competent rock. Since measuring the depth to competent bedrock is complicated by the likely presence of cobbles, floaters, boulders, clay seams/stratums, and possible voids from karst activity, we recommend probing each drilled pier location to verify competent rock is directly below the drilled piers and to better estimate the tip elevation of each pier. We recommend extending the probes a minimum of two shaft diameters or a continuous 10 feet into competent rock, whichever is greater. It may be beneficial to predrill the probes in advance of the drilled pier construction, when access to the proposed pier locations is readily available. Review the probe results to check the formation for karst features (i.e., open voids in the rock) and/or clay seams and verify the drilled piers are not constructed on boulders located above the competent bedrock surface. Note that interpretation of air-track rotary drilling results is highly dependent on the skill of the rig operator. Regardless, air-track rotary drilling provides rapid and cost-effective assessment on general bearing conditions. If the probing is not performed, we recommend increasing the rock socket depth to a minimum of 5 feet into competent rock, and SME must verify that no boulders, voids, or soil layers are present at the bottom of the drilled pier excavation.

Based on the borings and the assumed FFEs, we anticipate the length of the drilled piers could vary from about 5 to 30 feet depending on the final socket depth. Specific pier lengths will vary based on variations in the subsurface profile. We recommend the contractor be prepared to extend the drilled piers at least 5 feet deeper than the design tip elevations to account for unknown conditions, such as encountering voids in the limestone. For end bearing, side friction, and lateral resistance of drilled piers, we recommend using the soil design parameters as indicated in the table below.

RECOMMENDED DRILLED PIER DESIGN PARAMETERS

SOIL TYPE	TOTAL UNIT WEIGHT (PCF) (1)	FRICTION ANGLE (DEGREES)	ULTIMATE UNDRAINED SHEAR STRENGTH, S_u (PSF)	ADHESION ALONG SHAFT (PSF) (2) (3)	ε50	MODULUS OF SUBGRADE REACTION (K) (PCI)	ALLOWABLE TIP BEARING CAPACITY (PSF) (5)
Grade Raise Fill (on-site stiff lean clay borrow) (4)	125	N/A	2,500	950	0.005	1,000	N/A
Medium to Stiff Lean Clay and Lean to Fat Clay (CL) and (CL/CH)	125	N/A	1,500	750	0.007	100	N/A
Stiff to Very Stiff Fat Clay (CH) (4)	125	N/A	3,000	1,000	0.005	500	N/A
Competent Limestone	150	N/A	N/A	20,000	0.001	1,800	50,000

NOTES:

1. Use buoyant unit weights below the design groundwater level by subtracting the unit weight of water (62.4 pcf) from the unit weight listed above.
2. Neglect side friction beginning from the top of the drilled pier (assuming the top of pier is at the existing ground surface) and extending to a depth of 5 feet below the top of the drilled pier. If the top of the drilled pier is within five feet of design final grades, then neglect side friction to a depth of 10 feet below design final grades.
3. Does not include factor of safety. Use a minimum factor of safety of 2.0 for side friction when calculating uplift.
4. Calculated skin friction for CH soils in active zone should be deducted from total calculated skin friction for uplift.
5. Utilizes factor of safety of 3.0.

Due to the likelihood of pinnacles and an uneven rock surface, we recommend straight-shaft piers (no bells) for the project. While bells can provide additional uplift resistance to expansive clay forces, it may not be practical to install bells on a variable and potentially uneven bedrock surface. A minimum two-foot-deep rock socket is recommended to achieve fixity. Deeper embedment into rock may be required to develop uplift resistance. We recommend the drilling equipment be sufficiently sized and capable of readily advancing through the upper portion of the limestone rock. Furthermore, given the variable ground conditions and uncertainty with karst terrain, we recommend that pier structures be designed utilizing end bearing capacity while neglecting skin friction for compressive loading. Skin friction may be utilized for determining uplift resistance.

The contractor may encounter obstructions and/or refusal to auger penetration above the target tip elevation during drilled pier installation due to encountering naturally occurring fractured rock, cobbles, boulders, and/or clay layers/strata within the rock. The type, size, and frequency of these anomalies will have varying effects on the installation. When possible, the contractor needs to penetrate the obstruction, maneuver around the obstruction (provided pier plumbness/alignment requirements are not exceeded) or remove the obstruction by augering or excavation from the surface, and then backfill the resulting excavation and resume pier installation. Excavations to remove obstructions must not undermine existing structures/improvements.

We anticipate that the installation of the drilled shafts can be completed using “open hole” methods in some cases as the soil profile is predominantly clayey above the rock. Where heavy perched groundwater seepages are encountered, the excavations may require temporary steel casings to support the walls of the excavations until the concrete is placed. The length of the casings will depend upon subsurface conditions encountered.

We recommend the drilled shafts be observed and tested by an SME representative to verify the contractor has reached proper bearing soil and that the bearing surface is properly cleaned. The current practice of drilled pier contractors is that no persons are to enter drilled pier excavations for this verification testing. As a result, the field engineer will observe and test the soil and rock cuttings off the drilled pier auger and core barrel as a means of verifying the contractor has reached competent bearing material. Utilization of a down-hole camera (which could include using a conventional camera, such as a GoPro, or a more sophisticated optical or acoustic borehole televiewer, depending on borehole conditions) is recommended to observe excavation sidewalls, bearing surface, and rock socket.

The bottom of the drilled pier must be free of loose or disturbed soil/rock prior to placement of the concrete. Clean the bearing surface mechanically with the auger, or using a one-eye bucket, to remove loose/disturbed soils and rock, and expose the undisturbed subgrade.

If the drilled piers are constructed in the “dry” (less than 2 inches of water at the base of the excavation), the concrete may be placed by the free-fall method. The free-fall method consists of using a short hopper or chute to direct the concrete flow out of the concrete truck into a vertical stream of flowing concrete with a relatively small diameter. Direct the stream to avoid hitting the sides of the drilled piers or reinforcing cages. For the free-fall method of concrete placement, we recommend designing the concrete mix with a slump of 5 inches to 7 inches. If water in the drilled pier shaft cannot be removed or controlled, then place concrete using tremie methods. For tremie placed concrete, we recommend designing the concrete mix with a slump of 7 inches to 9 inches.

Concrete mixes for drilled piers are regularly changing to optimize performance and economy. We recommend using only concrete contractor(s) with substantial experience in concrete mixing, placement, finishing, and curing methods (e.g., to prevent undesirable shrinkage, segregation, bleeding, degradation, etc.). We do not recommend using a super plasticizer in the drilled pier concrete mix. The contractor may need to retain a concrete mix designer to develop the appropriate mix(es) for the project. We recommend using only specific type(s) of well-established concrete mixes that have been “tried and tested” to deliver successful long-term performance for the specific type/length/diameter of the proposed drilled piers.

When extracting temporary casings from the excavations, take care to maintain a head of concrete within the temporary casing during removal to prevent “hanging up” in the casing shell and infiltration of water and soil into the shaft area. The head of concrete should always be higher than the head of water trapped outside the drilled pier, considering the differences in unit weights of concrete and water.

To reduce lateral movement of the drilled shafts, it is necessary to place the concrete for the drilled shafts in intimate contact with the surrounding soil/rock. Fill any voids or enlargements in the shafts due to over-excavation, naturally occurring voids in the rock or temporary casing installation with concrete at the time the shaft concrete is placed. In association with the construction of drilled piers, consider the time of construction. We recommend the construction methods assure the drilled shaft excavation is not left open overnight prior to placing of concrete.

We estimate total settlement for drilled pier foundations using the recommended design soil bearing pressure and side friction values, as described above, will be about one-half-inch. The settlement will be from a small component of elastic compression of the drilled pier (less than one-quarter-inch) and settlement of the pier to mobilize side friction and end bearing. We estimate differential settlements between piers to be about one-half the total settlement. We base the settlement estimates on the available boring information, the estimated structural loads, our experience with similar structures and soil/rock conditions, and field verification of suitable bearing material by SME.

We recommend using a minimum design spacing of at least three pier diameters between adjacent piers (center-to-center) within a group. A minimum of three drilled piers per foundation are recommended for lateral stability. The use of closer pier spacing would require additional evaluation of the group effect. We recommend the bottom of any exterior pier caps (if pier caps are used) and grade beams be situated a minimum of 24 inches below final site grades (for frost protection). The use of a single drilled pier embedded into rock is acceptable so long as the single pier meets necessary uplift resistance, lateral stability, fixity, and axial bearing pressure requirements.

SME can provide lateral analyses for a select number of drilled piers upon request. Provision of structural loading conditions, pier diameters, and anticipated pier lengths will be required to perform these additional analyses.

4.3.4.2 OPTION 2 – SPREAD FOOTINGS ON RIGID INCLUSIONS (RIS)

Grouted column elements known as rigid inclusions (RIs) can be used to improve soil bearing conditions and reduce concerns associated with shallow spread footing foundation and/or slab support in karst terrain. RIs provide a significant risk reduction of loss of support when used below foundations or slabs while also increasing the load-carrying capability of the foundations or slabs. We recommend RIs be considered at least in areas of critical processes, where heavier slab supported equipment is proposed, and in areas with low tolerance for poor slab performance or cracking, and/or where risk associated with karst related subsidence cannot be tolerated.

The grouted columns are installed with specially designed augers, powered by equipment with large torque capacity and high static down thrust, which displaces the soil laterally, with virtually no spoil or vibration, which is also beneficial from a special handling and disposal standpoint. The augers are extended through the natural soils and until rock is encountered, creating a cylindrical space in the ground. During the auger extraction process, the column is filled with a cement-based grout under pressure. The diameter, spacing, and pressure-grouting procedures for the grouted column elements are designed to achieve a predetermined stiffness ratio with the surrounding soil. The result is a composite soil/cement ground improvement system. A load transfer platform as described is required for floor slabs supported on rigid inclusions. This load transfer platform may consist of a compacted aggregate (possibly geogrid reinforced) mat, a chemically stabilized subgrade, or a bulb of compacted stone placed above each RI location. Note that RI designs are proprietary and design methodologies vary.

Natural obstructions (e.g., cobbles) can affect penetration of the augers resulting in the potential need for additional columns or possibly redesign of foundations. Planning for rigid inclusions should include a method of measurement and payment for grouted column elements that encounter obstructions and for direct excavation of obstructions, where feasible, and backfilling these excavations to permit ground improvement. In some cases, installation of additional rigid inclusions could be necessary to improve soils around obstructed rigid inclusions, where excavation of the obstruction is not feasible. Such conditions should be evaluated and resolved on a case-by-case basis, during construction.

Additional analysis and design will be required to achieve the optimum combination of the rigid inclusion elements and design bearing pressure and estimation of foundation and/or slab settlement. SME can provide in-house design services for RI’s upon request. In general, we expect settlements will generally be elastic in nature and related to axial compression of the pile elements where pile elements are designed to bear on rock. The testing criteria should be performed as outlined in the RI contractor’s work plan. Again, SME can assist in the development of the work plan and/or recommend an appropriate testing and verification program. SME can also prepare a performance specification and assist with selection of a qualified specialty contractor, if desired.

4.3.5 INTERIOR EQUIPMENT FOUNDATIONS

We understand that the development may include additional structures or stamping equipment that will be supported on reinforced concrete mat foundations, although no further information regarding possible structures or equipment was provided at the time this report was prepared. We understand that these structures, equipment, and associated foundations may be supported at grade, or within below-grade pits.

It is assumed that these foundations will be isolated from the adjacent floor slab, main building structure foundation system, and below grade wall foundations. We have provided two options below for equipment foundations based upon our understanding of project details, each with varying levels of risk associated with construction on karst terrain.

4.3.5.1 OPTION 1 – MAT FOUNDATIONS ON DRILLED PIERS OR RIGID INCLUSIONS

The equipment foundations could be supported on drilled piers or on a rigid inclusion system per our previous recommendation for foundations. Again, this option would incur a higher initial cost than a mat foundation supported on an improved subgrade, but the drilled piers or RIs would be expected to mitigate much of the risk associated with potential sinkhole dropouts, and possible global settlement associated with the grade-raise fill. However, it should be noted that RIs are typically only minimally reinforced (or not reinforced). If the design requires resisting lateral forces, then it may be necessary to use reinforced auger cast piles, or drilled piers, for structural support.

A closer RI spacing may be required for areas where heavier equipment will be supported or where minimal settlement is tolerable. Settlement for mat foundations supported on an RI improved subgrade is expected to be minimal and general would be related to elastic compression of the grouted pile elements. The actual estimated settlement would be determined by the RI design/installer. Information and recommendations for deep foundations are provided in Section 4.3.4.

4.3.5.2 OPTION 2 – MAT FOUNDATIONS ON NATURAL SUBGRADE

As an alternative to supporting equipment foundations on piers or RIs, the mats could be supported on exposed suitable clay subgrade as discussed in Section 4.4.4.3 of this report. **Note that mats supported on improved subgrade are expected to exhibit improved uniform load carrying capacity (compared to an unimproved subgrade) but will incur the same risk of premature loss of serviceability for structure foundations and floor slabs supported in the same manner.**

We estimate that maximum settlement below mat foundations supported on natural suitable clays will be approximate 0.5 inch (as was referenced for floor slab areas) based upon the same considerations previously discussed for floor slabs. Note that our analysis of mat foundations assumes a maximum average contact pressure of 500 psf and assumes that mats will either be constructed in areas not impacted by grade-raise fill placement or where construction will not occur until after the settlement monitoring period has concluded as determined by the geotechnical engineer. Therefore, if mat foundations are proposed in areas where grade-raise fill is required, they must be supported by piers or RIs.

Contact SME should any of the design information be changed (including distributed loads for mat foundations and/or anticipated site grading/ building FFE) so that our recommendations can be revised accordingly.

4.3.5.3 GENERAL MAT FOUNDATION CONSIDERATIONS

A net allowable soil bearing pressure not exceeding 500 psf is suitable for mat foundations placed on improved subgrade as previously described overlying native stiff soils. The design bearing pressure provided above is based on a minimum factor-of-safety (FS) of 3, which is typical for mats bearing on natural lean clay soils. The actual bearing pressure even with additional dynamic loads are not expected to exceed the allowable bearing pressure. Note that an increased design bearing pressure could be considered, if necessary, provided that additional design details (including foundation contact pressure and plan dimensions) are provided.

Design of the mat foundations are typically not controlled by allowable soil pressure because the allowable bearing pressure is usually much larger than the net static contact pressure below the foundation. Thus, subgrade reaction theory is often utilized to design semi-rigid mat foundations, as observed settlements are generally elastic in nature. A vertical modulus of subgrade reaction (k_v) of 100 pounds per cubic-inch (pci) may be utilized in the analysis based on correlations with soil type developed from plate load tests conducted using a 1-foot square plate. Depending on how the mat foundation is analyzed, the vertical subgrade modulus may need to be modified based upon the loads and anticipated mat geometry.

A minimum factor of safety equal to 1.5 is used for sliding resistance. A friction coefficient of 0.30 can be utilized for calculating sliding resistance. Consider casting foundations directly against the soil (i.e., earth formed) for improved sliding and passive resistance.

The recommended allowable bearing pressure can be increased to 10,000 psf for mat foundations that are fully rock supported. Any pockets of soil or rock pinnacles or cutters are effectively removed down to rock and lean concrete having a minimum compressive strength of 3,000 psi is utilized to provide a level, uniform bearing surface. Remove any loose rock encountered at the bearing elevation and effectively clean out any soil filled or open crevices/grikes with slush grout. A friction factor of 0.60 can be used for mat foundations supported directly on limestone or lean concrete overlying limestone.

Since the mat foundation is expected to be comparatively rigid (i.e., designed for minimal flexure), we anticipate differential settlement across the mat foundation will be also relatively small and generally less than about one-quarter the total settlement (assuming uniform subsurface support). Deflections across the mat due to loads implied by structural elements are a function of the stiffness of the mat, the stiffness of the supporting subgrade soils, and the magnitude and locations of the applied loads. An analysis of the deflections across the mat due to the applied loads is typically performed by the structural engineer using an analytical computer program using the subgrade modulus to determine the reaction of the bearing soils.

4.3.5.4 FOUNDATION VIBRATION CONSIDERATIONS

We understand that stamping presses may be incorporated into the proposed plant operation. However, the anticipated location, bearing elevations, dimensions, and/or mat structural loading were not provided at the time of this report. SME can provide additional information, additional design parameters, including dynamic shear modulus, spring and damping constants, and Poisson's Ratio once this information has been provided.

A detailed soil-structure interaction analysis that considers impedances and dynamic response of the foundation was not performed as part of this evaluation. We assume that equipment foundations will be structurally isolated from the floor slab and other foundations.

Impedances (stiffness and damping) for vibration analysis are typically obtained using modeling software. Calculated amplitudes should not exceed the allowable vibration for the foundation system. An improperly designed foundation system may experience premature cracking and loss of serviceability if equipment induced vibrations are not considered in the structural design. The horizontal boundary for vibrating soils should be evaluated to minimize effects on adjacent machinery, racking systems, or other features that could be negatively impacted.

4.4 BELOW-GRADE STRUCTURE CONSIDERATIONS

At the time this report was prepared, SME was not provided with locations, depths, or any other specifics of pits and associated below grade walls, or other walls retaining soils (such as for below grade truck docks) pertaining to the project. Therefore, the following sections are intended to provide general considerations for design and construction of below grade structures only.

We understand the development may include below grade pits and associated walls inside of the main building, and (depressed) truck loading docks.

4.4.1 TEMPORARY EARTH RETENTION SYSTEMS

Depending on the depth, location, and lateral extent of proposed pits, utilization of open cut, sloped, and/or benched excavations may not be feasible at all proposed pit structure locations. At locations where adequate excavation slopes cannot be maintained during construction, a temporary earth retention system (TERS) will be necessary to support the excavation. Possible TERS may include steel sheeting, excavation bracing, soldier piles with lagging, and/ or soil nails.

The design of TERS depends upon several design-focused variables (e.g., minimum setback/space requirements, design load combinations, etc.) that need to be considered in selecting an appropriate system. The design must also consider construction sequencing to achieve a completed (built) product that is implemented in harmony with the overall progress of construction.

Steel sheet piles or other approved earth retention methods should be used where excavations are close to critical or sensitive structures or utilities. Drilling, rather than driving, may also be necessary to minimize construction vibrations. The design of the earth retention system and any required bracing is typically performed by the contractor's engineer and will be based on economy as well as geometric and ground conditions. Temporary earth retention must be designed by a licensed professional engineer in the State of Kentucky and must be installed by a qualified contractor. In some cases, additional geotechnical information could be required.

The performance of the TERS must also consider limiting the movements of nearby structures and site improvements. Consideration should be given to how installation and extraction of sheeting will affect nearby structures and underground utilities. Strict settlement/movement criteria will need to be assigned for underpinning and TERS supporting structures (especially those sensitive to movements), whereas less-stringent criteria may be adequate for a TERS that is only supporting non-structural subgrade. The limits on settlement/movement, as well as the specific type of system and sequencing required, will need to be determined by the design engineer on a case-by-case basis.

Pre-existing and post-construction condition surveys could be considered to document conditions of adjacent structures and utilities prior to and after performing the work, particularly if there are nearby structures that are more susceptible to damage from vibrations. Vibration monitoring should also be considered if the work will be performed near sensitive structures or if large magnitude vibrations are noted during construction.

Please contact SME for more information regarding TERS design services, condition surveys, or vibration monitoring during construction.

4.4.1.1 TEMPORARY GROUNDWATER CONTROL

SME has not been provided with specific below grade structure locations or depths at the time this report was prepared. Based on the borings, groundwater may be encountered, depending on the anticipated excavation depth. Groundwater control is necessary to reduce the potential for disturbance to the subgrade and to permit construction in dry conditions. The specific dewatering operations will depend on the rate and volume of groundwater flow as estimated and determined in the field by the dewatering contractor. Note that groundwater flow in limestone dominated geology is complicated by the presence of fracture zones and solution conduits within the rock. Thus, locations of sporadic or intense spring discharge (or interception of substantial groundwater flow paths) may be encountered during excavations extending into rock.

While seasonal fluctuations in the groundwater levels have not been evaluated at the time this report was prepared, the contractor needs to be prepared to dewater as necessary to provide stable and dry conditions for construction of below grade structures. Installation of TERS may reduce groundwater seepage but will not eliminate it and therefore should not be considered a primary solution for control of groundwater seepage. The dewatering technique utilized needs to be established based on the actual observed groundwater conditions.

We anticipate standard sump pit and pump methods should generally be adequate to control groundwater on a localized and temporary basis for excavations above the groundwater level. For excavations extending below the groundwater level, expect to encounter heavier flows that will require higher capacity (and continuous) dewatering techniques such as wellpoints or submersible pumps in slotted casings (wells). If higher capacity dewatering methods are used, an evaluation of the potential effect of the anticipated groundwater drawdown on adjacent structures should be performed. The contractor should be required to employ and demonstrate methods to resist "sanding" or loss of fine soil from around the wells, and to provide monitoring of sanding.

The dewatering system(s) will need to remain in operation until construction is sufficiently above the site groundwater levels and provisions to combat buoyancy effects are in-place.

Even after dewatering, the exposed soil subgrade can remain in a wet condition and can be sensitive to disturbances. In such cases, it may be necessary to undercut soft or disturbed subgrade to encounter suitable, undisturbed subgrade, and then backfill the undercut excavation with a layer of crushed aggregate or crushed concrete as discussed in Section 4.2.3. We recommend an SME representative be on-site during construction to identify unsuitable subgrade conditions requiring remediation, document subgrade improvement activities performed by the contractor, and verify subgrade for support.

The final design of the dewatering system is typically the responsibility of the contractor and their geotechnical engineer. We would be pleased to assist in the development of a performance-based specification or design for this portion of the project, if requested.

4.4.2 BELOW-GRADE WALLS

4.4.2.1 WALL FOUNDATIONS

The below-grade pit and recessed truck docks walls will be subjected to lateral loads from retained soil behind the walls. We have assumed these walls will bear on shallow continuous (wall) foundations over suitable bearing media (i.e., completely on suitable soils, completely on rock, or on lean concrete backfill after undercutting to rock) suitable for the recommended design soil or rock bearing pressures (which will depend on the proposed depth of the below grade features, and subsequently, the proposed wall foundation bearing elevation) as provided in Section 4.3.3 of this report.

Additionally, the walls need to be designed to effectively support the overburden weight of soil backfill, and additional lateral pressures due to surcharge loading; such as, anticipated equipment foundation loads, floor or column loads, and transient loads adjacent to the walls. With pavements sloping toward depressed truck docks, drainage will be especially important for suitable performance of the walls.

4.4.2.2 WALL BACKFILL

For the proposed below grade walls associated with pits, we recommend the wall backfill immediately behind or against the wall consist of an open-graded well-draining granular material (e.g., KYTC No. 57 crushed limestone aggregate) compacted as engineered fill within a zone extending 2 vertical to 1 horizontal from the base of the excavation (refer to the image below). Properly prepared and compacted clays can be used as excavation backfill (provided it is prepared and placed in accordance with the engineered fill section of this report) outside the 2 vertical to 1 horizontal zone.

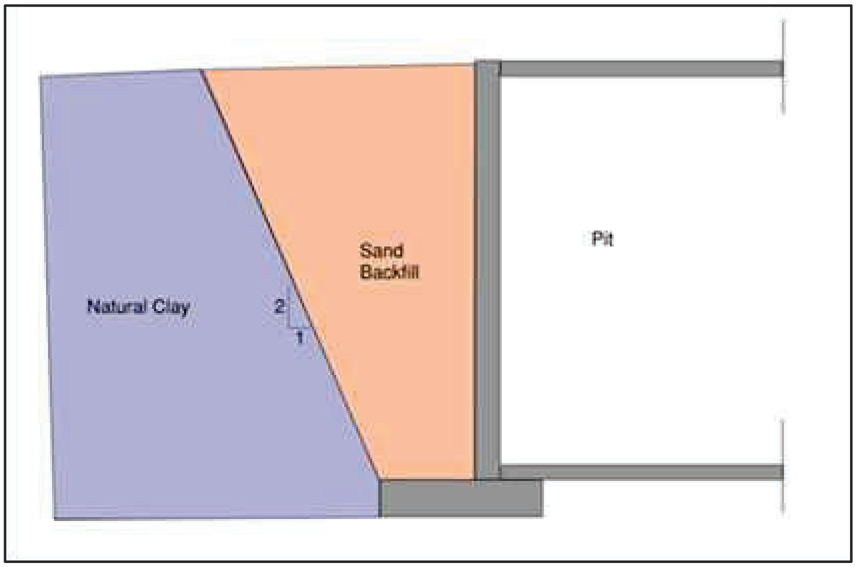

IMAGE NO. 37: Zone Of Granular Backfill For Pit Excavations

For below-grade truck dock walls, we recommend the wall backfill immediately behind or against the wall (recommended to extend a minimum of 12 inches behind the wall) consist of an open-graded well-draining granular material (e.g. KYTC graded structural backfill with a maximum nominal diameter of 1-inch and containing no more than 8 percent passing the No. 200 sieve) compacted as engineered fill. To limit water infiltration into the granular backfill behind the walls, the upper 1 to 2 feet of the backfill should consist of a compacted clay cap, covered with topsoil or an impermeable surface such as concrete or pavement as appropriate. A properly weighted woven filter fabric should be used to provide separation of the crushed limestone aggregate from the soil adjacent soil subgrade.

Exercise care during compaction of the wall backfill to avoid overstressing the walls. If required, walls must be designed to accommodate the additional stresses associated with operating compaction equipment adjacent to the wall.

4.4.2.3 LATERAL EARTH PRESSURES AND SLIDING RESISTANCE

Provided an open-graded granular material is used as backfill, a unit weight of 120 pounds per cubic foot (pcf) and a friction angle of 33 degrees can be considered for design purposes.

Where walls are designed to be rigid walls or restrained so they do not rotate sufficiently to permit the lower condition to be reached, an at-rest lateral earth pressure coefficient (K_0) of 0.45, a passive lateral earth pressure coefficient (K_p) of 3.4, and an equivalent fluid at-rest pressure of 57 psf per foot of wall height is recommend for calculating the lateral earth pressures. This equivalent fluid pressure would increase linearly from zero psf at the ground surface, to a maximum at the base of the wall.

When considering utilizing active earth pressures for design, the wall must move laterally about 0.004H (where H equals the wall height) for active earth pressures to be fully developed. If adequate rotation is expected to permit the lower active earth pressure (K_a) condition to be reached, an active lateral earth pressure coefficient (K_a) of 0.30 and an equivalent fluid at-rest pressure of 45 psf per foot of wall height is recommend for calculating the lateral earth pressures. This equivalent fluid pressure would increase linearly from zero psf at the ground surface, to a maximum at the base of the wall. If active earth pressures are not fully mobilized, use the at-rest lateral earth pressure coefficient.

When considering utilizing passive earth pressures for design, the wall must move laterally about 0.04H (where H equals the wall height) for passive earth pressures to be fully developed.

Additional lateral pressures due to surcharge loading must be added to the above lateral earth pressures for design. Surcharge loads need to be modeled as a uniform pressure distribution applied to the entire wall height. We recommend using a horizontal coefficient for at-rest conditions, anticipating the below-grade walls will be held rigid, to calculate loads on walls due to surcharges.

Sliding or shear resistance along the base of wall foundations may also be used to resist horizontal loads. A friction coefficient of 0.30 can be used to calculate sliding resistance for footings bearing on natural clays or lean clay fill. This coefficient can be increased to 0.45 for foundations bearing on compacted DGA, and to 0.60 for foundations supported directly on limestone. A minimum factor of safety equal to 1.5 is recommended to determine sliding resistance.

4.4.2.4 DRAINAGE

Based on the borings performed for this evaluation, the subgrade consists primarily of clays. Groundwater could accumulate over time within the relatively permeable granular wall backfill, which would be confined by the surrounding relatively impermeable clays. Groundwater accumulations within the backfill could potentially result in hydrostatic pressures acting on the below-grade walls and hydrostatic uplift pressures acting on the recessed structures.

The earth pressures presented above are for a drained wall backfill. To reduce the potential for the build-up of hydrostatic pressure behind the below-grade walls, we recommend foundation drains be installed along the sides of the walls retaining soil. We recommend the foundation drains consist of a minimum 6-inch diameter perforated plastic drainpipe, wrapped with a filter fabric (e.g. Mirafi® 140N or 160N) and surrounded by 6 inches of a filter material, such as KYTC No. 57 crushed stone wrapped with a filter fabric.

The drains must be connected to a sump pump system or discharged into an appropriate gravity drainage outlet, where feasible. We recommend the design include provisions for access to the drains for cleaning and maintenance (i.e., clean-outs). Properly designed waterproofing membranes should also be considered to reduce the potential for water infiltration into machine pits. The installation and maintenance of a long-term drainage system is critical for the facility and must be included behind any below-grade walls. Roof downspouts must not be discharged onto the ground surface above the walls.

4.5 SEISMIC SITE CLASS

Based on the subsurface information obtained from the borings which were advanced to refusal and our experience in the general area, we estimate that seismic site Class C applies to the building in accordance with the 2018 Kentucky Building Code (3rd Edition) referencing Table 20.3-1 in ASCE Standard ASCE/SEI 7. Our estimation of Seismic Site Class C is based on an average soil/rock shear wave velocity of at least 1,200 feet per second (fps) to a depth of 100 feet with a soil profile of less than about 25 feet in thickness.

We understand that the development may include structures/ equipment located in below grade pits. We estimate that a seismic Site Class B may apply to some of the proposed structures, depending on the location and depth of these structures and pits. The seismic classification will be structure dependent and will depend upon the existing soil and rock conditions at the proposed structure locations, as well the proposed grading.

4.6 PRELIMINARY ROCK EXCAVATION CONSIDERATIONS

Ability to excavate the rock (i.e., rippability or excavatability) will be dependent on the type, condition, and quality of the rock. Our preliminary assessment of ability to excavate the rock is based upon information obtained from the borings, the limited rock coring, the laboratory testing, and our experience with similar site conditions in the project vicinity.

It is our opinion that the near-surface weathered limestone would likely be categorized as Rippability Class 4 or 5. Thus, it is expected that the underlying limestone cannot be easily excavated without use of blasting or hoe-ramming. Blasting is likely not feasible due to the proximity to developments, roadways, and existing underground infrastructure. Therefore, very heavy-duty ripping equipment fitted with a ripping tool will likely be required to remove limestone slabs broken during excavation. It is possible that excavators may penetrate through the rock disintegration zone (RDZ) to the refusal depths noted on the boring logs with some difficulty, but the penetration is expected to be minimal at best.

Non-explosive rock breaking methods using hydraulic splitting or expansive chemical agents could also be considered as an alternative. These methods are typically not cost effective compared to conventional blasting on large scale projects, but do offer the advantage of less noise, ground disturbance, and potential for property damage compared to conventional blasting or hoe-ramming.

A more comprehensive and thorough assessment of rippability/excavatability would require performance of additional rock coring at specific locations where rock excavation is anticipated and/or seismic shear-wave velocity evaluation, which was beyond the scope of this limited evaluation.

4.7 STORMWATER MANAGEMENT BASIN DESIGN

4.7.1 INFILTRATION CONSIDERATIONS

SME performed two infiltration tests (IT1 and IT2) as part of this evaluation. The table below summarizes the locations, depths, and elevations of the infiltration tests. Refer to the Infiltrometer Test Data Sheets included in Appendix B. The approximate infiltration test locations are depicted on the attached Boring Location Diagrams (Figure Nos. 1 and 2). The table below also includes the USCS Group Symbol based on our visual classification of the soil present at the infiltration test depth based on a collected sample of auger cuttings. Refer to Appendix B for field testing procedures.

DOUBLE-RING INFILTROMETER FIELD TEST DATA

INFILTRATION TEST LOCATION	TEST DEPTH (FEET)	TEST ELEVATION [1] (FEET +/-)	USCS GROUP SYMBOL	MEASURED INFILTRATION RATE (INCH/HR) [2]	RECOMMENDED INFILTRATION RATE (INCH/HR)
IT1	2.3	719.7	CL	0	0
IT2	9.3	719.2	CH	0	0

NOTES

1. Corresponding elevation based on estimated ground surface elevation approximated from the provided topographic survey. Elevations are rounded to the nearest half foot.
2. Infiltration rate is based on the final interval after a stabilized rate was obtained.

No information regarding the proposed stormwater management basin was provided but based on the infiltration testing elevations requested by L&F, we assume the basin bottom will range from about elevation 719 feet to 721 feet. The soil conditions near the assumed base of the proposed basin consisted predominantly of lean clay, lean to fat clay, or fat clay soils. The infiltration tests indicate an infiltration rate of 0 inches per hour. Further considerations regarding proposed stormwater management are discussed in the following section.

4.7.2 STORMWATER RETENTION DESIGN CONSIDERATIONS

Some of the borings performed for this evaluation encountered groundwater during or upon completion of drilling. Site planning and the proposed grading plan should consider the possibility of encountering groundwater during excavation for the stormwater basin.

Based on the infiltration tests, the site clays are estimated to have relatively low permeability characteristics. Therefore, we generally consider this site to not be suitable for infiltration due to the relatively impermeable nature of the clayey subgrade.

For basins that provide stormwater storage and do not rely on percolation and instead on retention or temporary detention, we recommend a minimum 2-foot-thick compacted clay layer at the bottom of the basin to minimize water infiltration and soil loss into fractures within the rock. Utilization of clay is especially important where shallow rock is encountered and retention/detention is required. Undercutting of rock and replacement with the compacted clay liner may be necessary based on the actual soil/rock conditions and the planned basin bottom. Increase the clay cap thickness by at least 2 inches per foot of impounded water depth where the impounded water depth exceeds 10 feet. The native clay soils can be mixed with bentonite to increase soil plasticity and further reduce water infiltration. If the basin is not designed to maintain a normal pool, the clay liner should be capped with a minimum of 12 inches of topsoil and vegetated or covered with gravel to further discourage infiltration and reduce the potential for desiccation cracking (which can contribute to sinkhole dropouts) during the dry season. A synthetic liner can be utilized in-lieu of a clay liner and can provide additional resistance to formation of sinkhole dropouts or leaks, which can occur in karst areas despite implementation of best management practices.

Depending on the depth of the basin and the proposed grading, we recommend a slope stability analysis be performed prior to construction of the basin.

4.8 SOIL CORROSIVITY

SME performed corrosion analyses on five bulk soil samples. Soluble sulfate, chloride, and pH tests were performed by mixing the soil with distilled water and a mixture of two parts of distilled water to one-part soil. Electrical resistivity testing was performed using a Miller multi-combination meter with a Miller soil box. The resistivity of the soil was tested at the in-situ moisture content and at a saturated condition. The laboratory test results from our corrosion analysis are summarized below with full reports found in Appendix B.

LABORATORY CORROSION TEST RESULTS SUMMARY

BORING NO., DEPTH, AND SOIL TYPE (USCS)	IN-SITU MOISTURE CONTENT (PERCENT)	SOLUBLE CHLORIDES (ppm)	SOLUBLE SULFATES (ppm)	CONDUCTIVITY (uS/CM)	PH	RESISTIVITY (OHM-CM)	
						NATURAL MOISTURE CONTENT	SATURATED
B16 5 – 7 Lean Clay (CL)	22	16.3	17	75.25	4.99	11,000	10,000
B25 8 – 10 Fat Clay (CH)	27	20.0	22.6	244.20	7.08	1,600	1,200
B32 5 – 7 Lean Clay (CL)	24	15.4	6.8	60.21	5.08	12,000	11,000
B51 2 – 4 Lean Clay (CL)	22	20.0	7.4	180.30	7.31	3,200	2,000
B63 2 – 4 Silty Clay (CL/ML)	20	24.5	5.6	99.70	5.85	7,100	6,400

Refer to the tables below regarding suggested corrosion ratings.

SOIL RESISTIVITY CORROSIVITY RATING

SOIL RESISTIVITY (OHM-CM)	CORROSIVITY RATING
>10,000	Mildly corrosive
2,001 – 10,000	Moderately corrosive
1,001 – 2,000	Corrosive
0 to 1,000	Severely corrosive

NOTES: Underground Corrosion: NBS Circular 579. Reprinted by NACE. Houston, TX, 1989 pp. 166-167.

Based on the resistivity laboratory test results, we consider the tested onsite native soils to be mildly corrosive to corrosive to ferrous metals.

Per ACI 318-14, Table 19.3.1.1, (presented below) the sulfate level in the tested sample categorizes as S0 for corrosion of metals and cement. Based on the table, the corrosion protection of reinforcement exposed to the tested sample categorizes as C2 based on the high likelihood the concrete will be exposed to moisture and external sources of chlorides (i.e., deicing chemicals, salt, etc.). The chloride levels are considered corrosive to metals. The pH concentrations of the tested samples are judged to be acidic to neutral. Appropriate pipe SAE grades for underground steel should be selected based on the test results (e.g., pH, resistivity, and chlorides) provided above. The toleration of any buried steel pipes or other buried steel elements is dependent on the steel alloy utilized.

ACI 318 (Table 19.3.1.1) EXPOSURE CATEGORIES AND CLASSES

CATEGORY	CLASS	CONDITION	
Sulfate (S)		Water-soluble sulfate (SO_4^{2-}) in soil, percent by mass (1)	Dissolved sulfate (SO_4^{2-}) in water, ppm (2)
	S0	$SO_4^{2-} < 0.10$	$SO_4^{2-} < 150$
	S1	$0.10 \leq SO_4^{2-} < 0.20$	$150 \leq SO_4^{2-} < 1500$ or seawater
	S2	$0.20 \leq SO_4^{2-} \leq 2.00$	$1500 \leq SO_4^{2-} \leq 10{,}000$
	S3	$SO_4^{2-} > 2.00$	$SO_4^{2-} > 10{,}000$
Corrosion Protection of Reinforcement (C)	C0	Concrete dry or protected from moisture	
	C1	Concrete exposed to moisture but not to an external source of chlorides	
	C2	Concrete exposed to moisture and an external source of chlorides from deicing chemicals, salt, brackish water, seawater, or spray from these sources	

NOTES: Table 19.3.1.1 from ACI 318R-14 Chapter 9.
(1) Percent sulfate by mass in soil shall be determined by ASTM C1580.
(2) Concentration of dissolved sulfates in water, in ppm, shall be determined by ASTM D512 or ASTM D4130.

Metallic conduits, pipelines, and other below-grade structures in contact with the clayey subgrade can potentially experience aggressive corrosion. Where practical, we recommend locating metallic conduits/structures away from areas exposed to or impacted by road salts as they can increase the chloride concentrations in the soil over time. Metallic conduits, pipelines, and other below-grade structures in contact with the clay subgrade and/or poorly draining granular soils (if used as site fills) or shallow groundwater can potentially experience aggressive corrosion. Balance the risk of failure due to corrosion against the type of corrosion protection used. For critical utilities or structures (i.e., underground storage tanks, natural gas lines, fire protection lines, etc.) in contact with onsite clays, a high level of corrosion protection (such as cathodic protection) may be warranted. In general, cover buried metallic structures using a suitable coating material and surround the structures with a well-draining granular backfill and underdrain(s) (where applicable) to promote drainage in the area. Do not place the following materials adjacent to buried metallic utilities: topsoil, organic soils, undocumented fill, clay, silt, mixtures of sand and clay, and/or other deleterious materials.

Electrically isolate buried utilities of different metallic construction from each other to minimize galvanic corrosion problems. In addition, isolate new piping and conduits electrically from existing ones so the older metallic structure will not increase the rate of corrosion of the new structures.

We recommend normal Type I/II cement be used for foundation and floor slab construction. Additional soil corrosivity testing is recommended on any imported soils to be used as engineered fill to verify the corrosivity potential of those soils is acceptable.

4.9 PAVEMENT DESIGN RECOMMENDATIONS

SME was not provided with anticipated traffic conditions, including the types of vehicles utilizing the site pavements, the average daily traffic (ADT), and axle loading configurations at the time this report was prepared. Therefore, the pavement design recommendations of this report are limited to general recommendations for subgrade preparation, with the assumption that SME will provide recommendations for pavement sections, asphalt and concrete materials, and drainage once we have been provided with additional information.

4.9.1 SUBGRADE PREPARATION FOR PAVEMENTS

Based on the borings, we expect the exposed subgrade soils at the design subgrade level in the pavement areas (which we assume will be near elevation 752 feet) will consist mostly of lean clay, lean to fat clay, and fat clay. Subgrades need to be prepared in accordance with Section 4.2.3 of this report and as follows. Subgrade preparation and the aggregate base layers need to extend out to at least 18 inches beyond the edge of pavement or beyond the back of curbs to provide support for the outer edges of pavement.

After stripping surficial materials, cutting to design subgrade levels, removing/replacing any organics or deleterious materials, but prior to raising grades, compact the upper 12 inches of the exposed subgrade to a minimum of 100 percent of the maximum dry density determined by the Standard Proctor test. Proofroll the resulting subgrade using a fully loaded tandem axle dump truck. Improve areas exhibiting deflection greater than 1/2 inch as described in Section 4.2.3. Place and compact engineered fill as presented in Section 4.2.5.

The subgrade must be uniformly graded and sloped similar to the proposed pavement surface to provide proper drainage of the pavement system into an appropriate drainage outlet. Fine-grading of the underlying subgrade will be critical to minimize low-spots below the aggregate base where water can pond, likely resulting in moisture fluctuations of the subgrade and undesirable early pavement distress. Fine grading the subgrade is important for drainage of perched groundwater, and to achieve a uniform thickness of base course to be placed throughout the pavement section. Surrounding areas of greenspace need to be graded to provide drainage away from the pavement system. Also, we recommend installing underdrains at/through low spots in the prepared subgrade to facilitate drainage of perched groundwater. Additional recommendations for pavement drainage are provided in Section 4.9.2.

Prior to placement of the aggregate base, proofroll the subgrade again and repair any areas of disturbed or unstable subgrade identified by proofrolling. Once the subgrade passes the final proofroll test, we recommend fine grading the subgrade again and then placing the pavement layers soon thereafter to avoid further subgrade disturbance. Place and compact aggregate base to a minimum of 100 percent of the maximum dry density determined by the Standard Proctor test. Just prior to placing the pavement layers, proofroll the aggregate base and recompact areas exhibiting deflection greater than 1/4 inch as described in Section 4.2.3. Place and compact engineered fill as presented in Section 4.2.5.

Limit construction traffic on the prepared subgrade once the aggregate base layer is placed. Use designated haul roads and staging areas for heavy construction vehicles and equipment/materials storage. Haul roads should be constructed using a layer of crushed stone, possibly in combination with a high-strength woven geotextile fabric or geogrid, if necessary to stabilize and protect the subgrade. Contact SME for assistance with the type and quantity of stabilization required based on field conditions during construction.

4.9.2 PAVEMENT DRAINAGE CONSIDERATIONS

The pavement system must be properly drained to reduce the potential of frost heaving and softening of the subgrade due to water infiltrating through cracks. In general, we recommend constructing a pavement with a minimum of 1.5 percent surface slope to promote positive drainage. Additionally, we recommend sloping the surrounding ground surface away from pavements to improve surface drainage.

For subsurface drainage, we recommend installing underdrains. The installation of underdrains underlying pavement sections founded over low permeability soils (as observed at this site) will generally aid in improving long-term performance of the pavement sections, as well as helping reduce pavement maintenance costs. Therefore, we recommend that at each catch basin, a series of underdrains be installed that consist of a minimum 25 feet long section of underdrain installed in four directions.

Curb inlets (if provided) should have 25 feet long sections of underdrains installed in a minimum of two directions to provide subsurface drainage. Furthermore, cut-off drains should be installed along the perimeter of the pavement where adjacent ground surface elevations slope towards the pavement. Other areas of strategically placed additional underdrains might also be beneficial at this site.

We recommend the drain trenches be excavated to a minimum depth of 18 inches below the bottom of the aggregate base be at least 12-inches wide. The trench should be wrapped in a non-woven geotextile fabric (e.g., Mirafi® 180N, or approved equal) and backfilled with KYTC No. 57 crushed limestone. The underdrains should consist of a minimum 6 inch corrugated perforated PVC pipe bedded on a minimum 3 inches of KYTC No. 57 crushed limestone, and the fabric should be overlapped on top of the trench. The trench should be backfilled to the proposed bottom elevation of the aggregate base course and the fabric should be suitably overlapped on top of the trench in the prepared subgrade. Though not in the scope of our services, SME can be retained to provide layout recommendations for underdrain placement upon request.

5. EXCAVATION AND GROUNDWATER MANAGEMENT

Typical site excavations are not anticipated to extend below the depth of groundwater; however, water seepage into shallow foundation and utility excavations should be anticipated during construction. We anticipate standard sump pit and pump methods should generally be adequate to control groundwater on a localized and temporary basis for excavations, as needed.

The near-surface soils present at the site are moisture sensitive and susceptible to disturbance if they become wet and are trafficked by construction equipment. It will likely be more difficult and costly to attempt construction at this site during periods of seasonally cooler and/or wet weather. The warmer summer months will be the optimal time period to perform earthwork activities at this site in order to reduce disturbance of the existing soils, and the need for undercutting of disturbed materials and subgrade remediation. Subgrade stabilization using coarse crushed aggregates and geo-fabrics, and construction of dedicated construction roads, may be necessary to facilitate construction at this site. If subgrade preparation occurs during periods of adverse weather, chemical subgrade modification or stabilization could help reduce subgrade disturbance.

The contractor must protect adjacent existing buildings, utilities, and roadways during construction of the proposed building and site improvements. During the excavating and compacting operations, excessive vibrations should not cause settlement of the existing buildings, utilities, and roadways, and the contractor should avoid undermining existing buildings, utilities, and roadways. Excavations should not extend below existing foundations without first properly underpinning or shoring the existing foundations. In areas where there is insufficient space to temporarily slope back excavations in accordance with applicable regulations, TERS will be required during construction. Underpinning, shoring and earth retention systems should be designed by a qualified professional engineer, and installed by a contractor experienced with construction of these systems.

The contractor must provide safely sloped excavations or an adequately constructed and braced shoring system in accordance with federal, state, and local safety regulations for individuals working in an excavation that may expose them to the danger of moving ground. If material is stored or heavy equipment is operated near an excavation, use appropriate shoring to resist the extra pressure due to the superimposed loads.

Handling, transportation, and disposal of excavated materials and groundwater should be performed in accordance with applicable environmental regulations.

6. EVALUATION PROCEDURES

6.1 GEOTECHNICAL FIELD EXPLORATION

6.1.1 BORINGS

The proposed number and locations of the borings was determined by L&F, and the proposed depth of the borings was determined by SME. SME located the borings in field using our hand-held GPS. The elevations referenced in this report and included on the boring logs are rounded to the nearest 1/2-foot and were approximated using the provided topographic survey.

The borings were advanced using a rotary drill rig equipped with continuous flight augers. The borings included soil sampling based on Split-Barrel Sampling procedures. Shelby Tube samples and bulk samples consisting of 5-gallon buckets and 1-gallon bags were also obtained where noted. Rock cores were obtained from select borings using a double-tube NQ2 core barrel with a diamond-tipped bit via the wireline method.

Groundwater level measurements were recorded during and immediately after completion of each boring. After completion of drilling and obtaining groundwater level measurements, the boreholes were backfilled with auger cuttings.

The Field Testing Procedures in Appendix B provides more detailed descriptions of field tests typically performed by SME and referenced in this report.

Soil and rock samples recovered from the field exploration were taken to our laboratory for further observations and testing.

Upon completion of the laboratory testing, boring logs were prepared and include the soil and rock descriptions, penetration resistances, pertinent field observations, and the results of the laboratory testing. Each log also includes the estimated existing ground surface elevation. Explanations of symbols and terms used on the boring logs are provided on the Boring Log Terminology sheet included in Appendix A. Additionally, the logs include our qualitative assessment of recovered rock core specimens including sample recovery, RQD, RMR, and GSI.

Soil and rock samples are normally retained in our laboratory for 60 days and are then disposed, unless instructed otherwise.

6.1.2 INFILTRATION TESTING

The boreholes to perform the infiltration tests were advanced using a rotary drill rig. The infiltration test generally followed the double-ring infiltrometer field test procedures outlined in ASTM D3385-09 titled "Standard Test Method for Infiltration Rate of Soils in Field Using Double Ring Infiltrometer", with some modifications.

After the boreholes were performed to achieve the infiltration test depths, a 6-inch-diameter PVC outer casing (standpipe) and a 4-inch-diameter inner casing (standpipe) were inserted into the boreholes and used to perform the infiltration test. The casings were seated about two inches into the subgrade at the bottom of the prepared boreholes. About two inches of gravel was added inside the casings to prevent subgrade disturbance when adding water to the standpipes. To conduct the infiltration tests, the test soil was pre-soaked by filling both standpipes with about 12-inches of water. The water was observed to drain (i.e., drop) within the inner standpipe at a rate less than 2 inches per 30 minutes during the presoaking period. After pre-soaking, about 12-inches of water was maintained in both standpipes, and the water level drop in the standpipes was recorded after 30-minute time intervals. This procedure was repeated for eight test intervals. The water level drop within the center standpipe that was recorded during the final time interval was used to calculate the infiltration rate.

After completion of the infiltration test, the standpipes were removed and the boreholes used to conduct the infiltration tests were backfilled with auger cuttings mixed with bentonite chips.

6.2 LABORATORY TESTING

The laboratory testing program consisted of visually classifying the recovered samples in accordance with ASTM D-2488. Based on the laboratory testing, we prepared soil descriptions and assigned a group symbol for the various soil strata observed based on the Unified Soil Classification System (USCS). In addition, moisture content and hand penetrometer tests were performed on portions of cohesive samples obtained. Additional laboratory tests included:

- Two three-point California Bearing Ratio (CBR) tests.
- Two one-dimensional consolidation tests.
- Four Standard Proctor compaction tests.
- Five Grain Size Analyses.
- Eight Atterberg Limits tests.
- Soil corrosivity on five bulk samples, which included:
    - pH Analysis.
    - Conductivity.
    - Sulfate content.
    - Chloride content.
    - Soil box resistivity.
- Twelve unit weight (natural density) tests.
- One organic content test.
- Ten unconfined compressive strength tests on recovered rock core specimens.

The Laboratory Testing Procedures in Appendix B provides descriptions of the laboratory tests. The results of the laboratory tests are presented on the boring logs and included in Appendix A.

7. SIGNATURES

PREPARED BY:

Alex M Dodson

Alex M. Dodson, EI
Senior Staff Engineer

REVIEWED BY:

STATE OF KENTUCKY
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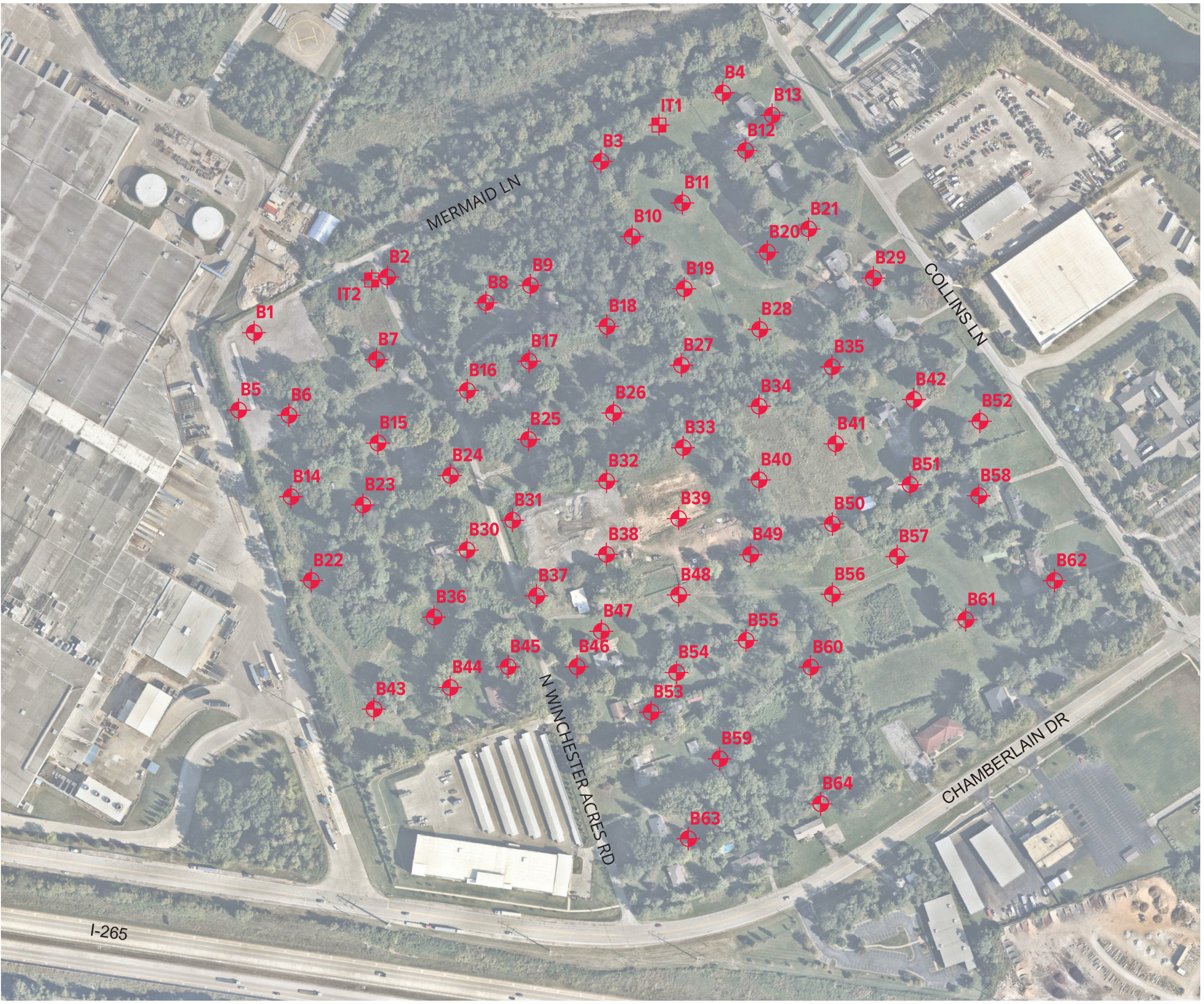
Regional Leader/ Senior Consultant

APPENDIX A

BORING LOCATION DIAGRAMS (FIGURE NOS. 1 AND 2)
BORING LOG TERMINOLOGY
BORING LOGS (B1 THROUGH B64)
HISTORIC TOPOGRAPHIC MAPS (FIGURE NOS. 3 THROUGH 8)
HISTORIC AERIAL IMAGERY (FIGURE NOS. 9 THROUGH 18)



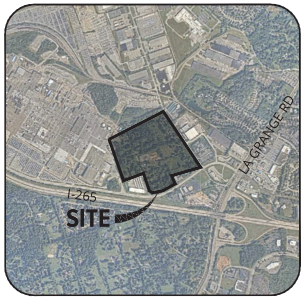
N W E S

0' 300' 600'

GRAPHIC SCALE: 1" = 300'

LEGEND

⊕	APPROXIMATE BORING LOCATION
▣	APPROXIMATE INFILTRATION TEST LOCATION



LOCATION MAP

NOT TO SCALE

N W E S

NOTE:
1. AERIAL IMAGE TAKEN FROM NEARMAP WITH AN IMAGE DATE OF 9-13-2025.

AERIAL BACKGROUND OBTAINED FROM: NEARMAP IMAGE DATE 9-13-2025.

SME
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Project
GREENFIELD SITE DEVELOPMENT

Project Location
LOUISVILLE, KENTUCKY

Sheet Name
BORING LOCATION DIAGRAM

No.	Revision Date

Date **1-23-2026**
CADD **M. NOWAK-ROCHFORD**
Designer **A. DODSON**
Project **102074.00**
Figure No. **1**

DRAWING NOTE: SCALE DEPICTED IS MEANT FOR 11" X 17" AND WILL SCALE INCORRECTLY IF PRINTED ON ANY OTHER SIZE MEDIA

NO REPRODUCTION SHALL BE MADE WITHOUT THE PRIOR CONSENT OF SME

FILE LOCATION: \\Sme-inc\pz\WIP\102074.00\CAD\Design Files\BLD\Rev0\102074.00-BLD.dwg

PLOT DATE: January 23, 2026 - 1:26 PM - matt.nowakrochford

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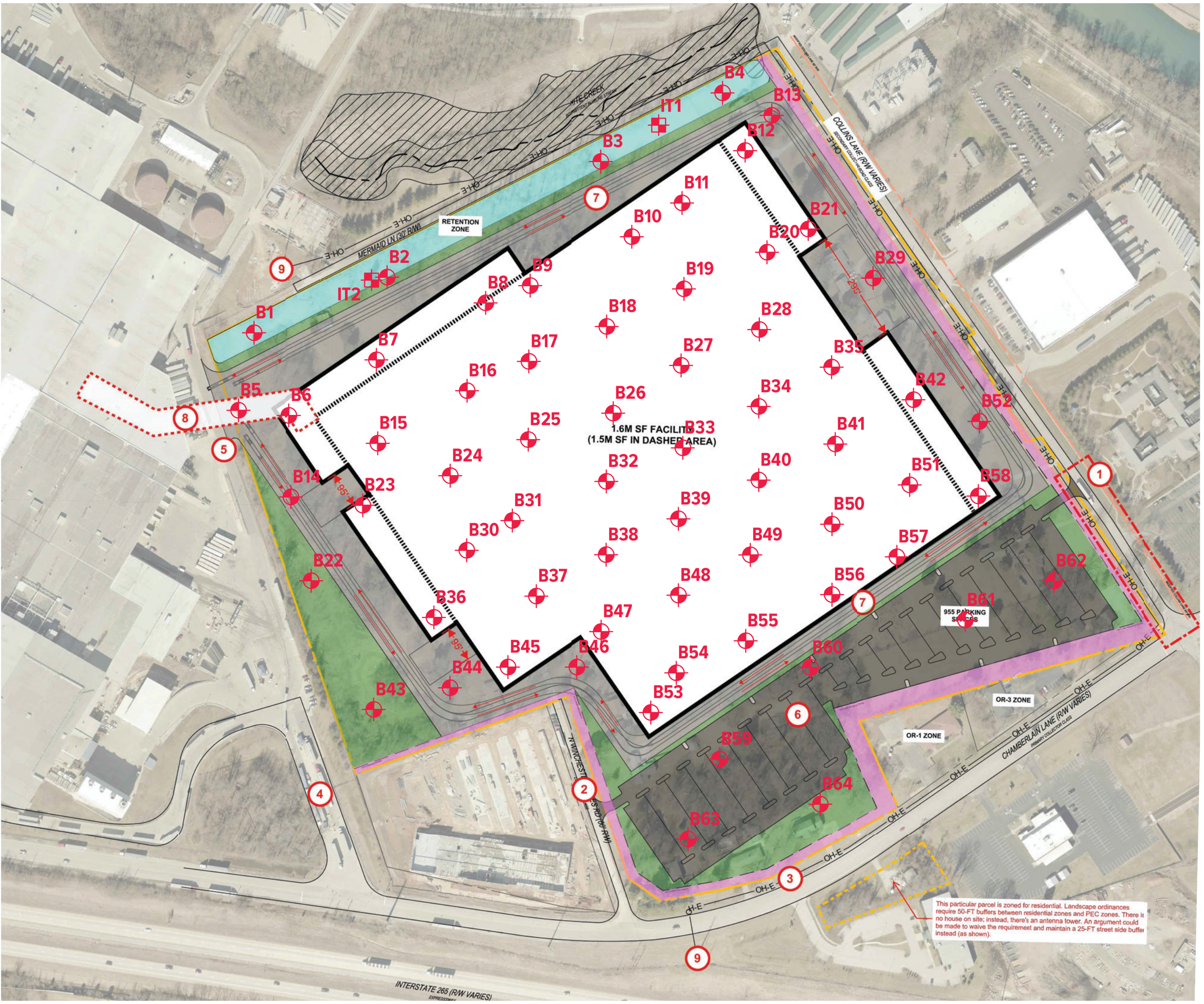
RECEIVED May 22, 2026 Planning and Design 26-ZONE-0056



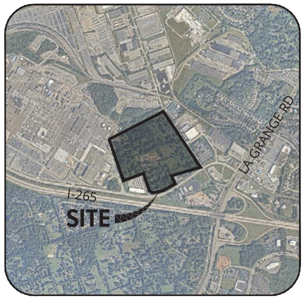
This particular parcel is zoned for residential. Landscape ordinances require 50-FT buffers between residential zones and PEC zones. There is no house on site; instead, there's an antenna tower. An argument could be made to waive the requirement and maintain a 25-FT street side buffer instead (as shown).

GRAPHIC SCALE: 1" = 300'

0' 300' 600'

LEGEND

⊕	APPROXIMATE BORING LOCATION
⊞	APPROXIMATE INFILTRATION TEST LOCATION



LOCATION MAP

NOT TO SCALE

NOTES:
1. BASE DRAWING INFORMATION TAKEN FROM A DRAWING TITLED "ADVANCED SITE DEVELOPMENT PLAN" (EXHIBIT A) WITH A LATEST REVISION DATE OF 9-10-2025, PREPARED BY LUCKET & FARLEY.
2. AERIAL IMAGE TAKEN FROM NEARMAP WITH AN IMAGE DATE OF 9-13-2025.

AERIAL BACKGROUND OBTAINED FROM: NEARMAP IMAGE DATE 9-13-2025.

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Project
GREENFIELD SITE DEVELOPMENT

Project Location
LOUISVILLE, KENTUCKY

Sheet Name
BORING LOCATION DIAGRAM

No.	Revision Date

Date: 1-23-2026
CADD: M. NOWAK-ROCHFORD
Designer: A. DODSON
Project: 102074.00
Figure No.: 2

DRAWING NOTE: SCALE DEPICTED IS MEANT FOR 11" X 17" AND WILL SCALE INCORRECTLY IF PRINTED ON ANY OTHER SIZE MEDIA

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PLOT DATE: January 23, 2026 - 1:28 PM - matt.nowakrochford

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BORING LOG TERMINOLOGY

UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART

COARSE-GRAINED SOIL (more than 50% of material is larger than No. 200 sieve size.)			
GRAVEL More than 50% of coarse fraction larger than No. 4 sieve size	Clean Gravel (Less than 5% fines)		
	▨	GW	Well-graded gravel; gravel-sand mixtures, little or no fines
	▨	GP	Poorly-graded gravel; gravel-sand mixtures, little or no fines
	Gravel with fines (More than 12% fines)		
	▨	GM	Silty gravel; gravel-sand-silt mixtures
	▨	GC	Clayey gravel; gravel-sand-clay mixtures
SAND 50% or more of coarse fraction smaller than No. 4 sieve size	Clean Sand (Less than 5% fines)		
	▨	SW	Well-graded sand; sand-gravel mixtures, little or no fines
	▨	SP	Poorly graded sand; sand-gravel mixtures, little or no fines
	Sand with fines (More than 12% fines)		
	▨	SM	Silty sand; sand-silt-gravel mixtures
	▨	SC	Clayey sand; sand–clay-gravel mixtures
FINE-GRAINED SOIL (50% or more of material is smaller than No. 200 sieve size)			
SILT AND CLAY Liquid limit less than 50%	▨	ML	Inorganic silt; sandy silt or gravelly silt with slight plasticity
	▨	CL	Inorganic clay of low plasticity; lean clay, sandy clay, gravelly clay
	🟩	OL	Organic silt and organic clay of low plasticity
SILT AND CLAY Liquid limit 50% or greater	▨	MH	Inorganic silt of high plasticity, elastic silt
	▨	CH	Inorganic clay of high plasticity, fat clay
	▨	OH	Organic silt and organic clay of high plasticity
HIGHLY ORGANIC SOIL	▨	PT	Peat and other highly organic soil

OTHER MATERIAL SYMBOLS

■ Topsoil	□ Void	▨ Sandstone
▨ Asphalt Concrete	▨ Glacial Till	▨ Siltstone
▨ Aggregate Base	▨ Coal	▨ Limestone
▨ Portland Cement Concrete	▨ Shale	▨ Fill

LABORATORY CLASSIFICATION CRITERIA

GW	$C_U = \frac{D_{60}}{D_{10}}$ greater than 4; $C_C = \frac{D_{30}{}^{2}}{D_{10} \times D_{60}}$ between 1 and 3	
GP	Not meeting all gradation requirements for GW	
GM	Atterberg limits below "A" line or PI less than 4	Above "A" line with PI between 4 and 7 are borderline cases requiring use of dual symbols
GC	Atterberg limits above "A" line with PI greater than 7	
SW	$C_U = \frac{D_{60}}{D_{10}}$ greater than 6; $C_C = \frac{D_{30}{}^{2}}{D_{10} \times D_{60}}$ between 1 and 3	
SP	Not meeting all gradation requirements for SW	
SM	Atterberg limits below "A" line or PI less than 4	Above "A" line with PI between 4 and 7 are borderline cases requiring use of dual symbols
SC	Atterberg limits above "A" line with PI greater than 7	

Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:

Less than 5 percent………………………..…….	GW, GP, SW, SP
More than 12 percent………………………..…….	GM, GC, SM, SC
5 to 12 percent…………….…..…….	Cases requiring dual symbols

- SP-SM or SW-SM (SAND with Silt or SAND with Silt and Gravel)
- SP-SC or SW-SC (SAND with Clay or SAND with Clay and Gravel)
- GP-GM or GW-GM (GRAVEL with Silt or GRAVEL with Silt and Sand)
- GP-GC or GW-GC (GRAVEL with Clay or GRAVEL with Clay and Sand)

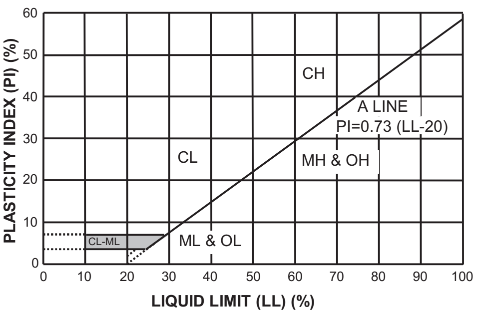
If the fines are CL-ML:

- SC-SM (SILTY CLAYEY SAND or SILTY CLAYEY SAND with Gravel)
- SM-SC (CLAYEY SILTY SAND or CLAYEY SILTY SAND with Gravel)
- GC-GM (SILTY CLAYEY GRAVEL or SILTY CLAYEY GRAVEL with Sand)

PARTICLE SIZES

Boulders		-	Greater than 12 inches
Cobbles		-	3 inches to 12 inches
Gravel-	Coarse	-	3/4 inches to 3 inches
	Fine	-	No. 4 to 3/4 inches
Sand-	Coarse	-	No. 10 to No. 4
	Medium	-	No. 40 to No. 10
	Fine	-	No. 200 to No. 40
Silt and Clay		-	Less than (0.074 mm)

PLASTICITY CHART



VISUAL MANUAL PROCEDURE

When laboratory tests are not performed to confirm the classification of soils exhibiting borderline classifications, the two possible classifications would be separated with a slash, as follows:

For soils where it is difficult to distinguish if it is a coarse or fine-grained soil:

- SC/CL (CLAYEY SAND to Sandy LEAN CLAY)
- SM/ML (SILTY SAND to Sandy SILT)
- GC/CL (CLAYEY GRAVEL to Gravelly LEAN CLAY)
- GM/ML (SILTY GRAVEL to Gravelly SILT)

For soils where it is difficult to distinguish if it is sand or gravel, poorly or well-graded sand or gravel; silt or clay; or plastic or non-plastic silt or clay:

- SP/GP or SW/GW (SAND with Gravel to GRAVEL with Sand)
- SC/GC (CLAYEY SAND with Gravel to CLAYEY GRAVEL with Sand)
- SM/GM (SILTY SAND with Gravel to SILTY GRAVEL with Sand)
- SW/SP (SAND or SAND with Gravel)
- GP/GW (GRAVEL or GRAVEL with Sand)
- SC/SM (CLAYEY to SILTY SAND)
- GM/GC (SILTY to CLAYEY GRAVEL)
- CL/ML (SILTY CLAY)
- ML/CL (CLAYEY SILT)
- CH/MH (FAT CLAY to ELASTIC SILT)
- CL/CH (LEAN to FAT CLAY)
- MH/ML (ELASTIC SILT to SILT)

DRILLING AND SAMPLING ABBREVIATIONS

2ST	–	Shelby Tube – 2" O.D.
3ST	–	Shelby Tube – 3" O.D.
AS	–	Auger Sample
GS	–	Grab Sample
LS	–	Liner Sample
NR	–	No Recovery
PM	–	Pressuremeter
RC	–	Rock Core diamond bit. NX size, except where noted
SB	–	Split Barrel Sample 1-3/8" I.D., 2" O.D., except where noted
VS	–	Vane Shear
WS	–	Wash Sample

OTHER ABBREVIATIONS

WOH	–	Weight of Hammer
WOR	–	Weight of Rods
SP	–	Soil Probe
PID	–	Photo Ionization Device
FID	–	Flame Ionization Device

DEPOSITIONAL FEATURES

Parting	–	as much as 1/16 inch thick
Seam	–	1/16 inch to 1/2 inch thick
Layer	–	1/2 inch to 12 inches thick
Stratum	–	greater than 12 inches thick
Pocket	–	deposit of limited lateral extent
Lens	–	lenticular deposit
Hardpan/Till	–	an unstratified, consolidated or cemented mixture of clay, silt, sand and/or gravel, the size/shape of the constituents vary widely
Lacustrine	–	soil deposited by lake water
Mottled	–	soil irregularly marked with spots of different colors that vary in number and size
Varved	–	alternating partings or seams of silt and/or clay
Occasional	–	one or less per foot of thickness
Frequent	–	more than one per foot of thickness
Interbedded	–	strata of soil or beds of rock lying between or alternating with other strata of a different nature

DESCRIPTION OF RELATIVE QUANTITIES

The visual-manual procedure uses the following terms to describe the relative quantities of notable foreign materials, gravel, sand or fines:

Trace	–	particles are present but estimated to be less than 5%
Few	–	5 to 10%
Little	–	15 to 25%
Some	–	30 to 45%
Mostly	–	50 to 100%

CLASSIFICATION TERMINOLOGY AND CORRELATIONS

Cohesionless Soils

Relative Density	**N_{60} (N-Value) (Blows per foot)**
Very Loose	0 to 4
Loose	5 to 10
Medium Dense	11 to 30
Dense	31 to 50
Very Dense	51 to 80
Extremely Dense	Over 81

Cohesive Soils

Consistency	**N_{60} (N-Value) (Blows per foot)**	**Undrained Shear Strength (kips/ft^2)**
Very Soft	<2	0.25 or less
Soft	2 - 4	> 0.25 to 0.50
Medium	5 - 8	> 0.50 to 1.0
Stiff	9 - 15	> 1.0 to 2.0
Very Stiff	16 - 30	> 2.0 to 4.0
Hard	> 30	> 4.0 or greater

Standard Penetration 'N-Value' = Blows per foot of a 140-pound hammer falling 30 inches on a 2-inch O.D. split barrel sampler, except where noted. N60 values as reported on boring logs represent raw N-values corrected for hammer efficiency only.

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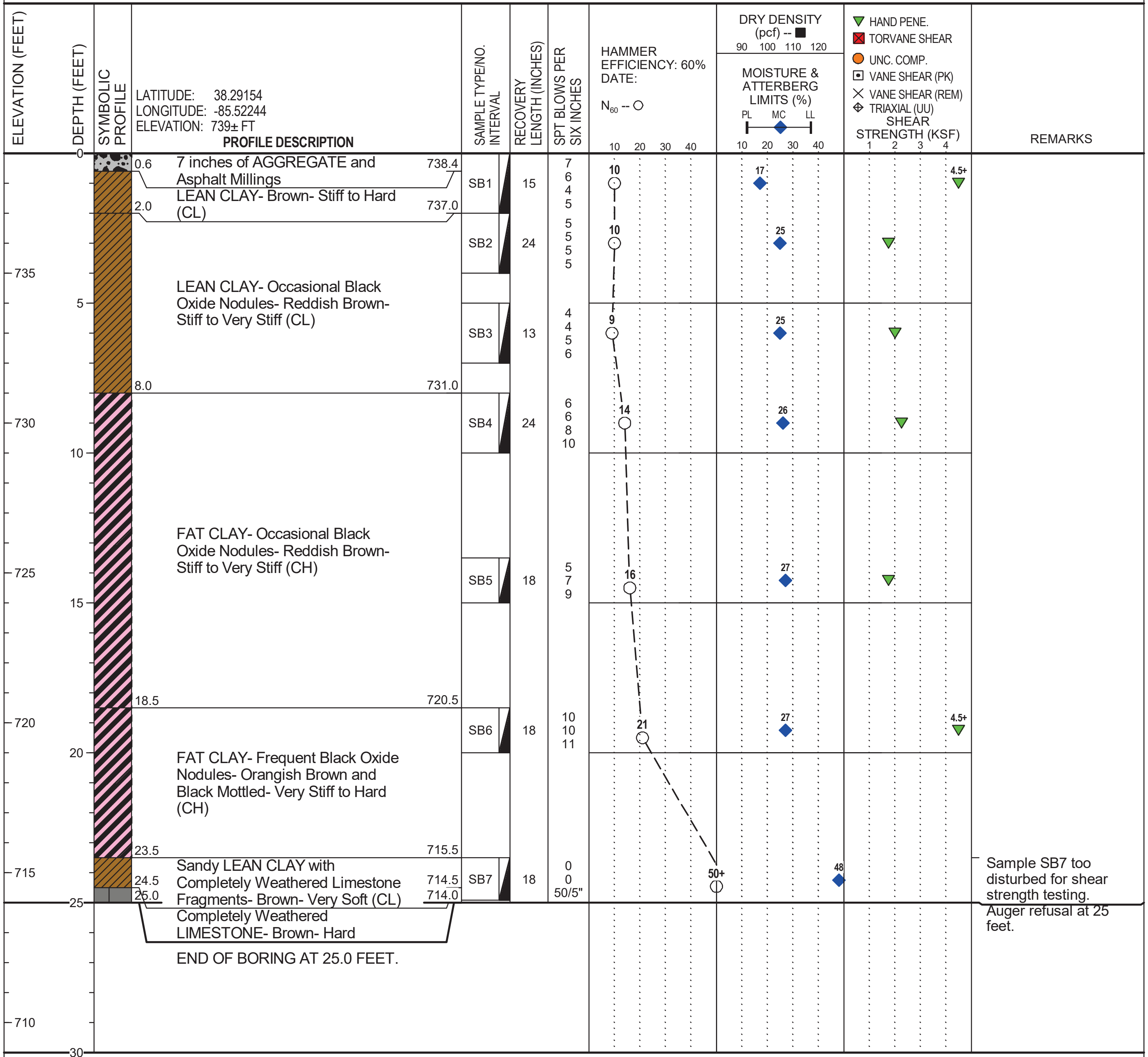
SME

BORING B 1

PAGE 1 OF 1

BORING DEPTH: 25 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 1/13/26
COMPLETED: 1/13/26
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH



LATITUDE: 38.29154
LONGITUDE: -85.52244
ELEVATION: 739± FT

PROFILE DESCRIPTION

Depth (ft)	Description	Elevation (ft)
0.6	7 inches of AGGREGATE and Asphalt Millings	738.4
2.0	LEAN CLAY- Brown- Stiff to Hard (CL)	737.0
8.0	LEAN CLAY- Occasional Black Oxide Nodules- Reddish Brown- Stiff to Very Stiff (CL)	731.0
18.5	FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown- Stiff to Very Stiff (CH)	720.5
23.5	FAT CLAY- Frequent Black Oxide Nodules- Orangish Brown and Black Mottled- Very Stiff to Hard (CH)	715.5
24.5	Sandy LEAN CLAY with Completely Weathered Limestone Fragments- Brown- Very Soft (CL)	714.5
25.0	Completely Weathered LIMESTONE- Brown- Hard	714.0

END OF BORING AT 25.0 FEET.

SAMPLE TYPE/NO.	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	N60	MC	SHEAR STRENGTH (KSF)	REMARKS
SB1	15	7 6 4 5	10	17	4.5+	
SB2	24	5 5 5 5	10	25		
SB3	13	4 4 5 6	9	25		
SB4	24	6 6 8 10	14	26		
SB5	18	5 7 9	16	27		
SB6	18	10 10 11	21	27	4.5+	
SB7	18	0 0 50/5"	50+	48		Sample SB7 too disturbed for shear strength testing. Auger refusal at 25 feet.

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	Not Encountered	
▼ **AT END OF BORING:**	Note 3	
CAVE-IN OF BOREHOLE AT:	5.0	734.0
BACKFILL METHOD:	Auger Cuttings	

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. Groundwater not encountered above cave in depth.

SME

BORING B 2

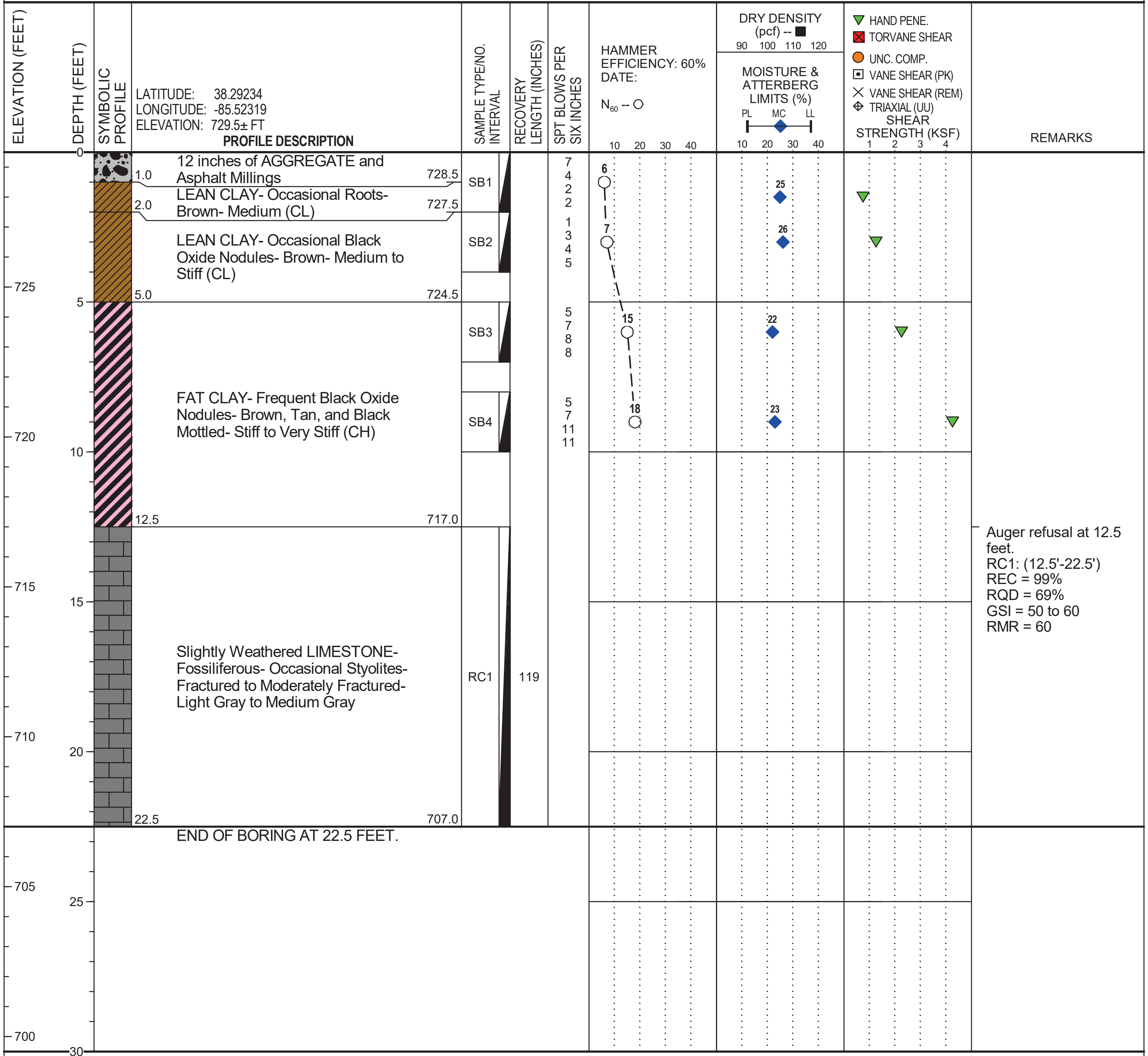
PAGE 1 OF 1

BORING DEPTH: 22.5 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 1/20/26
COMPLETED: 1/20/26
BORING METHOD: Hollow Stem Augers/NQ2 Core
DRILLER: RM (Mathes Drilling)
RIG NO.: B-53 (ATV)
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.29234
LONGITUDE: -85.52319
ELEVATION: 729.5± FT

HAMMER EFFICIENCY: 60%
DATE:



Depth (ft)	Elevation (ft)	Profile Description
0–1.0	728.5	12 inches of AGGREGATE and Asphalt Millings
1.0–2.0	727.5	LEAN CLAY- Occasional Roots- Brown- Medium (CL)
2.0–5.0	724.5	LEAN CLAY- Occasional Black Oxide Nodules- Brown- Medium to Stiff (CL)
5.0–12.5	717.0	FAT CLAY- Frequent Black Oxide Nodules- Brown, Tan, and Black Mottled- Stiff to Very Stiff (CH)
12.5–22.5	707.0	Slightly Weathered LIMESTONE- Fossiliferous- Occasional Stylolites- Fractured to Moderately Fractured- Light Gray to Medium Gray

END OF BORING AT 22.5 FEET.

Sample Type/No.	Recovery Length (inches)	SPT Blows per Six Inches	N60	MC (%)
SB1		7 4 2 2	6	25
SB2		1 3 4 5	7	26
SB3		5 7 8 8	15	22
SB4		5 7 11 11	18	23
RC1	119			

REMARKS:
Auger refusal at 12.5 feet.
RC1: (12.5'-22.5')
REC = 99%
RQD = 69%
GSI = 50 to 60
RMR = 60

GROUNDWATER & BACKFILL INFORMATION

GROUNDWATER WAS NOT ENCOUNTERED

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

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BORING B 3

PAGE 1 OF 1

BORING DEPTH: 7.9 FEET

PROJECT NAME: Greenfield Site Development

PROJECT NUMBER: 102074.00

CLIENT: Luckett & Farley

PROJECT LOCATION: Louisville, Kentucky

DATE STARTED: 1/16/26

COMPLETED: 1/16/26

BORING METHOD: Hollow Stem Augers

DRILLER: CD (Black Sheep)

RIG NO.: Geoprobe 7822DT ATV

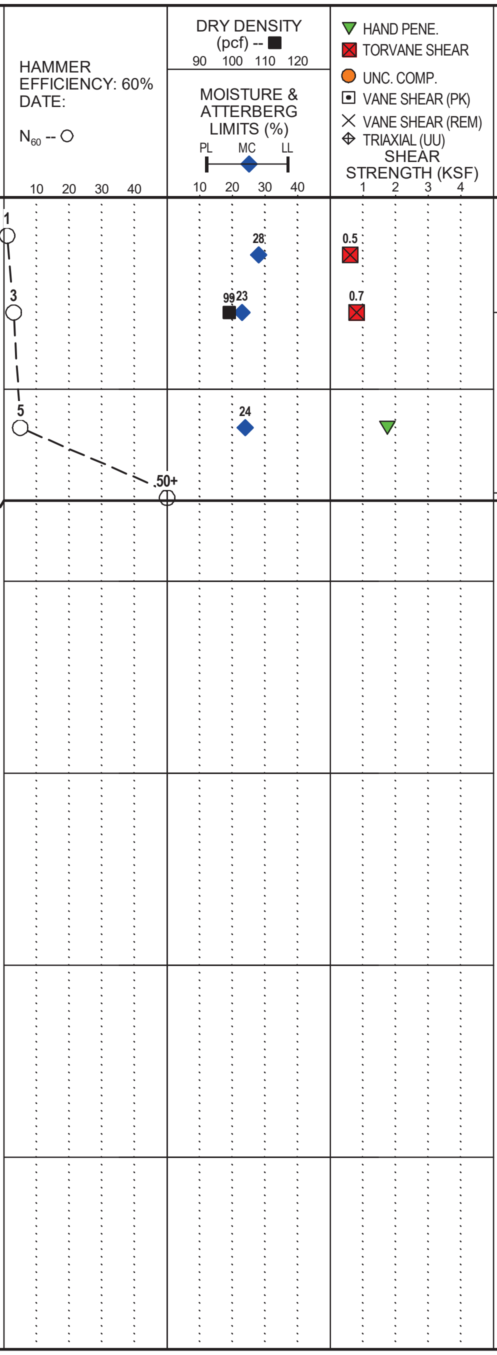
LOGGED BY: A. Dodson

CHECKED BY: WH

LATITUDE: 38.29319
LONGITUDE: -85.52126
ELEVATION: 721± FT

ELEVATION (FEET)	DEPTH (FEET)	SYMBOLIC PROFILE	PROFILE DESCRIPTION		SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	REMARKS
	0.3		4 inches of TOPSOIL	720.7				
720	2.0		LEAN CLAY- Occasional Roots- Brown and Gray Mottled- Very Soft to Medium (CL)	719.0	SB1	24	0 0 1 1	
	5.0		LEAN CLAY- Trace Organics- Brown and Gray Mottled- Soft to Medium (CL)	716.0	SB2	24	1 1 2 3	Loss-on-ignition (LOI) test performed on sample SB2 indicates an organics content of about 4.0 percent.
715	7.6		LEAN to FAT CLAY- Trace Limestone Fragments- Brown and Gray Mottled- Medium to Stiff (CL/CH)	713.4	SB3	24	2 2 3 3	
	7.9		Completely Weathered LIMESTONE- Gray- Hard	713.1	SB4	3	50/3"	Sample SB4 was too disturbed to perform a shear strength test.
			END OF BORING AT 7.9 FEET.					Sampler refusal at 7.9 feet.

ELEVATION (FEET): 720, 715, 710, 705, 700, 695
DEPTH (FEET): 0, 5, 10, 15, 20, 25, 30



GROUNDWATER & BACKFILL INFORMATION	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	Not Encountered	
▼ **AT END OF BORING:**	Note 3	
CAVE-IN OF BOREHOLE AT:	4.0	717.0
BACKFILL METHOD:	Auger Cuttings	

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. Groundwater not encountered above cave in depth.

RECEIVED May 22, 2026 Planning and Design 26-ZONE-0056

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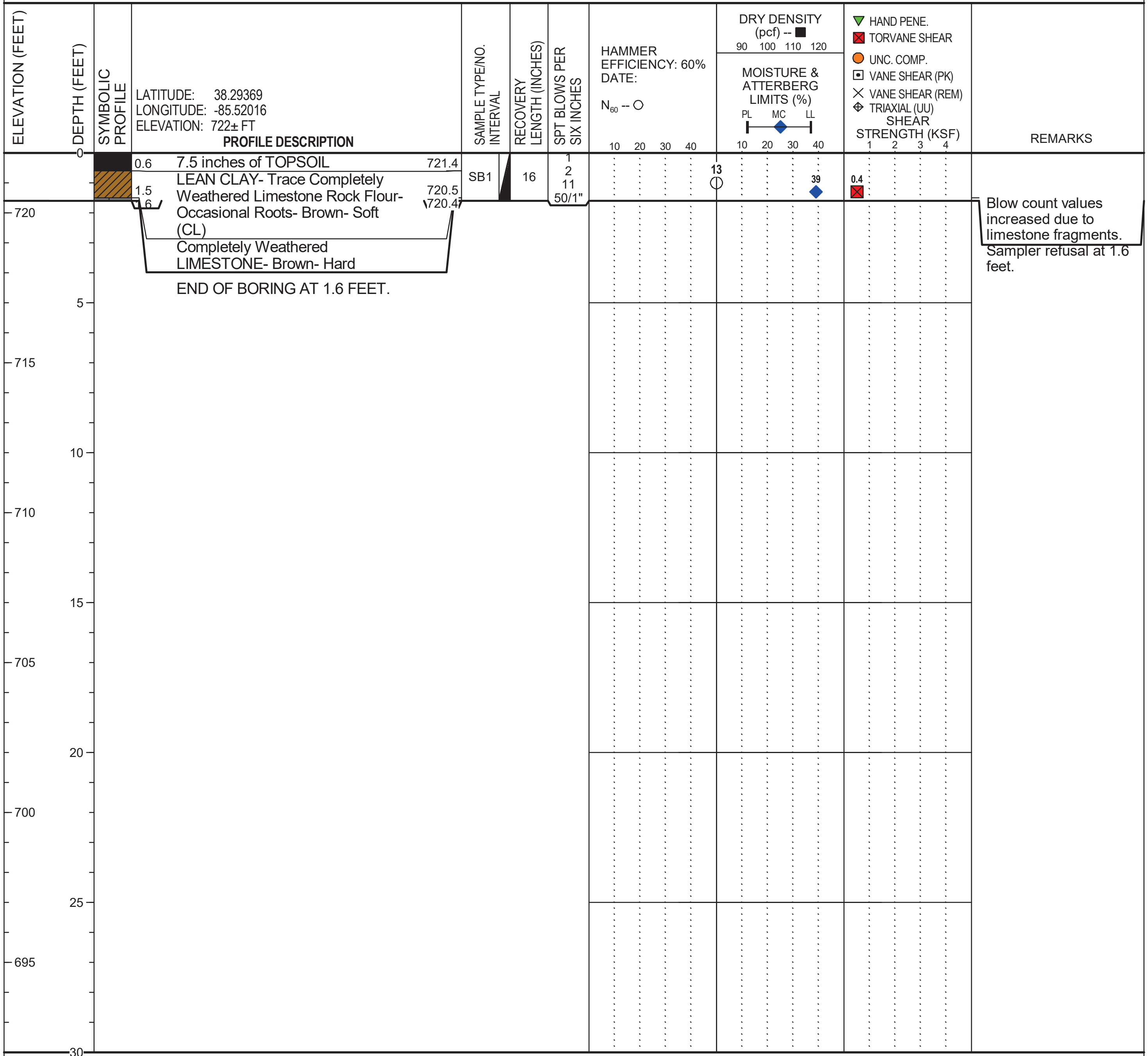
BORING B 4

PAGE 1 OF 1

BORING DEPTH: 1.6 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky

DATE STARTED: 12/22/25
COMPLETED: 12/22/25
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH



LATITUDE: 38.29369
LONGITUDE: -85.52016
ELEVATION: 722± FT

Depth	PROFILE DESCRIPTION	Elev.	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	REMARKS
0.6	7.5 inches of TOPSOIL	721.4	SB1	16	1 2 11 50/1"	Blow count values increased due to limestone fragments. Sampler refusal at 1.6 feet.
1.5	LEAN CLAY- Trace Completely Weathered Limestone Rock Flour- Occasional Roots- Brown- Soft (CL)	720.5				
1.6	Completely Weathered LIMESTONE- Brown- Hard	720.4				

END OF BORING AT 1.6 FEET.

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
∇ **DURING BORING:**	Not Encountered	
▼ **AT END OF BORING:**	Note 3	
CAVE-IN OF BOREHOLE AT:	1.6	720.4

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. Groundwater was not encountered above the borehole cave in depth.

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BORING B 5

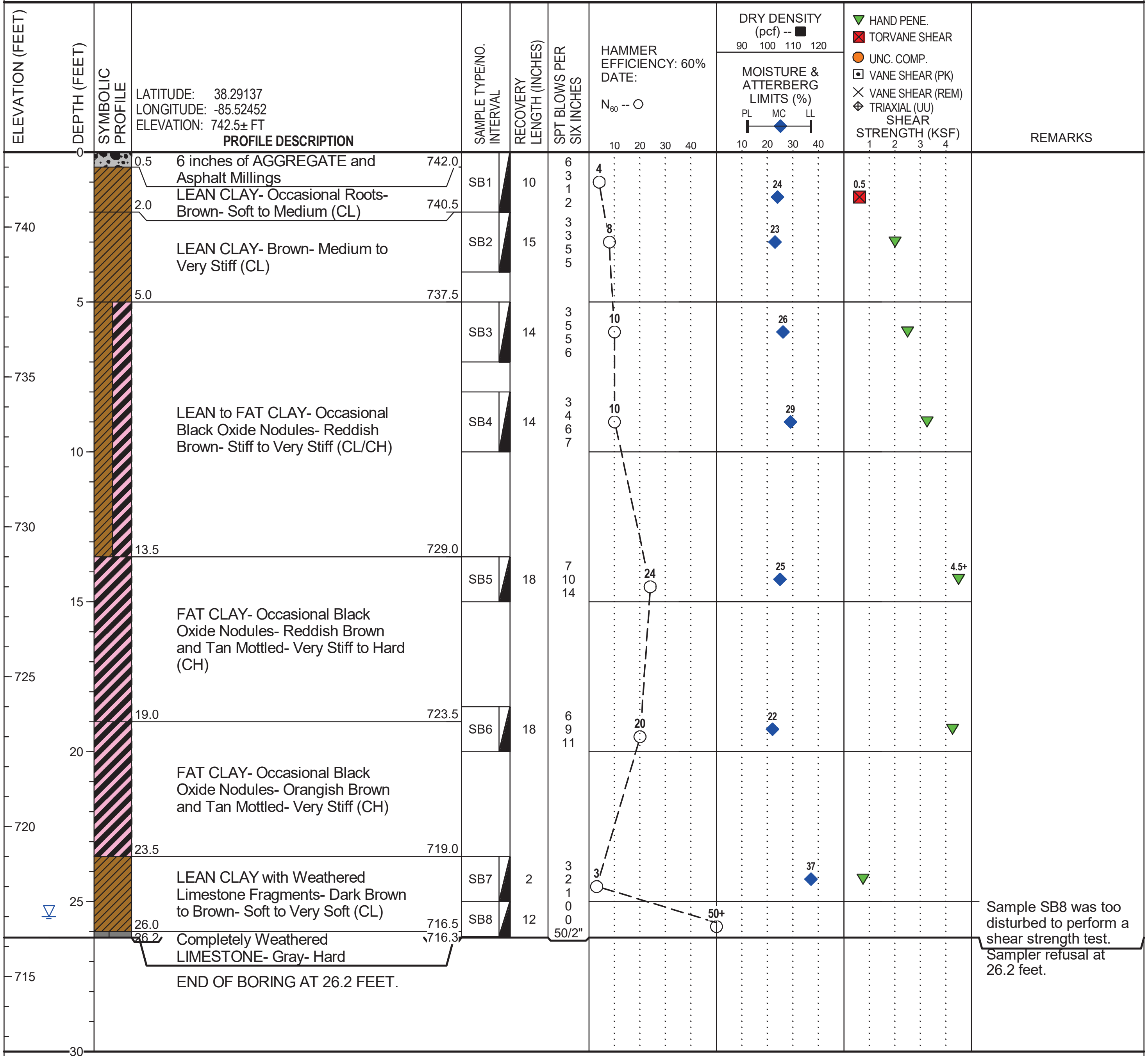
PAGE 1 OF 1

BORING DEPTH: 26.2 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky

DATE STARTED: 1/18/26
COMPLETED: 1/18/26
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.29137
LONGITUDE: -85.52452
ELEVATION: 742.5± FT



Depth (ft)	Profile Description	Elev. (ft)
0.5	6 inches of AGGREGATE and Asphalt Millings	742.0
2.0	LEAN CLAY- Occasional Roots- Brown- Soft to Medium (CL)	740.5
5.0	LEAN CLAY- Brown- Medium to Very Stiff (CL)	737.5
13.5	LEAN to FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown- Stiff to Very Stiff (CL/CH)	729.0
19.0	FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown and Tan Mottled- Very Stiff to Hard (CH)	723.5
23.5	FAT CLAY- Occasional Black Oxide Nodules- Orangish Brown and Tan Mottled- Very Stiff (CH)	719.0
26.0	LEAN CLAY with Weathered Limestone Fragments- Dark Brown to Brown- Soft to Very Soft (CL)	716.5
26.2	Completely Weathered LIMESTONE- Gray- Hard	716.3

END OF BORING AT 26.2 FEET.

Sample Type/No.	Recovery Length (Inches)	SPT Blows per Six Inches	N60	MC (%)	Remarks
SB1	10	6 3 1 2	4	24	
SB2	15	3 3 5 5	8	23	
SB3	14	3 5 5 6	10	26	
SB4	14	3 4 6 7	10	29	
SB5	18	7 10 14	24	25	
SB6	18	6 9 11	20	22	
SB7	2	3 2 1 0	3	37	
SB8	12	0 50/2"	50+		Sample SB8 was too disturbed to perform a shear strength test. Sampler refusal at 26.2 feet.

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ DURING BORING:	25.5	717.0
▼ AT END OF BORING:	Note 3	
CAVE-IN OF BOREHOLE AT:	4.0	738.5

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. Groundwater not encountered above cave in depth.

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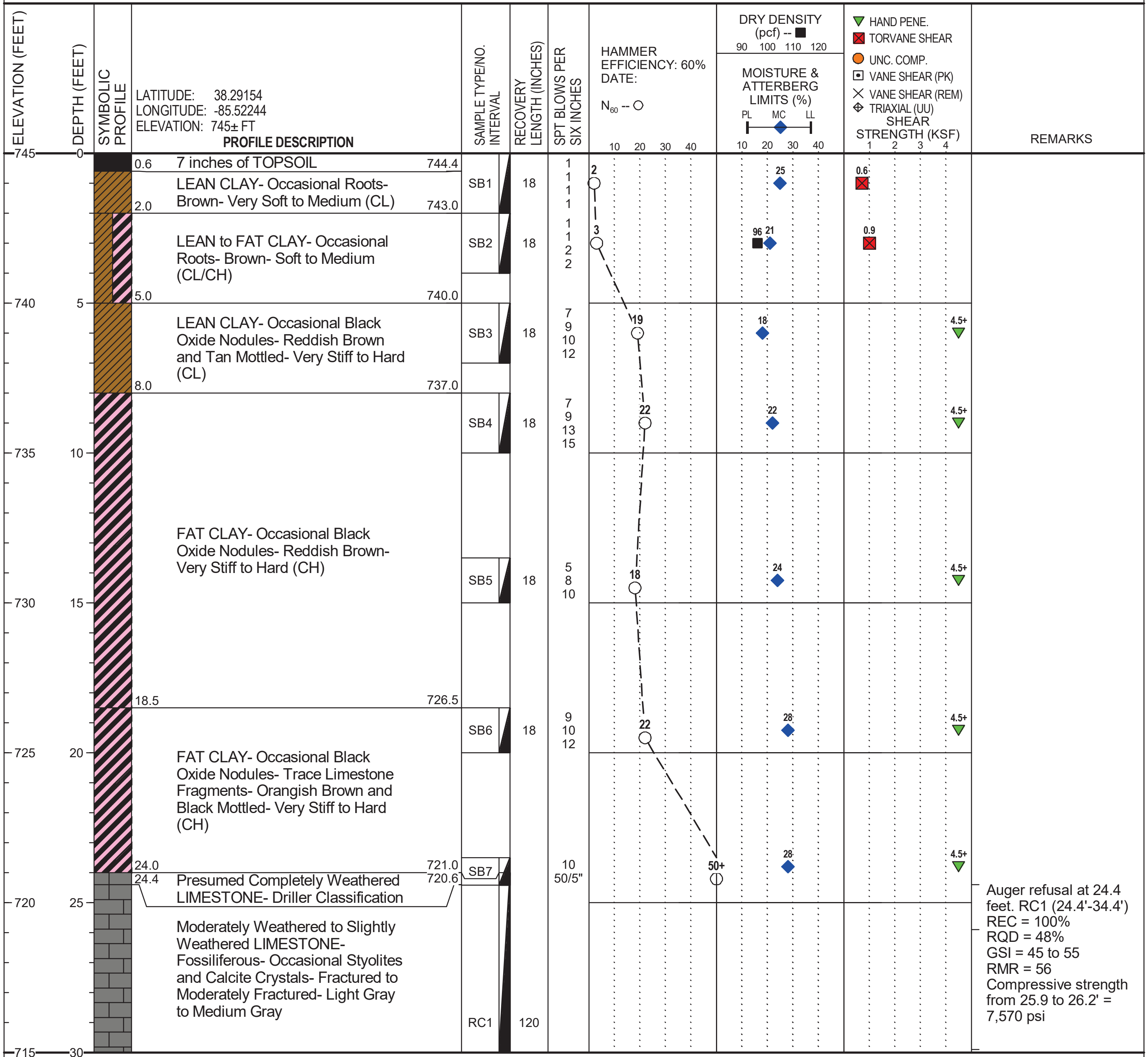
BORING B 6

PAGE 1 OF 2

BORING DEPTH: 34.4 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 1/13/26
COMPLETED: 1/13/26
BORING METHOD: Hollow Stem Augers/NQ2 Core
DRILLER: RM (Mathes Drilling)
RIG NO.: B-53 (ATV)
LOGGED BY: A. Dodson
CHECKED BY: WH



LATITUDE: 38.29154
LONGITUDE: -85.52244
ELEVATION: 745± FT

DEPTH (FEET)	PROFILE DESCRIPTION	ELEVATION (FEET)	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	N60	DRY DENSITY (pcf)	MOISTURE (%)	SHEAR STRENGTH (KSF)	REMARKS
0.6	7 inches of TOPSOIL	744.4								
2.0	LEAN CLAY- Occasional Roots- Brown- Very Soft to Medium (CL)	743.0	SB1	18	1 1 1 1	2		25	0.6	
5.0	LEAN to FAT CLAY- Occasional Roots- Brown- Soft to Medium (CL/CH)	740.0	SB2	18	1 1 2 2	3	96	21	0.9	
8.0	LEAN CLAY- Occasional Black Oxide Nodules- Reddish Brown and Tan Mottled- Very Stiff to Hard (CL)	737.0	SB3	18	7 9 10 12	19		18	4.5+	
18.5	FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown- Very Stiff to Hard (CH)	726.5	SB4	18	7 9 13 15	22		22	4.5+	
			SB5	18	5 8 10	18		24	4.5+	
24.0	FAT CLAY- Occasional Black Oxide Nodules- Trace Limestone Fragments- Orangish Brown and Black Mottled- Very Stiff to Hard (CH)	721.0	SB6	18	9 10 12	22		28	4.5+	
			SB7		10 50/5"	50+		28	4.5+	
24.4	Presumed Completely Weathered LIMESTONE- Driller Classification	720.6								
	Moderately Weathered to Slightly Weathered LIMESTONE- Fossiliferous- Occasional Stylolites and Calcite Crystals- Fractured to Moderately Fractured- Light Gray to Medium Gray		RC1	120						Auger refusal at 24.4 feet. RC1 (24.4'-34.4') REC = 100% RQD = 48% GSI = 45 to 55 RMR = 56 Compressive strength from 25.9 to 26.2' = 7,570 psi

GROUNDWATER & BACKFILL INFORMATION

GROUNDWATER WAS NOT ENCOUNTERED

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

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BORING B 6

PAGE 2 OF 2

BORING DEPTH: 34.4 FEET

PROJECT NAME: Greenfield Site Development

PROJECT NUMBER: 102074.00

CLIENT: Luckett & Farley

PROJECT LOCATION: Louisville, Kentucky

LATITUDE: 38.29154
LONGITUDE: -85.52244
ELEVATION: 745± FT

HAMMER EFFICIENCY: 60%
DATE:
N_{60} -- ○

DRY DENSITY (pcf) -- ■ (90, 100, 110, 120)

MOISTURE & ATTERBERG LIMITS (%) PL MC LL (10, 20, 30, 40)

▼ HAND PENE.
☒ TORVANE SHEAR
● UNC. COMP.
⊡ VANE SHEAR (PK)
× VANE SHEAR (REM)
⊕ TRIAXIAL (UU)
SHEAR STRENGTH (KSF) (1, 2, 3, 4)

ELEVATION (FEET)	DEPTH (FEET)	SYMBOLIC PROFILE	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	N_{60} (10, 20, 30, 40)	DRY DENSITY / MOISTURE & ATTERBERG LIMITS	SHEAR STRENGTH (KSF)	REMARKS
715	30	▨	Moderately Weathered to Slightly Weathered LIMESTONE- Fossiliferous- Occasional Stylolites and Calcite Crystals- Fractured to Moderately Fractured- Light Gray to Medium Gray *(continued)* 34.4 710.6							Compressive strength from 29.9 to 30.2' = 7,570 psi
			END OF BORING AT 34.4 FEET.							
710	35									
705	40									
700	45									
695	50									
690	55									
685	60									
680	65									
675	70									

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BORING B 7

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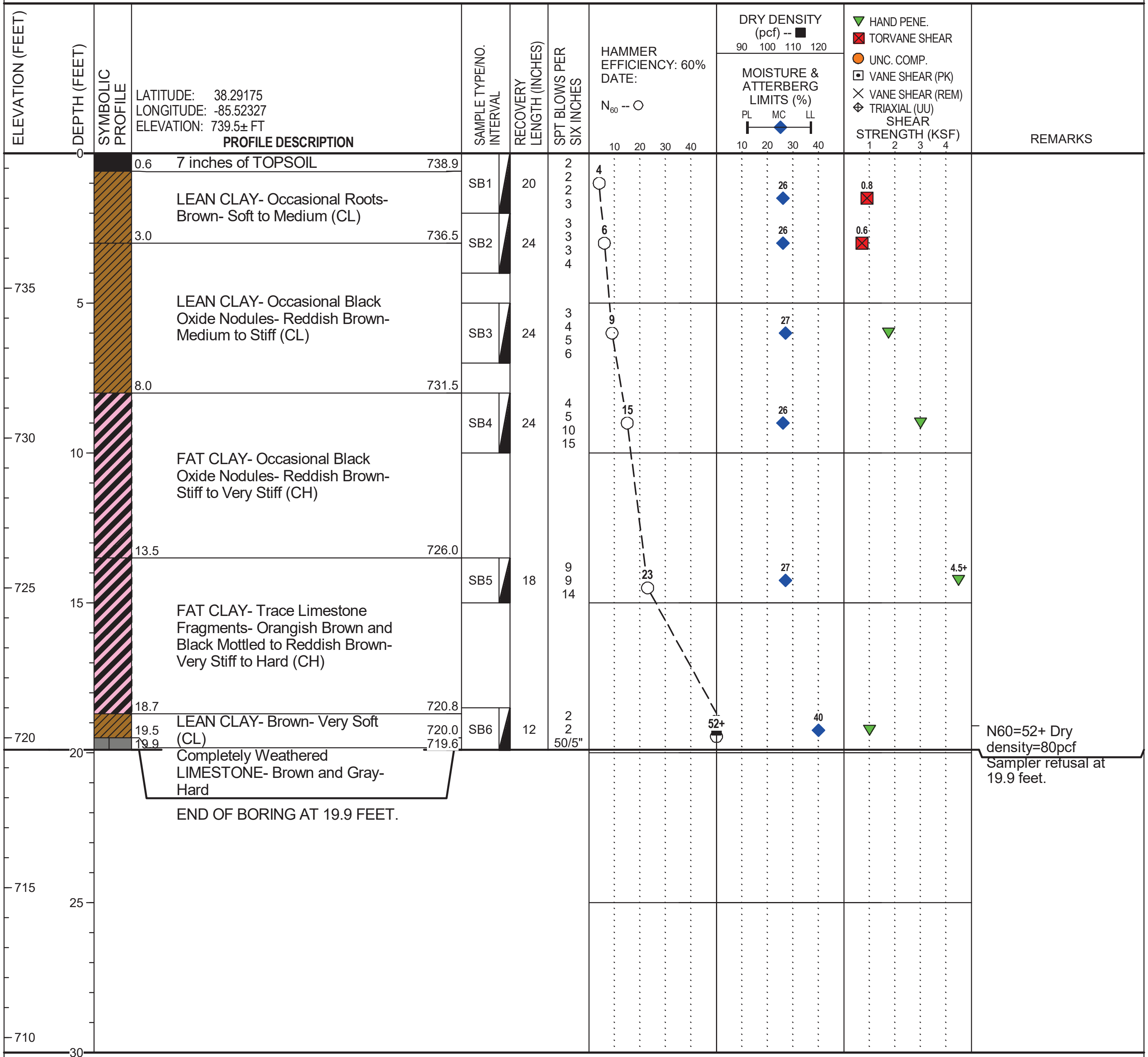
BORING DEPTH: 19.9 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky

DATE STARTED: 1/17/26
COMPLETED: 1/17/26
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH



Depth (ft)	Profile Description	Elevation
0.6	7 inches of TOPSOIL	738.9
3.0	LEAN CLAY- Occasional Roots- Brown- Soft to Medium (CL)	736.5
8.0	LEAN CLAY- Occasional Black Oxide Nodules- Reddish Brown- Medium to Stiff (CL)	731.5
13.5	FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown- Stiff to Very Stiff (CH)	726.0
18.7	FAT CLAY- Trace Limestone Fragments- Orangish Brown and Black Mottled to Reddish Brown- Very Stiff to Hard (CH)	720.8
19.5	LEAN CLAY- Brown- Very Soft (CL)	720.0
19.9	Completely Weathered LIMESTONE- Brown and Gray- Hard	719.6

END OF BORING AT 19.9 FEET.

SB1	20	2 2 2 3	
SB2	24	3 3 3 4	
SB3	24	3 4 5 6	
SB4	24	4 5 10 15	
SB5	18	9 9 14	
SB6	12	2 2 50/5"	N60=52+ Dry density=80pcf Sampler refusal at 19.9 feet.

GROUNDWATER & BACKFILL INFORMATION

DEPTH (FT) ELEV (FT)

▽ **DURING BORING:** Not Encountered

▼ **AT END OF BORING:** Note 3

CAVE-IN OF BOREHOLE AT: 4.0 735.5

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. Groundwater not encountered above cave in depth.

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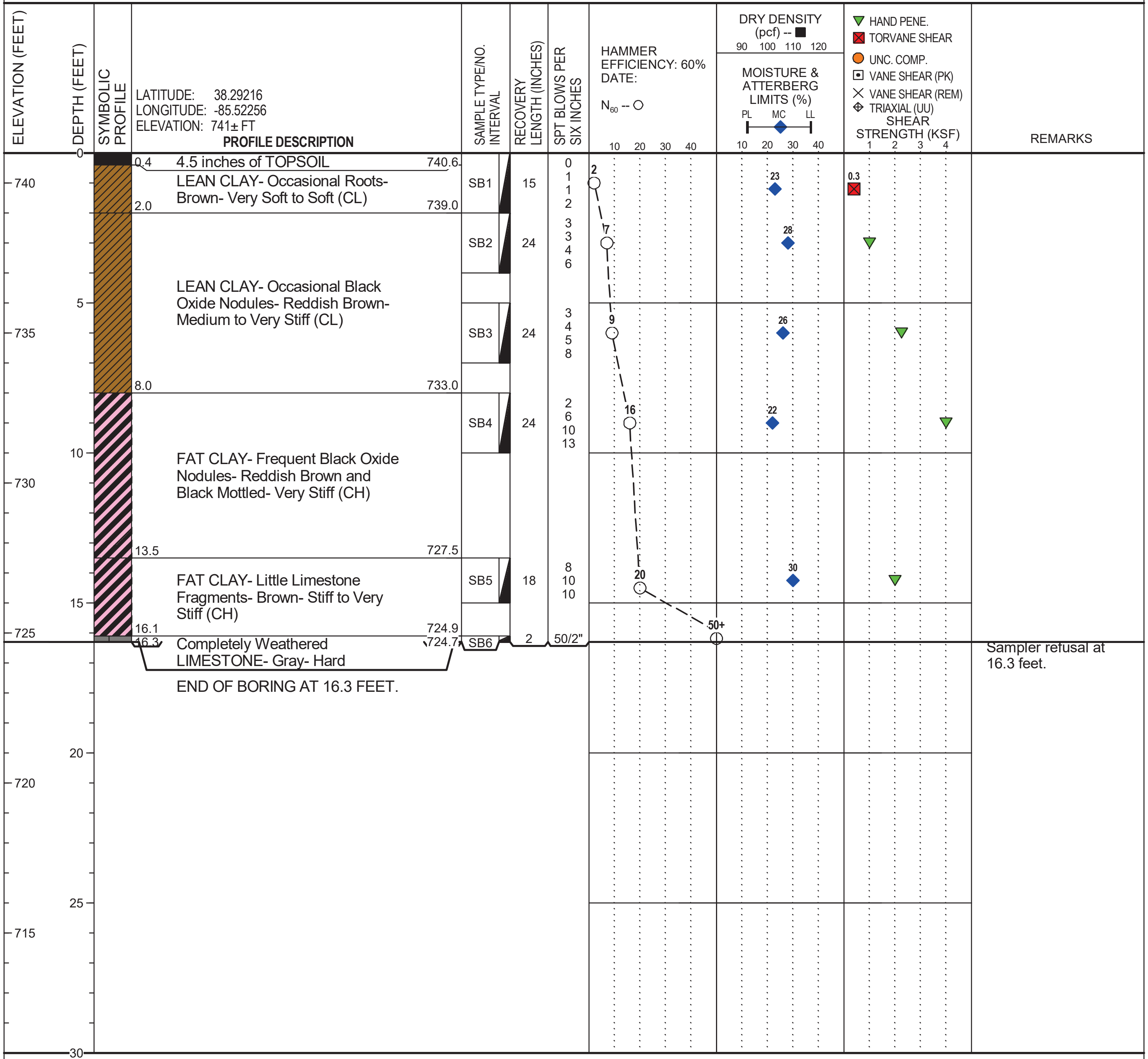
BORING B 8

PAGE 1 OF 1

BORING DEPTH: 16.3 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 12/27/25
COMPLETED: 12/27/25
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH



LATITUDE: 38.29216
LONGITUDE: -85.52256
ELEVATION: 741± FT

DEPTH (FEET)	PROFILE DESCRIPTION	ELEVATION (FEET)
0.4	4.5 inches of TOPSOIL	740.6
2.0	LEAN CLAY- Occasional Roots- Brown- Very Soft to Soft (CL)	739.0
8.0	LEAN CLAY- Occasional Black Oxide Nodules- Reddish Brown- Medium to Very Stiff (CL)	733.0
13.5	FAT CLAY- Frequent Black Oxide Nodules- Reddish Brown and Black Mottled- Very Stiff (CH)	727.5
16.1	FAT CLAY- Little Limestone Fragments- Brown- Stiff to Very Stiff (CH)	724.9
16.3	Completely Weathered LIMESTONE- Gray- Hard	724.7

END OF BORING AT 16.3 FEET.

SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	N60	MC
SB1	15	0 1 1 2	2	23
SB2	24	3 3 4 6	7	28
SB3	24	3 4 5 8	9	26
SB4	24	2 6 10 13	16	22
SB5	18	8 10 10	20	30
SB6	2	50/2"	50+	

REMARKS: Sampler refusal at 16.3 feet.

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	Not Encountered	
▼ **AT END OF BORING:**	Note 3	
CAVE-IN OF BOREHOLE AT:	2.0	739.0
BACKFILL METHOD:	Auger Cuttings	

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. Groundwater was not encountered above the borehole cave in depth.

BORING B 8A

PAGE 1 OF 1

BORING DEPTH: 15.5 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky

DATE STARTED: 1/23/26
COMPLETED: 1/23/26
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.29216
LONGITUDE: -85.52256
ELEVATION: 741± FT

HAMMER EFFICIENCY: 60%
DATE:
N_{60} -- ○ (10, 20, 30, 40)

DRY DENSITY (pcf) -- ■ (90, 100, 110, 120)

MOISTURE & ATTERBERG LIMITS (%) PL MC LL (10, 20, 30, 40)

▽ HAND PENE.
☒ TORVANE SHEAR
● UNC. COMP.
⊡ VANE SHEAR (PK)
× VANE SHEAR (REM)
⊕ TRIAXIAL (UU)
SHEAR STRENGTH (KSF) (1, 2, 3, 4)

ELEVATION (FEET)	DEPTH (FEET)	SYMBOLIC PROFILE	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	REMARKS
	0					
740						Boring B8A offset approximately 5 feet from boring B8.
	5					
735						
	10					
730						
				3ST1	25	Shelby tube obtained from 13-15 feet.
	15					
725						
	20					
720						
	25					
715						
	30					

GROUNDWATER & BACKFILL INFORMATION

GROUNDWATER WAS NOT ENCOUNTERED

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

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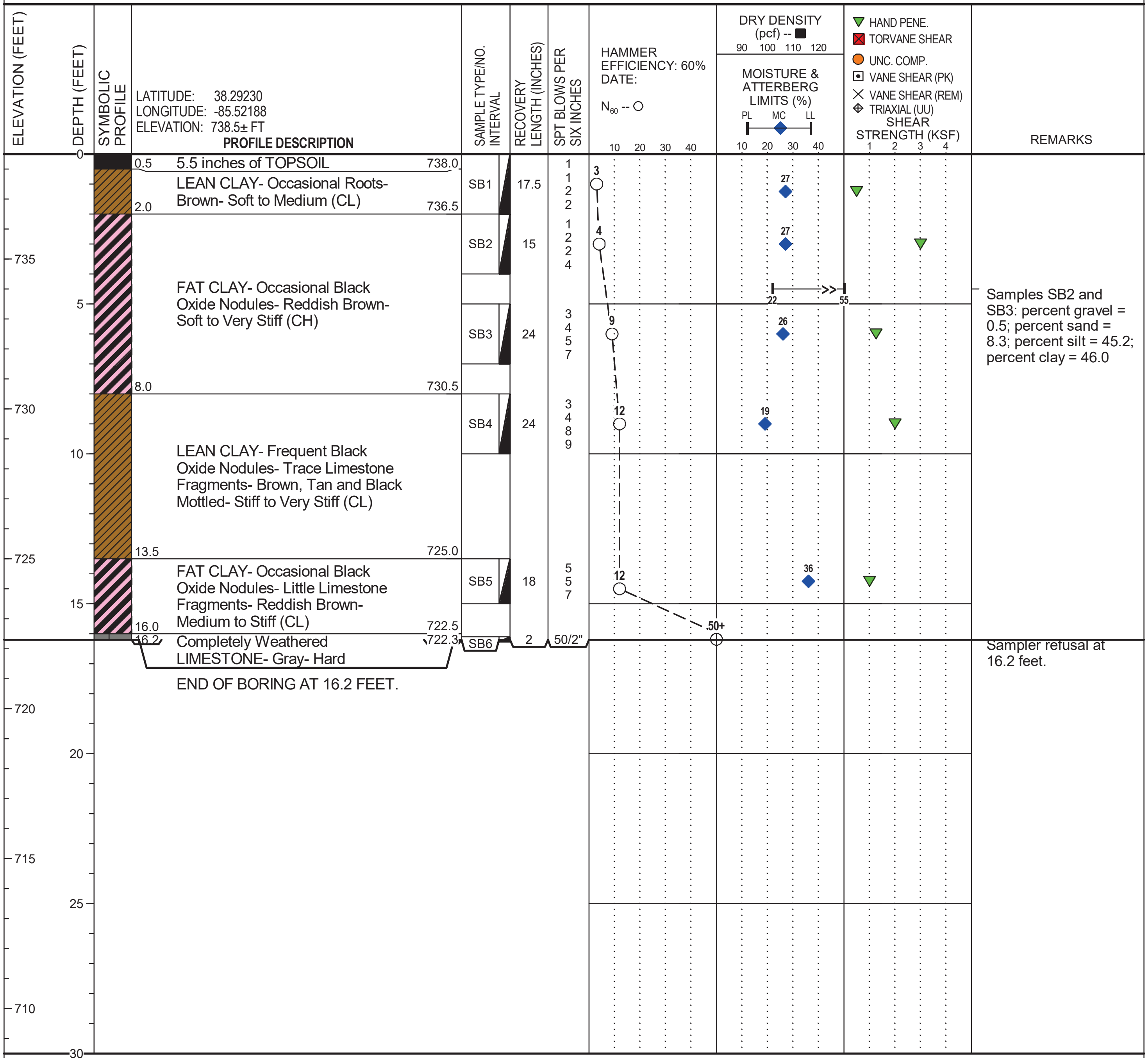
BORING B 9

PAGE 1 OF 1

BORING DEPTH: 16.2 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 12/27/25
COMPLETED: 12/27/25
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH



Depth (ft)	Elev. (ft)	Profile Description
0.5	738.0	5.5 inches of TOPSOIL
2.0	736.5	LEAN CLAY- Occasional Roots- Brown- Soft to Medium (CL)
8.0	730.5	FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown- Soft to Very Stiff (CH)
13.5	725.0	LEAN CLAY- Frequent Black Oxide Nodules- Trace Limestone Fragments- Brown, Tan and Black Mottled- Stiff to Very Stiff (CL)
16.0	722.5	FAT CLAY- Occasional Black Oxide Nodules- Little Limestone Fragments- Reddish Brown- Medium to Stiff (CL)
16.2	722.3	Completely Weathered LIMESTONE- Gray- Hard

END OF BORING AT 16.2 FEET.

Sample Type/No.	Recovery Length (Inches)	SPT Blows per Six Inches	N60	MC (%)
SB1	17.5	1 1 2 2	3	27
SB2	15	1 2 2 4	4	27
SB3	24	3 4 5 7	9	26
SB4	24	3 4 8 9	12	19
SB5	18	5 5 7	12	36
SB6	2	50/2"	50+	

REMARKS

Samples SB2 and SB3: percent gravel = 0.5; percent sand = 8.3; percent silt = 45.2; percent clay = 46.0

Sampler refusal at 16.2 feet.

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	Not Encountered	
▼ **AT END OF BORING:**	Note 3	
CAVE-IN OF BOREHOLE AT:	3.0	735.5
BACKFILL METHOD:	Auger Cuttings	

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. Groundwater was not encountered above the borehole cave in depth.

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BORING B10

PAGE 1 OF 1

BORING DEPTH: 24 FEET

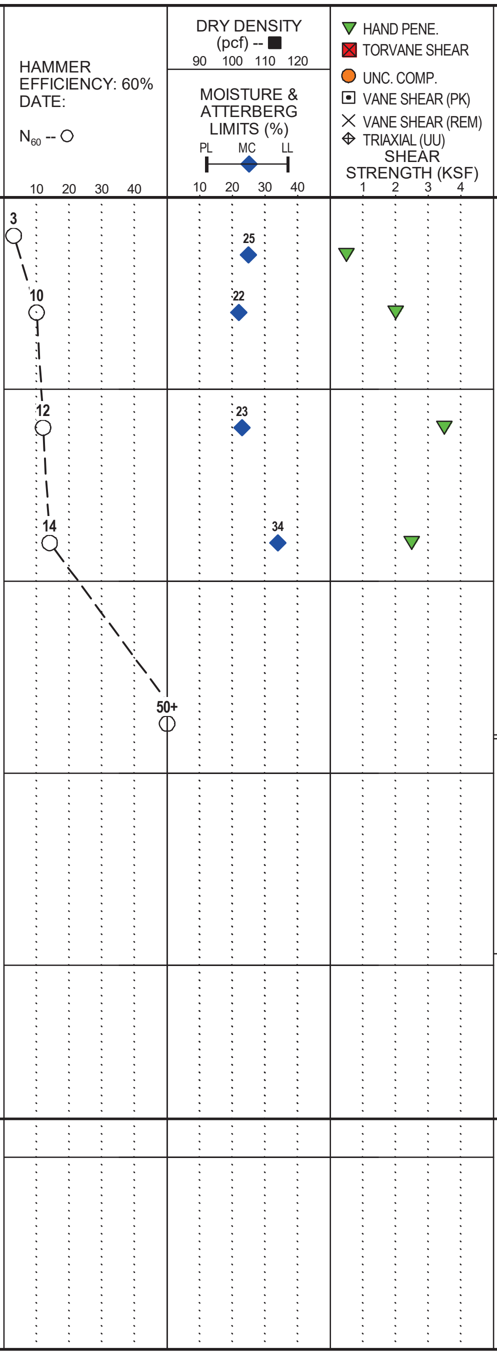
PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 1/17/26
COMPLETED: 1/17/26
BORING METHOD: Hollow Stem Augers/NQ2 Core
DRILLER: RM (Mathes Drilling)
RIG NO.: B-53 (ATV)
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.29266
LONGITUDE: -85.52097
ELEVATION: 733± FT

DEPTH (FEET)	PROFILE DESCRIPTION	ELEVATION (FEET)
0.7	8 inches of TOPSOIL	732.3
2.0	LEAN CLAY- Occasional Roots- Brown- Soft to Medium (CL)	731.0
5.0	LEAN CLAY- Frequent Black Oxide Nodules- Brown and Black Mottled- Stiff to Very Stiff (CL)	728.0
8.0	FAT CLAY- Frequent Black Oxide Nodules- Brown and Black Mottled- Stiff to Very Stiff (CH)	725.0
13.5	FAT CLAY- Occasional Black Oxide Nodules- Trace Limestone Fragments- Brown- Stiff to Very Stiff (CH)	719.5
14.0	Completely Weathered LIMESTONE- Brown and Gray- Hard	719.0
19.7	Highly to Moderately Weathered LIMESTONE- Pitted- Occasional Stylolites and Vertical Fractures- Highly Fractured to Fractured- Light Gray	713.3
24.0	Slightly Weathered LIMESTONE- Pitted- Occasional Stylolites- Moderately Fractured to Slightly Fractured- Medium Gray	709.0

END OF BORING AT 24.0 FEET.

SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES
SB1		1 1 2 3
SB2		3 4 6 8
SB3		5 6 6 9
SB4		4 6 8 7
SB5		50/5"
RC1	116	



REMARKS

Auger refusal at 14 feet. RC1 (14'-24')
REC = 97%
From 14 to 19.7 feet
RQD = 15%
GSI = 35 to 45
RMR = 47

From 19.7 to 24 feet
RQD = 83%
GSI = 50 to 60
RMR = 64

GROUNDWATER & BACKFILL INFORMATION

GROUNDWATER WAS NOT ENCOUNTERED

BACKFILL METHOD: Auger Cuttings

NOTES: 1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

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BORING B11

PAGE 1 OF 1

BORING DEPTH: 8.6 FEET

PROJECT NAME: Greenfield Site Development

PROJECT NUMBER: 102074.00

CLIENT: Luckett & Farley

PROJECT LOCATION: Louisville, Kentucky

DATE STARTED: 12/22/25

COMPLETED: 12/22/25

BORING METHOD: Hollow Stem Augers

DRILLER: CD (Black Sheep)

RIG NO.: Geoprobe 7822DT ATV

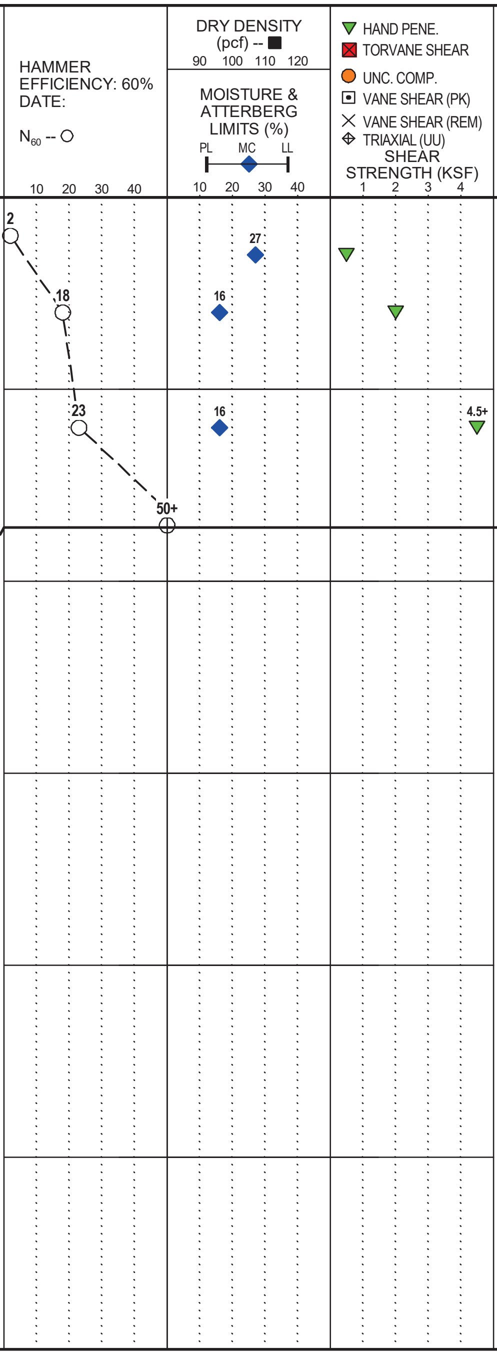
LOGGED BY: A. Dodson

CHECKED BY: WH

LATITUDE: 38.29290
LONGITUDE: -85.52052
ELEVATION: 730± FT

ELEVATION (FEET)	DEPTH (FEET)	PROFILE DESCRIPTION		SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	N60	MOISTURE (%)	SHEAR STRENGTH (KSF)	REMARKS
730	0									
729.0	1.0	11.5 inches of TOPSOIL		SB1	22	2 1 1 3	2	27		
728.0	2.0	LEAN CLAY- Occasional Roots- Brown- Soft to Medium (CL)								
725.0	5.0	LEAN CLAY- Occasional Black Oxide Nodules- Brown- Stiff to Very Stiff (CL)		SB2	21	2 8 10 14	18	16		
722.0	8.0	LEAN CLAY- Frequent Black Oxide Nodules- Little Limestone Fragments- Brown, Gray and Black Mottled- Very Stiff to Hard (CL)		SB3	14	6 11 12 10	23	16	4.5+	
721.4	8.6	Completely Weathered LIMESTONE- Brown and Gray- Hard		SB4	1	50/1"	50+			Sampler refusal at 8.6 feet.

END OF BORING AT 8.6 FEET.



Elevation scale: 730, 725, 720, 715, 710, 705, 700; depth scale: 0, 5, 10, 15, 20, 25, 30.

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ DURING BORING:	8.5	721.5
▼ AT END OF BORING:	Note 3	
CAVE-IN OF BOREHOLE AT:	4.0	726.0
BACKFILL METHOD:	Auger Cuttings	

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. Groundwater was not encountered above the borehole cave in depth.

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BORING B12

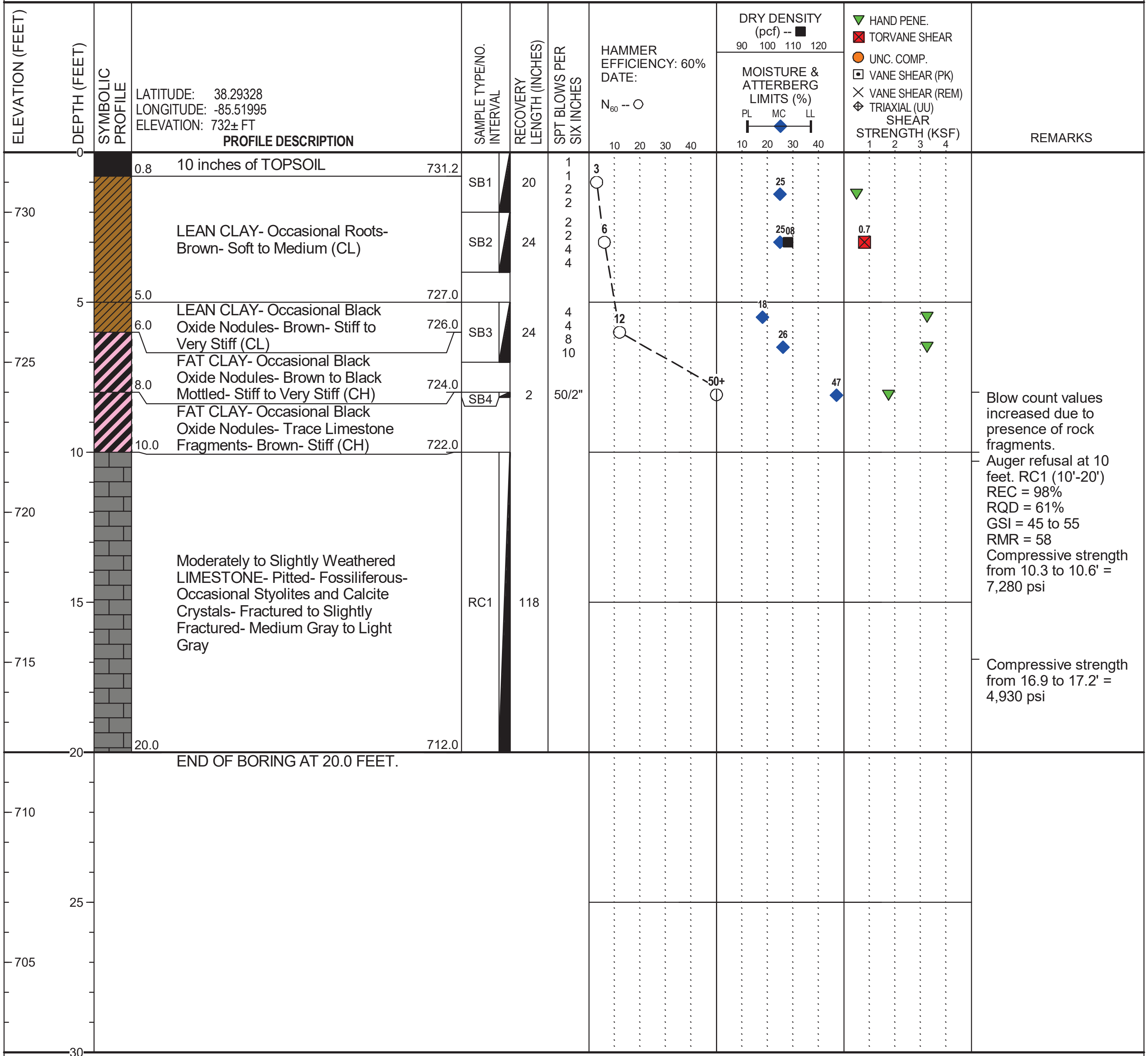
PAGE 1 OF 1

BORING DEPTH: 20 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 12/29/25
COMPLETED: 12/29/25
BORING METHOD: Hollow Stem Augers/NQ2 Core
DRILLER: RM (Mathes Drilling)
RIG NO.: B-53 (ATV)
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.29328
LONGITUDE: -85.51995
ELEVATION: 732± FT

HAMMER EFFICIENCY: 60%
DATE:



DEPTH (FEET)	PROFILE DESCRIPTION	ELEVATION (FEET)
0.8	10 inches of TOPSOIL	731.2
5.0	LEAN CLAY- Occasional Roots- Brown- Soft to Medium (CL)	727.0
6.0	LEAN CLAY- Occasional Black Oxide Nodules- Brown- Stiff to Very Stiff (CL)	726.0
8.0	FAT CLAY- Occasional Black Oxide Nodules- Brown to Black Mottled- Stiff to Very Stiff (CH)	724.0
10.0	FAT CLAY- Occasional Black Oxide Nodules- Trace Limestone Fragments- Brown- Stiff (CH)	722.0
20.0	Moderately to Slightly Weathered LIMESTONE- Pitted- Fossiliferous- Occasional Stylolites and Calcite Crystals- Fractured to Slightly Fractured- Medium Gray to Light Gray	712.0

END OF BORING AT 20.0 FEET.

SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES
SB1	20	1 1 2 2
SB2	24	2 2 4 4
SB3	24	4 4 8 10
SB4	2	50/2"
RC1	118	

REMARKS

Blow count values increased due to presence of rock fragments.

Auger refusal at 10 feet. RC1 (10'-20')
REC = 98%
RQD = 61%
GSI = 45 to 55
RMR = 58
Compressive strength from 10.3 to 10.6' = 7,280 psi

Compressive strength from 16.9 to 17.2' = 4,930 psi

GROUNDWATER & BACKFILL INFORMATION

GROUNDWATER WAS NOT ENCOUNTERED

BACKFILL METHOD: Auger Cuttings

NOTES: 1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

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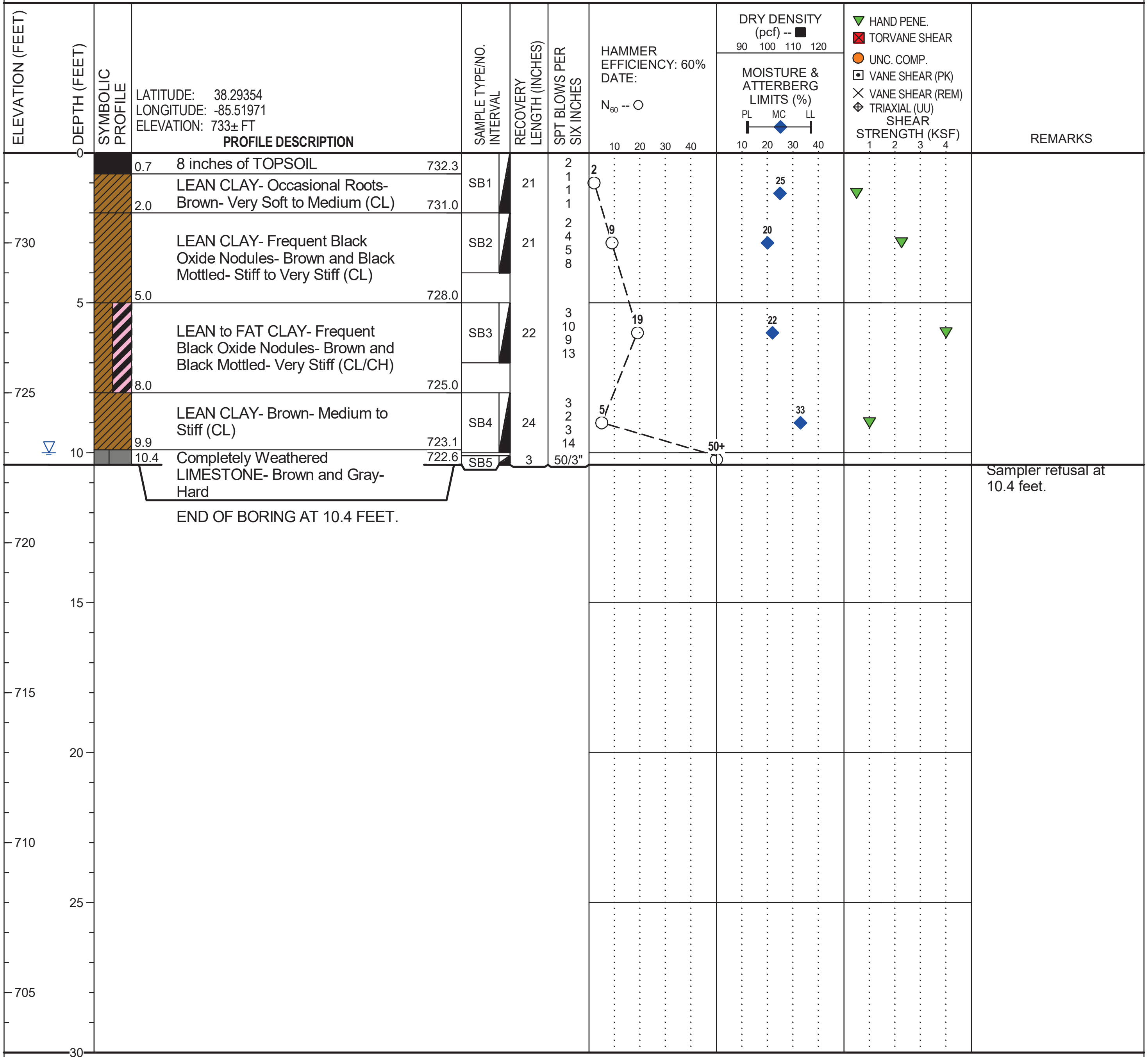
BORING B13

PAGE 1 OF 1

BORING DEPTH: 10.4 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 12/22/25
COMPLETED: 12/22/25
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH



LATITUDE: 38.29354
LONGITUDE: -85.51971
ELEVATION: 733± FT

DEPTH (FEET)	PROFILE DESCRIPTION	ELEVATION (FEET)	SAMPLE TYPE/NO.	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	N_{60}	MC	REMARKS
0.7	8 inches of TOPSOIL	732.3						
2.0	LEAN CLAY- Occasional Roots- Brown- Very Soft to Medium (CL)	731.0	SB1	21	2 1 1 1	2	25	
5.0	LEAN CLAY- Frequent Black Oxide Nodules- Brown and Black Mottled- Stiff to Very Stiff (CL)	728.0	SB2	21	2 4 5 8	9	20	
8.0	LEAN to FAT CLAY- Frequent Black Oxide Nodules- Brown and Black Mottled- Very Stiff (CL/CH)	725.0	SB3	22	3 10 9 13	19	22	
9.9	LEAN CLAY- Brown- Medium to Stiff (CL)	723.1	SB4	24	3 2 3 14	5/	33	
10.4	Completely Weathered LIMESTONE- Brown and Gray- Hard	722.6	SB5	3	50/3"	50+		Sampler refusal at 10.4 feet.

END OF BORING AT 10.4 FEET.

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	10.0	723.0
▼ **AT END OF BORING:**	Note 3	
CAVE-IN OF BOREHOLE AT:	3.7	729.3
BACKFILL METHOD:	Auger Cuttings	

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. Groundwater was not encountered above the borehole cave in depth.

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BORING B14

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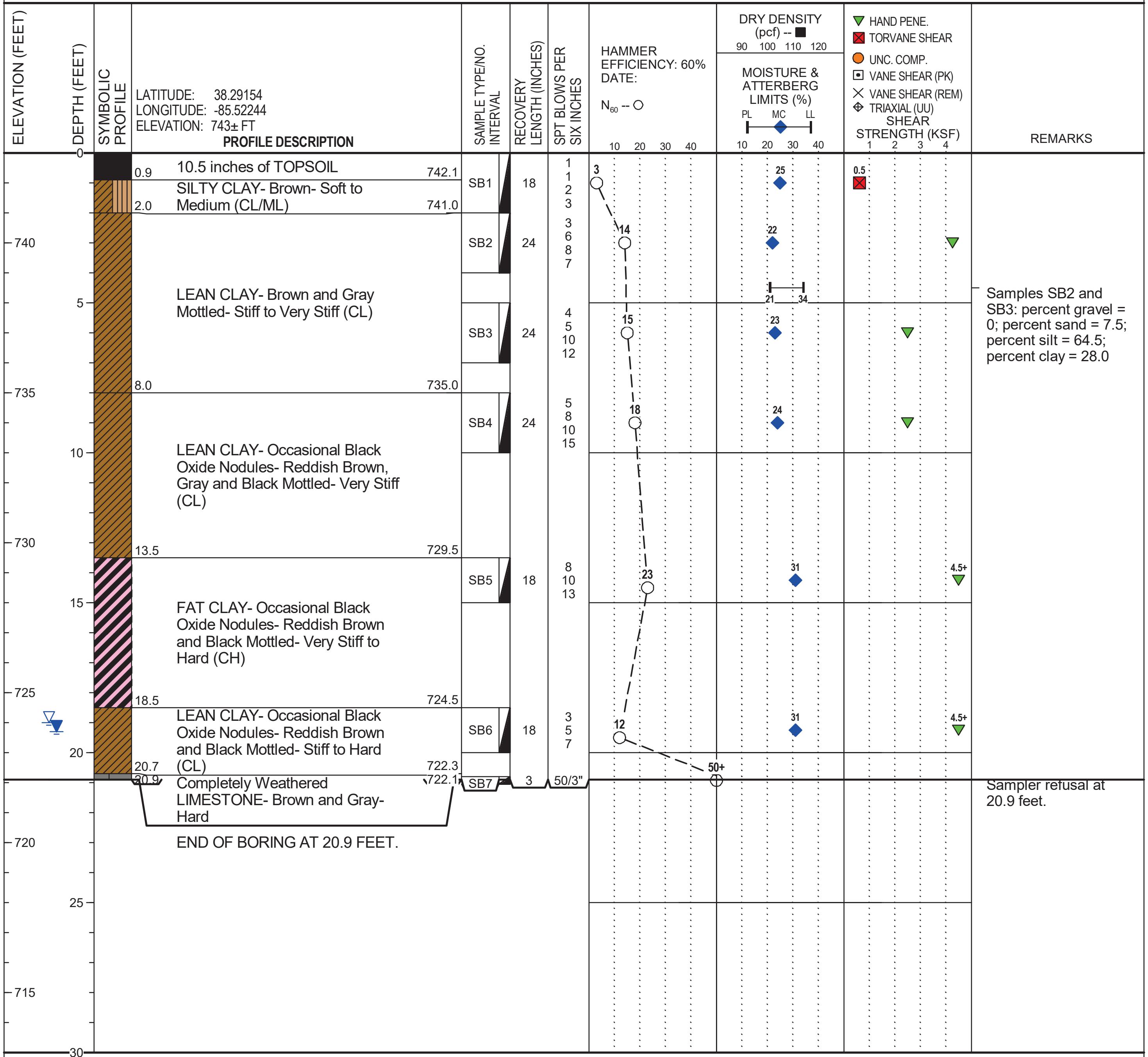
BORING DEPTH: 20.9 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky

DATE STARTED: 1/13/26
COMPLETED: 1/13/26
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH



Depth (ft)	Elevation (ft)	Profile Description
0.9	742.1	10.5 inches of TOPSOIL
2.0	741.0	SILTY CLAY- Brown- Soft to Medium (CL/ML)
8.0	735.0	LEAN CLAY- Brown and Gray Mottled- Stiff to Very Stiff (CL)
13.5	729.5	LEAN CLAY- Occasional Black Oxide Nodules- Reddish Brown, Gray and Black Mottled- Very Stiff (CL)
18.5	724.5	FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown and Black Mottled- Very Stiff to Hard (CH)
20.7	722.3	LEAN CLAY- Occasional Black Oxide Nodules- Reddish Brown and Black Mottled- Stiff to Hard (CL)
20.9	722.1	Completely Weathered LIMESTONE- Brown and Gray- Hard

END OF BORING AT 20.9 FEET.

Sample	Recovery (in.)	SPT Blows	N60	MC (%)	Shear Strength (KSF)
SB1	18	1 1 2 3	3	25	0.5
SB2	24	3 6 8 7	14	22	
SB3	24	4 5 10 12	15	23	
SB4	24	5 8 10 15	18	24	
SB5	18	8 10 13	23	31	4.5+
SB6	18	3 5 7	12	31	4.5+
SB7	3	50/3"	50+		

Atterberg limits: PL 21, LL 34

REMARKS:

Samples SB2 and SB3: percent gravel = 0; percent sand = 7.5; percent silt = 64.5; percent clay = 28.0

Sampler refusal at 20.9 feet.

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	19.0	724.0
▼ **AT END OF BORING:**	19.3	723.7
CAVE-IN OF BOREHOLE AT:	4.0	739.0

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

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BORING B15

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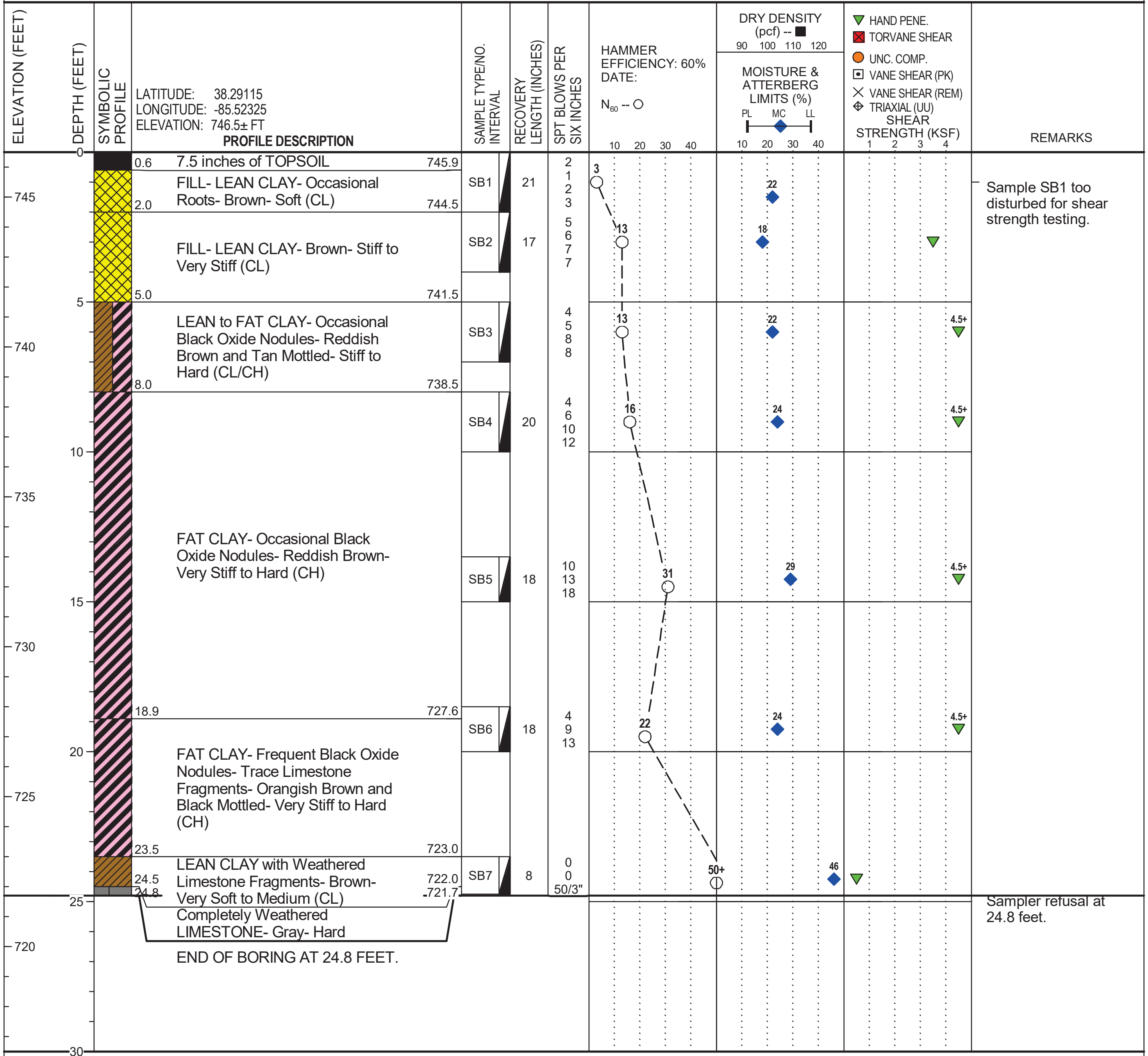
BORING DEPTH: 24.8 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 1/17/26
COMPLETED: 1/17/26
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.29115
LONGITUDE: -85.52325
ELEVATION: 746.5± FT

HAMMER EFFICIENCY: 60%
DATE:



DEPTH (FEET)	ELEVATION (FEET)	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	N_{60}	MC (%)	SHEAR STRENGTH (KSF)	REMARKS
0.6	745.9	7.5 inches of TOPSOIL							
2.0	744.5	FILL- LEAN CLAY- Occasional Roots- Brown- Soft (CL)	SB1	21	2 1 2 3	3	22		Sample SB1 too disturbed for shear strength testing.
5.0	741.5	FILL- LEAN CLAY- Brown- Stiff to Very Stiff (CL)	SB2	17	5 6 7 7	13	18	▼	
8.0	738.5	LEAN to FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown and Tan Mottled- Stiff to Hard (CL/CH)	SB3		4 5 8 8	13	22	4.5+	
18.9	727.6	FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown- Very Stiff to Hard (CH)	SB4	20	4 6 10 12	16	24	4.5+	
			SB5	18	10 13 18	31	29	4.5+	
23.5	723.0	FAT CLAY- Frequent Black Oxide Nodules- Trace Limestone Fragments- Orangish Brown and Black Mottled- Very Stiff to Hard (CH)	SB6	18	4 9 13	22	24	4.5+	
24.5	722.0	LEAN CLAY with Weathered Limestone Fragments- Brown- Very Soft to Medium (CL)	SB7	8	0 0 50/3"	50+	46	▼	
24.8	721.7	Completely Weathered LIMESTONE- Gray- Hard							Sampler refusal at 24.8 feet.

END OF BORING AT 24.8 FEET.

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	Not Encountered	
▼ **AT END OF BORING:**	Note 3	
CAVE-IN OF BOREHOLE AT:	5.0	741.5
BACKFILL METHOD:	Auger Cuttings	

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. Groundwater was not encountered above the borehole cave in depth.

3/19/26 8:50:02 AM

BORING B16

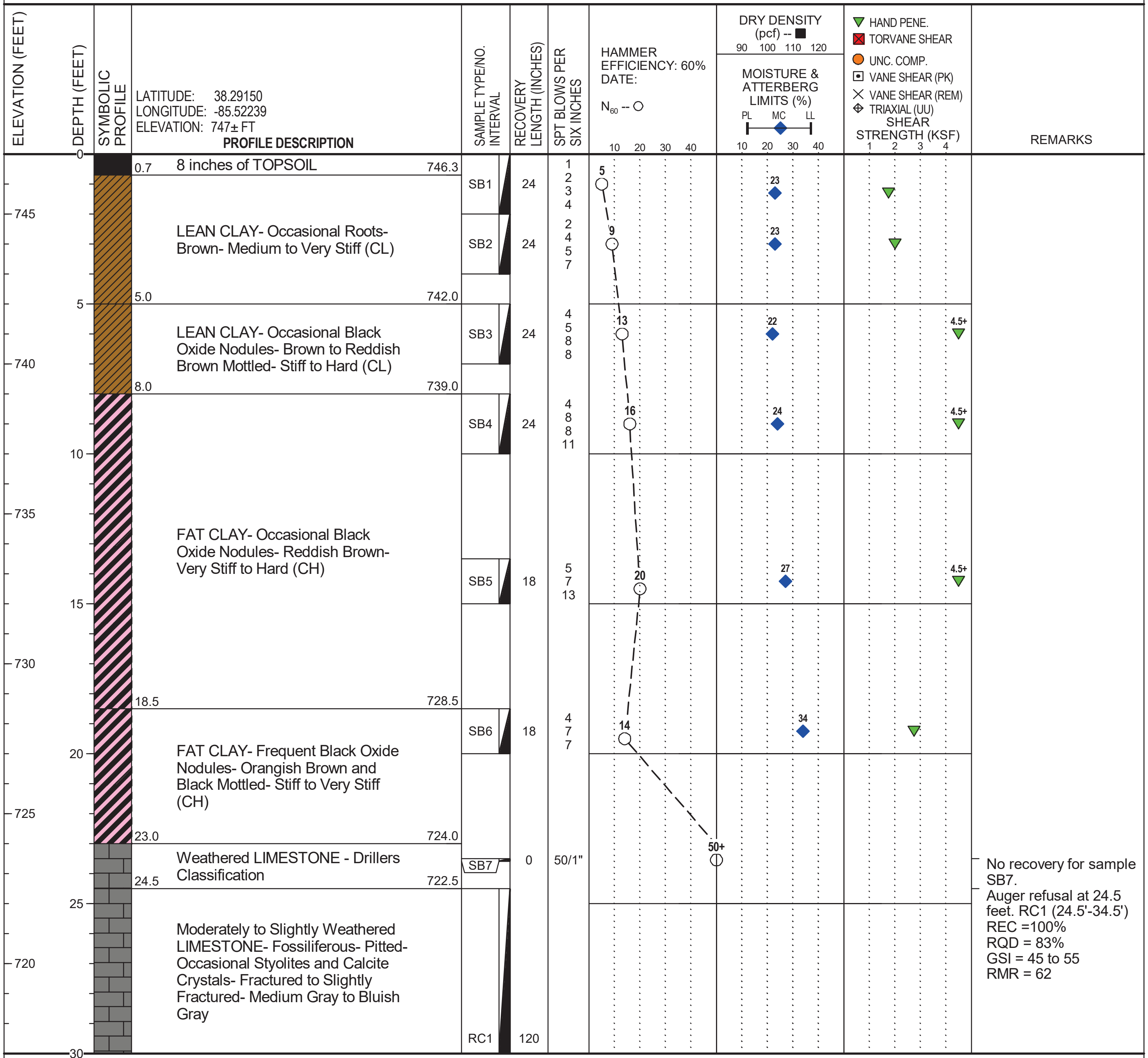
PAGE 1 OF 2

BORING DEPTH: 34.5 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 12/29/25
COMPLETED: 12/29/25
BORING METHOD: Hollow Stem Augers/NQ2 Core
DRILLER: RM (Mathes Drilling)
RIG NO.: B-53 (ATV)
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.29150
LONGITUDE: -85.52239
ELEVATION: 747± FT

HAMMER EFFICIENCY: 60%
DATE:



DEPTH (FEET)	PROFILE DESCRIPTION	ELEVATION (FEET)
0.7	8 inches of TOPSOIL	746.3
5.0	LEAN CLAY- Occasional Roots- Brown- Medium to Very Stiff (CL)	742.0
8.0	LEAN CLAY- Occasional Black Oxide Nodules- Brown to Reddish Brown Mottled- Stiff to Hard (CL)	739.0
18.5	FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown- Very Stiff to Hard (CH)	728.5
23.0	FAT CLAY- Frequent Black Oxide Nodules- Orangish Brown and Black Mottled- Stiff to Very Stiff (CH)	724.0
24.5	Weathered LIMESTONE - Drillers Classification	722.5
	Moderately to Slightly Weathered LIMESTONE- Fossiliferous- Pitted- Occasional Stylolites and Calcite Crystals- Fractured to Slightly Fractured- Medium Gray to Bluish Gray	

SAMPLE TYPE/NO.	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	N60	MC	HAND PENE.
SB1	24	1 2 3 4	5	23	
SB2	24	2 4 5 7	9	23	
SB3	24	4 5 8 8	13	22	4.5+
SB4	24	4 8 8 11	16	24	4.5+
SB5	18	5 7 13	20	27	4.5+
SB6	18	4 7 7	14	34	
SB7	0	50/1"	50+		
RC1	120				

REMARKS:
No recovery for sample SB7.
Auger refusal at 24.5 feet. RC1 (24.5'-34.5')
REC =100%
RQD = 83%
GSI = 45 to 55
RMR = 62

GROUNDWATER & BACKFILL INFORMATION

GROUNDWATER WAS NOT ENCOUNTERED

BACKFILL METHOD: Auger Cuttings

NOTES: 1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

(Continued Next Page)

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BORING B16

PAGE 2 OF 2

BORING DEPTH: 34.5 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky

LATITUDE: 38.29150
LONGITUDE: -85.52239
ELEVATION: 747± FT

ELEVATION (FEET)	DEPTH (FEET)	SYMBOLIC PROFILE	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	HAMMER EFFICIENCY: 60% DATE: N_{60} -- ○ 10 20 30 40	DRY DENSITY (pcf) -- ■ 90 100 110 120 MOISTURE & ATTERBERG LIMITS (%) PL MC LL 10 20 30 40	▽ HAND PENE. ☒ TORVANE SHEAR ● UNC. COMP. ⊡ VANE SHEAR (PK) × VANE SHEAR (REM) ◈ TRIAXIAL (UU) SHEAR STRENGTH (KSF) 1 2 3 4	REMARKS
715	30		Moderately to Slightly Weathered LIMESTONE- Fossiliferous- Pitted- Occasional Stylolites and Calcite Crystals- Fractured to Slightly Fractured- Medium Gray to Bluish Gray *(continued)*							
712.5	34.5		END OF BORING AT 34.5 FEET.							
710	35									
705	40									
700	45									
695	50									
690	55									
685	60									
680	65									
	70									

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BORING B16A

PAGE 1 OF 1

BORING DEPTH: 15.5 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky

DATE STARTED: 1/21/26
COMPLETED: 1/22/26
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.29150
LONGITUDE: -85.52239
ELEVATION: 747± FT

HAMMER EFFICIENCY: 60%
DATE:
N_{60} -- ○
10 20 30 40

DRY DENSITY (pcf) -- ■
90 100 110 120
MOISTURE & ATTERBERG LIMITS (%)
PL MC LL
10 20 30 40

▽ HAND PENE.
☒ TORVANE SHEAR
● UNC. COMP.
⊡ VANE SHEAR (PK)
× VANE SHEAR (REM)
⊕ TRIAXIAL (UU)
SHEAR STRENGTH (KSF)
1 2 3 4

ELEVATION (FEET)	DEPTH (FEET)	SYMBOLIC PROFILE	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	REMARKS
	0					
745						Boring B16A offset approximately 5 feet from boring B16.
	5			GS1		Bulk sample obtained from 5-7 feet.
740						
				GS2		Bulk sample obtained from 8-13 feet.
	10					
735						
				3ST1	14	Shelby tube obtained from 13-15 feet.
	15					
730						
	20					
725						
	25					
720						
	30					

GROUNDWATER & BACKFILL INFORMATION

GROUNDWATER WAS NOT ENCOUNTERED

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

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BORING B17

PAGE 1 OF 1

BORING DEPTH: 21.6 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 12/19/25
COMPLETED: 12/19/25
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH

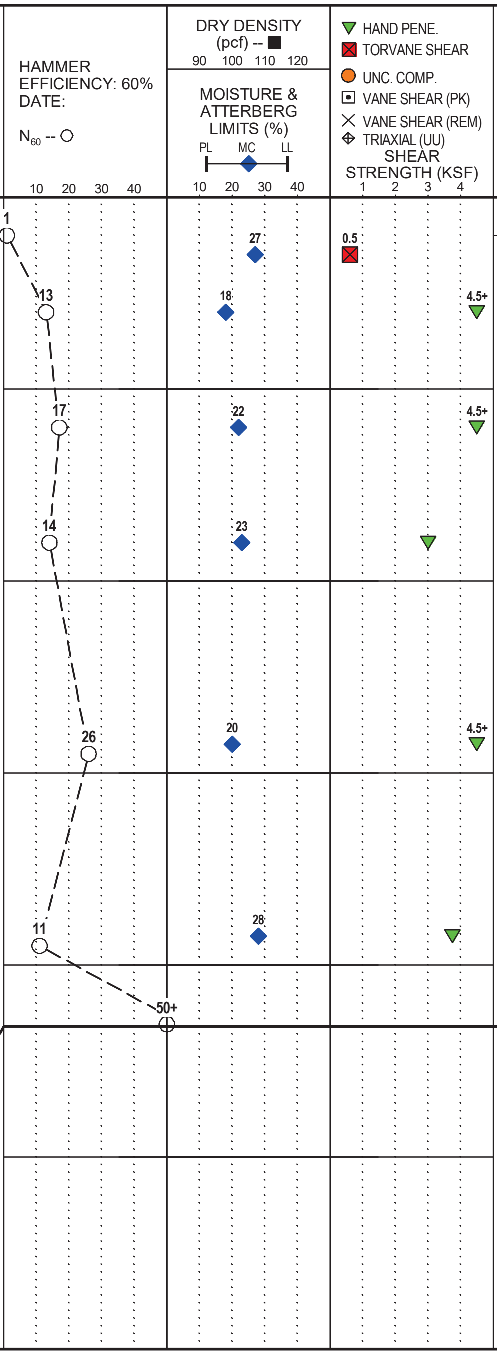
LATITUDE: 38.29175
LONGITUDE: -85.52189
ELEVATION: 746± FT

HAMMER EFFICIENCY: 60%
DATE:

DEPTH (FEET)	PROFILE DESCRIPTION	ELEVATION (FEET)
1.0	12 inches of TOPSOIL	745.0
2.0	LEAN CLAY- Brown- Very Soft to Medium (CL)	744.0
8.0	LEAN to FAT CLAY- Occasional Roots and Black Oxide Nodules- Reddish Brown- Stiff to Hard (CL/CH)	738.0
13.5	FAT CLAY- Occasional Black Oxide Nodules- Little Limestone Fragments- Reddish Brown- Stiff to Very Stiff (CH)	732.5
18.5	FAT CLAY- Frequent Black Oxide Nodules- Brown and Black Mottled- Very Stiff to Hard (CH)	727.5
21.5	FAT CLAY- Brown- Stiff to Very Stiff (CH)	724.5
21.6	Completely Weathered LIMESTONE- Gray- Hard	724.4

END OF BORING AT 21.6 FEET.

SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	REMARKS
SB1	14	0 1 0 1	Odor noted in sample SB1.
SB2	24	3 6 7 9	
SB3	18	5 7 10 13	
SB4	22	4 5 9 12	
SB5	15	6 11 15	
SB6	14	4 5 6	
SB7	1	50/1"	Sampler refusal at 21.6 feet.



GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
∇ **DURING BORING:**	Not Encountered	
▼ **AT END OF BORING:**	Note 3	
CAVE-IN OF BOREHOLE AT:	4.0	742.0
BACKFILL METHOD:	Auger Cuttings	

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. Groundwater was not encountered above the borehole cave in depth.

BORING B18

PAGE 1 OF 1

BORING DEPTH: 12.8 FEET

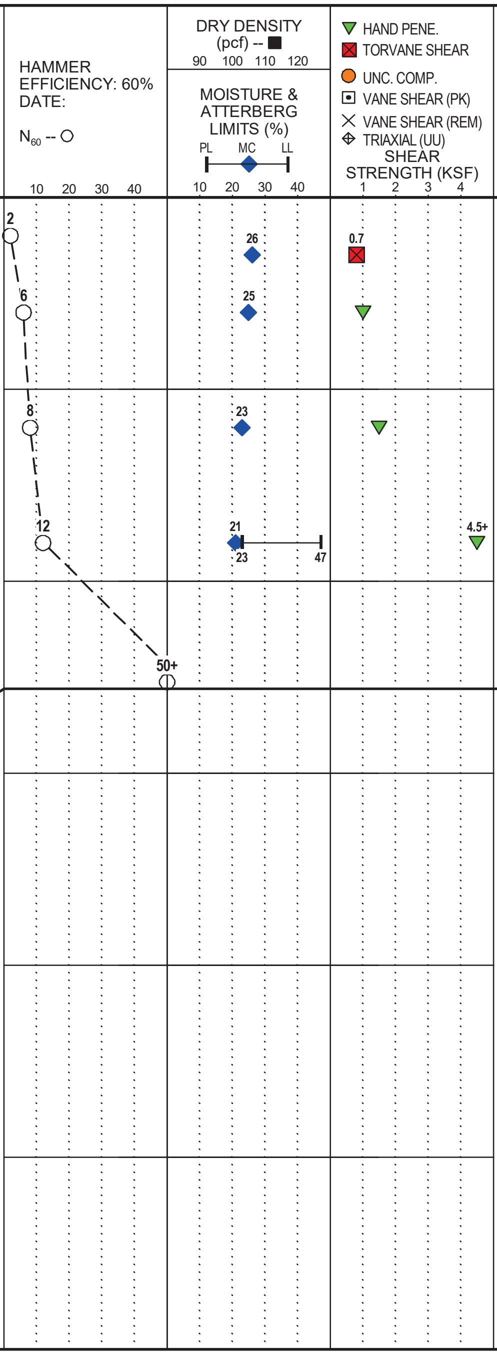
PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky

DATE STARTED: 12/21/25
COMPLETED: 12/21/25
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.29201
LONGITUDE: -85.52118
ELEVATION: 735.5± FT

ELEVATION (FEET)	DEPTH (FEET)	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	REMARKS
734.5	1.0	12 inches of TOPSOIL	SB1	14	0 1 1 1	
733.5	2.0	LEAN CLAY- Brown to Reddish Brown- Very Soft to Medium (CL)				
730.5	5.0	LEAN CLAY- Brown to Reddish Brown- Medium to Stiff (CL)	SB2	23	2 3 3 4	
727.5	8.0	LEAN CLAY- Trace Gravel- Brown- Medium to Stiff (CL)	SB3	20	2 4 4 7	
723.0	12.5	LEAN CLAY- Frequent Black Oxide Nodules- Trace Limestone Fragments- Orangish Brown and Black Mottled- Stiff to Hard (CL)	SB4	21	4 6 6 9	
722.7	12.8	Completely Weathered LIMESTONE- Gray- Hard	SB5	1	50/3"	Sampler refusal at 12.8 feet.

END OF BORING AT 12.8 FEET.



GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	Not Encountered	
▼ **AT END OF BORING:**	Note 3	
CAVE-IN OF BOREHOLE AT:	4.0	731.5
BACKFILL METHOD:	Auger Cuttings	

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. Groundwater was not encountered above the borehole cave in depth.

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BORING B19

PAGE 1 OF 1

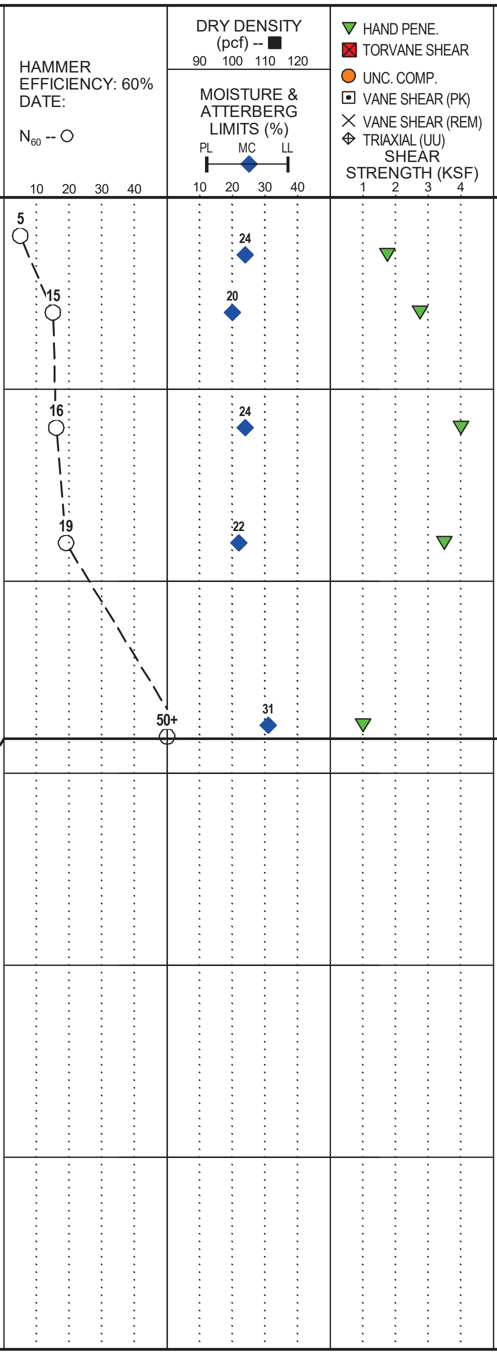
BORING DEPTH: 14.1 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 12/21/25
COMPLETED: 12/21/25
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.29229
LONGITUDE: -85.52049
ELEVATION: 739± FT

DEPTH (FEET)	PROFILE DESCRIPTION	ELEVATION (FEET)	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	REMARKS
0 – 1.0	12 inches of TOPSOIL	738.0	SB1	18	2 2 3 5	
1.0 – 2.0	LEAN CLAY- Occasional Roots- Brown- Medium to Stiff (CL)	737.0				
2.0 – 5.0	LEAN CLAY- Occasional Black Oxide Nodules- Brown and Gray Mottled- Stiff to Very Stiff (CL)	734.0	SB2	24	7 7 8 11	
5.0 – 8.0	FAT CLAY- Brown and Gray Mottled- Very Stiff (CH)	731.0	SB3	20	4 7 9 12	
8.0 – 13.5	FAT CLAY- Frequent Black Oxide Nodules- Brown, Gray and Black Mottled- Very Stiff (CH)	725.5	SB4	21	3 8 11 15	
13.5 – 14.0	LEAN CLAY- Brown- Medium to Stiff (CL)	725.0	SB5	6	5 50/1"	
14.0 – 14.1	Completely Weathered LIMESTONE- Gray- Hard	724.9				Sampler refusal at 14.1 feet.

END OF BORING AT 14.1 FEET.



GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ DURING BORING:	Not Encountered	
▼ AT END OF BORING:	Note 3	
CAVE-IN OF BOREHOLE AT:	3.0	736.0
BACKFILL METHOD:	Auger Cuttings	

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. Groundwater was not encountered above the borehole cave in depth.

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SME

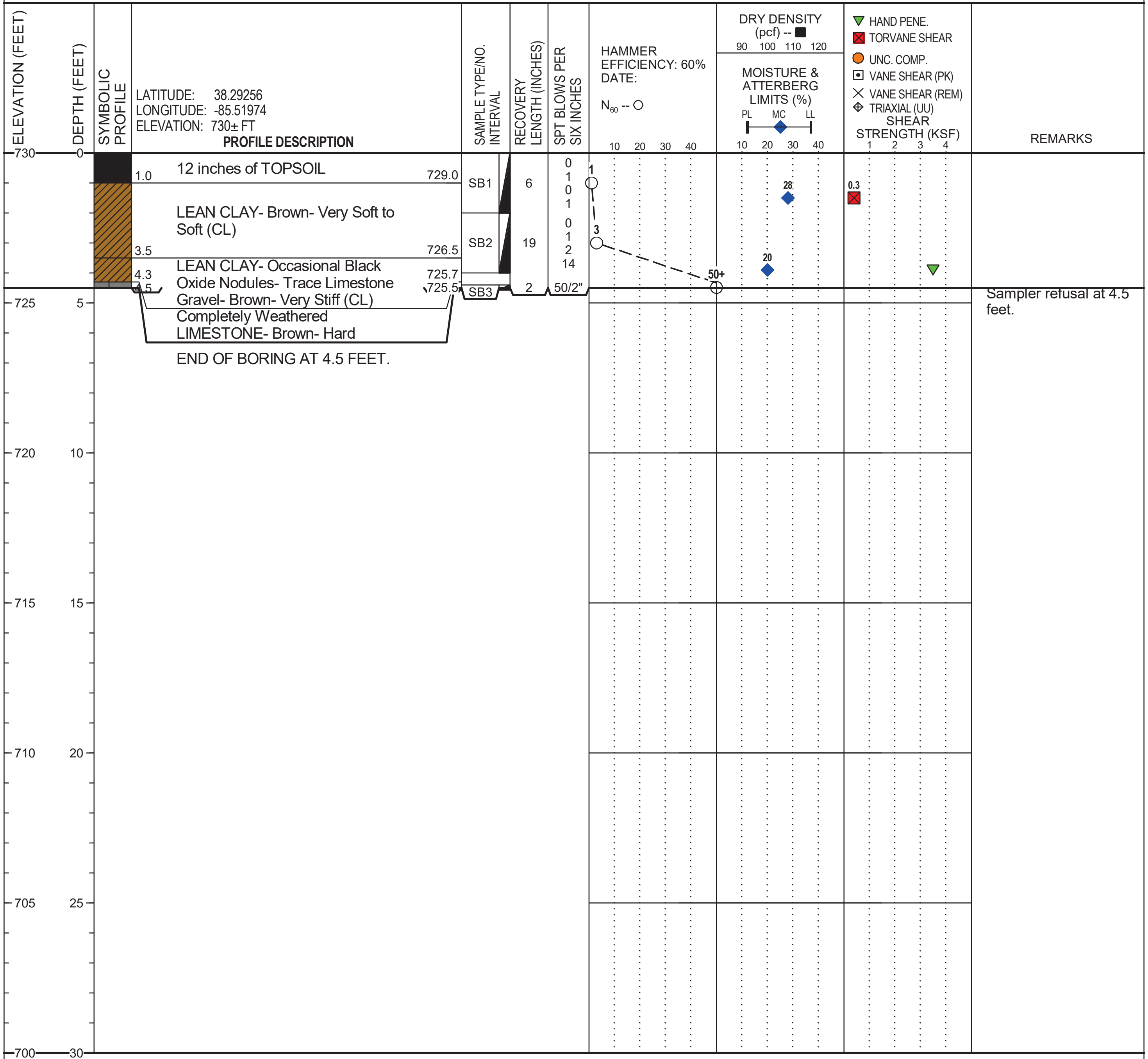
BORING B20

PAGE 1 OF 1

BORING DEPTH: 4.5 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 12/22/25
COMPLETED: 12/22/25
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.29256
LONGITUDE: -85.51974
ELEVATION: 730± FT



Depth (ft)	Elev. (ft)	Profile Description	Sample	Recovery (in)	SPT Blows
1.0	729.0	12 inches of TOPSOIL	SB1	6	0 1 0 1
3.5	726.5	LEAN CLAY- Brown- Very Soft to Soft (CL)	SB2	19	0 1 2 14
4.3	725.7	LEAN CLAY- Occasional Black Oxide Nodules- Trace Limestone Gravel- Brown- Very Stiff (CL)	SB3	2	50/2"
4.5	725.5	Completely Weathered LIMESTONE- Brown- Hard			

END OF BORING AT 4.5 FEET.

Sampler refusal at 4.5 feet.

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	Not Encountered	
▼ **AT END OF BORING:**	Note 3	
CAVE-IN OF BOREHOLE AT:	4.0	726.0
BACKFILL METHOD:	Auger Cuttings	

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. Groundwater was not encountered above the borehole cave in depth.

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3/19/26 8:50:12 AM

SME

BORING B20A

PAGE 1 OF 1

BORING DEPTH: 3.5 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky

DATE STARTED: 1/22/26
COMPLETED: 1/22/26
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.29256
LONGITUDE: -85.51974
ELEVATION: 730± FT

HAMMER EFFICIENCY: 60%
DATE:
N_{60} -- ○

DRY DENSITY (pcf) -- ■ (90, 100, 110, 120)
MOISTURE & ATTERBERG LIMITS (%) PL MC LL (10, 20, 30, 40)

▽ HAND PENE.
☒ TORVANE SHEAR
● UNC. COMP.
⊡ VANE SHEAR (PK)
× VANE SHEAR (REM)
⊕ TRIAXIAL (UU)
SHEAR STRENGTH (KSF) (1, 2, 3, 4)

ELEVATION (FEET)	DEPTH (FEET)	SYMBOLIC PROFILE	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	N_{60} (10 20 30 40)	DRY DENSITY / MOISTURE & ATTERBERG LIMITS (10 20 30 40)	SHEAR STRENGTH (KSF) (1 2 3 4)	REMARKS
730	0			3ST1	23				Boring B20A offset approximately 5 feet from boring B20. Shelby tube obtained from 1-3 feet.
725	5								
720	10								
715	15								
710	20								
705	25								
700	30								

GROUNDWATER & BACKFILL INFORMATION

GROUNDWATER WAS NOT ENCOUNTERED

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

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SME

BORING B21

PAGE 1 OF 1

BORING DEPTH: 22.5 FEET

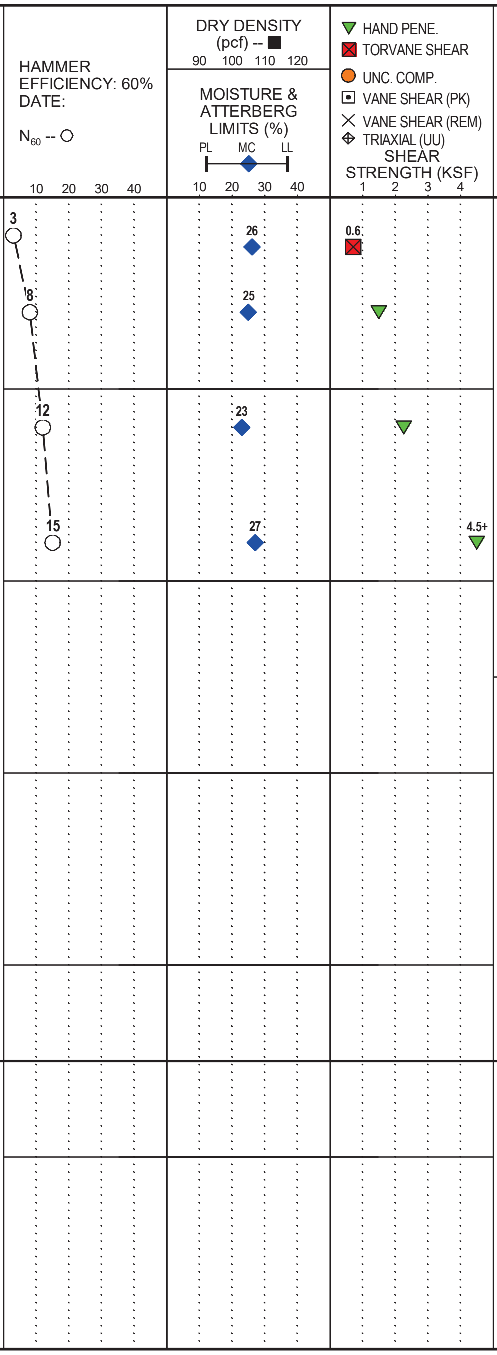
PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky

DATE STARTED: 12/29/25
COMPLETED: 12/29/25
BORING METHOD: Hollow Stem Augers/NQ2 Core
DRILLER: RM (Mathes Drilling)
RIG NO.: B-53 (ATV)
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.29273
LONGITUDE: -85.51937
ELEVATION: 740± FT

DEPTH (FEET)	PROFILE DESCRIPTION	ELEVATION (FEET)	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	N60	MC	SHEAR STRENGTH (KSF)	REMARKS
0.7	8 inches of TOPSOIL	739.3							
2.0	LEAN CLAY- Occasional Roots- Brown- Soft to Medium (CL)	738.0	SB1	18	1 1 2 2	3	26	0.6	
5.0	LEAN CLAY- Occasional Roots- Brown- Medium to Stiff (CL)	735.0	SB2	24	3 3 5 6	8	25		
8.0	LEAN to FAT CLAY- Occasional Black Oxide Nodules- Brown and Reddish Brown- Stiff to Very Stiff (CL/CH)	732.0	SB3	24	3 5 7 8	12	23		
12.5	FAT CLAY- Occasional Black Oxide Nodules- Trace Limestone Fragments- Orangish Brown and Black Mottled- Stiff to Hard (CH)	727.5	SB4	24	4 6 9 10	15	27	4.5+	
22.5	Slightly Weathered LIMESTONE- Pitted- Occasional Stylolites- Fractured to Slightly Fractured- Medium Gray	717.5	RC1	118					Auger refusal at 12.5 feet. RC1 (12.5'-22.5') REC = 98% RQD = 75% GSI = 50 to 60 RMR = 63

END OF BORING AT 22.5 FEET.



GROUNDWATER & BACKFILL INFORMATION

GROUNDWATER WAS NOT ENCOUNTERED

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

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SME

BORING B22

PAGE 1 OF 1

BORING DEPTH: 24.4 FEET

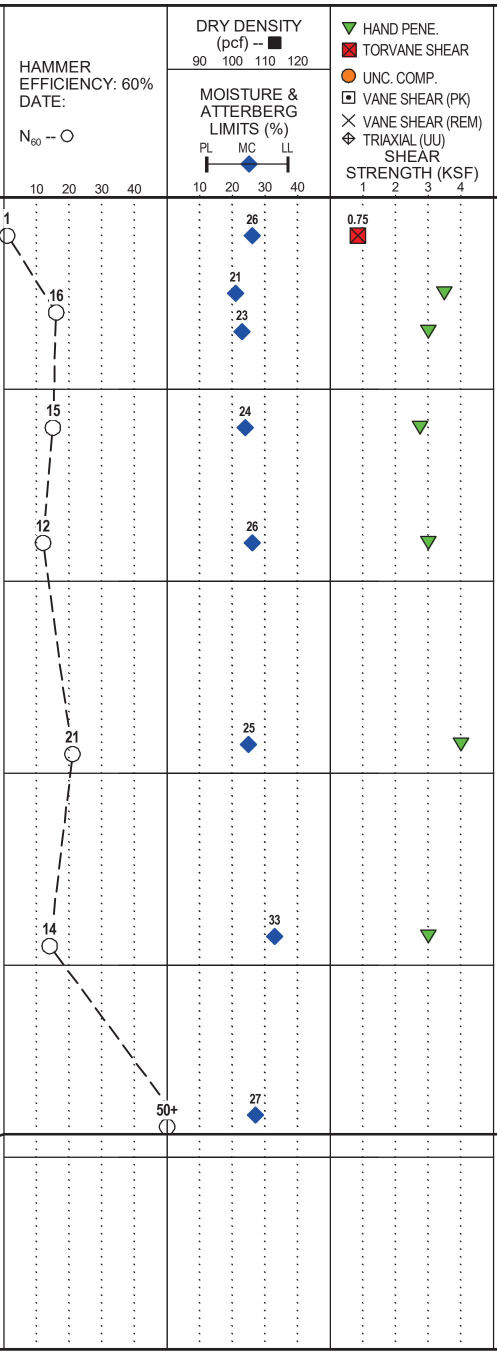
PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 1/13/26
COMPLETED: 1/13/26
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.29154
LONGITUDE: -85.52244
ELEVATION: 747± FT

DEPTH (FEET)	ELEVATION (FEET)	PROFILE DESCRIPTION
0.8	746.2	9.5 inches of TOPSOIL
2.0	745.0	LEAN CLAY- Occasional Roots- Yellowish Brown- Very Soft to Medium (CL)
3.1	743.9	Sandy SILTY CLAY- Gray and Brown Mottled- Very Stiff (CL/ML)
8.0	739.0	LEAN CLAY- Occasional Black Oxide Nodules- Brown, Gray and Black Mottled- Very Stiff to Stiff (CL)
13.5	733.5	LEAN to FAT CLAY- Occasional Black Oxide Nodules- Red- Stiff to Very Stiff (CL/CH)
24.0	723.0	FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown and Black Mottled- Stiff to Very Stiff (CH)
24.4	722.6	Completely Weathered LIMESTONE- Brown and Gray- Hard

END OF BORING AT 24.4 FEET.

SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES
SB1	20	1 0 1 2
SB2	24	4 6 10 11
SB3	24	3 6 9 13
SB4	24	3 5 7 11
SB5	18	8 10 11
SB6	18	3 6 8
SB7	2	0 50/5"



REMARKS: Sampler refusal at 24.4 feet.

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	Not Encountered	
▼ **AT END OF BORING:**	Note 3	

BACKFILL METHOD: Auger Cuttings

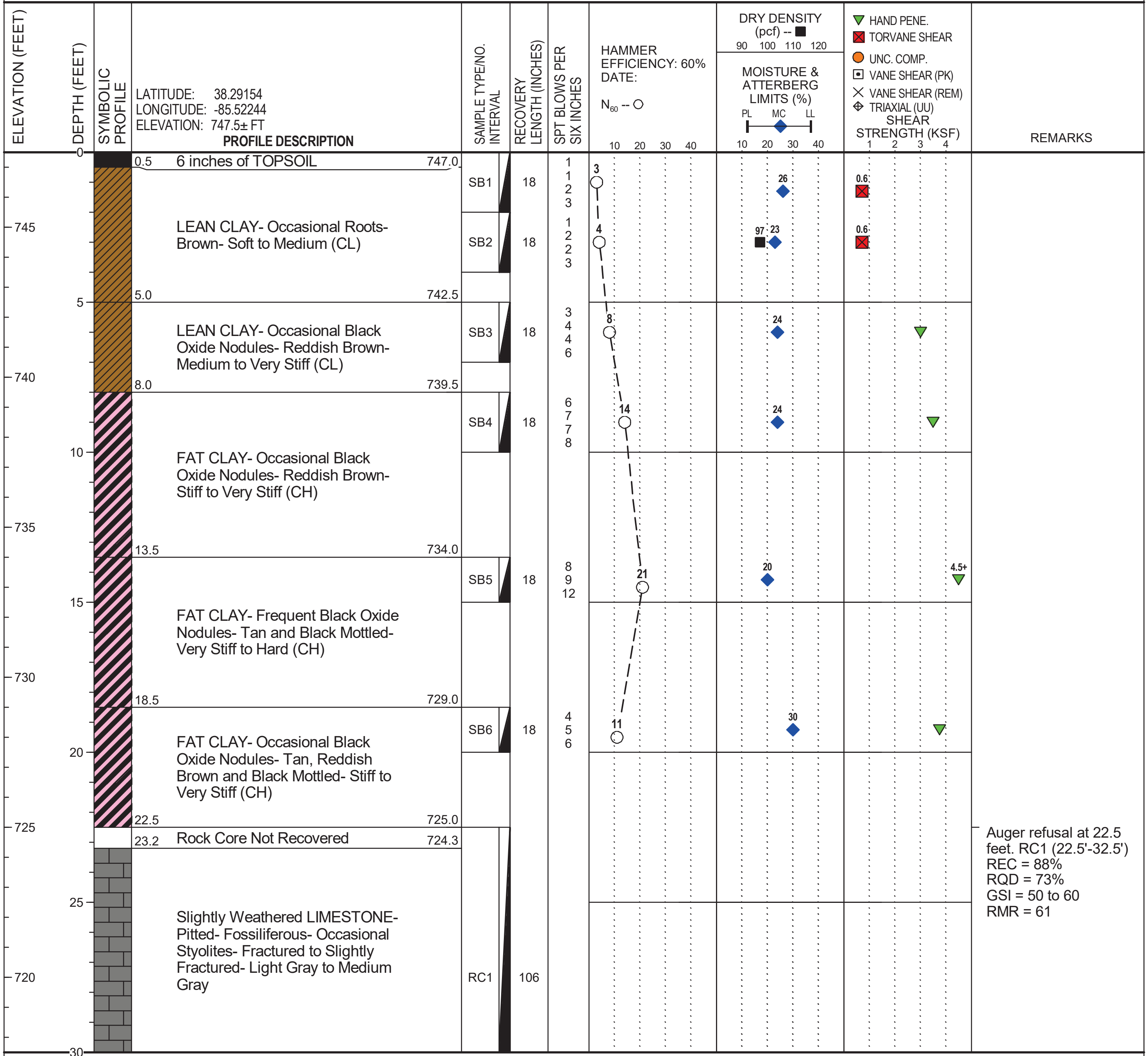
NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. Groundwater was not encountered above the borehole cave in depth.

BORING B23

PAGE 1 OF 2

BORING DEPTH: 32.5 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 1/13/26
COMPLETED: 1/13/26
BORING METHOD: Hollow Stem Augers/NQ2 Core
DRILLER: RM (Mathes Drilling)
RIG NO.: B-53 (ATV)
LOGGED BY: A. Dodson
CHECKED BY: WH



LATITUDE: 38.29154
LONGITUDE: -85.52244
ELEVATION: 747.5± FT

Depth (ft)	PROFILE DESCRIPTION	Elevation (ft)
0.5	6 inches of TOPSOIL	747.0
5.0	LEAN CLAY- Occasional Roots- Brown- Soft to Medium (CL)	742.5
8.0	LEAN CLAY- Occasional Black Oxide Nodules- Reddish Brown- Medium to Very Stiff (CL)	739.5
13.5	FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown- Stiff to Very Stiff (CH)	734.0
18.5	FAT CLAY- Frequent Black Oxide Nodules- Tan and Black Mottled- Very Stiff to Hard (CH)	729.0
22.5	FAT CLAY- Occasional Black Oxide Nodules- Tan, Reddish Brown and Black Mottled- Stiff to Very Stiff (CH)	725.0
23.2	Rock Core Not Recovered	724.3
	Slightly Weathered LIMESTONE- Pitted- Fossiliferous- Occasional Stylolites- Fractured to Slightly Fractured- Light Gray to Medium Gray	

SAMPLE TYPE/NO.	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	N60	DRY DENSITY (pcf)	MC (%)	SHEAR STRENGTH (KSF)
SB1	18	1 1 2 3	3		26	0.6
SB2	18	1 2 2 3	4	97	23	0.6
SB3	18	3 4 4 6	8		24	
SB4	18	6 7 7 8	14		24	
SB5	18	8 9 12	21		20	4.5+
SB6	18	4 5 6	11		30	
RC1	106					

REMARKS:
Auger refusal at 22.5 feet. RC1 (22.5'-32.5')
REC = 88%
RQD = 73%
GSI = 50 to 60
RMR = 61

GROUNDWATER & BACKFILL INFORMATION

GROUNDWATER WAS NOT ENCOUNTERED

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

(Continued Next Page)

SME

BORING B23

PAGE 2 OF 2

BORING DEPTH: 32.5 FEET

PROJECT NAME: Greenfield Site Development

PROJECT NUMBER: 102074.00

CLIENT: Luckett & Farley

PROJECT LOCATION: Louisville, Kentucky

LATITUDE: 38.29154
LONGITUDE: -85.52244
ELEVATION: 747.5± FT

HAMMER EFFICIENCY: 60%
DATE:
N_{60} -- ○

DRY DENSITY (pcf) -- ■
90 100 110 120

MOISTURE & ATTERBERG LIMITS (%)
PL MC LL
10 20 30 40

▼ HAND PENE.
☒ TORVANE SHEAR
● UNC. COMP.
⊡ VANE SHEAR (PK)
× VANE SHEAR (REM)
⊕ TRIAXIAL (UU)
SHEAR STRENGTH (KSF)
1 2 3 4

ELEVATION (FEET)	DEPTH (FEET)	SYMBOLIC PROFILE	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	N_{60} 10 20 30 40	MOISTURE & ATTERBERG LIMITS (%) 10 20 30 40	SHEAR STRENGTH (KSF) 1 2 3 4	REMARKS
	30									
715			32.5 715.0							
			END OF BORING AT 32.5 FEET.							
	35									
710										
	40									
705										
	45									
700										
	50									
695										
	55									
690										
	60									
685										
	65									
680										
	70									

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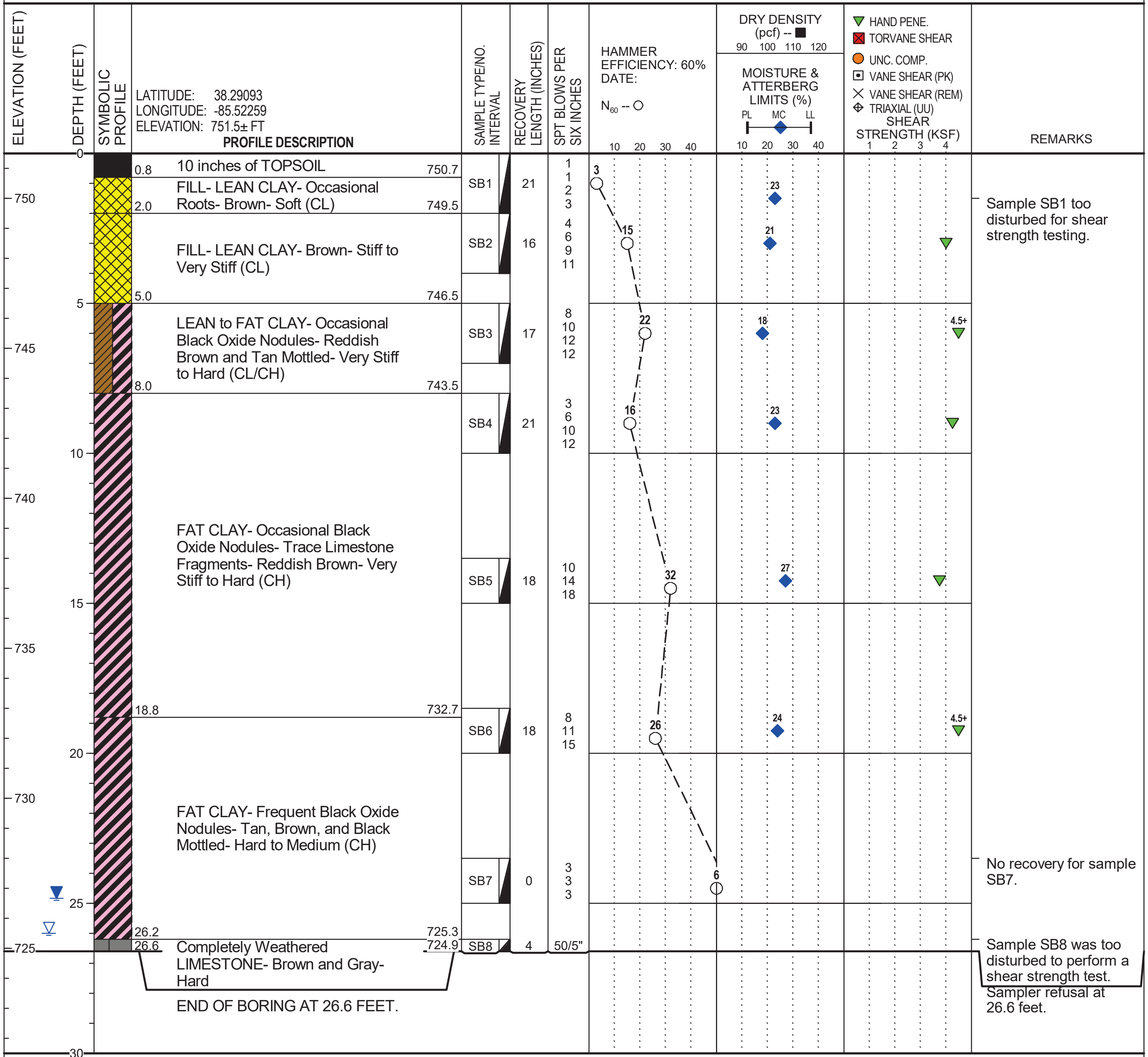
SME

BORING B24

PAGE 1 OF 1

BORING DEPTH: 26.6 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 1/17/26
COMPLETED: 1/17/26
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH



DEPTH (FEET)	PROFILE DESCRIPTION	ELEVATION (FEET)
0.8	10 inches of TOPSOIL	750.7
2.0	FILL- LEAN CLAY- Occasional Roots- Brown- Soft (CL)	749.5
5.0	FILL- LEAN CLAY- Brown- Stiff to Very Stiff (CL)	746.5
8.0	LEAN to FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown and Tan Mottled- Very Stiff to Hard (CL/CH)	743.5
18.8	FAT CLAY- Occasional Black Oxide Nodules- Trace Limestone Fragments- Reddish Brown- Very Stiff to Hard (CH)	732.7
26.2	FAT CLAY- Frequent Black Oxide Nodules- Tan, Brown, and Black Mottled- Hard to Medium (CH)	725.3
26.6	Completely Weathered LIMESTONE- Brown and Gray- Hard	724.9

END OF BORING AT 26.6 FEET.

SAMPLE TYPE/NO.	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	N_{60}	MC (%)	SHEAR STRENGTH (KSF)	REMARKS
SB1	21	1 1 2 3	3	23		Sample SB1 too disturbed for shear strength testing.
SB2	16	4 6 9 11	15	21	▼	
SB3	17	8 10 12 12	22	18	▼ 4.5+	
SB4	21	3 6 10 12	16	23	▼	
SB5	18	10 14 18	32	27	▼	
SB6	18	8 11 15	26	24	▼ 4.5+	
SB7	0	3 3 3	6			No recovery for sample SB7.
SB8	4	50/5"				Sample SB8 was too disturbed to perform a shear strength test. Sampler refusal at 26.6 feet.

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	26.0	725.5
▼ **AT END OF BORING:**	24.8	726.7
CAVE-IN OF BOREHOLE AT:	6.0	745.5

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

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BORING B25

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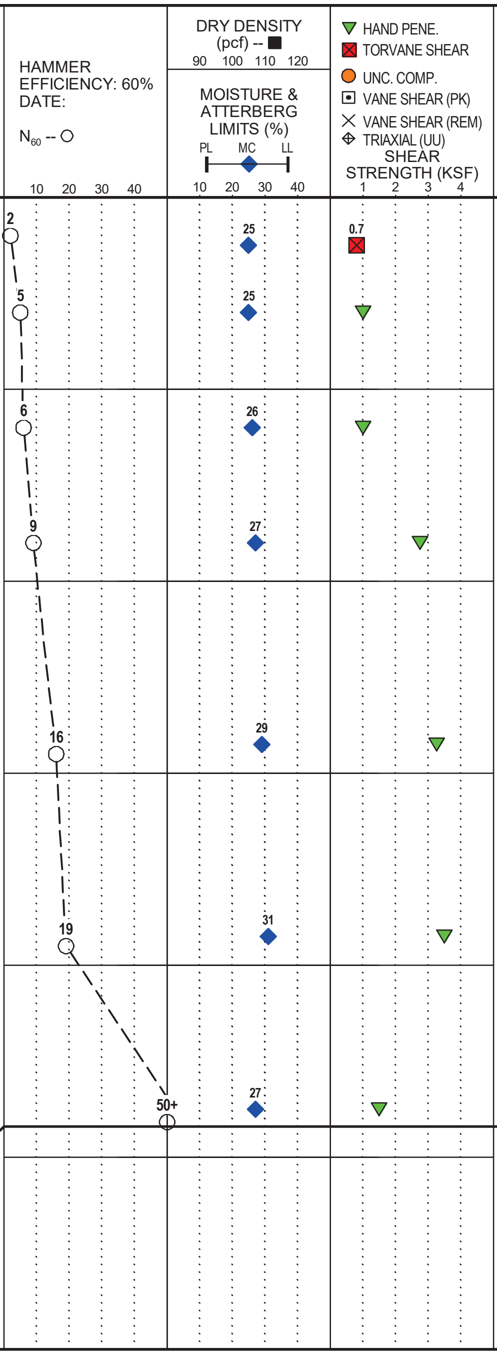
BORING DEPTH: 24.2 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 12/27/25
COMPLETED: 12/27/25
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.29119
LONGITUDE: -85.52188
ELEVATION: 751± FT

ELEVATION (FEET)	DEPTH (FEET)	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	REMARKS
750.5	0.5	6 inches of TOPSOIL				
749.0	2.0	LEAN CLAY- Occasional Roots- Brown- Very Soft to Medium (CL)	SB1	20	1 1 1 2	
743.0	8.0	LEAN CLAY- Occasional Black Oxide Nodules- Reddish Brown- Medium to Stiff (CL)	SB2	24	1 2 3 3	
			SB3	24	2 2 4 5	
737.5	13.5	FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown- Stiff to Very Stiff (CH)	SB4	24	3 4 5 8	
732.5	18.5	FAT CLAY- Trace Limestone Fragments- Reddish Brown and Tan Mottled- Very Stiff (CH)	SB5	18	5 6 10	
727.5	23.5	FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown, Tan and Black Mottled- Very Stiff (CH)	SB6	18	6 8 11	
727.0	24.0	FAT CLAY with Medium to Coarse Sand Rock Flour and Fine Gravel- Brown- Stiff (CH)	SB7	8	6 50/2"	Sampler refusal at 24.2 feet.
726.8	24.2	Completely Weathered LIMESTONE- Gray and Brown- Hard				

END OF BORING AT 24.2 FEET.



GROUNDWATER & BACKFILL INFORMATION

DEPTH (FT) ELEV (FT)
▽ **DURING BORING:** Not Encountered
▼ **AT END OF BORING:** Note 3

CAVE-IN OF BOREHOLE AT: 3.0 748.0

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. Groundwater was not encountered above the borehole cave in depth.

3/19/26 8:50:24 AM

SME

BORING B25A

PAGE 1 OF 1

BORING DEPTH: 21.5 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 1/23/26
COMPLETED: 1/23/26
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH

ELEVATION (FEET) | DEPTH (FEET) | SYMBOLIC PROFILE

LATITUDE: 38.29119
LONGITUDE: -85.52188
ELEVATION: 751± FT
PROFILE DESCRIPTION

SAMPLE TYPE/NO. INTERVAL | RECOVERY LENGTH (INCHES)

HAMMER EFFICIENCY: 60%
DATE:
N_{60} -- ○
10 20 30 40

DRY DENSITY (pcf) -- ■
90 100 110 120
MOISTURE & ATTERBERG LIMITS (%)
PL MC LL
10 20 30 40

▽ HAND PENE.
☒ TORVANE SHEAR
● UNC. COMP.
⊡ VANE SHEAR (PK)
✕ VANE SHEAR (REM)
⊕ TRIAXIAL (UU)
SHEAR STRENGTH (KSF)
1 2 3 4

REMARKS

SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	REMARKS
		Boring B25A offset approximately 5 feet from boring B25. Bulk sample obtained from 2-5 feet.
GS1		
GS2		Bulk sample obtained from 8-10 feet.
3ST	20	Shelby tube obtained from 19-21 feet.

ELEVATION: 750, 745, 740, 735, 730, 725
DEPTH: 0, 5, 10, 15, 20, 25, 30

GROUNDWATER & BACKFILL INFORMATION

GROUNDWATER WAS NOT ENCOUNTERED

BACKFILL METHOD: Auger Cuttings

NOTES: 1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

SME

BORING B26

PAGE 1 OF 1

BORING DEPTH: 19.9 FEET

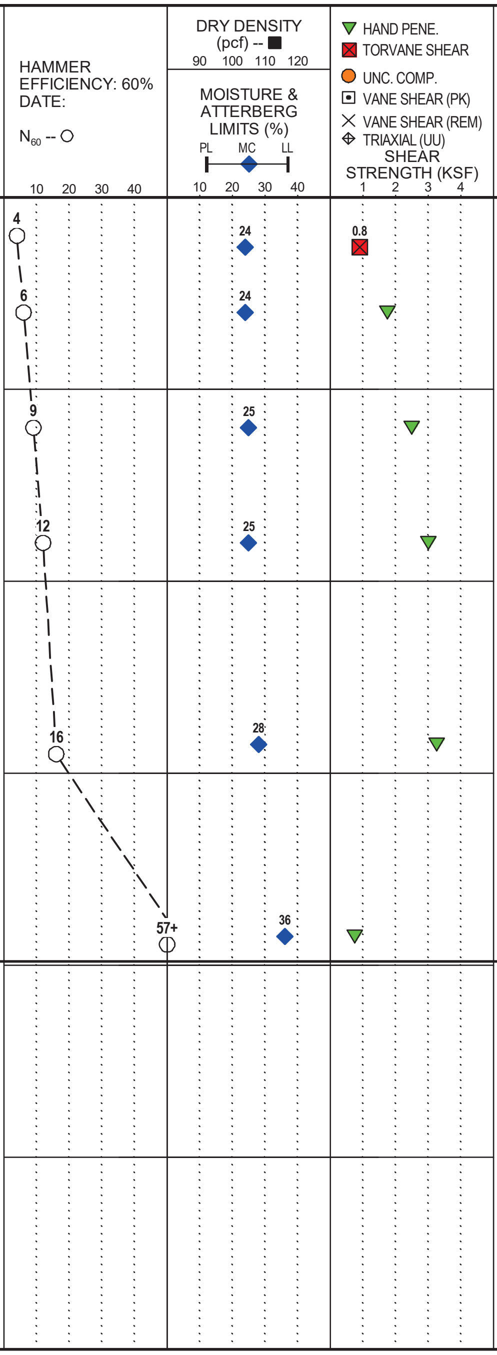
PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 12/27/25
COMPLETED: 12/27/25
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.29142
LONGITUDE: -85.52112
ELEVATION: 748± FT

HAMMER EFFICIENCY: 60%
DATE:

DEPTH (FEET)	PROFILE DESCRIPTION	ELEVATION (FEET)	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	N_{60}	MOISTURE (%) MC	SHEAR STRENGTH (KSF)	REMARKS
0.6	7.5 inches of TOPSOIL	747.4							
2.0	LEAN CLAY- Occasional Roots- Brown- Soft to Medium (CL)	746.0	SB1	17	1 2 2 3	4	24	0.8	
5.0	LEAN CLAY- Occasional Black Oxide Nodules- Reddish Brown- Medium to Stiff (CL)	743.0	SB2	19	2 3 3 4	6	24		
			SB3	20	2 4 5 6	9	25		
13.5	FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown- Stiff to Very Stiff (CH)	734.5	SB4	24	4 6 6 9	12	25		
18.5	FAT CLAY- Trace Limestone Fragments- Tan and Black Mottled- Very Stiff (CH)	729.5	SB5	18	6 7 9	16	28		
19.5	FAT CLAY with Fine to Medium Sand- Trace Limestone Fragments- Brown- Medium (CH)	728.5	SB6	17	6 7 50/5"	57+	36		
19.9	Completely Weathered LIMESTONE- Gray and Brown- Hard	728.1							Sampler refusal at 19.9 feet.

END OF BORING AT 19.9 FEET.



GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	Not Encountered	
▼ **AT END OF BORING:**	Note 3	
CAVE-IN OF BOREHOLE AT:	3.0	745.0
BACKFILL METHOD:	Auger Cuttings	

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. Groundwater was not encountered above the borehole cave in depth.

3/19/26 8:50:27 AM

SME

BORING B27

PAGE 1 OF 1

BORING DEPTH: 28 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 12/30/25
COMPLETED: 12/30/25
BORING METHOD: Hollow Stem Augers/NQ2 Core
DRILLER: RM (Mathes Drilling)
RIG NO.: B-53 (ATV)
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.29174
LONGITUDE: -85.52050
ELEVATION: 744.5± FT

HAMMER EFFICIENCY: 60%
DATE:
N_{60} -- ○

DRY DENSITY (pcf) -- ■

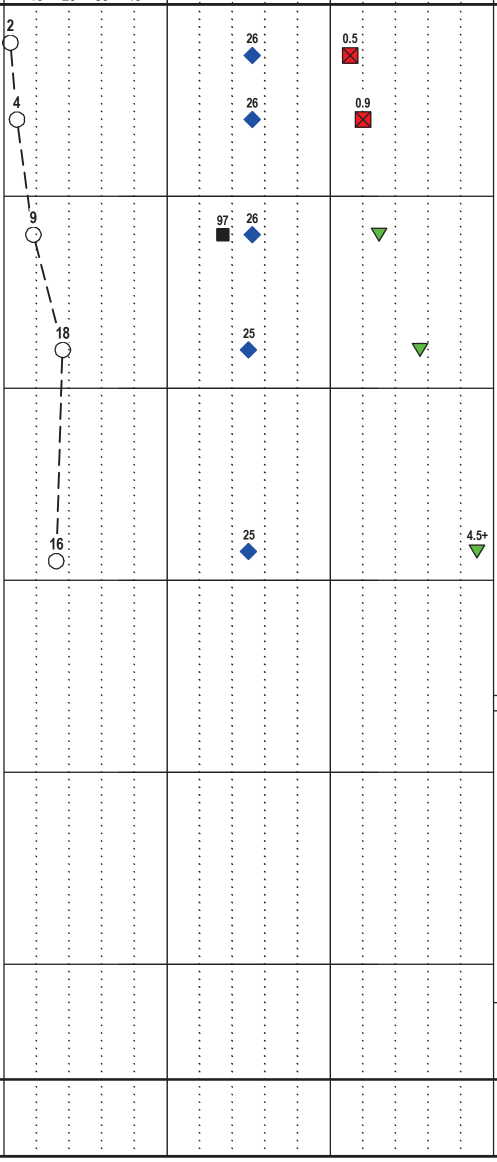
MOISTURE & ATTERBERG LIMITS (%) PL MC LL

▼ HAND PENE.
☒ TORVANE SHEAR
● UNC. COMP.
⊡ VANE SHEAR (PK)
× VANE SHEAR (REM)
⊕ TRIAXIAL (UU)
SHEAR STRENGTH (KSF)

DEPTH (FEET)	PROFILE DESCRIPTION	ELEVATION (FEET)	REMARKS
0.7	8 inches of TOPSOIL	743.8	
5.0	LEAN CLAY- Occasional Roots- Brown- Very Soft to Medium (CL)	739.5	
8.0	LEAN CLAY- Occasional Black Oxide Nodules- Reddish Brown- Stiff (CL)	736.5	
18.0	FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown- Very Stiff to Hard (CH)	726.5	Auger refusal at 18 feet. RC1 (18'-28') REC = 97% RQD = 66% GSI = 40 to 50 RMR = 56 Compressive strength from 18.4 to 18.7' = 3,550 psi
28.0	Moderately Weathered LIMESTONE- Pitted- Fossiliferous- Occasional Stylites and Calcite Crystals- Moderately Fractured- Light Gray	716.5	Compressive strength from 26.0 to 26.3' = 3,930 psi

END OF BORING AT 28.0 FEET.

SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	N_{60}	DRY DENSITY (pcf)	MC (%)	SHEAR STRENGTH (KSF)
SB1	24	1 1 1 2	2		26	0.5
SB2	24	2 2 2 4	4		26	0.9
SB3	24	2 4 5 6	9	97	26	
SB4	24	4 8 10 15	18		25	
SB5	18	4 6 10	16		25	4.5+
RC1	116					



Elevation scale: 740, 735, 730, 725, 720, 715
Depth scale: 0, 5, 10, 15, 20, 25, 30

GROUNDWATER & BACKFILL INFORMATION

GROUNDWATER WAS NOT ENCOUNTERED

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

SME

BORING B28

PAGE 1 OF 1

BORING DEPTH: 3.3 FEET

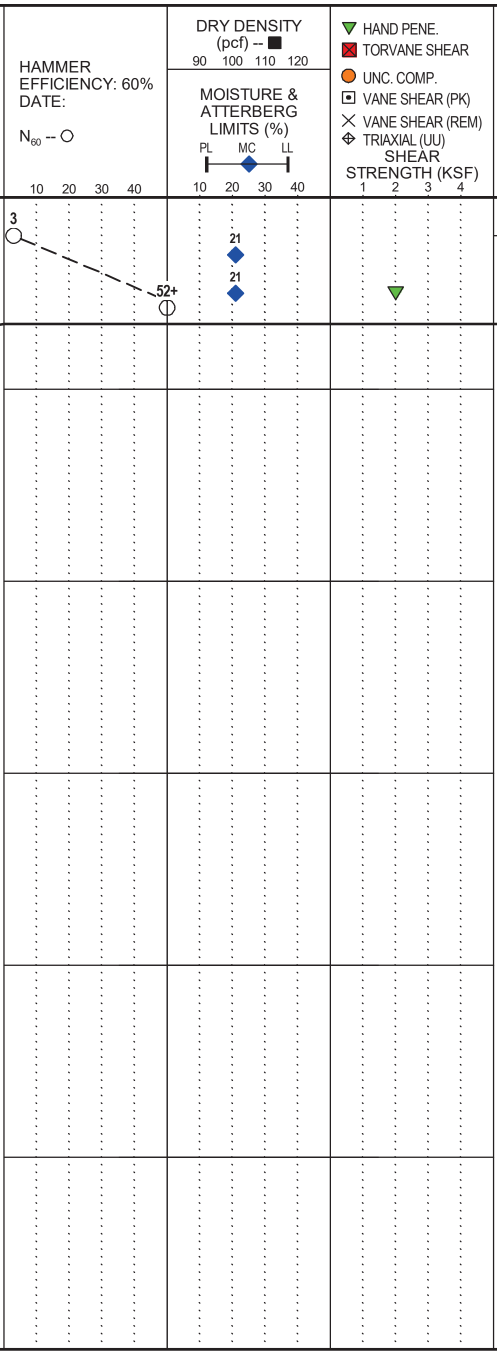
PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky

DATE STARTED: 12/22/25
COMPLETED: 12/22/25
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.29200
LONGITUDE: -85.51980
ELEVATION: 732± FT

DEPTH (FEET)	PROFILE DESCRIPTION	ELEVATION (FEET)	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	REMARKS
0.9	10.5 inches of TOPSOIL	731.1	SB1	21	0 1 2	Sample SB1 too disturbed for shear strength testing.
2.0	LEAN CLAY- Occasional Black Oxide Nodules- Brown- Soft (CL)	730.0				
3.0	LEAN CLAY- Occasional Black Oxide Nodules- Brown- Stiff to Very Stiff (CL)	729.0	SB2	15	2 3 2 50/3"	
3.3	Completely Weathered LIMESTONE- Brown- Hard	728.7				Sampler refusal at 3.3 feet.

END OF BORING AT 3.3 FEET.



GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
∇ **DURING BORING:**	Not Encountered	
▼ **AT END OF BORING:**	Note 3	
CAVE-IN OF BOREHOLE AT:	3.0	729.0
BACKFILL METHOD:	Auger Cuttings	

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. Groundwater was not encountered above the borehole cave in depth.

SME

BORING B29

PAGE 1 OF 1

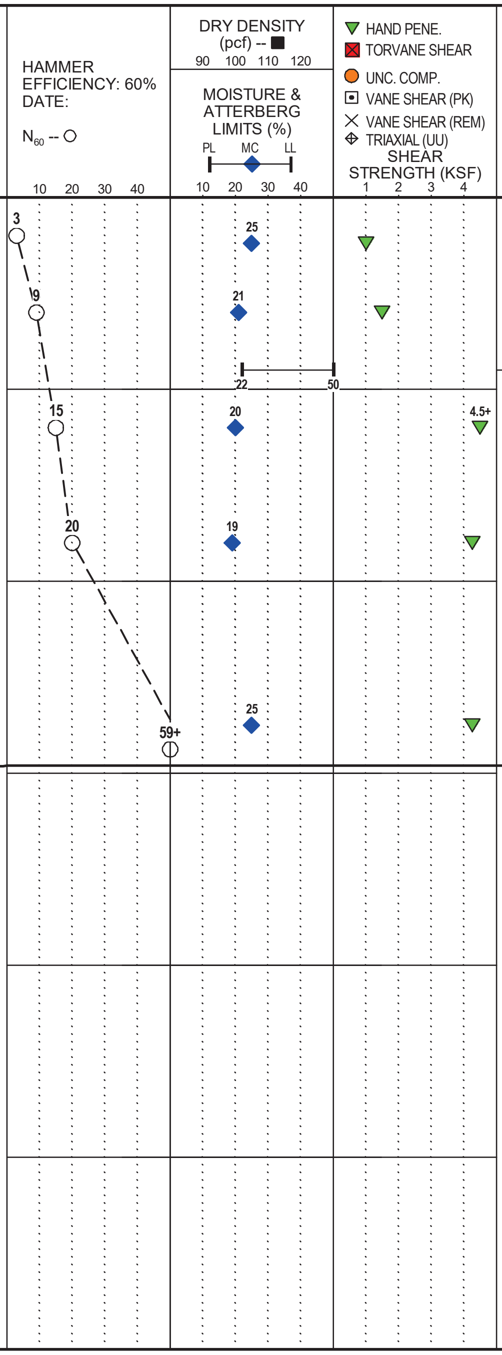
BORING DEPTH: 14.8 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 12/22/25
COMPLETED: 12/22/25
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.29238
LONGITUDE: -85.51877
ELEVATION: 749± FT

DEPTH (FEET)	ELEVATION (FEET)	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	REMARKS
0.4	748.6	5 inches of TOPSOIL				
2.0	747.0	LEAN CLAY- Occasional Roots- Brown- Soft to Medium (CL)	SB1	23	1 2 1 2	
8.0	741.0	LEAN to FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown- Stiff to Hard (CL/CH)	SB2 SB3	24 19	2 4 5 7 4 6 9 11	Samples SB2 and SB3: percent gravel = 0.8; percent sand = 7.4; percent silt = 50.4; percent clay = 41.4
13.5	735.5	FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown and Black Mottled- Very Stiff (CH)	SB4	20	6 9 11 15	
14.5	734.5	FAT CLAY- Occasional Black Oxide Nodules- Very Stiff (CH)	SB5	15	6 9 50/3"	
14.8	734.2	Completely Weathered LIMESTONE- Brown and Gray- Hard				Sampler refusal at 14.8 feet.

END OF BORING AT 14.8 FEET.



GROUNDWATER & BACKFILL INFORMATION	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	Not Encountered	
▼ **AT END OF BORING:**	Note 3	
CAVE-IN OF BOREHOLE AT:	4.0	745.0
BACKFILL METHOD:	Auger Cuttings	

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. Groundwater was not encountered above the borehole cave in depth.

SME

BORING B30

PAGE 1 OF 1

BORING DEPTH: 27.7 FEET

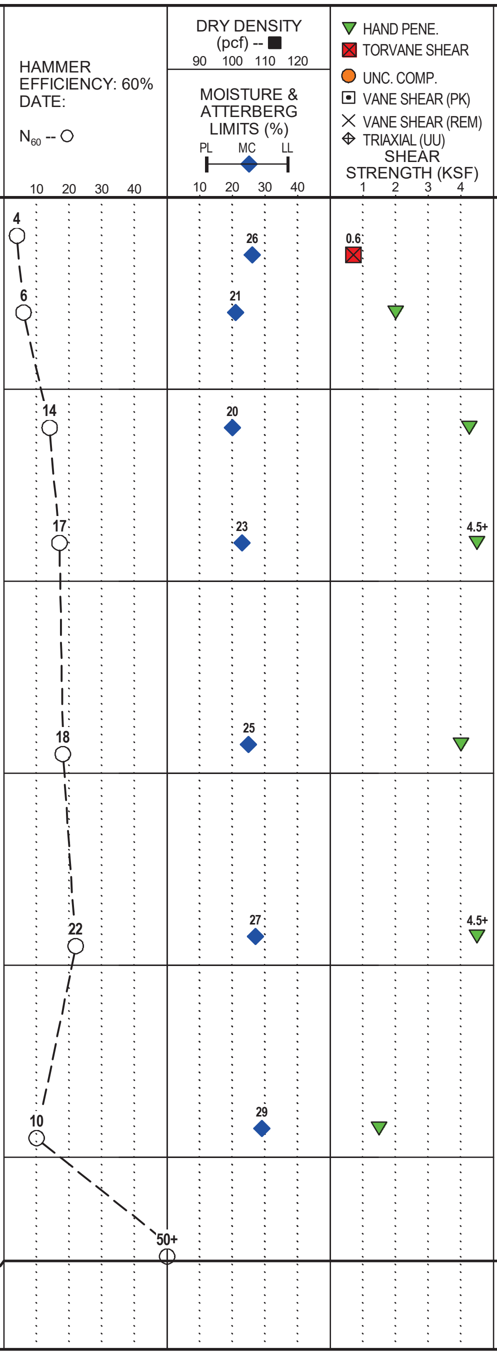
PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 1/14/26
COMPLETED: 1/14/26
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.29039
LONGITUDE: -85.52250
ELEVATION: 754± FT

DEPTH (FEET)	ELEVATION (FEET)	PROFILE DESCRIPTION
0.4	753.6	5 inches of TOPSOIL
2.0	752.0	LEAN CLAY- Occasional Roots- Brown- Soft to Medium (CL)
5.0	749.0	LEAN CLAY- Occasional Roots- Brown- Medium to Very Stiff (CL)
8.0	746.0	LEAN to FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown and Tan- Stiff to Very Stiff (CL/CH)
18.5	735.5	FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown- Very Stiff to Hard (CH)
23.5	730.5	FAT CLAY- Occasional Black Oxide Nodules- Orangish Brown and Black- Very Stiff to Hard (CH)
27.5	726.5	FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown- Stiff (CH)
27.7	726.3	Completely Weathered LIMESTONE- Gray- Hard

END OF BORING AT 27.7 FEET.

SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	N_{60}	MOISTURE (%)	SHEAR STRENGTH (KSF)	REMARKS
SB1	15	1 1 3 3	4	26	0.6	
SB2	18	2 2 4 6	6	21		
SB3	17	5 7 7 9	14	20		
SB4	18	4 7 10 12	17	23	4.5+	
SB5	18	8 8 10	18	25		
SB6	18	9 10 12	22	27	4.5+	
SB7	18	3 4 6	10	29		
SB8	2	50/2"	50+			Sampler refusal at 27.7 feet.



GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	27.0	727.0
▼ **AT END OF BORING:**	27.0	727.0
CAVE-IN OF BOREHOLE AT:	4.0	750.0

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

3/19/26 8:50:33 AM

BORING B31

PAGE 1 OF 1

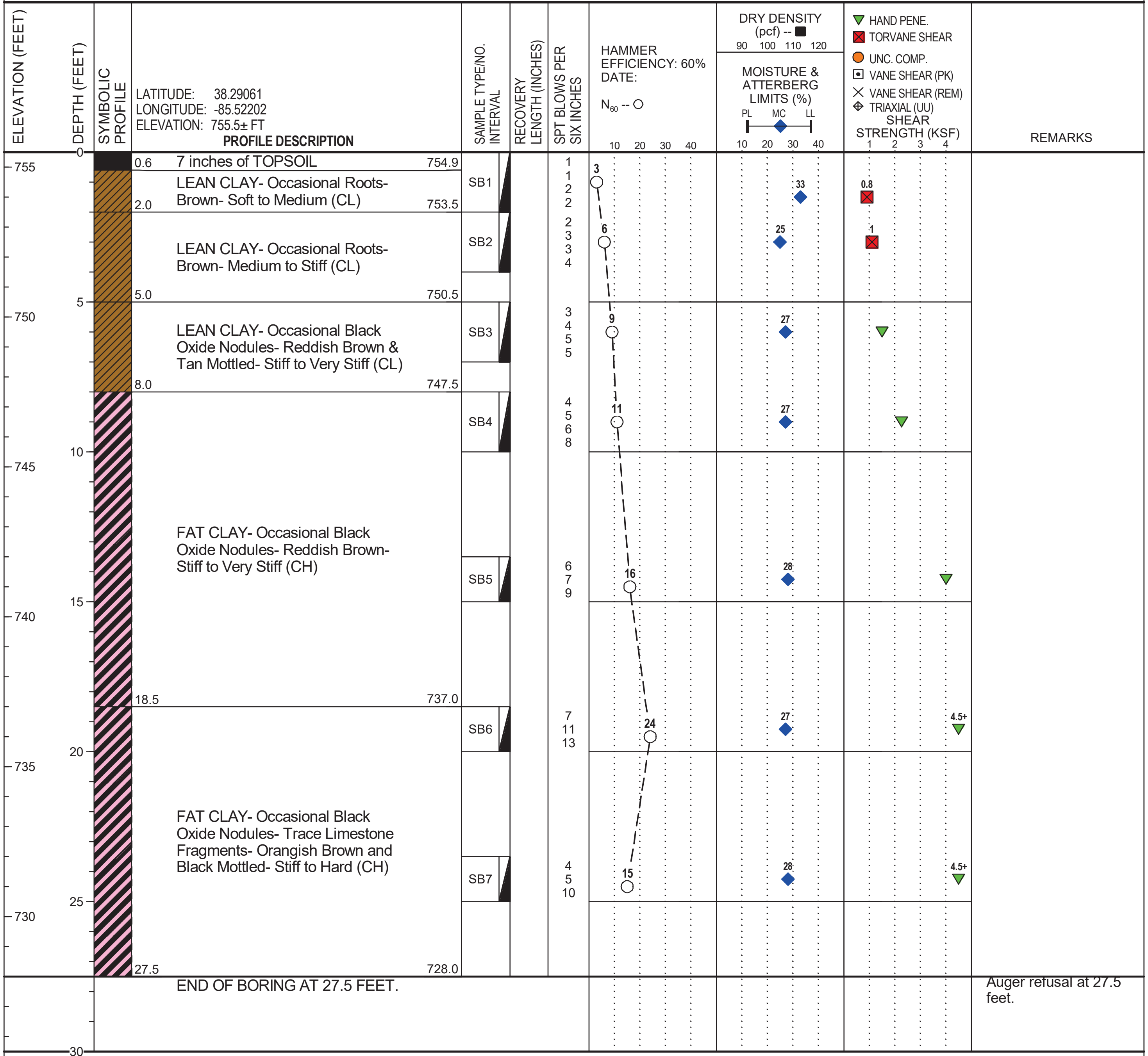
BORING DEPTH: 27.5 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky

DATE STARTED: 1/19/26
COMPLETED: 1/19/26
BORING METHOD: Hollow Stem Augers
DRILLER: RM (Mathes Drilling)
RIG NO.: B-53 (ATV)
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.29061
LONGITUDE: -85.52202
ELEVATION: 755.5± FT

HAMMER EFFICIENCY: 60%
DATE:



DEPTH (FEET)	ELEVATION (FEET)	PROFILE DESCRIPTION
0.6	754.9	7 inches of TOPSOIL
2.0	753.5	LEAN CLAY- Occasional Roots- Brown- Soft to Medium (CL)
5.0	750.5	LEAN CLAY- Occasional Roots- Brown- Medium to Stiff (CL)
8.0	747.5	LEAN CLAY- Occasional Black Oxide Nodules- Reddish Brown & Tan Mottled- Stiff to Very Stiff (CL)
18.5	737.0	FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown- Stiff to Very Stiff (CH)
27.5	728.0	FAT CLAY- Occasional Black Oxide Nodules- Trace Limestone Fragments- Orangish Brown and Black Mottled- Stiff to Hard (CH)

END OF BORING AT 27.5 FEET.

SAMPLE TYPE/NO.	SPT BLOWS PER SIX INCHES	N_{60}	MC	SHEAR STRENGTH (KSF)
SB1	1 1 2 2	3	33	0.8
SB2	2 3 3 4	6	25	1
SB3	3 4 5 5	9	27	
SB4	4 5 6 8	11	27	
SB5	6 7 9	16	28	
SB6	7 11 13	24	27	4.5+
SB7	4 5 10	15	28	4.5+

REMARKS: Auger refusal at 27.5 feet.

GROUNDWATER & BACKFILL INFORMATION

GROUNDWATER WAS NOT ENCOUNTERED

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

RECEIVED May 22, 2026 Planning and Design 26-ZONE-0056

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BORING B32

PAGE 1 OF 2

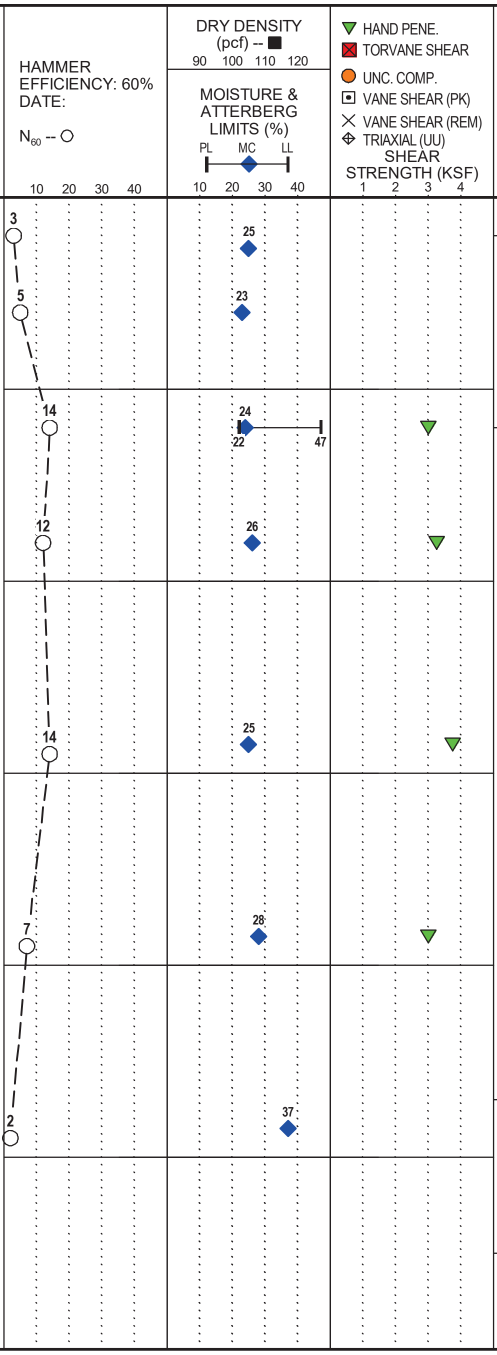
BORING DEPTH: 37.5 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 12/30/25
COMPLETED: 12/30/25
BORING METHOD: Hollow Stem Augers/NQ2 Core
DRILLER: RM (Mathes Drilling)
RIG NO.: B-53 (ATV)
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.29090
LONGITUDE: -85.52117
ELEVATION: 755± FT

HAMMER EFFICIENCY: 60%
DATE:

ELEVATION (FEET)	DEPTH (FEET)	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	N_{60}	MC (%)	REMARKS
754.3	0.7	8 inches of TOPSOIL						
750.0	5.0	LEAN CLAY- Occasional Roots- Brown- Soft to Medium (CL)	SB1	24	1 1 2 3	3	25	Samples SB1 and SB2 too disturbed for shear strength testing.
			SB2	24	2 2 3 4	5	23	
746.0	9.0	LEAN CLAY- Occasional Black Oxide Nodules- Reddish Brown and Brown Mottled- Stiff to Very Stiff (CL)	SB3	24	5 7 7 10	14	24 (PL 22, LL 47)	Sample SB3: percent gravel = 0; percent sand = 3.7; percent silt = 55.7; percent clay = 40.6
			SB4	24	3 5 7 9	12	26	
736.5	18.5	FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown- Stiff to Very Stiff (CH)	SB5	18	4 6 8	14	25	
731.5	23.5	FAT CLAY- Frequent Black Oxide Nodules- Orangish Brown and Black Mottled- Medium to Very Stiff (CH)	SB6	18	2 3 4	7	28	
729.0	26.0	LEAN CLAY- Brown- Very Soft (CL)	SB7	1	1 1 1	2	37	Sample SB7 too disturbed for shear strength testing.
727.5	27.5	Presumed Completely Weathered LIMESTONE- Drillers Classification						Auger refusal at 27.5 feet. RC1 (27.5'-37.5') REC = 100% RQD = 67% GSI = 45 to 55



GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	23.0	732.0

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

(Continued Next Page)

BORING B32

PAGE 2 OF 2

BORING DEPTH: 37.5 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky

LATITUDE: 38.29090
LONGITUDE: -85.52117
ELEVATION: 755± FT

HAMMER EFFICIENCY: 60%
DATE:
N_{60} -- ○

DRY DENSITY (pcf) -- ■ (90, 100, 110, 120)
MOISTURE & ATTERBERG LIMITS (%): PL, MC, LL (10, 20, 30, 40)

▼ HAND PENE.
☒ TORVANE SHEAR
● UNC. COMP.
⊡ VANE SHEAR (PK)
× VANE SHEAR (REM)
◈ TRIAXIAL (UU)
SHEAR STRENGTH (KSF) (1, 2, 3, 4)

ELEVATION (FEET)	DEPTH (FEET)	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	REMARKS
725	30	Moderately to Slightly Weathered LIMESTONE- Fossiliferous- Pitted- Occasional Stylolites and Vertical Fractures- Highly Fractured to Moderately Fractured- Light Gray to Medium Gray *(continued)*	RC1	120		RMR = 50
717.5	37.5	END OF BORING AT 37.5 FEET.				

Elevation scale: 725, 720, 715, 710, 705, 700, 695, 690, 685
Depth scale: 30, 35, 40, 45, 50, 55, 60, 65, 70

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BORING B32A

PAGE 1 OF 1

BORING DEPTH: 25.5 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 1/23/26
COMPLETED: 1/23/26
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.29090
LONGITUDE: -85.52117
ELEVATION: 755± FT

HAMMER EFFICIENCY: 60%
DATE:
N_{60} -- ○ (10 20 30 40)

DRY DENSITY (pcf) -- ■ (90 100 110 120)

MOISTURE & ATTERBERG LIMITS (%) PL MC LL (10 20 30 40)

▽ HAND PENE.
☒ TORVANE SHEAR
● UNC. COMP.
⊡ VANE SHEAR (PK)
× VANE SHEAR (REM)
⊕ TRIAXIAL (UU)
SHEAR STRENGTH (KSF) (1 2 3 4)

ELEVATION (FEET)	DEPTH (FEET)	SYMBOLIC PROFILE	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	REMARKS
755	0					Boring B32A offset approximately 5 feet from boring B32.
750	5			GS1		Bulk sample obtained from 5-7 feet.
745	10			GS2		Bulk sample obtained from 10-12 feet.
740	15					
735	20					
				3ST1	22	Shelby tube obtained from 23-25 feet.
730	25					
725	30					

GROUNDWATER & BACKFILL INFORMATION

GROUNDWATER WAS NOT ENCOUNTERED

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

3/19/26 8:50:38 AM

SME®

BORING B33

PAGE 1 OF 1

BORING DEPTH: 25.6 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky

DATE STARTED: 12/27/25
COMPLETED: 12/27/25
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH

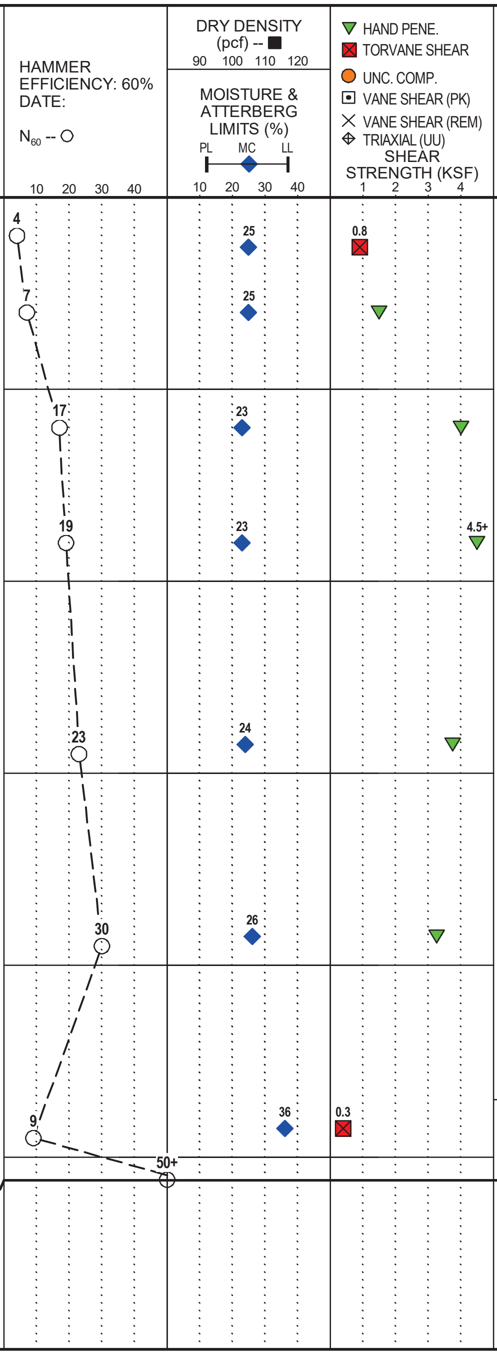
LATITUDE: 38.29115
LONGITUDE: -85.52048
ELEVATION: 755.5± FT

HAMMER EFFICIENCY: 60%
DATE:

DEPTH (FEET)	PROFILE DESCRIPTION	ELEVATION (FEET)
0.5	6 inches of TOPSOIL	755.0
2.0	LEAN CLAY- Occasional Roots- Brown- Soft to Medium (CL)	753.5
5.0	LEAN CLAY- Occasional Black Oxide Nodules- Reddish Brown- Medium to Stiff (CL)	750.5
13.5	FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown- Very Stiff to Hard (CH)	742.0
18.5	FAT CLAY with Fine Sand- Reddish Brown- Very Stiff (CH)	737.0
23.5	FAT CLAY- Frequent Black Oxide Nodules- Trace Limestone Fragments- Tan and Black Mottled- Very Stiff (CH)	732.0
25.5	LEAN CLAY with Fine to Coarse Sand and Fine Gravel- Trace Limestone Fragments- Brown- Soft to Medium (CL)	730.0
25.6	Completely Weathered LIMESTONE- Brown and Gray- Hard	729.9

END OF BORING AT 25.6 FEET.

SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	N60	MC (%)	SHEAR STRENGTH (KSF)	REMARKS
SB1	19	2 2 2 3	4	25	0.8	
SB2	17	1 3 4 5	7	25		
SB3	19	3 7 10 12	17	23		
SB4	24	5 8 11 15	19	23	4.5+	
SB5	18	10 11 12	23	24		
SB6	18	8 11 19	30	26		
SB7	18	4 5 4	9	36	0.3	Blow count values increased due to presence of rock fragments.
SB8	2	50/2"	50+			Sampler refusal at 25.6 feet.



GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ DURING BORING:	Not Encountered	
▼ AT END OF BORING:	Note 3	
CAVE-IN OF BOREHOLE AT:	3.0	752.5
BACKFILL METHOD:	Auger Cuttings	

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. Groundwater was not encountered above the borehole cave in depth.

RECEIVED May 22, 2026 Planning and Design 26-ZONE-0056

3/19/26 8:50:40 AM

SME®

BORING B34

PAGE 1 OF 1

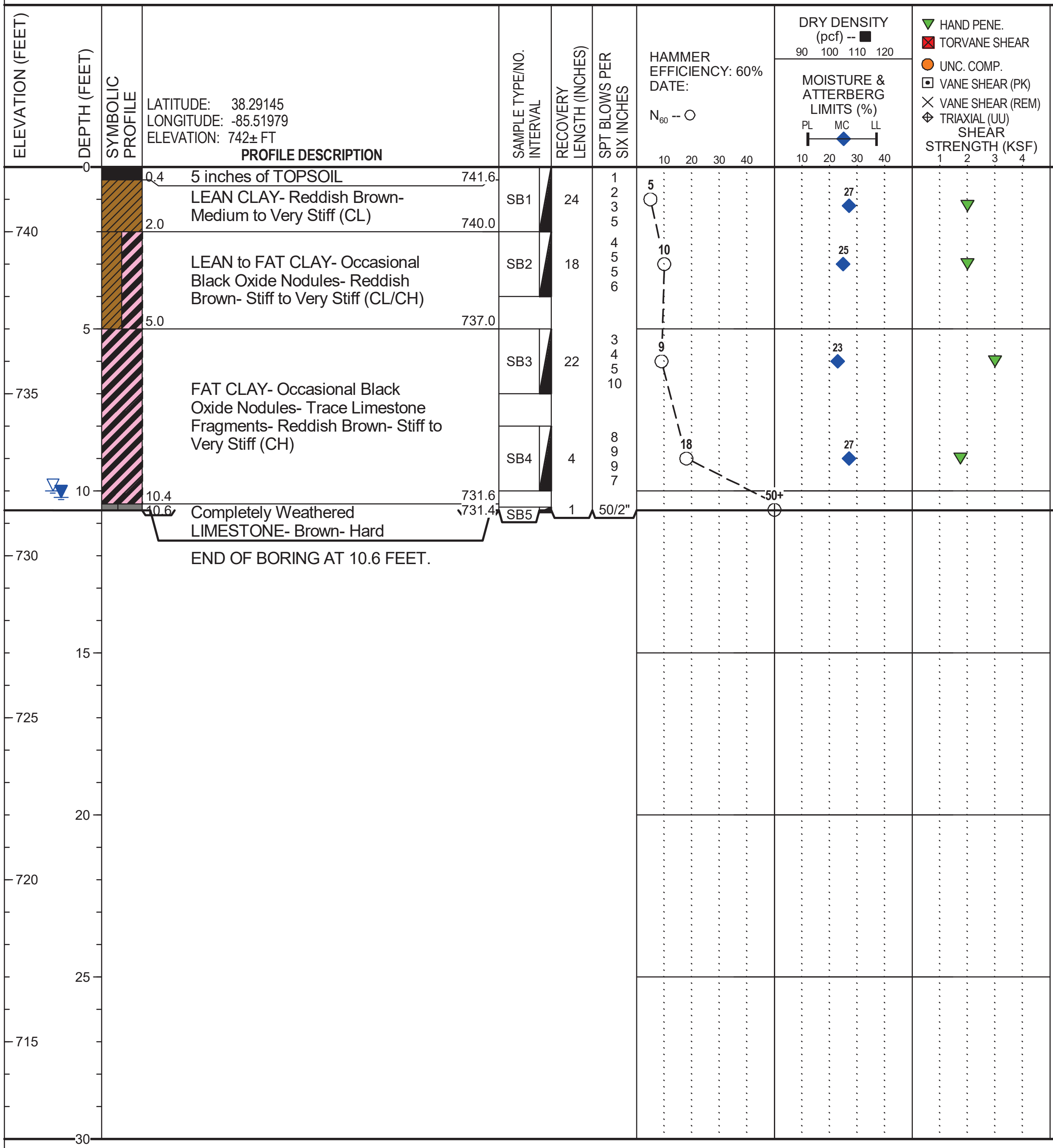
BORING DEPTH: 10.6 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 12/23/25
COMPLETED: 12/23/25
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.29145
LONGITUDE: -85.51979
ELEVATION: 742± FT

DEPTH (FEET)	PROFILE DESCRIPTION	ELEVATION (FEET)	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	REMARKS
0.4	5 inches of TOPSOIL	741.6				
2.0	LEAN CLAY- Reddish Brown- Medium to Very Stiff (CL)	740.0	SB1	24	1 2 3 5	
5.0	LEAN to FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown- Stiff to Very Stiff (CL/CH)	737.0	SB2	18	4 5 5 6	
10.4	FAT CLAY- Occasional Black Oxide Nodules- Trace Limestone Fragments- Reddish Brown- Stiff to Very Stiff (CH)	731.6	SB3 SB4	22 4	3 4 5 10 8 9 9 7	
10.6	Completely Weathered LIMESTONE- Brown- Hard	731.4	SB5	1	50/2"	Sampler refusal at 10.6 feet.

END OF BORING AT 10.6 FEET.



GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	10.0	732.0
▼ **AT END OF BORING:**	10.2	731.8
CAVE-IN OF BOREHOLE AT:	1.8	740.3

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

3/19/26 8:50:42 AM

BORING B35

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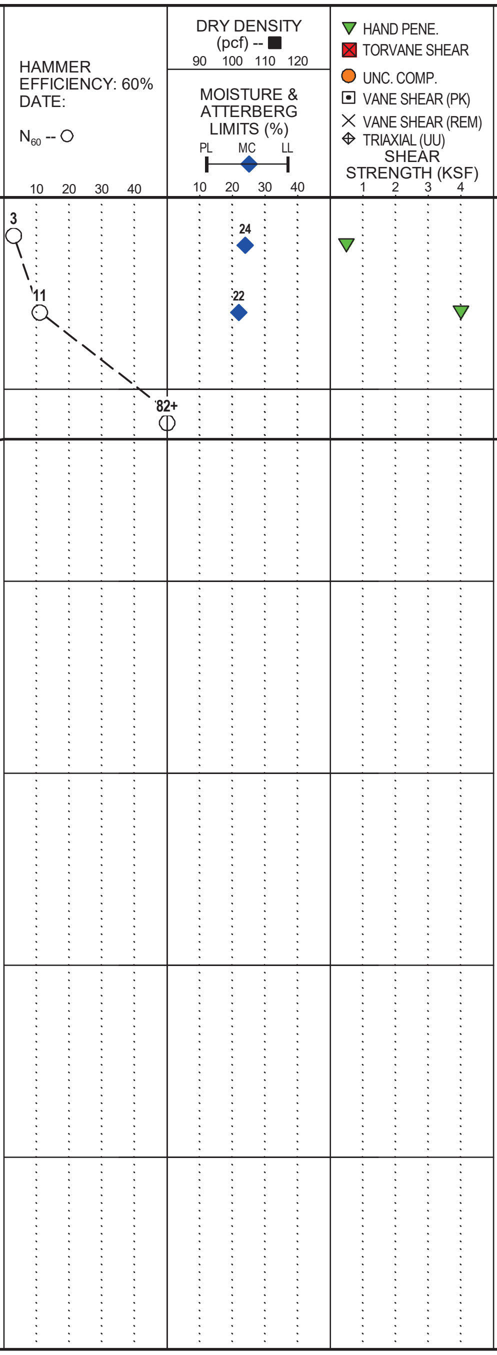
BORING DEPTH: 6.3 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 12/22/25
COMPLETED: 12/22/25
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.29174
LONGITUDE: -85.51914
ELEVATION: 738± FT

ELEVATION (FEET)	DEPTH (FEET)	PROFILE DESCRIPTION		SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	REMARKS
737.5	0.5	5.5 inches of TOPSOIL					
736.0	2.0	LEAN CLAY- Occasional Roots- Brown- Soft to Medium (CL)		SB1	24	0 1 2 1	
733.0	5.0	LEAN CLAY- Frequent Black Oxide Nodules- Trace Limestone Gravel- Brown and Black Mottled- Stiff to Very Stiff (CL)		SB2	24	2 5 6 5	
731.7	6.3	Completely Weathered LIMESTONE- Brown and Gray- Hard		SB3	10	5 32 50/3"	Sampler refusal at 6.3 feet.

END OF BORING AT 6.3 FEET.



GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	5.0	733.0
▼ **AT END OF BORING:**	4.3	733.7
CAVE-IN OF BOREHOLE AT:	4.0	734.0

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

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SME

BORING B36

PAGE 1 OF 1

BORING DEPTH: 26.7 FEET

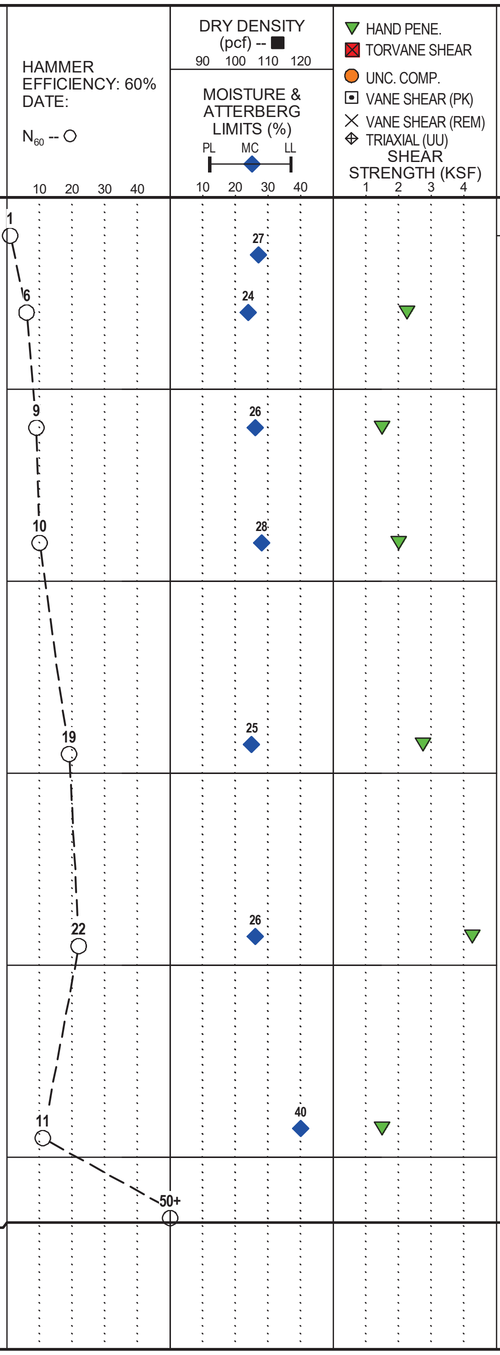
PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 1/15/26
COMPLETED: 1/15/26
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.28991
LONGITUDE: -85.52272
ELEVATION: 754.5± FT

DEPTH (FEET)	PROFILE DESCRIPTION	ELEVATION (FEET)
0.5	6.5 inches of TOPSOIL	754.0
2.0	LEAN CLAY- Occasional Roots- Brown- Very Soft (CL)	752.5
5.0	LEAN CLAY- Occasional Roots- Brown- Medium to Very Stiff (CL)	749.5
8.0	LEAN CLAY- Occasional Black Oxide Nodules- Reddish Brown- Stiff (CL)	746.5
18.9	FAT CLAY- Occasional Black Oxide Nodules- Stiff to Very Stiff (CH)	735.6
26.5	FAT CLAY- Frequent Black Oxide Nodules- Orangish Brown and Black Mottled- Very Stiff to Stiff (CH)	728.0
26.7	Completely Weathered LIMESTONE- Gray and Brown- Hard	727.8

END OF BORING AT 26.7 FEET.

SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES
SB1	16	0 0 1 2
SB2	24	3 3 3 4
SB3	24	3 4 5 5
SB4	24	3 4 6 8
SB5	18	6 8 11
SB6	18	6 9 13
SB7	18	4 4 7
SB8	2	50/2"



REMARKS

Sample SB1 too disturbed for shear strength testing.

Sampler refusal at 26.7 feet.

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	Not Encountered	
▼ **AT END OF BORING:**	26.1	728.4
CAVE-IN OF BOREHOLE AT:	5.0	749.5
BACKFILL METHOD:	Auger Cuttings	

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

RECEIVED May 22, 2026 Planning and Design 26-ZONE-0056

SME

BORING B37

PAGE 1 OF 2

BORING DEPTH: 29.3 FEET

PROJECT NAME: Greenfield Site Development

PROJECT NUMBER: 102074.00

CLIENT: Luckett & Farley

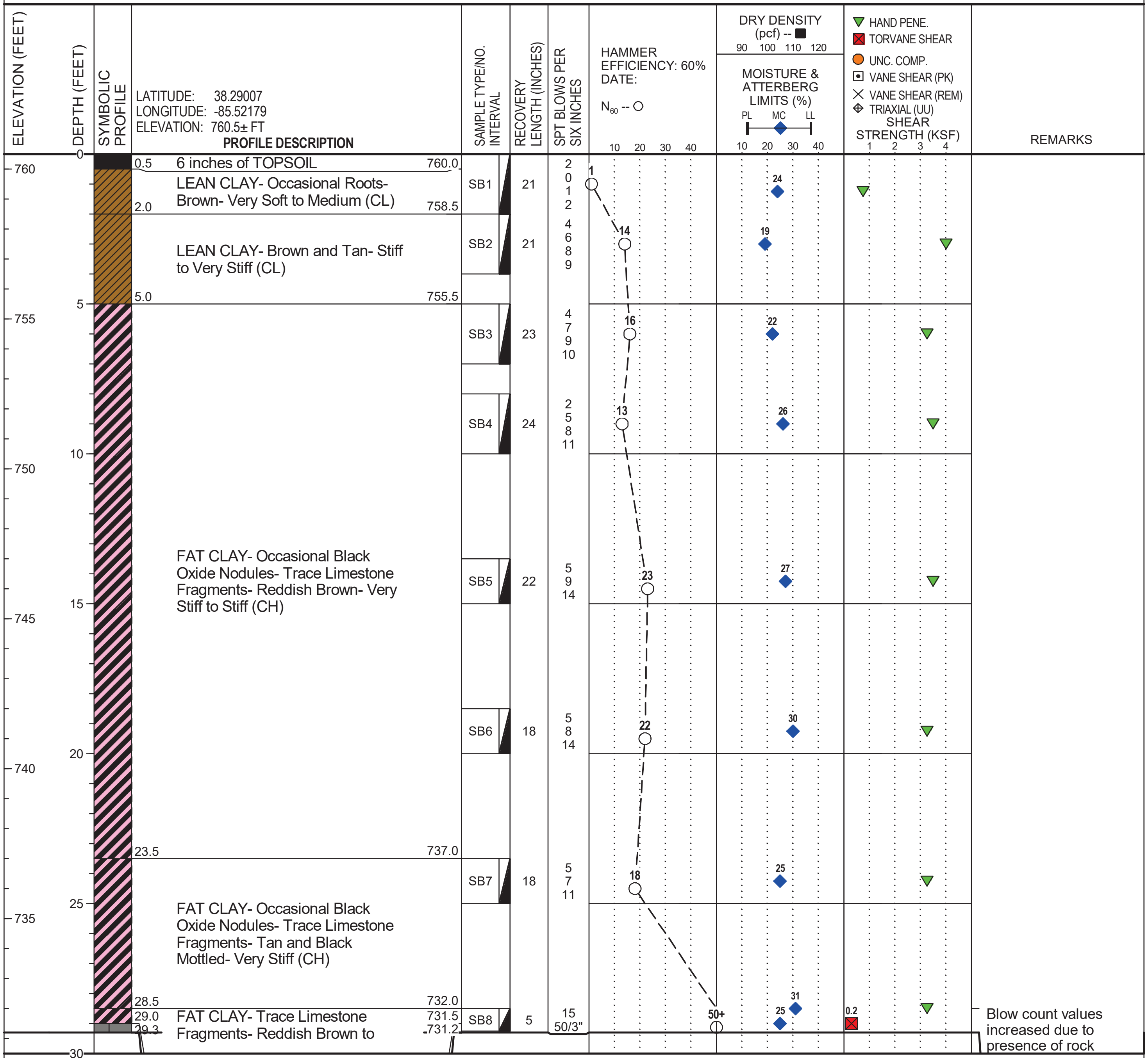
PROJECT LOCATION: Louisville, Kentucky

DATE STARTED: 12/28/25 **COMPLETED:** 12/28/25 **BORING METHOD:** Hollow Stem Augers

DRILLER: CD (Black Sheep) **RIG NO.:** Geoprobe 7822DT ATV **LOGGED BY:** A. Dodson **CHECKED BY:** WH

LATITUDE: 38.29007
LONGITUDE: -85.52179
ELEVATION: 760.5± FT

HAMMER EFFICIENCY: 60%
DATE:



DEPTH (FT)	ELEV (FT)	PROFILE DESCRIPTION
0.5	760.0	6 inches of TOPSOIL
2.0	758.5	LEAN CLAY- Occasional Roots- Brown- Very Soft to Medium (CL)
5.0	755.5	LEAN CLAY- Brown and Tan- Stiff to Very Stiff (CL)
23.5	737.0	FAT CLAY- Occasional Black Oxide Nodules- Trace Limestone Fragments- Reddish Brown- Very Stiff to Stiff (CH)
28.5	732.0	FAT CLAY- Occasional Black Oxide Nodules- Trace Limestone Fragments- Tan and Black Mottled- Very Stiff (CH)
29.0	731.5	FAT CLAY- Trace Limestone Fragments- Reddish Brown to
29.3	731.2	

SAMPLE TYPE/NO.	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	N_{60}	MC (%)	SHEAR STRENGTH (KSF)	REMARKS
SB1	21	2 0 1 2	1	24		
SB2	21	4 6 8 9	14	19		
SB3	23	4 7 9 10	16	22		
SB4	24	2 5 8 11	13	26		
SB5	22	5 9 14	23	27		
SB6	18	5 8 14	22	30		
SB7	18	5 7 11	18	25		
SB8	5	15 50/3"	50+	31 25	0.2	Blow count values increased due to presence of rock

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	Not Encountered	
▼ **AT END OF BORING:**	Note 3	
CAVE-IN OF BOREHOLE AT:	3.0	757.5
BACKFILL METHOD:	Auger Cuttings	

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. Groundwater was not encountered above the borehole cave in depth.

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BORING B37

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BORING DEPTH: 29.3 FEET

PROJECT NAME: Greenfield Site Development

PROJECT NUMBER: 102074.00

CLIENT: Luckett & Farley

PROJECT LOCATION: Louisville, Kentucky

ELEVATION (FEET)	DEPTH (FEET)	SYMBOLIC PROFILE	LATITUDE: 38.29007 LONGITUDE: -85.52179 ELEVATION: 760.5± FT PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	HAMMER EFFICIENCY: 60% DATE: N_{60} -- ○ 10 20 30 40	DRY DENSITY (pcf) -- ■ 90 100 110 120 MOISTURE & ATTERBERG LIMITS (%) PL MC LL 10 20 30 40	▼ HAND PENE. ☒ TORVANE SHEAR ● UNC. COMP. ⊡ VANE SHEAR (PK) ✕ VANE SHEAR (REM) ⊕ TRIAXIAL (UU) SHEAR STRENGTH (KSF) 1 2 3 4	REMARKS
	30		Brown- Very Soft (CH)							fragments.
730			Completely Weathered LIMESTONE- Brown and Gray- Hard							Sampler refusal at 29.3 feet.
			END OF BORING AT 29.3 FEET.							
	35									
725										
	40									
720										
	45									
715										
	50									
710										
	55									
705										
	60									
700										
	65									
695										
	70									

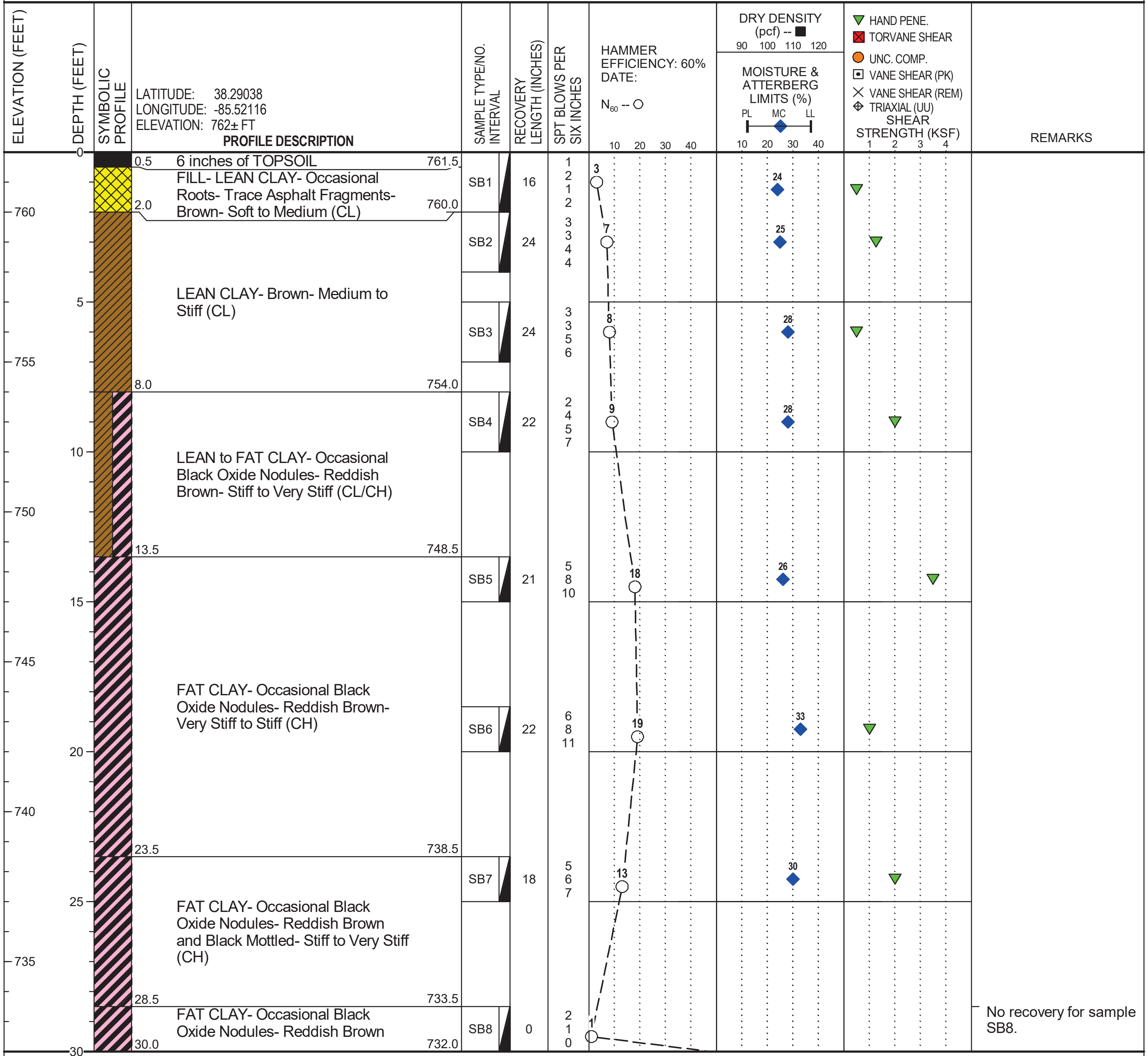
SME

BORING B38

PAGE 1 OF 2

BORING DEPTH: 30.2 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 12/27/25
COMPLETED: 12/27/25
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH



Depth (ft)	Elevation (ft)	Profile Description
0.5	761.5	6 inches of TOPSOIL
2.0	760.0	FILL- LEAN CLAY- Occasional Roots- Trace Asphalt Fragments- Brown- Soft to Medium (CL)
8.0	754.0	LEAN CLAY- Brown- Medium to Stiff (CL)
13.5	748.5	LEAN to FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown- Stiff to Very Stiff (CL/CH)
23.5	738.5	FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown- Very Stiff to Stiff (CH)
28.5	733.5	FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown and Black Mottled- Stiff to Very Stiff (CH)
30.0	732.0	FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown

Sample	Recovery (in.)	SPT Blows	N60	MC (%)	Remarks
SB1	16	1 2 1 2	3	24	
SB2	24	3 3 4 4	7	25	
SB3	24	3 3 5 6	8	28	
SB4	22	2 4 5 7	9	28	
SB5	21	5 8 10	18	26	
SB6	22	6 8 11	19	33	
SB7	18	5 6 7	13	30	
SB8	0	2 1 0	1		No recovery for sample SB8.

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	Not Encountered	
▼ **AT END OF BORING:**	Note 3	
CAVE-IN OF BOREHOLE AT:	4.0	758.0
BACKFILL METHOD:	Auger Cuttings	

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. Groundwater was not encountered above the borehole cave in depth.

(Continued Next Page)

BORING B38

BORING DEPTH: 30.2 FEET

PROJECT NAME: Greenfield Site Development **PROJECT NUMBER:** 102074.00

CLIENT: Luckett & Farley **PROJECT LOCATION:** Louisville, Kentucky

LATITUDE: 38.29038
LONGITUDE: -85.52116
ELEVATION: 762± FT

HAMMER EFFICIENCY: 60%
DATE:

N_{60} -- ○

DRY DENSITY (pcf) -- ■ 90 100 110 120

MOISTURE & ATTERBERG LIMITS (%) PL MC LL ⊢◆⊣ 10 20 30 40

▼ HAND PENE.
☒ TORVANE SHEAR
● UNC. COMP.
⊡ VANE SHEAR (PK)
× VANE SHEAR (REM)
⊕ TRIAXIAL (UU)

SHEAR STRENGTH (KSF) 1 2 3 4

ELEVATION (FEET)	DEPTH (FEET)	SYMBOLIC PROFILE	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	N_{60} 10 20 30 40	DRY DENSITY / MOISTURE & ATTERBERG LIMITS	SHEAR STRENGTH (KSF)	REMARKS
731.8	30		and Black Mottled- Very Soft (CH)							Sampler refusal at 30.2 feet.
	30.2		Completely Weathered LIMESTONE- Gray and Brown- Hard	SB9	2	50/2"	50+			

END OF BORING AT 30.2 FEET.

ELEVATION (FEET)	DEPTH (FEET)
730	
	35
725	
	40
720	
	45
715	
	50
710	
	55
705	
	60
700	
	65
695	
	70

BORING B39

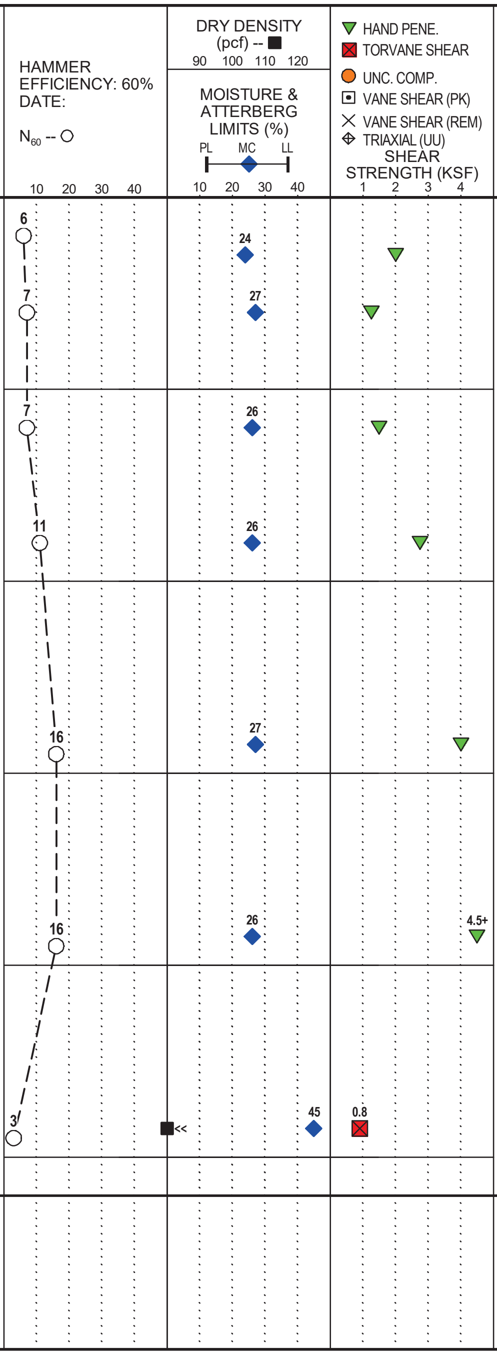
PAGE 1 OF 1

BORING DEPTH: 26 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 1/19/26
COMPLETED: 1/19/26
BORING METHOD: Hollow Stem Augers
DRILLER: RM (Mathes Drilling)
RIG NO.: B-53 (ATV)
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.29064
LONGITUDE: -85.52051
ELEVATION: 760.5± FT

DEPTH (FEET)	ELEVATION (FEET)	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	REMARKS
0 – 5.0	760.5 – 755.5	LEAN CLAY- Occasional Roots- Brown to Reddish Brown- Medium to Very Stiff (CL)	SB1	24	2 3 3 3	
			SB2	24	2 3 4 6	
5.0 – 8.0	755.5 – 752.5	LEAN CLAY- Occasional Black Oxide Nodules- Reddish Brown and Tan Mottled- Medium to Stiff (CL)	SB3	24	1 3 4 6	
8.0 – 18.5	752.5 – 742.0	FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown- Stiff to Very Stiff (CH)	SB4	24	3 4 7 9	
			SB5	18	5 7 9	
18.5 – 23.5	742.0 – 737.0	FAT CLAY- Frequent Black Oxide Nodules- Orangish Brown and Black Mottled- Very Stiff to Hard (CH)	SB6	18	4 8 8	
23.5 – 26.0	737.0 – 734.5	LEAN to FAT CLAY- Brown- Soft to Medium (CL/CH)	SB7		1 1 2	
26.0	734.5	END OF BORING AT 26.0 FEET.				Auger refusal at 26 feet.



GROUNDWATER & BACKFILL INFORMATION
GROUNDWATER WAS NOT ENCOUNTERED
BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

3/19/26 8:50:52 AM

BORING B40

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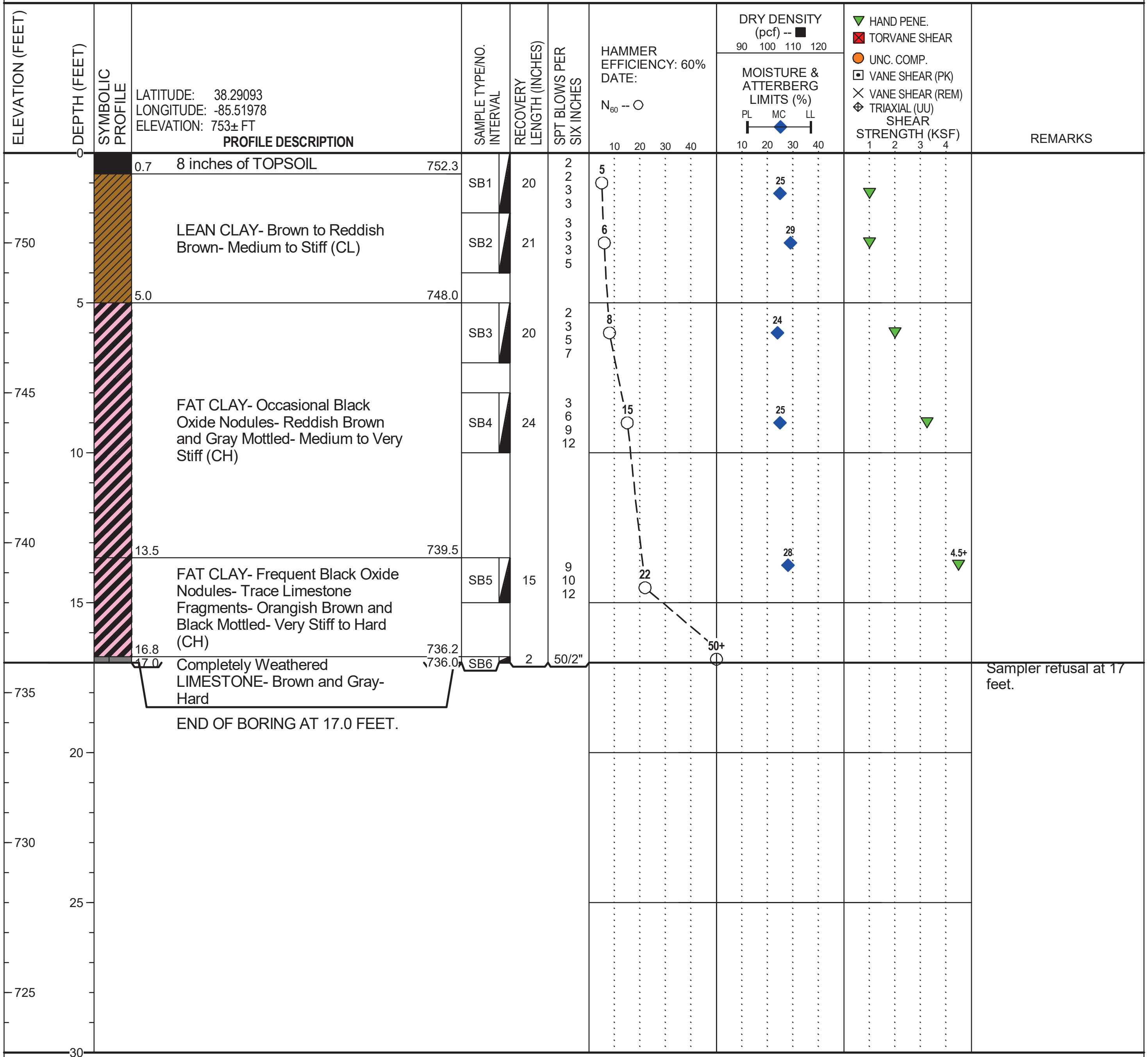
BORING DEPTH: 17 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 12/23/25
COMPLETED: 12/23/25
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH



LATITUDE: 38.29093
LONGITUDE: -85.51978
ELEVATION: 753± FT

DEPTH (FEET)	ELEVATION (FEET)	PROFILE DESCRIPTION
0.7	752.3	8 inches of TOPSOIL
5.0	748.0	LEAN CLAY- Brown to Reddish Brown- Medium to Stiff (CL)
13.5	739.5	FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown and Gray Mottled- Medium to Very Stiff (CH)
16.8	736.2	FAT CLAY- Frequent Black Oxide Nodules- Trace Limestone Fragments- Orangish Brown and Black Mottled- Very Stiff to Hard (CH)
17.0	736.0	Completely Weathered LIMESTONE- Brown and Gray- Hard

END OF BORING AT 17.0 FEET.

SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	N60	MC	REMARKS
SB1	20	2 2 3 3	5	25	
SB2	21	3 3 3 5	6	29	
SB3	20	2 3 5 7	8	24	
SB4	24	3 6 9 12	15	25	
SB5	15	9 10 12	22	28	
SB6	2	50/2"	50+		Sampler refusal at 17 feet.

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	Not Encountered	
▼ **AT END OF BORING:**	Note 3	
CAVE-IN OF BOREHOLE AT:	2.5	750.5
BACKFILL METHOD:	Auger Cuttings	

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. Groundwater was not encountered above the borehole cave in depth.

BORING B41

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BORING DEPTH: 7.7 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky

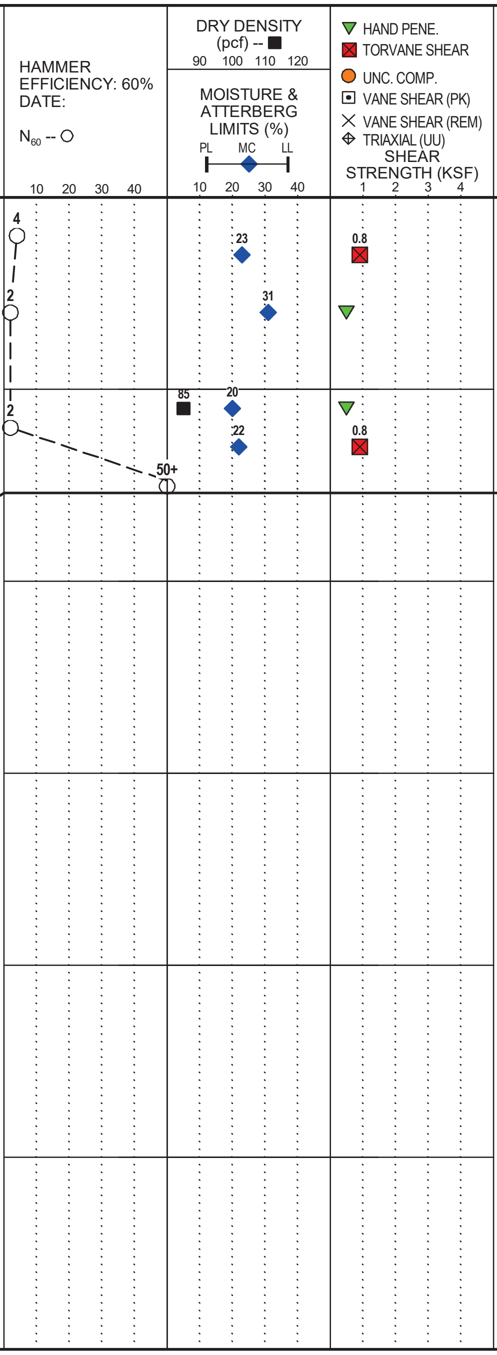
DATE STARTED: 12/22/25
COMPLETED: 12/22/25
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.29119
LONGITUDE: -85.51909
ELEVATION: 741.5± FT

DEPTH (FEET)	ELEVATION (FEET)	PROFILE DESCRIPTION
0.5	741.0	6 inches of TOPSOIL
2.0	739.5	LEAN CLAY- Occasional Roots and Black Oxide Nodules- Brown and Reddish Brown- Soft to Medium (CL)
5.0	736.5	LEAN CLAY- Occasional Roots and Black Oxide Nodules- Reddish Brown- Very Soft to Medium (CL)
6.0	735.5	LEAN CLAY- Trace Gravel- Gray- Very Soft to Medium (CL)
7.4	734.1	FAT CLAY- Frequent Black Oxide Nodules- Brown and Black Mottled- Very Soft to Medium (CH)
7.7	733.8	Completely Weathered LIMESTONE- Brown- Hard

END OF BORING AT 7.7 FEET.

SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES
SB1	14	1 2 2 2
SB2	8	2 1 1 1
SB3	24	1 1 1 4
SB4	3	50/3"



REMARKS: Sampler refusal at 7.7 feet.

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	Not Encountered	
▼ **AT END OF BORING:**	Note 3	
CAVE-IN OF BOREHOLE AT:	1.8	739.7
BACKFILL METHOD:	Auger Cuttings	

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. Groundwater was not encountered above the borehole cave in depth.

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SME

BORING B41A

PAGE 1 OF 1

BORING DEPTH: 7.5 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 1/23/26
COMPLETED: 1/23/26
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.29119
LONGITUDE: -85.51909
ELEVATION: 741.5± FT

HAMMER EFFICIENCY: 60%
DATE:
N_{60} -- ○
10 20 30 40

DRY DENSITY (pcf) -- ■
90 100 110 120

MOISTURE & ATTERBERG LIMITS (%)
PL MC LL
10 20 30 40

▽ HAND PENE.
☒ TORVANE SHEAR
● UNC. COMP.
⊡ VANE SHEAR (PK)
✕ VANE SHEAR (REM)
◈ TRIAXIAL (UU)
SHEAR STRENGTH (KSF)
1 2 3 4

ELEVATION (FEET)	DEPTH (FEET)	SYMBOLIC PROFILE	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	REMARKS
	0					
740						Boring B41A offset approximately 5 feet from boring B41.
				3ST1	11	Shelby tube obtained from 3-5 feet.
	5					
735				3ST2	17	Shelby tube obtained from 5-7 feet.
	10					
730						
	15					
725						
	20					
720						
	25					
715						
	30					

GROUNDWATER & BACKFILL INFORMATION

GROUNDWATER WAS NOT ENCOUNTERED

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

3/19/26 8:50:57 AM

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BORING B42

PAGE 1 OF 1

BORING DEPTH: 23.6 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 12/26/25
COMPLETED: 12/26/25
BORING METHOD: Hollow Stem Augers/NQ2 Core
DRILLER: RM (Mathes Drilling)
RIG NO.: B-53 (ATV)
LOGGED BY: A. Dodson
CHECKED BY: WH

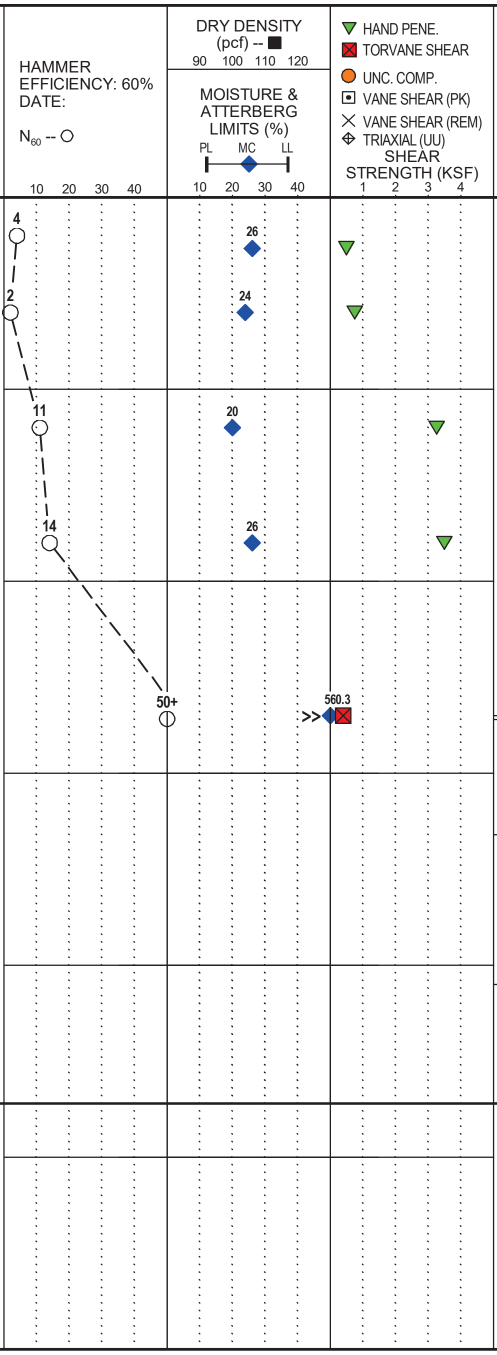
LATITUDE: 38.29152
LONGITUDE: -85.51839
ELEVATION: 751± FT

HAMMER EFFICIENCY: 60%
DATE:

DEPTH (FEET)	ELEVATION (FEET)	PROFILE DESCRIPTION
0.7	750.3	8 inches of TOPSOIL
2.0	749.0	FILL- LEAN CLAY- Occasional Roots- Brown- Soft to Medium (CL)
3.0	748.0	FILL- LEAN CLAY- Frequent Roots- Dark Brown- Very Soft to Medium (CL)
5.0	746.0	FILL- LEAN CLAY- Occasional Roots- Brown- Very Soft to Soft (CL)
6.0	745.0	FILL- LEAN CLAY- Frequent Roots- Dark Brown and Brown Mottled- Stiff to Very Stiff (CL)
8.0	743.0	LEAN CLAY- Frequent Black Oxide Nodules- Reddish Brown- Stiff to Very Stiff (CL)
9.0	742.0	LEAN CLAY- Occasional Roots and Black Oxide Nodules- Little Limestone Fragments- Brown- Stiff to Very Stiff (CL)
13.5	737.5	FAT CLAY- Frequent Black Oxide Nodules- Orangish Brown and Black Mottled- Stiff (CH)
13.6	737.4	LEAN CLAY with Completely Weathered Limestone- Brown- Soft (CL)
23.6	727.4	Moderately Weathered LIMESTONE- Pitted- Fossiliferous- Occasional Stylolites- Fractured to Moderately Fractured- Light Gray to Medium Gray

END OF BORING AT 23.6 FEET.

SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	N_{60}	MOISTURE (%)	REMARKS
SB1	18	2 2 2 3	4	26	
SB2	24	1 1 1 1	2	24	
SB3	24	2 5 6 6	11	20	
SB4	24	5 6 8 9	14	26	
SB5	2	50/2"	50+	>> 56	Sample SB5 moisture content = 56 percent, torvane = 0.3 KSF. Auger refusal at 13.6 feet. RC1 (13.6'-23.6') REC =100% RQD = 73% GSI = 40 to 50 RMR = 51
RC1	120				Compressive strength from 16.6 to 16.9' = 2,000 psi Compressive strength from 20.5 to 20.8' = 1,790 psi



GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	13.5	737.5

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

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BORING B42A

PAGE 1 OF 1

BORING DEPTH: 12.5 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 1/22/26
COMPLETED: 1/22/26
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.29152
LONGITUDE: -85.51839
ELEVATION: 751± FT

HAMMER EFFICIENCY: 60%
DATE:
N_{60} -- ○ (10, 20, 30, 40)

DRY DENSITY (pcf) -- ■ (90, 100, 110, 120)

MOISTURE & ATTERBERG LIMITS (%): PL, MC, LL (10, 20, 30, 40)

▼ HAND PENE.
☒ TORVANE SHEAR
● UNC. COMP.
⊡ VANE SHEAR (PK)
✕ VANE SHEAR (REM)
⊕ TRIAXIAL (UU)
SHEAR STRENGTH (KSF) (1, 2, 3, 4)

ELEVATION (FEET)	DEPTH (FEET)	SYMBOLIC PROFILE	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	REMARKS
750	0					
	2-4			3ST1	22	Shelby tube obtained from 2-4 feet.
745	4-6			3ST2	23	Shelby tube obtained from 4-6 feet.
740	10-12			3ST3	19	Shelby tube obtained from 10-12 feet.

Elevation scale: 750, 745, 740, 735, 730, 725
Depth scale: 0, 5, 10, 15, 20, 25, 30

GROUNDWATER & BACKFILL INFORMATION

GROUNDWATER WAS NOT ENCOUNTERED

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

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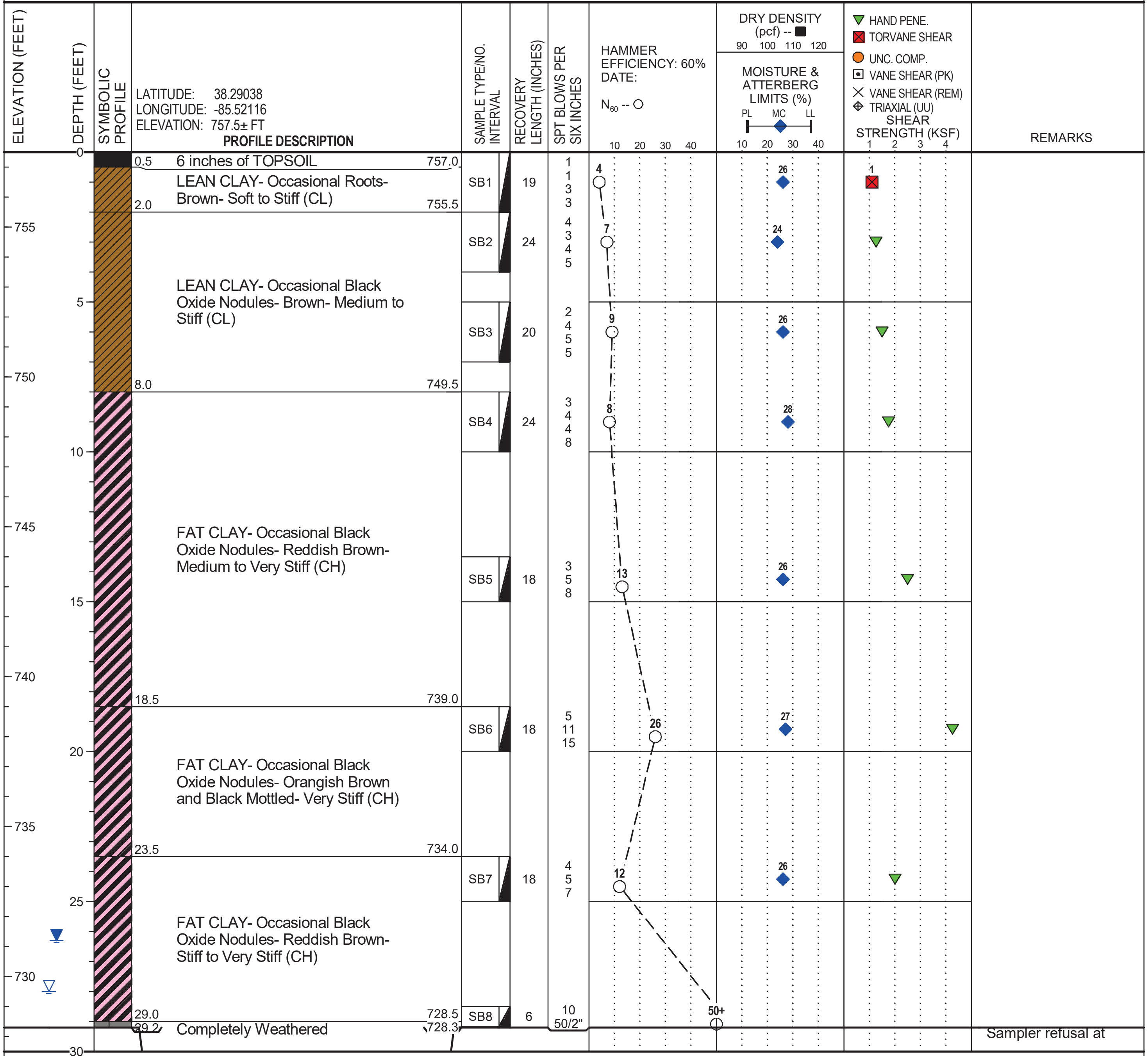
SME

BORING B43

PAGE 1 OF 2

BORING DEPTH: 29.2 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 1/14/26
COMPLETED: 1/14/26
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH



Depth (ft)	Profile Description	Elev.
0.5	6 inches of TOPSOIL	757.0
2.0	LEAN CLAY- Occasional Roots- Brown- Soft to Stiff (CL)	755.5
8.0	LEAN CLAY- Occasional Black Oxide Nodules- Brown- Medium to Stiff (CL)	749.5
18.5	FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown- Medium to Very Stiff (CH)	739.0
23.5	FAT CLAY- Occasional Black Oxide Nodules- Orangish Brown and Black Mottled- Very Stiff (CH)	734.0
29.0	FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown- Stiff to Very Stiff (CH)	728.5
29.2	Completely Weathered	728.3

Sample	Recovery (in.)	SPT Blows	N60	MC (%)	Shear Strength	Remarks
SB1	19	1 1 3 3	4	26	1	
SB2	24	4 3 4 5	7	24		
SB3	20	2 4 5 5	9	26		
SB4	24	3 4 4 8	8	28		
SB5	18	3 5 8	13	26		
SB6	18	5 11 15	26	27		
SB7	18	4 5 7	12	26		
SB8	6	10 50/2"	50+			Sampler refusal at

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	28.0	729.5
▼ **AT END OF BORING:**	26.3	731.2
CAVE-IN OF BOREHOLE AT:	5.0	752.5

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. Groundwater was not encountered above the borehole cave in depth.

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BORING B43

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BORING DEPTH: 29.2 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky

ELEVATION (FEET)	DEPTH (FEET)	SYMBOLIC PROFILE	LATITUDE: 38.29038 LONGITUDE: -85.52116 ELEVATION: 757.5± FT PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	HAMMER EFFICIENCY: 60% DATE: N_{60} -- ○ 10 20 30 40	DRY DENSITY (pcf) -- ■ 90 100 110 120 MOISTURE & ATTERBERG LIMITS (%) PL MC LL 10 20 30 40	▼ HAND PENE. ☒ TORVANE SHEAR ● UNC. COMP. ⊡ VANE SHEAR (PK) × VANE SHEAR (REM) ⊕ TRIAXIAL (UU) SHEAR STRENGTH (KSF) 1 2 3 4	REMARKS
	30		LIMESTONE- Brown and Gray-Hard							29.2 feet.
			END OF BORING AT 29.2 FEET.							
725										
	35									
720										
	40									
715										
	45									
710										
	50									
705										
	55									
700										
	60									
695										
	65									
690										
	70									

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BORING B44

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BORING DEPTH: 30.8 FEET

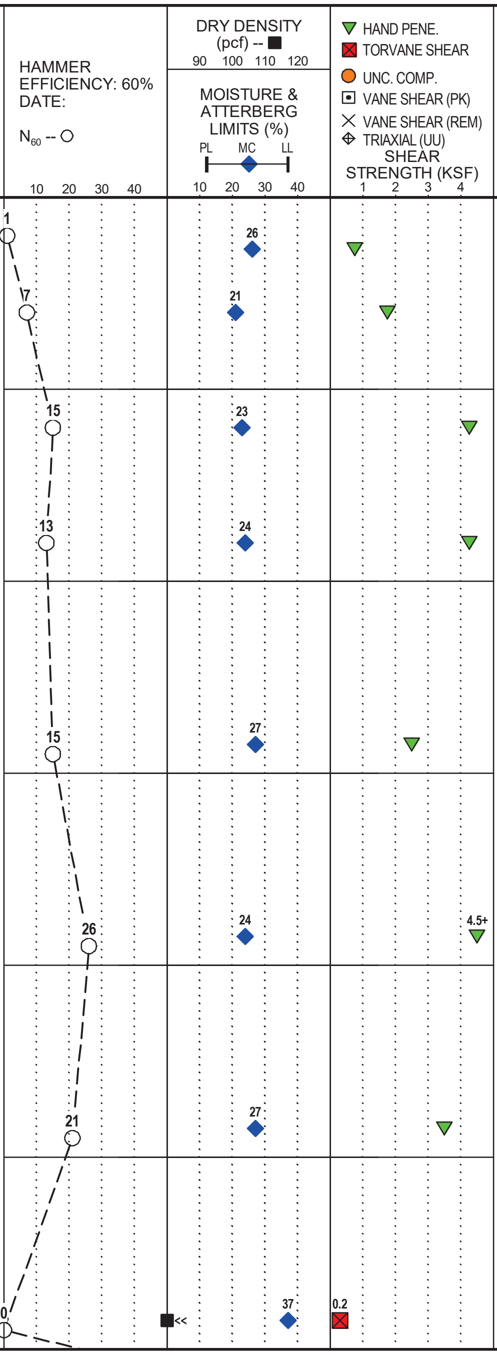
PROJECT NAME: Greenfield Site Development **PROJECT NUMBER:** 102074.00
CLIENT: Luckett & Farley **PROJECT LOCATION:** Louisville, Kentucky

DATE STARTED: 12/30/25 **COMPLETED:** 12/30/25 **BORING METHOD:** Hollow Stem Augers
DRILLER: CD (Black Sheep) **RIG NO.:** Geoprobe 7822DT ATV **LOGGED BY:** A. Dodson **CHECKED BY:** WH

LATITUDE: 38.28941
LONGITUDE: -85.52256
ELEVATION: 759.5± FT

DEPTH (FEET)	PROFILE DESCRIPTION	ELEVATION (FEET)
0.7	8 inches of TOPSOIL	758.8
2.0	LEAN CLAY- Brown- Very Soft to Medium (CL)	757.5
5.0	LEAN CLAY- Brown- Medium to Stiff (CL)	754.5
18.5	FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown- Stiff to Very Stiff (CH)	741.0
23.5	FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown, Tan and Black Mottled- Very Stiff to Hard (CH)	736.0
28.5	FAT CLAY- Occasional Black Oxide Nodules- Trace Limestone Fragments- Tan- Very stiff (CH)	731.0
	FAT CLAY with Fine to Coarse Sand- Little Limestone Fragments-	

SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES
SB1	24	0 1 0 2
SB2	17	1 3 4 6
SB3	22	5 7 8 8
SB4	23	2 5 8 11
SB5	18	5 7 8
SB6	18	7 10 16
SB7	18	6 8 13
SB8	8	1 0 0



REMARKS

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **14 HRS AFTER BORING:**	24.1	735.4
CAVE-IN OF BOREHOLE AT:	4.0	755.5

BACKFILL METHOD: Auger Cuttings

NOTES: 1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

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BORING B44

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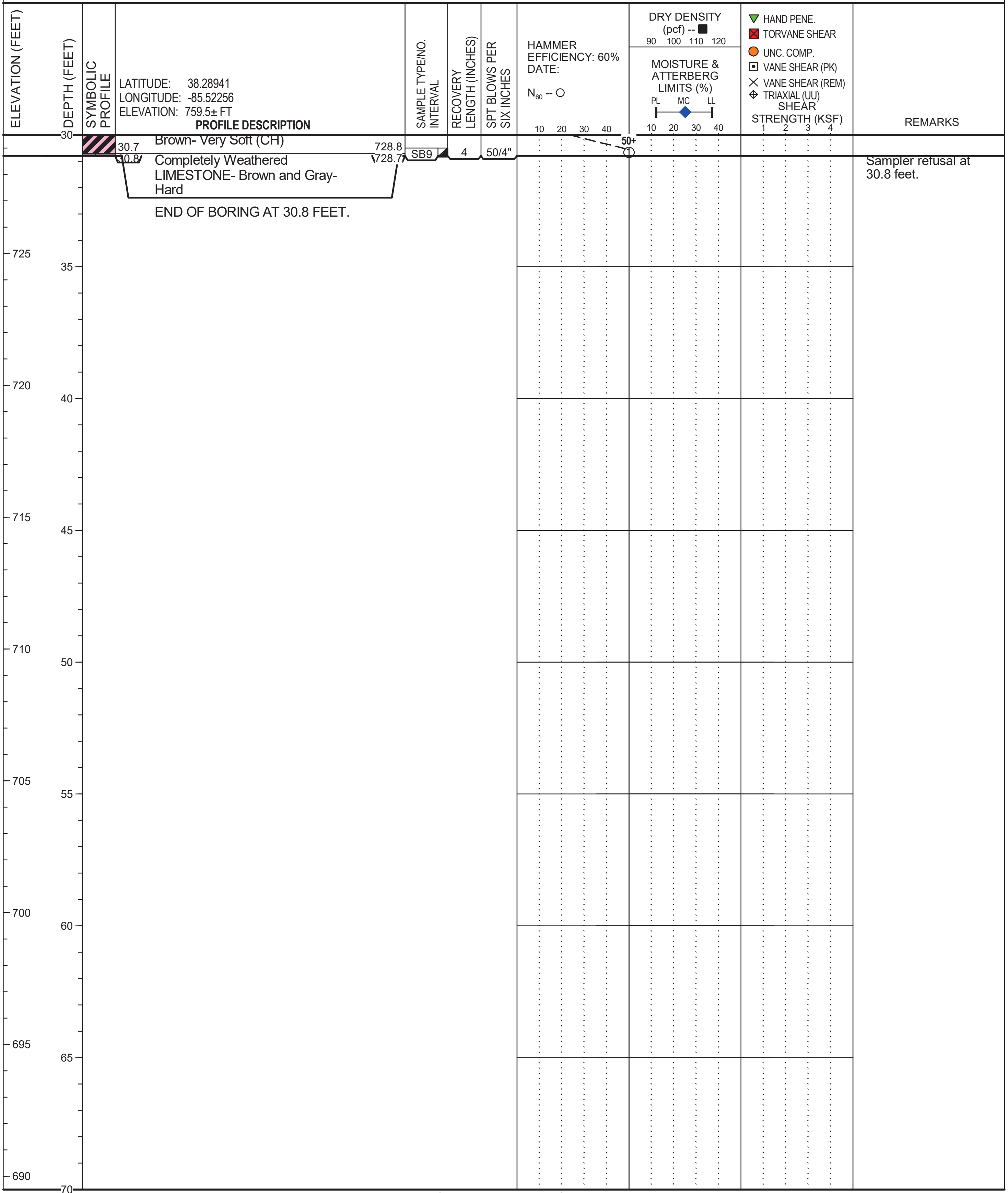
BORING DEPTH: 30.8 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky



LATITUDE: 38.28941
LONGITUDE: -85.52256
ELEVATION: 759.5± FT

HAMMER EFFICIENCY: 60%
DATE:
N_{60} -- ○

DRY DENSITY (pcf) -- ■ 90 100 110 120

MOISTURE & ATTERBERG LIMITS (%) PL MC LL 10 20 30 40

▼ HAND PENE.
☒ TORVANE SHEAR
● UNC. COMP.
⊡ VANE SHEAR (PK)
✕ VANE SHEAR (REM)
✧ TRIAXIAL (UU)
SHEAR STRENGTH (KSF) 1 2 3 4

ELEVATION (FEET)	DEPTH (FEET)	SYMBOLIC PROFILE	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	N_{60} 10 20 30 40	REMARKS
728.8	30 – 30.7	▨	Brown- Very Soft (CH)					
728.7	30.8		Completely Weathered LIMESTONE- Brown and Gray- Hard	SB9	4	50/4"	50+	Sampler refusal at 30.8 feet.

END OF BORING AT 30.8 FEET.

ELEVATION (FEET): 725, 720, 715, 710, 705, 700, 695, 690
DEPTH (FEET): 30, 35, 40, 45, 50, 55, 60, 65, 70

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BORING B45

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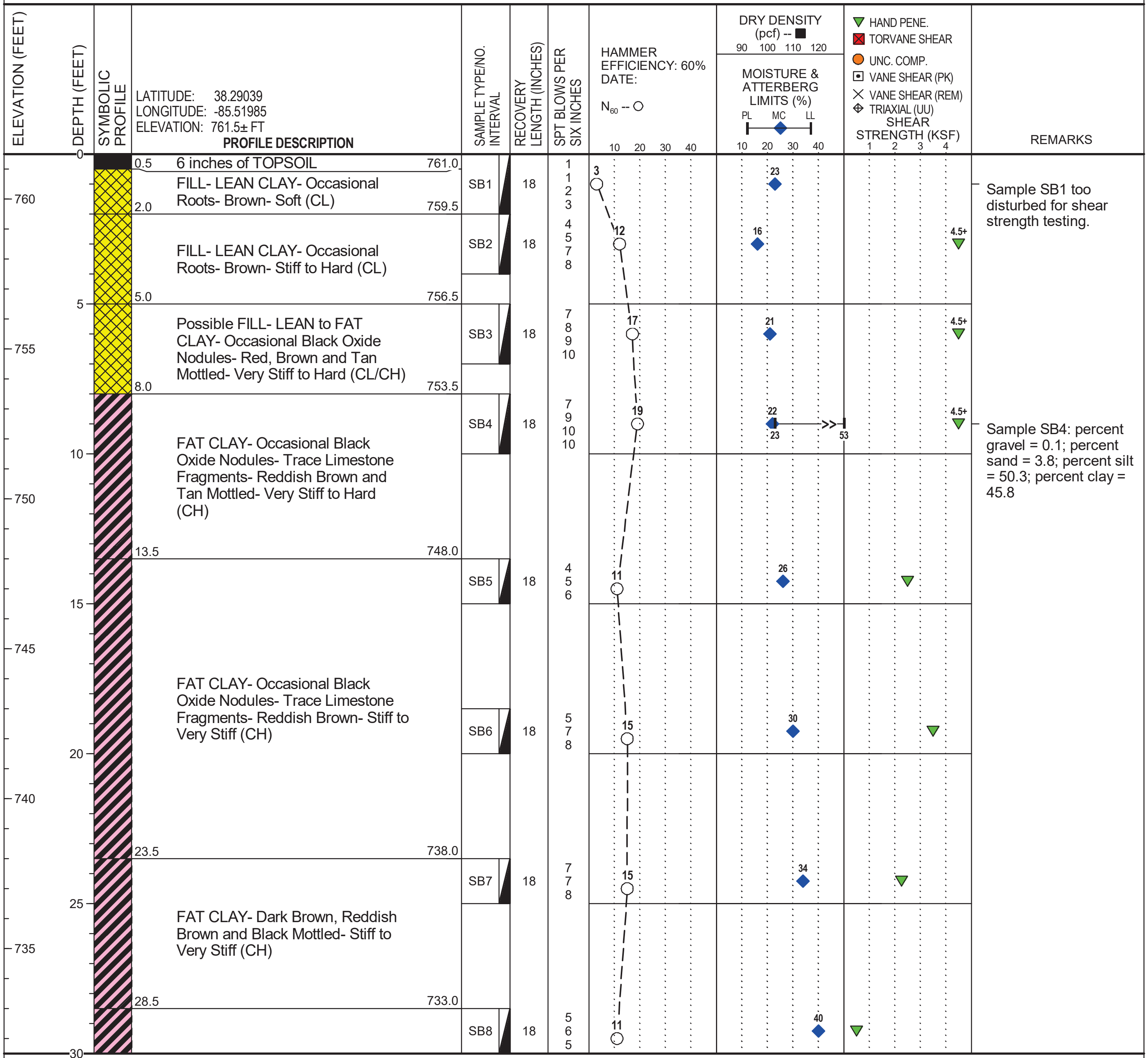
BORING DEPTH: 43 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 1/13/26
COMPLETED: 1/13/26
BORING METHOD: Hollow Stem Augers/NQ2 Core
DRILLER: RM (Mathes Drilling)
RIG NO.: B-53 (ATV)
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.29039
LONGITUDE: -85.51985
ELEVATION: 761.5± FT

HAMMER EFFICIENCY: 60%
DATE:



DEPTH (FEET)	PROFILE DESCRIPTION	ELEVATION (FEET)
0.5	6 inches of TOPSOIL	761.0
2.0	FILL- LEAN CLAY- Occasional Roots- Brown- Soft (CL)	759.5
5.0	FILL- LEAN CLAY- Occasional Roots- Brown- Stiff to Hard (CL)	756.5
8.0	Possible FILL- LEAN to FAT CLAY- Occasional Black Oxide Nodules- Red, Brown and Tan Mottled- Very Stiff to Hard (CL/CH)	753.5
13.5	FAT CLAY- Occasional Black Oxide Nodules- Trace Limestone Fragments- Reddish Brown and Tan Mottled- Very Stiff to Hard (CH)	748.0
23.5	FAT CLAY- Occasional Black Oxide Nodules- Trace Limestone Fragments- Reddish Brown- Stiff to Very Stiff (CH)	738.0
28.5	FAT CLAY- Dark Brown, Reddish Brown and Black Mottled- Stiff to Very Stiff (CH)	733.0

SAMPLE TYPE/NO.	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	N60	MC (%)	HAND PENE. (KSF)	REMARKS
SB1	18	1 1 2 3	3	23		Sample SB1 too disturbed for shear strength testing.
SB2	18	4 5 7 8	12	16	4.5+	
SB3	18	7 8 9 10	17	21	4.5+	
SB4	18	7 9 10 10	19	22 (PL 23, LL 53)	4.5+	Sample SB4: percent gravel = 0.1; percent sand = 3.8; percent silt = 50.3; percent clay = 45.8
SB5	18	4 5 6	11	26		
SB6	18	5 7 8	15	30		
SB7	18	7 7 8	15	34		
SB8	18	5 6 5	11	40		

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	31.0	730.5

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

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BORING B45

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BORING DEPTH: 43 FEET

PROJECT NAME: Greenfield Site Development

PROJECT NUMBER: 102074.00

CLIENT: Luckett & Farley

PROJECT LOCATION: Louisville, Kentucky

LATITUDE: 38.29039
LONGITUDE: -85.51985
ELEVATION: 761.5± FT

HAMMER EFFICIENCY: 60%
DATE:
N_{60} -- ○

DRY DENSITY (pcf) -- ■ 90 100 110 120

MOISTURE & ATTERBERG LIMITS (%) PL MC LL 10 20 30 40

▼ HAND PENE.
☒ TORVANE SHEAR
● UNC. COMP.
⊡ VANE SHEAR (PK)
× VANE SHEAR (REM)
⊕ TRIAXIAL (UU)
SHEAR STRENGTH (KSF) 1 2 3 4

ELEVATION (FEET)	DEPTH (FEET)	SYMBOLIC PROFILE	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	N_{60} 10 20 30 40	DRY DENSITY / MOISTURE & ATTERBERG LIMITS 10 20 30 40	SHEAR STRENGTH (KSF) 1 2 3 4	REMARKS
730 728.5	30 ▽ 33.0		FAT CLAY- Occasional Black Oxide Nodules- Trace Limestone Fragments- Reddish Brown- Medium to Stiff (CH) *(continued)*							
725 724.2	35 37.3		Moderately to Slightly Weathered LIMESTONE- Pitted- Occasional Stylolites and Vertical Fractures- Fractured to Moderately Fractured- Light Gray	RC1	117					Auger refusal at 33 feet. RC1 (33'-43') REC = 98% RQD = 76% GSI = 45 to 55 RMR = 54 Compressive strength from 36.3 to 36.6' = 3,660 psi
720 718.5	40 43.0		Slightly Weathered LIMESTONE- Fractured to Slightly Fractured- Medium Gray							Compressive strength from 40.1 to 40.4' = 5,110 psi
715 710 705 700 695	45 50 55 60 65 70		END OF BORING AT 43.0 FEET.							

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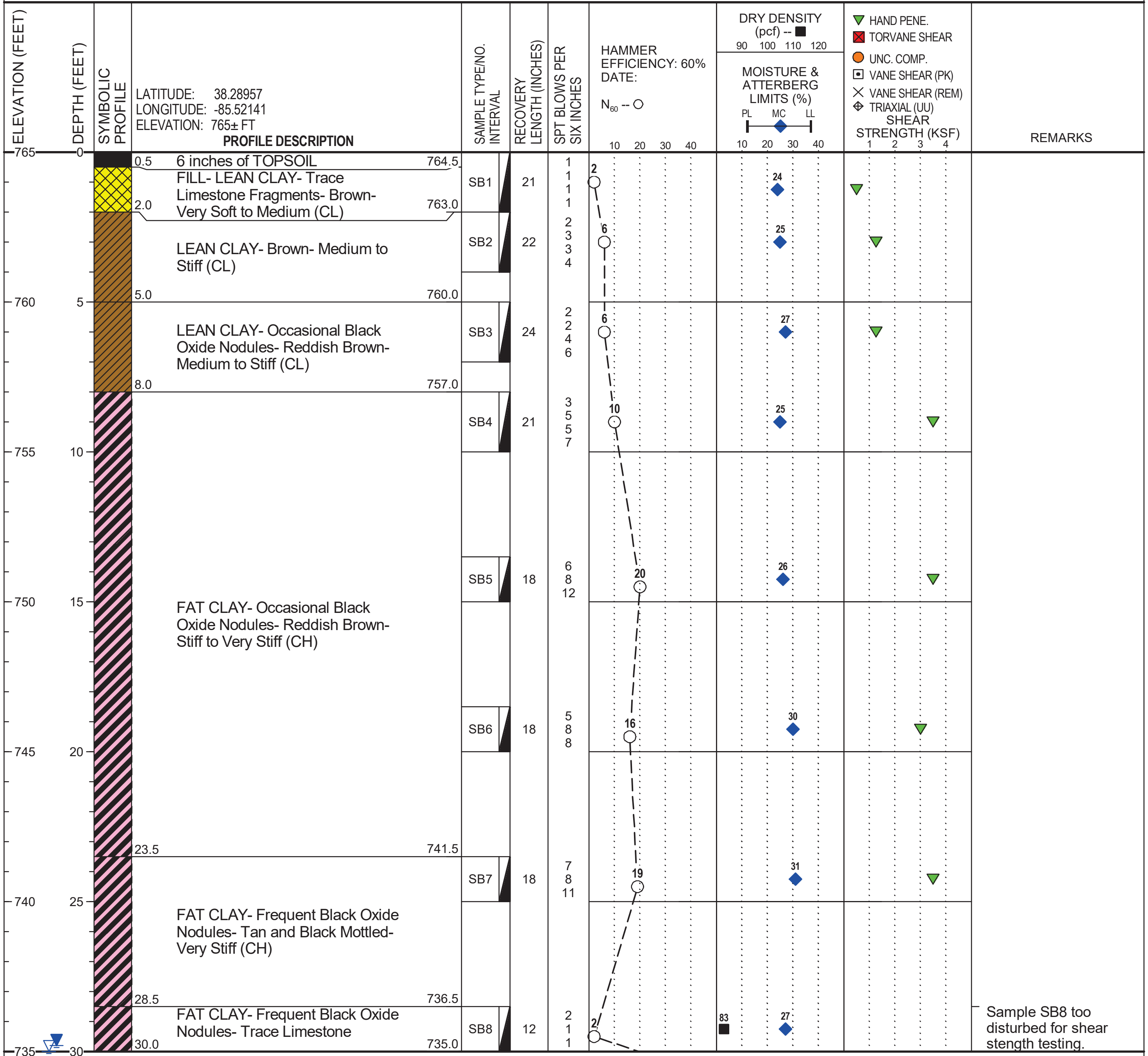
BORING B46

PAGE 1 OF 2

BORING DEPTH: 31.5 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 12/28/25
COMPLETED: 12/28/25
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH



LATITUDE: 38.28957
LONGITUDE: -85.52141
ELEVATION: 765± FT

HAMMER EFFICIENCY: 60%
DATE:

DEPTH (FEET)	ELEVATION (FEET)	PROFILE DESCRIPTION
0.5	764.5	6 inches of TOPSOIL
2.0	763.0	FILL- LEAN CLAY- Trace Limestone Fragments- Brown- Very Soft to Medium (CL)
5.0	760.0	LEAN CLAY- Brown- Medium to Stiff (CL)
8.0	757.0	LEAN CLAY- Occasional Black Oxide Nodules- Reddish Brown- Medium to Stiff (CL)
23.5	741.5	FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown- Stiff to Very Stiff (CH)
28.5	736.5	FAT CLAY- Frequent Black Oxide Nodules- Tan and Black Mottled- Very Stiff (CH)
30.0	735.0	FAT CLAY- Frequent Black Oxide Nodules- Trace Limestone

SAMPLE TYPE/NO.	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	N_{60}	DRY DENSITY (pcf)	MC (%)	REMARKS
SB1	21	1 1 1 1	2		24	
SB2	22	2 3 3 4	6		25	
SB3	24	2 2 4 6	6		27	
SB4	21	3 5 5 7	10		25	
SB5	18	6 8 12	20		26	
SB6	18	5 8 8	16		30	
SB7	18	7 8 11	19		31	
SB8	12	2 1 1	2	83	27	Sample SB8 too disturbed for shear stength testing.

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ DURING BORING:	30.0	735.0
▼ AT END OF BORING:	29.8	735.2
CAVE-IN OF BOREHOLE AT:	3.0	762.0

BACKFILL METHOD: Auger Cuttings

NOTES: 1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

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BORING B46

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BORING DEPTH: 31.5 FEET

PROJECT NAME: Greenfield Site Development

PROJECT NUMBER: 102074.00

CLIENT: Luckett & Farley

PROJECT LOCATION: Louisville, Kentucky

LATITUDE: 38.28957
LONGITUDE: -85.52141
ELEVATION: 765± FT

HAMMER EFFICIENCY: 60%
DATE:
N_{60} -- ○

DRY DENSITY (pcf) -- ■

MOISTURE & ATTERBERG LIMITS (%) PL MC LL

▼ HAND PENE.
☒ TORVANE SHEAR
● UNC. COMP.
⊡ VANE SHEAR (PK)
× VANE SHEAR (REM)
⊕ TRIAXIAL (UU)

SHEAR STRENGTH (KSF)

ELEVATION (FEET)	DEPTH (FEET)	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	N_{60}	REMARKS
735	30	Fragments- Tan and Black Mottled- Very Soft (CH)	SB9	15	14 20 50 50/0"	70	
733.5	31.5	Completely Weathered LIMESTONE- Gray and Brown- Hard					Sampler refusal at 31.5 feet.

END OF BORING AT 31.5 FEET.

SME

BORING B47

PAGE 1 OF 2

BORING DEPTH: 30 FEET

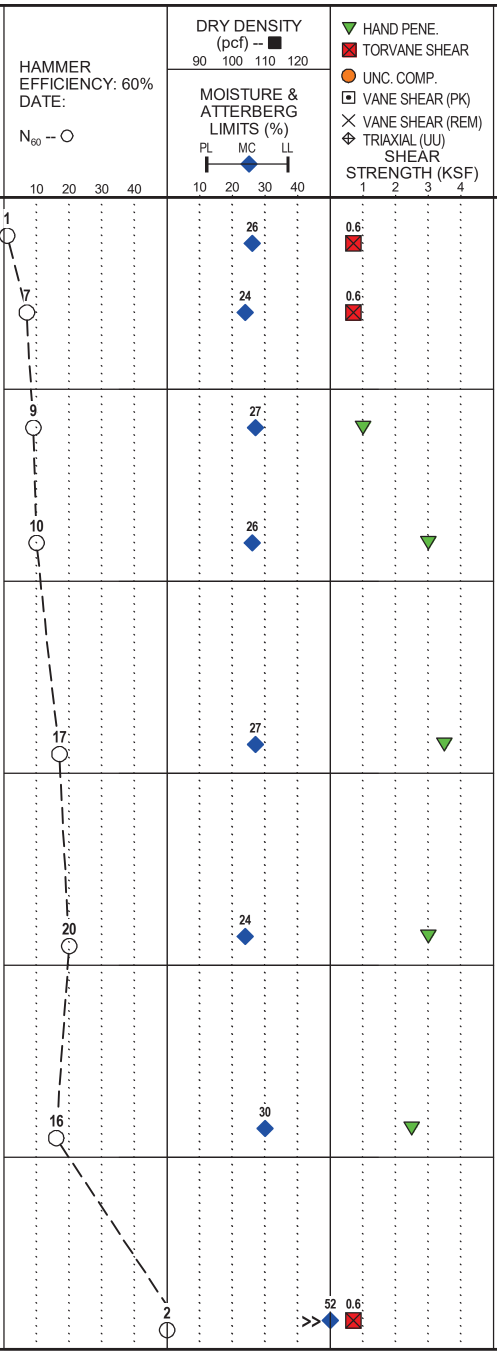
PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky

DATE STARTED: 12/28/25
COMPLETED: 12/28/25
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.28983
LONGITUDE: -85.52120
ELEVATION: 765± FT

DEPTH (FEET)	PROFILE DESCRIPTION	ELEVATION (FEET)
0.8	10 inches of TOPSOIL	764.2
5.0	LEAN CLAY- Occasional Roots- Brown- Very Soft to Medium (CL)	760.0
8.0	LEAN CLAY- Occasional Black Oxide Nodules- Reddish Brown- Medium to Stiff (CL)	757.0
23.5	FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown- Stiff to Very Stiff (CH)	741.5
28.5	FAT CLAY- Frequent Black Oxide Nodules- Tan, Reddish Brown and Black Mottled- Very Stiff (CH)	736.5
29.8	FAT CLAY with Fine Sand- Little Limestone Fragments- Brown-	735.2

SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES
SB1	24	0 0 1 1
SB2	19	2 3 4 4
SB3	20	2 4 5 6
SB4	20	3 4 6 10
SB5	24	6 8 9
SB6	18	5 6 14
SB7	17	5 7 9
SB8	17	1 1 1



REMARKS

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
DURING BORING:	Not Encountered	
AT END OF BORING:	Note 3	
CAVE-IN OF BOREHOLE AT:	5.0	760.0
BACKFILL METHOD:	Auger Cuttings	

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. Groundwater was not encountered above the borehole cave in depth.

(Continued Next Page)

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BORING B47

PAGE 2 OF 2

BORING DEPTH: 30 FEET

PROJECT NAME: Greenfield Site Development

PROJECT NUMBER: 102074.00

CLIENT: Luckett & Farley

PROJECT LOCATION: Louisville, Kentucky

LATITUDE: 38.28983
LONGITUDE: -85.52120
ELEVATION: 765± FT

HAMMER EFFICIENCY: 60%
DATE:
N_{60} -- ○

DRY DENSITY (pcf) -- ■ (90 100 110 120)

MOISTURE & ATTERBERG LIMITS (%): PL, MC, LL (10 20 30 40)

SHEAR STRENGTH (KSF) (1 2 3 4):
- ▼ HAND PENE.
- ☒ TORVANE SHEAR
- ● UNC. COMP.
- ⊡ VANE SHEAR (PK)
- × VANE SHEAR (REM)
- ⊕ TRIAXIAL (UU)

ELEVATION (FEET)	DEPTH (FEET)	SYMBOLIC PROFILE	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	REMARKS
735	30	30.0	Very Soft to Medium (CH) Completely Weathered LIMESTONE- Brown and Gray- Hard (735.0)			50/0"	Sampler refusal at 30 feet.
			END OF BORING AT 30.0 FEET.				
730	35						
725	40						
720	45						
715	50						
710	55						
705	60						
700	65						
695	70						

BORING B48

PAGE 1 OF 2

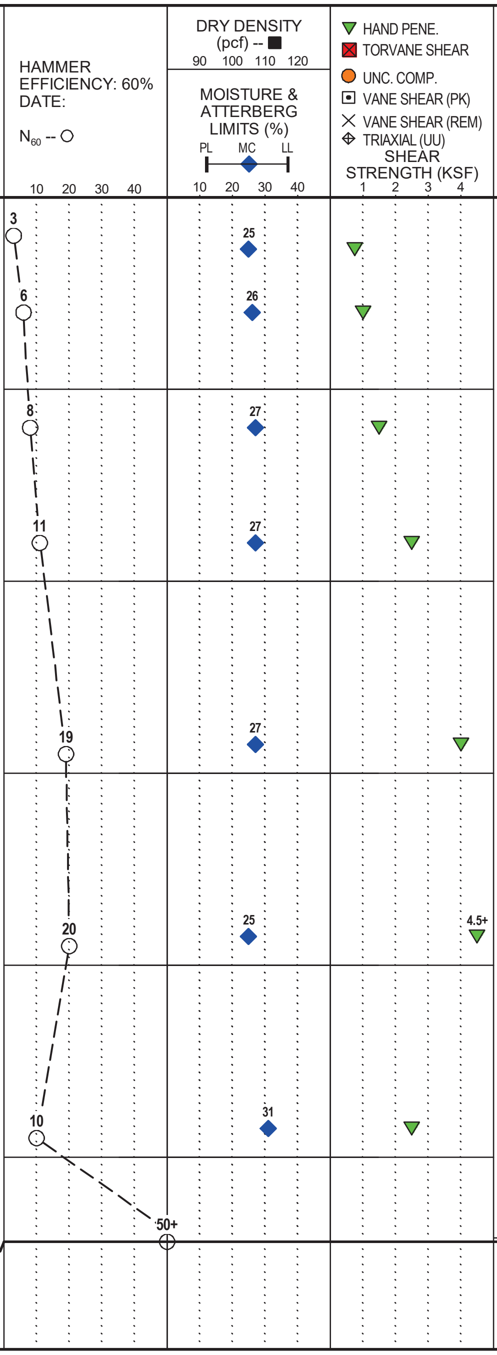
BORING DEPTH: 27.2 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 12/28/25
COMPLETED: 12/28/25
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.29009
LONGITUDE: -85.52050
ELEVATION: 765± FT

HAMMER EFFICIENCY: 60%
DATE:

DEPTH (FEET)	PROFILE DESCRIPTION	ELEVATION (FEET)	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	N_{60}	MOISTURE (%)	REMARKS
0.7	8.5 inches of TOPSOIL	764.3						
2.0	LEAN CLAY- Brown- Soft to Medium (CL)	763.0	SB1	20	0 1 2 2	3	25	
5.0	LEAN to FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown- Medium to Stiff (CL/CH)	760.0	SB2	24	3 2 4 5	6	26	
8.0	LEAN CLAY- Occasional Black Oxide Nodules- Reddish Brown- Medium to Stiff (CL)	757.0	SB3	21	3 3 5 6	8	27	
18.5	FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown- Stiff to Very Stiff (CH)	746.5	SB4 SB5	23 18	2 4 7 8 4 8 11	11 19	27 27	
23.5	FAT CLAY- Frequent Black Oxide Nodules- Brown, Tan and Black Mottled- Very Stiff to Hard (CH)	741.5	SB6	18	6 9 11	20	25	
27.2	FAT CLAY- Occasional Black Oxide Nodules- Trace Limestone Fragments- Brown and Black Mottled- Stiff to Very Stiff (CH)	737.8	SB7	18	3 4 6	10	31	
	END OF BORING AT 27.2 FEET.		SB8	0	50/0"	50+		No recovery for sample SB8. Driller reported encountering limestone at 27.2 feet. Sampler refusal at



GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	Not Encountered	
▼ **AT END OF BORING:**	Note 3	
CAVE-IN OF BOREHOLE AT:	5.0	760.0
BACKFILL METHOD:	Auger Cuttings	

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. Groundwater was not encountered above the borehole cave in depth.

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BORING B48

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BORING DEPTH: 27.2 FEET

PROJECT NAME: Greenfield Site Development

PROJECT NUMBER: 102074.00

CLIENT: Luckett & Farley

PROJECT LOCATION: Louisville, Kentucky

ELEVATION (FEET)	DEPTH (FEET)	SYMBOLIC PROFILE	LATITUDE: 38.29009 LONGITUDE: -85.52050 ELEVATION: 765± FT PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	HAMMER EFFICIENCY: 60% DATE: N_{60} -- ○ 10 20 30 40	DRY DENSITY (pcf) -- ■ 90 100 110 120 MOISTURE & ATTERBERG LIMITS (%) PL MC LL 10 20 30 40	▼ HAND PENE. ☒ TORVANE SHEAR ● UNC. COMP. ▣ VANE SHEAR (PK) ✕ VANE SHEAR (REM) ⊕ TRIAXIAL (UU) SHEAR STRENGTH (KSF) 1 2 3 4	REMARKS
735	30									27.2 feet.
730	35									
725	40									
720	45									
715	50									
710	55									
705	60									
700	65									
695	70									

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BORING B49

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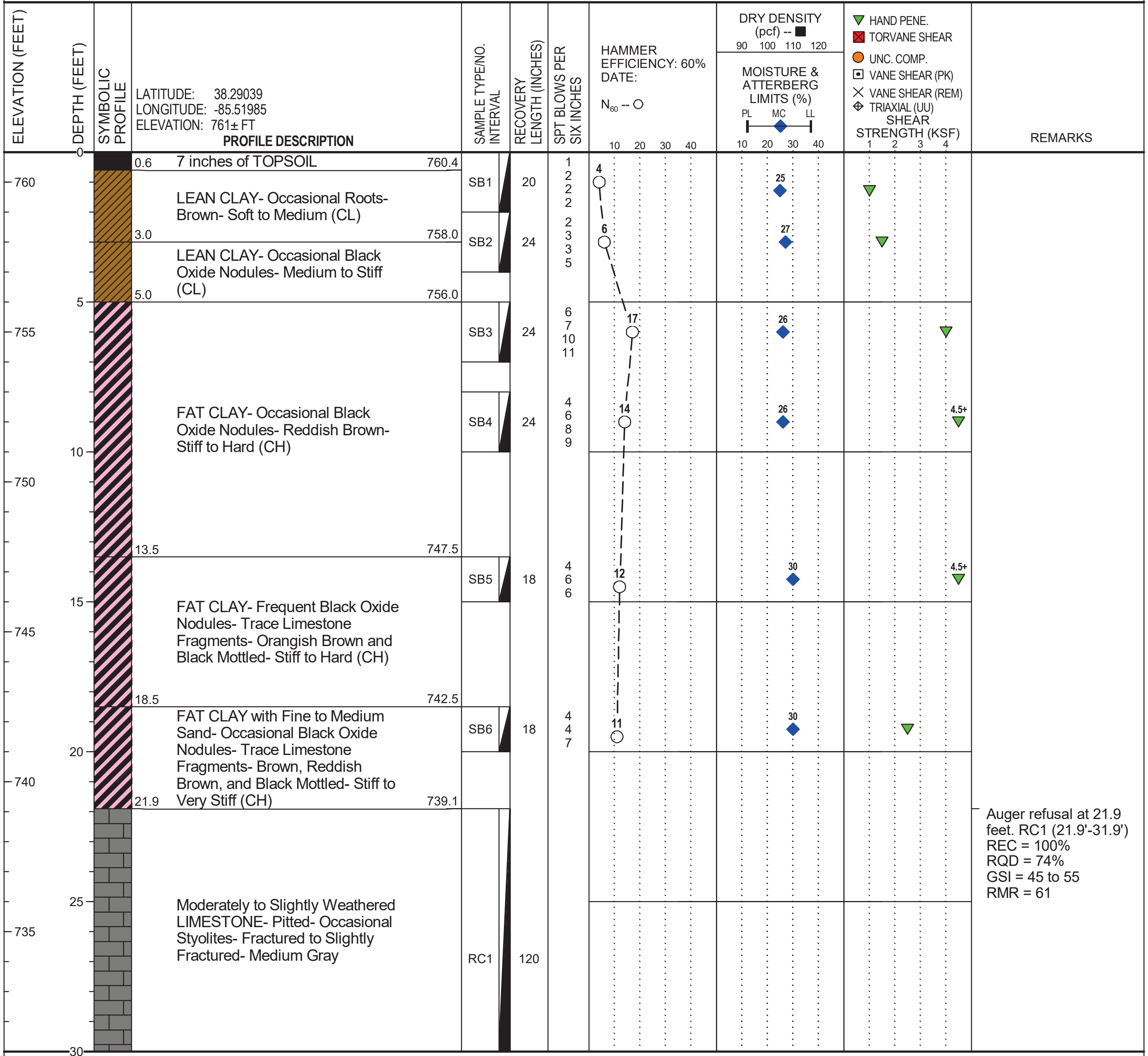
BORING DEPTH: 31.9 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky

DATE STARTED: 12/29/25
COMPLETED: 12/29/25
BORING METHOD: Hollow Stem Augers/NQ2 Core
DRILLER: RM (Mathes Drilling)
RIG NO.: B-53 (ATV)
LOGGED BY: A. Dodson
CHECKED BY: WH



LATITUDE: 38.29039
LONGITUDE: -85.51985
ELEVATION: 761± FT

PROFILE DESCRIPTION

DEPTH (FEET)	PROFILE DESCRIPTION	ELEVATION (FEET)
0.6	7 inches of TOPSOIL	760.4
3.0	LEAN CLAY- Occasional Roots- Brown- Soft to Medium (CL)	758.0
5.0	LEAN CLAY- Occasional Black Oxide Nodules- Medium to Stiff (CL)	756.0
13.5	FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown- Stiff to Hard (CH)	747.5
18.5	FAT CLAY- Frequent Black Oxide Nodules- Trace Limestone Fragments- Orangish Brown and Black Mottled- Stiff to Hard (CH)	742.5
21.9	FAT CLAY with Fine to Medium Sand- Occasional Black Oxide Nodules- Trace Limestone Fragments- Brown, Reddish Brown, and Black Mottled- Stiff to Very Stiff (CH)	739.1
	Moderately to Slightly Weathered LIMESTONE- Pitted- Occasional Stylolites- Fractured to Slightly Fractured- Medium Gray	

SAMPLE TYPE/NO.	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	N_{60}	MC (%)	SHEAR STRENGTH (KSF)
SB1	20	1 2 2 2	4	25	
SB2	24	2 3 3 5	6	27	
SB3	24	6 7 10 11	17	26	
SB4	24	4 6 8 9	14	26	4.5+
SB5	18	4 6 6	12	30	4.5+
SB6	18	4 4 7	11	30	
RC1	120				

REMARKS

Auger refusal at 21.9 feet. RC1 (21.9'-31.9')
REC = 100%
RQD = 74%
GSI = 45 to 55
RMR = 61

GROUNDWATER & BACKFILL INFORMATION

GROUNDWATER WAS NOT ENCOUNTERED

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

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BORING B49

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BORING DEPTH: 31.9 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky

ELEVATION (FEET)	DEPTH (FEET)	SYMBOLIC PROFILE	LATITUDE: 38.29039 LONGITUDE: -85.51985 ELEVATION: 761± FT PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	HAMMER EFFICIENCY: 60% DATE: N_{60} -- ○ 10 20 30 40	DRY DENSITY (pcf) -- ■ 90 100 110 120 MOISTURE & ATTERBERG LIMITS (%) PL MC LL 10 20 30 40	▼ HAND PENE. ☒ TORVANE SHEAR ● UNC. COMP. ⊡ VANE SHEAR (PK) ✕ VANE SHEAR (REM) ⊕ TRIAXIAL (UU) SHEAR STRENGTH (KSF) 1 2 3 4	REMARKS
730	30		31.9 729.1							
			END OF BORING AT 31.9 FEET.							

Depth (feet): 35, 40, 45, 50, 55, 60, 65, 70
Elevation (feet): 725, 720, 715, 710, 705, 700, 695

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BORING B50

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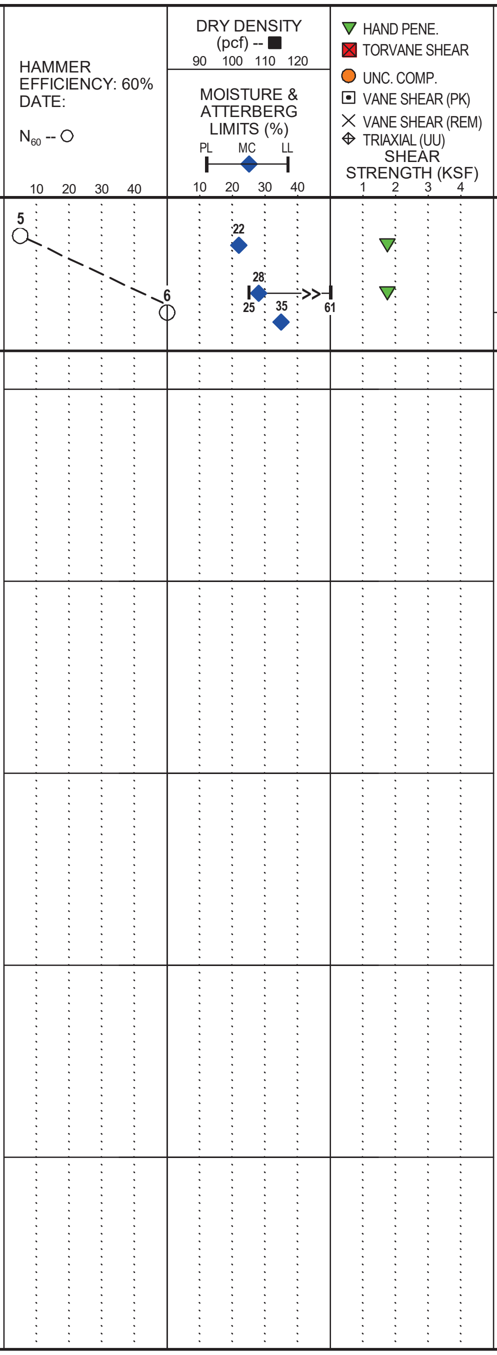
BORING DEPTH: 4 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 12/23/25
COMPLETED: 12/23/25
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.29062
LONGITUDE: -85.51911
ELEVATION: 742± FT

ELEVATION (FEET)	DEPTH (FEET)	SYMBOLIC PROFILE	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	REMARKS
741.5	0.5		5.5 inches of TOPSOIL	SB1	18	2 2 3 4	
740.0	2.0		LEAN CLAY- Occasional Black Oxide Nodules- Medium to Stiff (CL)				
738.5	3.5		FAT CLAY- Trace Limestone Gravel- Brown- Medium to Stiff (CH)	SB2	22	3 3 3 50	Bottom of sample SB2 was too disturbed to perform a shear strength test.
738.0	4.0		Completely Weathered LIMESTONE- Brown and Gray- Hard				Auger refusal at 4 feet.

END OF BORING AT 4.0 FEET.



Elevation scale (feet): 740, 735, 730, 725, 720, 715
Depth scale (feet): 0, 5, 10, 15, 20, 25, 30

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
DURING BORING:	Not Encountered	
AT END OF BORING:	Note 3	
CAVE-IN OF BOREHOLE AT:	1.6	740.4
BACKFILL METHOD:	Auger Cuttings	

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. Groundwater was not encountered above the borehole cave in depth.

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BORING B51

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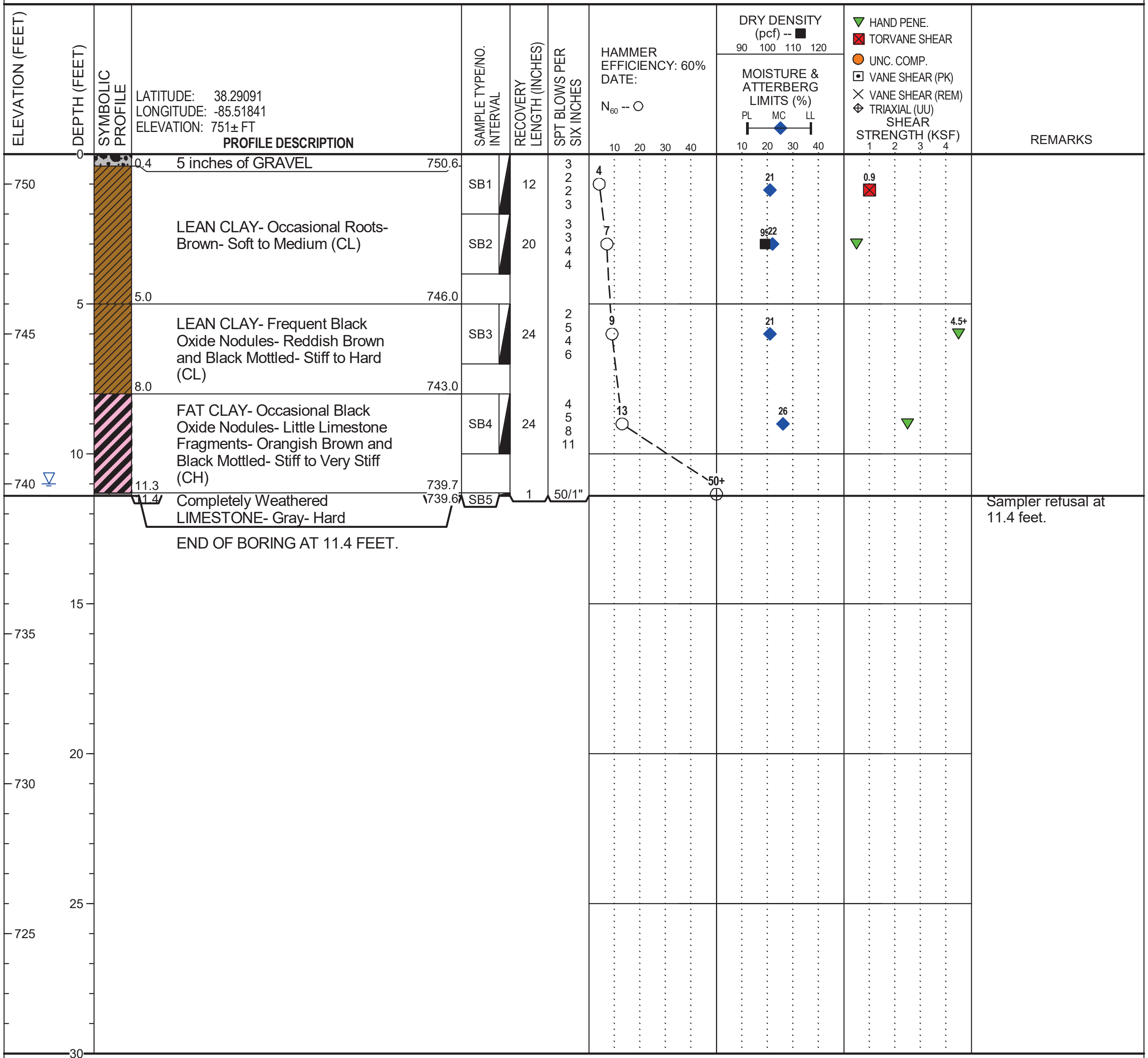
BORING DEPTH: 11.4 FEET

PROJECT NAME: Greenfield Site Development **PROJECT NUMBER:** 102074.00

CLIENT: Luckett & Farley **PROJECT LOCATION:** Louisville, Kentucky

DATE STARTED: 12/23/25 **COMPLETED:** 12/23/25 **BORING METHOD:** Hollow Stem Augers

DRILLER: CD (Black Sheep) **RIG NO.:** Geoprobe 7822DT ATV **LOGGED BY:** A. Dodson **CHECKED BY:** WH



GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	11.0	740.0
▼ **AT END OF BORING:**	Note 3	
CAVE-IN OF BOREHOLE AT:	4.0	747.0

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. Groundwater was not encountered above the borehole cave in depth.

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BORING B51A

PAGE 1 OF 1

BORING DEPTH: 10.5 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 1/22/26
COMPLETED: 1/22/26
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH

ELEVATION (FEET)	DEPTH (FEET)	SYMBOLIC PROFILE	LATITUDE: 38.29091 LONGITUDE: -85.51841 ELEVATION: 751± FT PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	HAMMER EFFICIENCY: 60% DATE: N_{60} -- ○ 10 20 30 40	DRY DENSITY (pcf) -- ■ 90 100 110 120 MOISTURE & ATTERBERG LIMITS (%) PL MC LL 10 20 30 40	▽ HAND PENE. ☒ TORVANE SHEAR ● UNC. COMP. ⊡ VANE SHEAR (PK) × VANE SHEAR (REM) ⊕ TRIAXIAL (UU) SHEAR STRENGTH (KSF) 1 2 3 4	REMARKS
	0								
750									Boring B51A offset approximately 5 feet from boring B51. Bulk sample obtained from 2-4 feet.
				GS1					
	5								
745									Shelby tube obtained from 8-10 feet.
				3ST1	22				
	10								
740									
	15								
735									
	20								
730									
	25								
725									
	30								

GROUNDWATER & BACKFILL INFORMATION

GROUNDWATER WAS NOT ENCOUNTERED

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

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BORING B52

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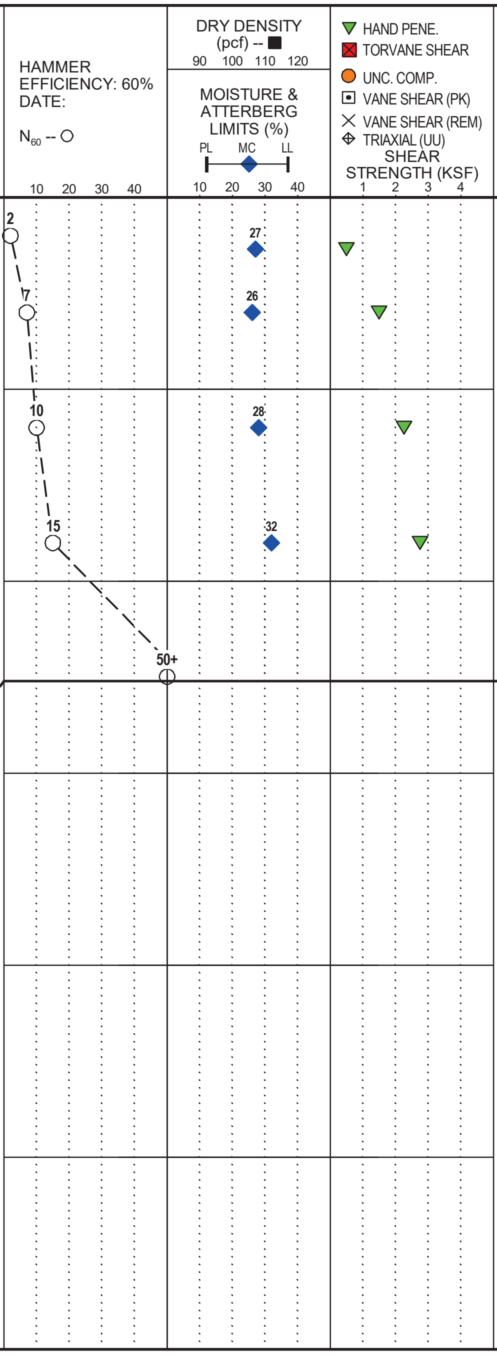
BORING DEPTH: 12.6 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 12/23/25
COMPLETED: 12/23/25
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.29137
LONGITUDE: -85.51779
ELEVATION: 755± FT

HAMMER EFFICIENCY: 60%
DATE:

ELEVATION (FEET)	DEPTH (FEET)	PROFILE DESCRIPTION		SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	REMARKS
755	0	8.5 inches of TOPSOIL	754.3				
	0.7	LEAN CLAY- Occasional Roots- Brown- Very Soft to Medium (CL)	753.0	SB1	17	1 0 2 2	
	2.0	LEAN CLAY- Occasional Black Oxide Nodules- Reddish Brown and Black Mottled- Medium to Stiff (CL)	750.0	SB2	18	3 3 4 5	
750	5.0	LEAN to FAT CLAY- Orangish Brown and Black Mottled- Stiff to Very Stiff (CL/CH)	747.0	SB3	19	3 4 6 6	
	8.0	FAT CLAY- Orangish Brown and Black Mottled- Stiff to Very Stiff (CH)	742.6	SB4	21	4 6 9 12	
745	10						
	12.4	Completely Weathered LIMESTONE- Gray and Brown- Hard	742.4	SB5	2	50/2"	Sampler refusal at 12.6 feet.
	12.6	END OF BORING AT 12.6 FEET.					
740	15						
735	20						
730	25						
725	30						



GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	Not Encountered	
▼ **AT END OF BORING:**	Note 3	
CAVE-IN OF BOREHOLE AT:	3.0	752.0
BACKFILL METHOD:	Auger Cuttings	

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. Groundwater was not encountered above the borehole cave in depth.

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BORING B53

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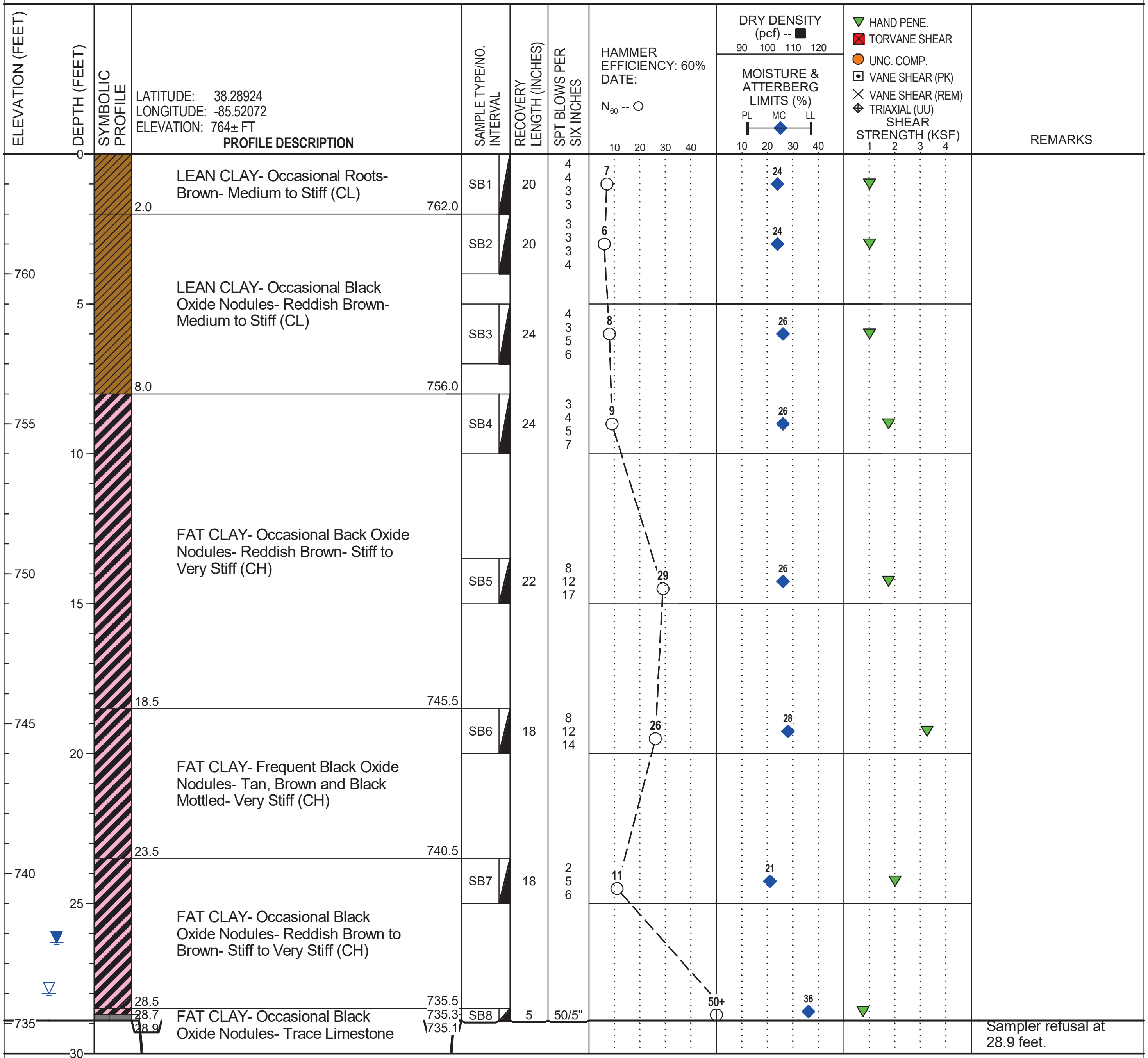
BORING DEPTH: 28.9 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 12/30/25
COMPLETED: 12/30/25
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH



LATITUDE: 38.28924
LONGITUDE: -85.52072
ELEVATION: 764± FT

PROFILE DESCRIPTION

DEPTH (FEET)	PROFILE DESCRIPTION	ELEVATION (FEET)
0 – 2.0	LEAN CLAY- Occasional Roots- Brown- Medium to Stiff (CL)	762.0
2.0 – 8.0	LEAN CLAY- Occasional Black Oxide Nodules- Reddish Brown- Medium to Stiff (CL)	756.0
8.0 – 18.5	FAT CLAY- Occasional Back Oxide Nodules- Reddish Brown- Stiff to Very Stiff (CH)	745.5
18.5 – 23.5	FAT CLAY- Frequent Black Oxide Nodules- Tan, Brown and Black Mottled- Very Stiff (CH)	740.5
23.5 – 28.5	FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown to Brown- Stiff to Very Stiff (CH)	735.5
28.5 – 28.7	FAT CLAY- Occasional Black Oxide Nodules- Trace Limestone	735.3
28.9		735.1

SAMPLE TYPE/NO.	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	N_{60}	MC
SB1	20	4 4 3 3	7	24
SB2	20	3 3 3 4	6	24
SB3	24	4 3 5 6	8	26
SB4	24	3 4 5 7	9	26
SB5	22	8 12 17	29	26
SB6	18	8 12 14	26	28
SB7	18	2 5 6	11	21
SB8	5	50/5"	50+	36

REMARKS: Sampler refusal at 28.9 feet.

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	28.0	736.0
▼ **AT END OF BORING:**	26.3	737.7
CAVE-IN OF BOREHOLE AT:	2.0	762.0

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

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BORING B53

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BORING DEPTH: 28.9 FEET

PROJECT NAME: Greenfield Site Development

PROJECT NUMBER: 102074.00

CLIENT: Luckett & Farley

PROJECT LOCATION: Louisville, Kentucky

ELEVATION (FEET)	DEPTH (FEET)	SYMBOLIC PROFILE	LATITUDE: 38.28924 LONGITUDE: -85.52072 ELEVATION: 764± FT PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	HAMMER EFFICIENCY: 60% DATE: N_{60} -- ○ 10 20 30 40	DRY DENSITY (pcf) -- ■ 90 100 110 120 MOISTURE & ATTERBERG LIMITS (%) PL MC LL 10 20 30 40	▼ HAND PENE. ☒ TORVANE SHEAR ● UNC. COMP. ⊡ VANE SHEAR (PK) × VANE SHEAR (REM) ⊕ TRIAXIAL (UU) SHEAR STRENGTH (KSF) 1 2 3 4	REMARKS
	30		Fragments- Reddish Brown- Medium (CH)							
			Completely Weathered LIMESTONE- Brown- Hard							
			END OF BORING AT 28.9 FEET.							
730										
	35									
725										
	40									
720										
	45									
715										
	50									
710										
	55									
705										
	60									
700										
	65									
695										
	70									

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BORING B54

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BORING DEPTH: 34 FEET

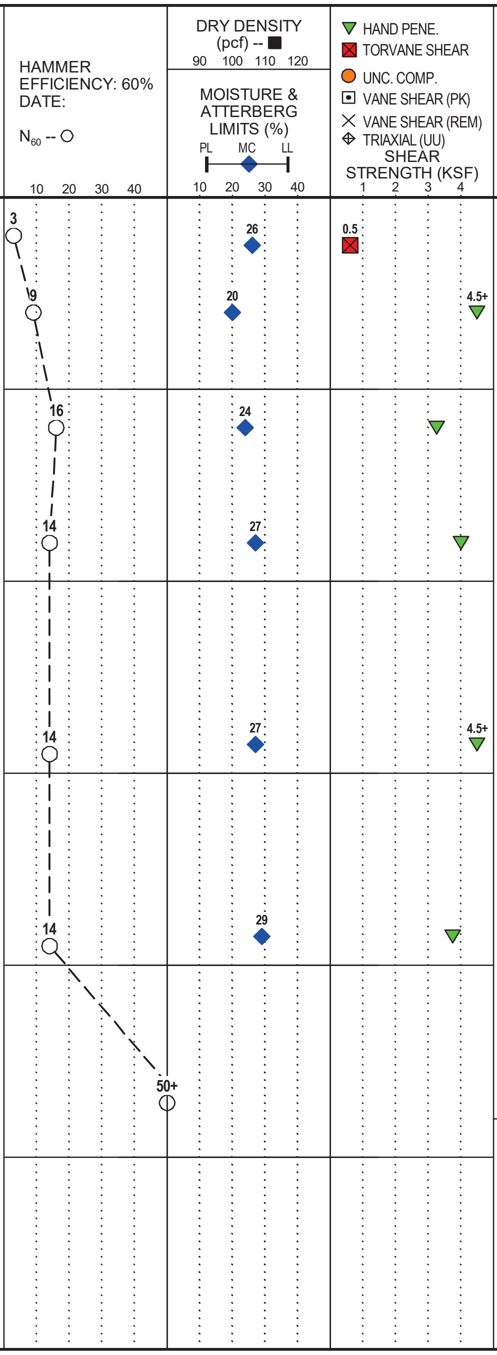
PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 12/29/25
COMPLETED: 12/29/25
BORING METHOD: Hollow Stem Augers/NQ2 Core
DRILLER: RM (Mathes Drilling)
RIG NO.: B-53 (ATV)
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.28954
LONGITUDE: -85.52051
ELEVATION: 762± FT

HAMMER EFFICIENCY: 60%
DATE:
N_{60} -- ○

DEPTH (FEET)	PROFILE DESCRIPTION	ELEVATION (FEET)
0.5	6 inches of TOPSOIL	761.5
2.0	LEAN CLAY- Occasional Roots- Brown- Soft to Medium (CL)	760.0
3.0	LEAN CLAY- Brown- Stiff to Hard (CL)	759.0
6.0	LEAN CLAY- Occasional Roots and Black Oxide Nodules- Brown and Tan Mottled- Stiff to Very Stiff (CL)	756.0
9.0	FAT CLAY- Occasional Black Oxide Nodules- Trace Limestone Fragments- Reddish Brown, Tan, and Black Mottled- Very Stiff to Stiff (CH)	753.0
13.5	FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown- Stiff to Very Stiff (CH)	748.5
23.5	FAT CLAY with Fine Sand- Occasional Black Oxide Nodules- Trace Limestone Fragments- Orangish Brown and Black Mottled- Stiff to Hard (CH)	738.5
24.0	Completely Weathered LIMESTONE- Brown and Gray- Hard	738.0
	Highly to Moderately Weathered LIMESTONE- Vuggy, Pitted, Occasional Stylolites, Calcite Crystals and Oxide Staining- Fractured to Moderately Fractured- Light Gray to Medium Gray	

SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES
SB1	24	1 1 2 2
SB2	24	2 4 5 8
SB3	24	6 7 9 10
SB4	24	5 6 8 12
SB5	18	5 6 8
SB6	18	4 6 8
SB7	2	50/2"
RC1	117	



REMARKS

Auger refusal at 24 feet. RC1: (24'-34')
REC = 98%
RQD = 75%
GSI = 34 to 45
RMR = 49

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	23.0	739.0

BACKFILL METHOD: Auger Cuttings

NOTES: 1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

(Continued Next Page)

SME

BORING B54

PAGE 2 OF 2

BORING DEPTH: 34 FEET

PROJECT NAME: Greenfield Site Development

PROJECT NUMBER: 102074.00

CLIENT: Luckett & Farley

PROJECT LOCATION: Louisville, Kentucky

LATITUDE: 38.28954
LONGITUDE: -85.52051
ELEVATION: 762± FT

HAMMER EFFICIENCY: 60%
DATE:

N_{60} -- ○

DRY DENSITY (pcf) -- ■ (90, 100, 110, 120)

MOISTURE & ATTERBERG LIMITS (%): PL, MC ◆, LL (10, 20, 30, 40)

▼ HAND PENE.
☒ TORVANE SHEAR
● UNC. COMP.
⊡ VANE SHEAR (PK)
× VANE SHEAR (REM)
◈ TRIAXIAL (UU)

SHEAR STRENGTH (KSF) (1, 2, 3, 4)

ELEVATION (FEET)	DEPTH (FEET)	SYMBOLIC PROFILE	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	N_{60} (10, 20, 30, 40)	DRY DENSITY / MOISTURE & ATTERBERG LIMITS (10, 20, 30, 40)	SHEAR STRENGTH (KSF) (1, 2, 3, 4)	REMARKS
730	30	▨	Highly to Moderately Weathered LIMESTONE- Vuggy, Pitted, Occasional Styolites, Calcite Crystals and Oxide Staining- Fractured to Moderately Fractured- Light Gray to Medium Gray *(continued)*							
728.0	34.0		END OF BORING AT 34.0 FEET.							

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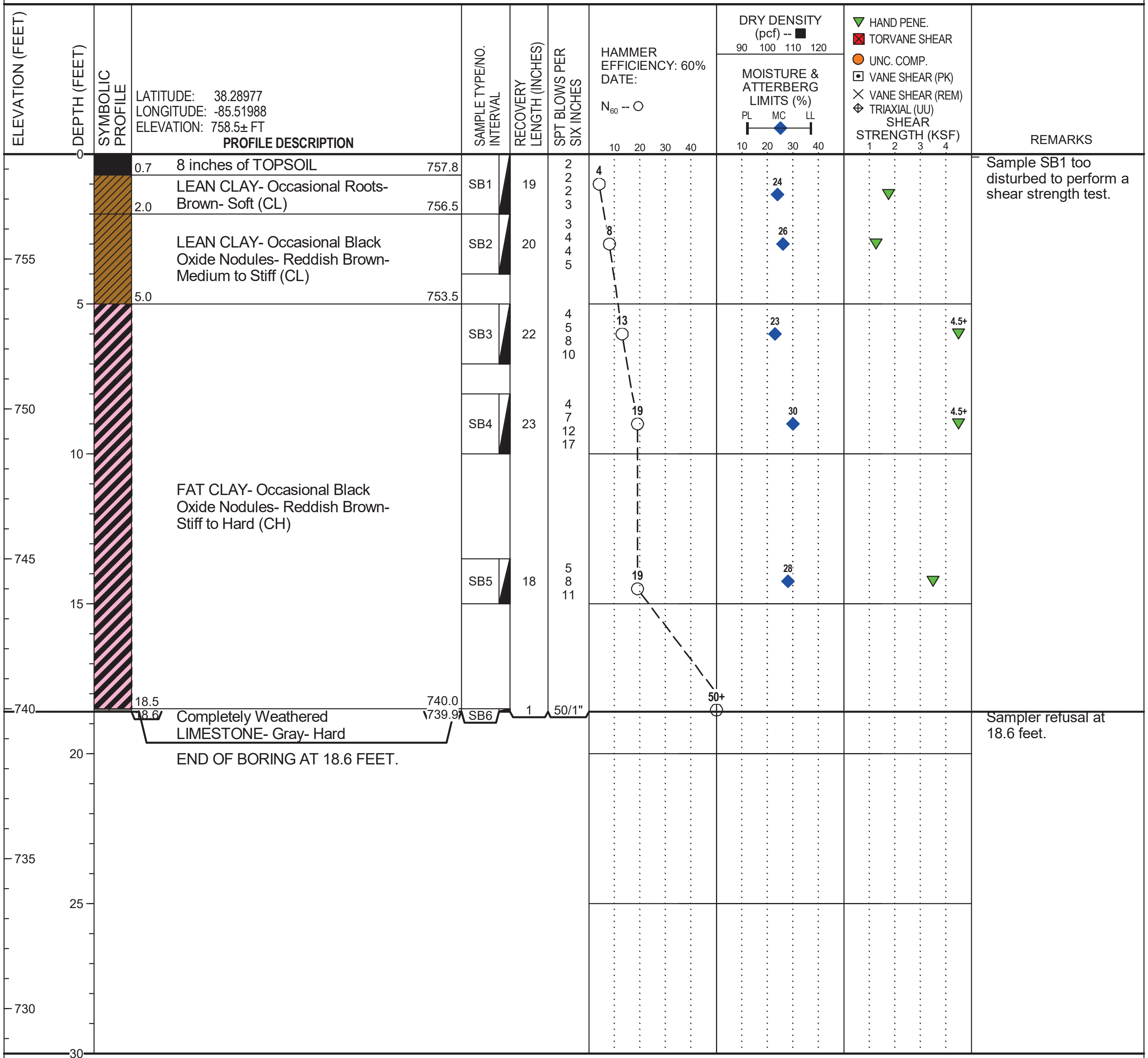
BORING B55

PAGE 1 OF 1

BORING DEPTH: 18.6 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 12/30/25
COMPLETED: 12/30/25
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH



Depth (ft)	Description	Elevation (ft)
0.7	8 inches of TOPSOIL	757.8
2.0	LEAN CLAY- Occasional Roots- Brown- Soft (CL)	756.5
5.0	LEAN CLAY- Occasional Black Oxide Nodules- Reddish Brown- Medium to Stiff (CL)	753.5
18.5	FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown- Stiff to Hard (CH)	740.0
18.6	Completely Weathered LIMESTONE- Gray- Hard	739.9

END OF BORING AT 18.6 FEET.

Sample	Recovery (in.)	SPT Blows per Six Inches	N60	MC (%)
SB1	19	2 2 2 3	4	24
SB2	20	3 4 4 5	8	26
SB3	22	4 5 8 10	13	23
SB4	23	4 7 12 17	19	30
SB5	18	5 8 11	19	28
SB6	1	50/1"	50+	

REMARKS:

Sample SB1 too disturbed to perform a shear strength test.

Sampler refusal at 18.6 feet.

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	Not Encountered	
▼ **AT END OF BORING:**	Note 3	
CAVE-IN OF BOREHOLE AT:	3.0	755.5
BACKFILL METHOD:	Auger Cuttings	

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. Groundwater was not encountered above the borehole cave in depth.

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SME

BORING B56

PAGE 1 OF 1

BORING DEPTH: 5.7 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky

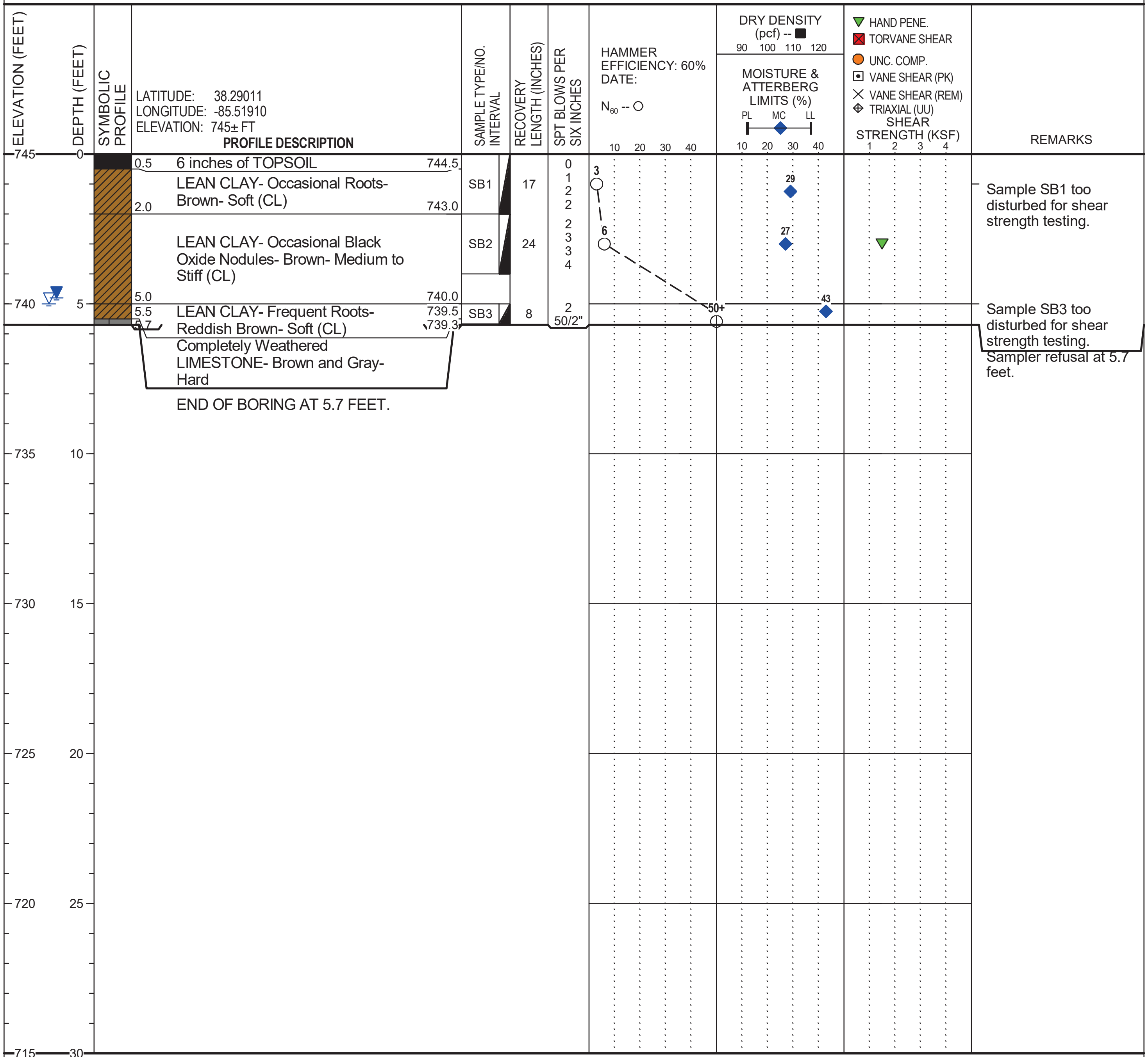
DATE STARTED: 12/23/25
COMPLETED: 12/23/25
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.29011
LONGITUDE: -85.51910
ELEVATION: 745± FT

HAMMER EFFICIENCY: 60%
DATE:

DEPTH (FEET)	PROFILE DESCRIPTION	ELEVATION (FEET)	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	N_{60}	MC (%)	HAND PENE. (KSF)	REMARKS
0.5	6 inches of TOPSOIL	744.5							
2.0	LEAN CLAY- Occasional Roots- Brown- Soft (CL)	743.0	SB1	17	0 1 2 2	3	29		Sample SB1 too disturbed for shear strength testing.
5.0	LEAN CLAY- Occasional Black Oxide Nodules- Brown- Medium to Stiff (CL)	740.0	SB2	24	2 3 3 4	6	27	▼	
5.5	LEAN CLAY- Frequent Roots- Reddish Brown- Soft (CL)	739.5	SB3	8	2 50/2"	50+	43		Sample SB3 too disturbed for shear strength testing.
5.7	Completely Weathered LIMESTONE- Brown and Gray- Hard	739.3							Sampler refusal at 5.7 feet.

END OF BORING AT 5.7 FEET.



GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	5.0	740.0
▼ **AT END OF BORING:**	4.8	740.2

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

3/19/26 8:51:28 AM

SME

BORING B57

PAGE 1 OF 1

BORING DEPTH: 6.9 FEET

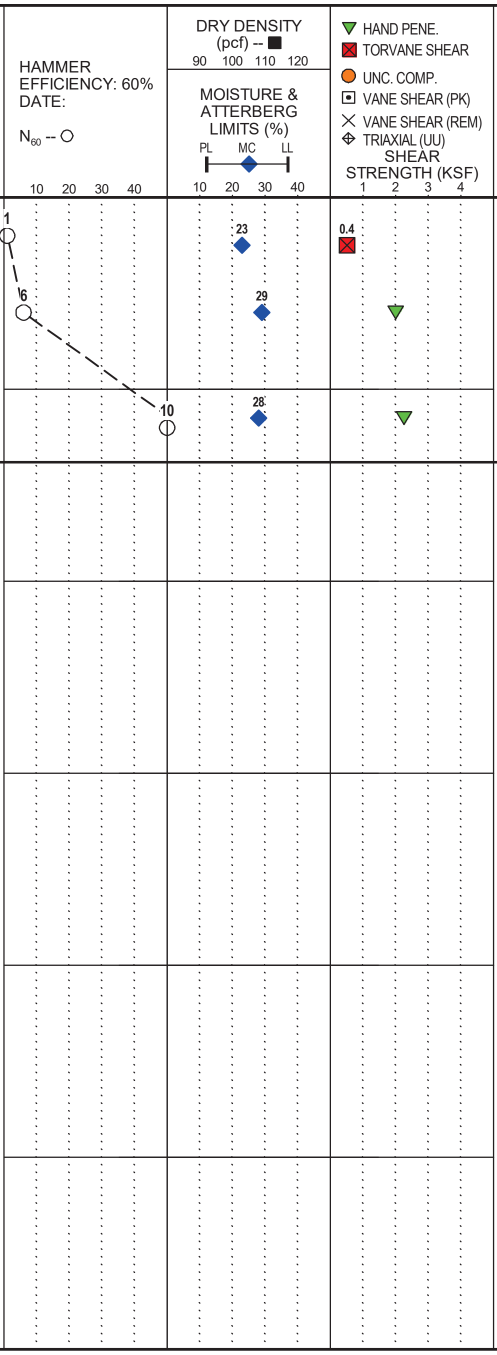
PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 12/23/25
COMPLETED: 12/23/25
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.29039
LONGITUDE: -85.51852
ELEVATION: 746± FT

HAMMER EFFICIENCY: 60%
DATE:

ELEVATION (FEET)	DEPTH (FEET)	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	N_{60}	MOISTURE (%) MC	SHEAR STRENGTH (KSF)	REMARKS
745.5	0.5	6 inches of TOPSOIL							
744.0	2.0	LEAN CLAY- Occasional Roots- Brown- Very Soft to Soft (CL)	SB1	18	1 0 1 0	1	23	0.4	
741.0	5.0	LEAN CLAY- Frequent Black Oxide Nodules- Brown and Black Mottled- Medium to Very Stiff (CL)	SB2	15	1 2 4 4	6	29		
739.5	6.5	FAT CLAY- Frequent Black Oxide Nodules- Brown- Stiff to Very Stiff (CH)	SB3	16	4 5 5 50/5"	10	28		
739.1	6.9	Completely Weathered LIMESTONE- Brown and Gray- Hard							Sampler refusal at 6.9 feet.

END OF BORING AT 6.9 FEET.



GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	5.5	740.5
▼ **AT END OF BORING:**	3.5	742.5
CAVE-IN OF BOREHOLE AT:	1.0	745.0

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

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BORING B58

PAGE 1 OF 1

BORING DEPTH: 16.9 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky

DATE STARTED: 12/26/25
COMPLETED: 12/26/25
BORING METHOD: Hollow Stem Augers
DRILLER: RM (Mathes Drilling)
RIG NO.: B-53 (ATV)
LOGGED BY: A. Dodson
CHECKED BY: WH

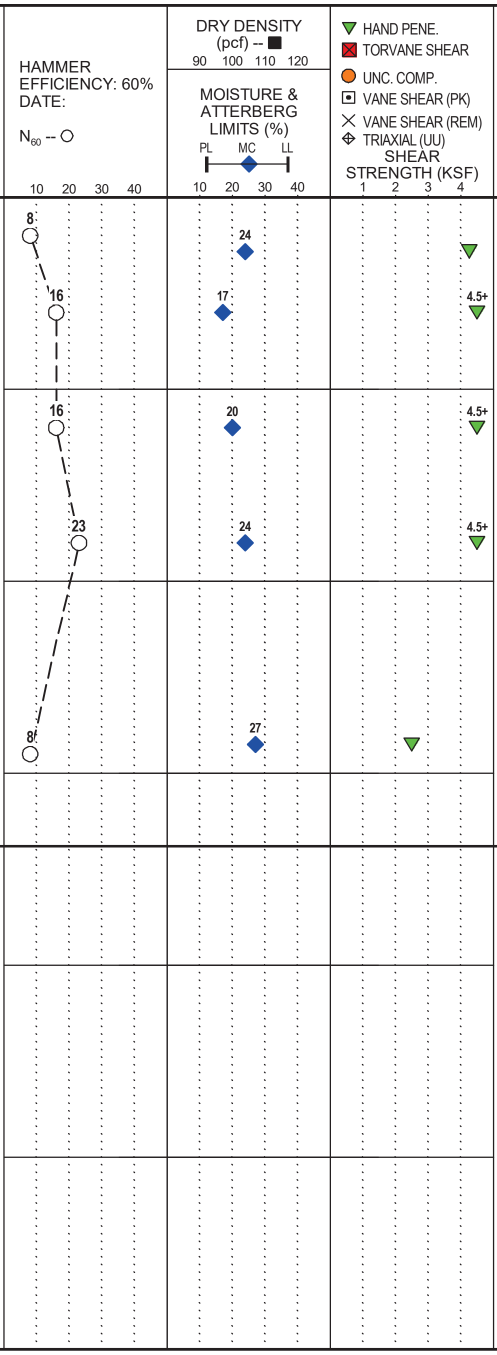
LATITUDE: 38.29083
LONGITUDE: -85.51779
ELEVATION: 757± FT

HAMMER EFFICIENCY: 60%
DATE:

DEPTH (FEET)	PROFILE DESCRIPTION	ELEVATION (FEET)
0.8	10 inches of TOPSOIL	756.2
3.0	LEAN CLAY- Occasional Roots- Brown- Medium to Very Stiff (CL)	754.0
5.0	LEAN CLAY- Occasional Black Oxide Nodules- Reddish Brown and Tan Mottled- Very Stiff to Hard (CL)	752.0
8.0	FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown and Tan Mottled- Very Stiff to Hard (CH)	749.0
9.0	LEAN CLAY with Fine Sand- Occasional Black Oxide Nodules- Dark Brown- Very Stiff to Hard (CL)	748.0
13.5	FAT CLAY- Frequent Black Oxide Nodules- Orangish Brown and Black Mottled- Very Stiff to Hard (CH)	743.5
16.9	FAT CLAY- Occasional Roots and Black Oxide Nodules- Trace Limestone Fragments- Reddish Brown, Brown, and Black Mottled- Medium to Very Stiff (CH)	740.1

END OF BORING AT 16.9 FEET.

SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES
SB1	24	2 4 4 6
SB2	24	3 7 9 11
SB3	24	5 7 9 12
SB4	24	9 11 12 14
SB5	18	2 4 4



REMARKS: Auger refusal at 16.9 feet.

GROUNDWATER & BACKFILL INFORMATION

GROUNDWATER WAS NOT ENCOUNTERED

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

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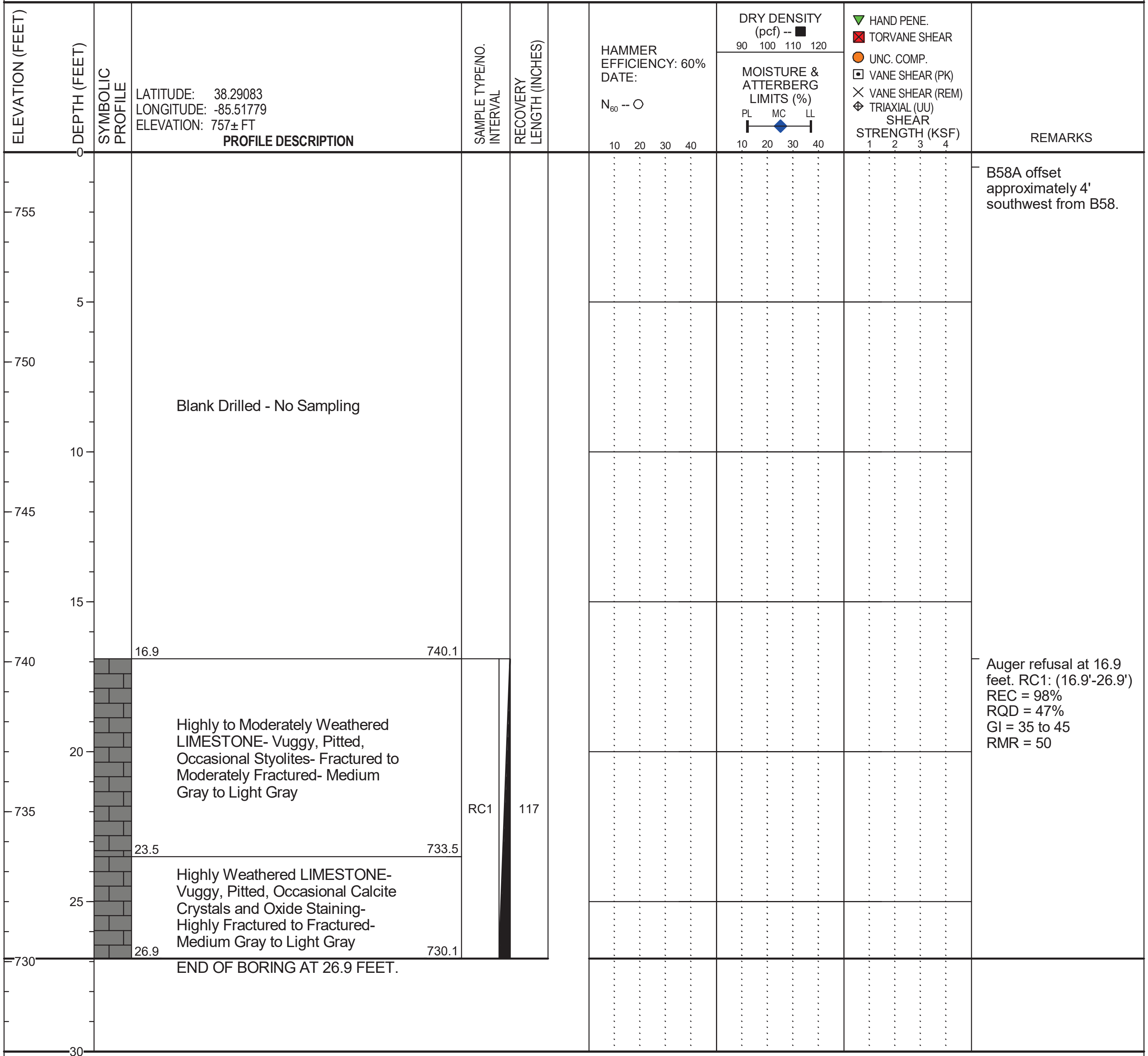
BORING B58A

PAGE 1 OF 1

BORING DEPTH: 26.9 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 12/26/25
COMPLETED: 12/26/25
BORING METHOD: Hollow Stem Augers/NQ2 Core
DRILLER: RM (Mathes Drilling)
RIG NO.: B-53 (ATV)
LOGGED BY: A. Dodson
CHECKED BY: WH



LATITUDE: 38.29083
LONGITUDE: -85.51779
ELEVATION: 757± FT

PROFILE DESCRIPTION

Blank Drilled - No Sampling

16.9 — 740.1

Highly to Moderately Weathered LIMESTONE- Vuggy, Pitted, Occasional Stylolites- Fractured to Moderately Fractured- Medium Gray to Light Gray

23.5 — 733.5

Highly Weathered LIMESTONE- Vuggy, Pitted, Occasional Calcite Crystals and Oxide Staining- Highly Fractured to Fractured- Medium Gray to Light Gray

26.9 — 730.1

END OF BORING AT 26.9 FEET.

REMARKS:

B58A offset approximately 4' southwest from B58.

Auger refusal at 16.9 feet. RC1: (16.9'-26.9')
REC = 98%
RQD = 47%
GI = 35 to 45
RMR = 50

GROUNDWATER & BACKFILL INFORMATION

GROUNDWATER WAS NOT ENCOUNTERED

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

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SME

BORING B59

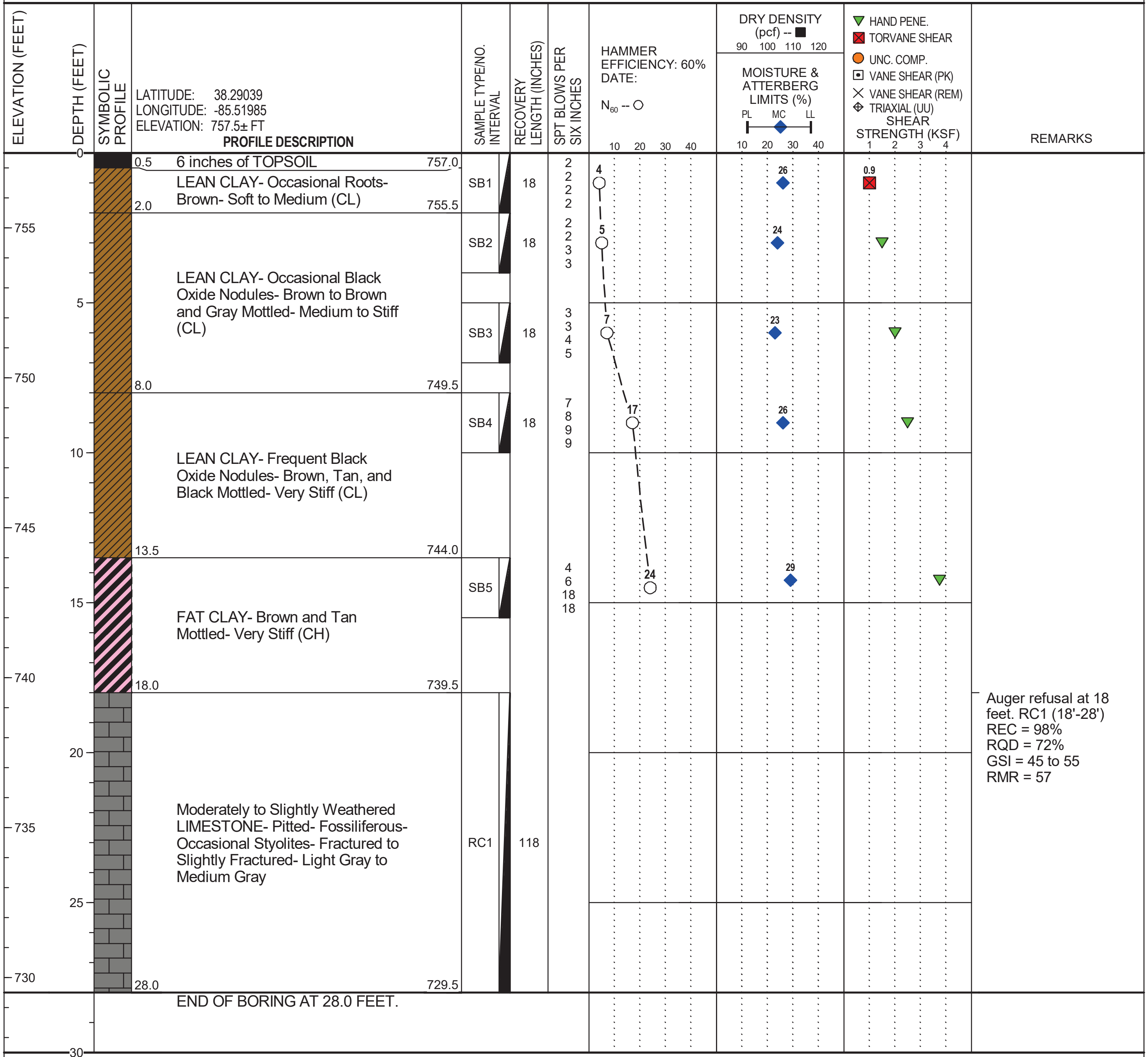
PAGE 1 OF 1

BORING DEPTH: 28 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 1/13/26
COMPLETED: 1/13/26
BORING METHOD: Hollow Stem Augers/NQ2 Core
DRILLER: RM (Mathes Drilling)
RIG NO.: B-53 (ATV)
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.29039
LONGITUDE: -85.51985
ELEVATION: 757.5± FT

HAMMER EFFICIENCY: 60%
DATE:



Depth (ft)	PROFILE DESCRIPTION	Elevation (ft)
0.5	6 inches of TOPSOIL	757.0
2.0	LEAN CLAY- Occasional Roots- Brown- Soft to Medium (CL)	755.5
8.0	LEAN CLAY- Occasional Black Oxide Nodules- Brown to Brown and Gray Mottled- Medium to Stiff (CL)	749.5
13.5	LEAN CLAY- Frequent Black Oxide Nodules- Brown, Tan, and Black Mottled- Very Stiff (CL)	744.0
18.0	FAT CLAY- Brown and Tan Mottled- Very Stiff (CH)	739.5
28.0	Moderately to Slightly Weathered LIMESTONE- Pitted- Fossiliferous- Occasional Stylolites- Fractured to Slightly Fractured- Light Gray to Medium Gray	729.5

END OF BORING AT 28.0 FEET.

SAMPLE TYPE/NO.	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	N_{60}	MC
SB1	18	2 2 2 2	4	26
SB2	18	2 2 3 3	5	24
SB3	18	3 3 4 5	7	23
SB4	18	7 8 9 9	17	26
SB5	18	4 6 18 18	24	29
RC1	118			

REMARKS:
Auger refusal at 18 feet. RC1 (18'-28')
REC = 98%
RQD = 72%
GSI = 45 to 55
RMR = 57

GROUNDWATER & BACKFILL INFORMATION

GROUNDWATER WAS NOT ENCOUNTERED

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

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SME

BORING B60

PAGE 1 OF 1

BORING DEPTH: 8.9 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 1/16/26
COMPLETED: 1/16/26
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH

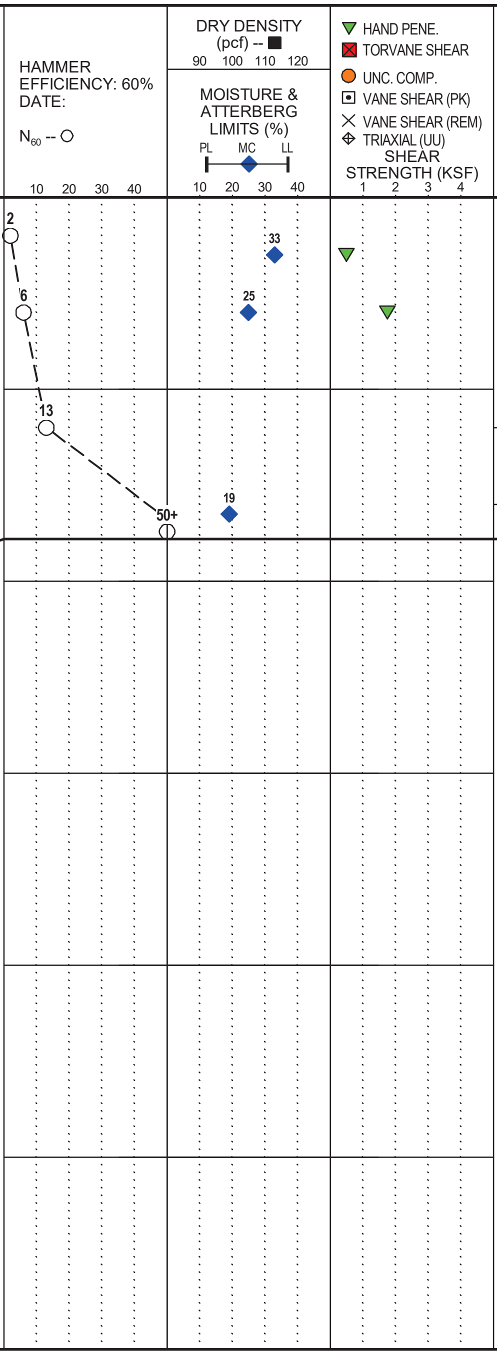
LATITUDE: 38.28959
LONGITUDE: -85.51929
ELEVATION: 749.5± FT

PROFILE DESCRIPTION

DEPTH (FEET)	PROFILE DESCRIPTION	ELEVATION (FEET)
0.2	2 inches of TOPSOIL	749.3
2.0	LEAN CLAY- Occasional Roots- Dark Brown- Very Soft to Medium (CL)	747.5
5.0	LEAN CLAY- Occasional Black Oxide Nodules- Reddish Brown- Medium to Very Stiff (CL)	744.5
8.5	Sandy LEAN CLAY with Completely Limestone Fragments- Brown and Gray- Stiff (CL)	741.0
8.9	Completely Weathered LIMESTONE- Brown and Gray- Hard	740.6

END OF BORING AT 8.9 FEET.

SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES
SB1	24	2 1 1 1
SB2	24	3 3 3 4
SB3		6 6 7 9
SB4	8	26 50/5"



REMARKS

Driller collected auger cuttings from 6 to 8 feet for classification purposes.
Sample SB4 was too disturbed to perform a shear strength test.
Sampler refusal at 8.9 feet.

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	8.5	741.0
▼ **AT END OF BORING:**	Note 3	
CAVE-IN OF BOREHOLE AT:	4.0	745.5
BACKFILL METHOD:	Auger Cuttings	

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. Groundwater not encountered above cave in depth.

RECEIVED May 22, 2026 Planning and Design 26-ZONE-0056

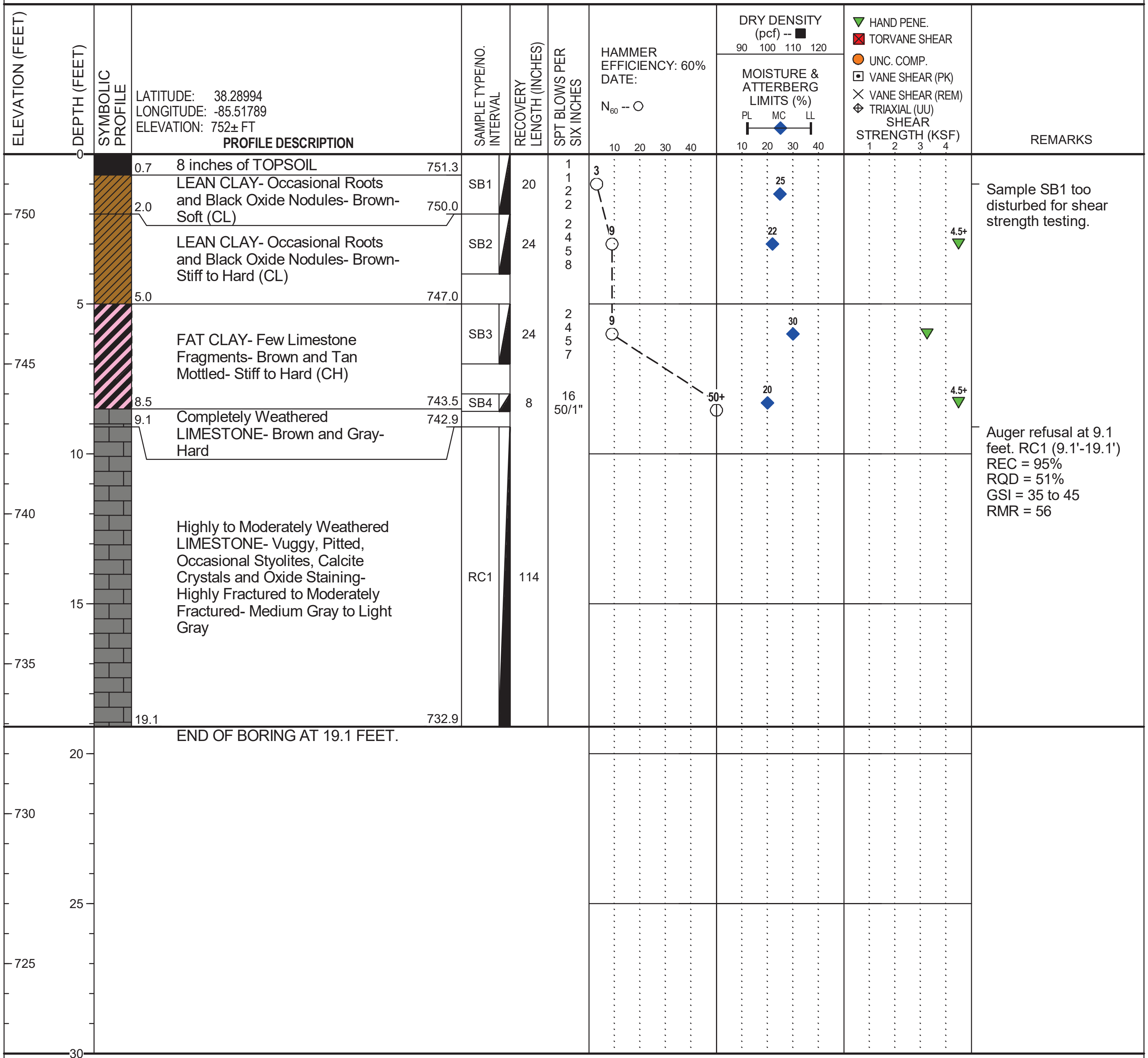
BORING B61

PAGE 1 OF 1

BORING DEPTH: 19.1 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky

DATE STARTED: 12/23/25
COMPLETED: 12/23/25
BORING METHOD: Hollow Stem Augers/NQ2 Core
DRILLER: RM (Mathes Drilling)
RIG NO.: B-53 (ATV)
LOGGED BY: A. Dodson
CHECKED BY: WH



Depth (ft)	Elevation (ft)	Profile Description	Sample Type/No.	Recovery Length (inches)	SPT Blows per Six Inches	N60	MC (%)	Shear Strength (KSF)	Remarks
0.7	751.3	8 inches of TOPSOIL							
2.0	750.0	LEAN CLAY- Occasional Roots and Black Oxide Nodules- Brown- Soft (CL)	SB1	20	1 1 2 2	3	25		Sample SB1 too disturbed for shear strength testing.
5.0	747.0	LEAN CLAY- Occasional Roots and Black Oxide Nodules- Brown- Stiff to Hard (CL)	SB2	24	2 4 5 8	9	22	4.5+	
8.5	743.5	FAT CLAY- Few Limestone Fragments- Brown and Tan Mottled- Stiff to Hard (CH)	SB3	24	2 4 5 7	9	30	▽	
			SB4	8	16 50/1"	50+	20	4.5+	
9.1	742.9	Completely Weathered LIMESTONE- Brown and Gray- Hard							
19.1	732.9	Highly to Moderately Weathered LIMESTONE- Vuggy, Pitted, Occasional Stylolites, Calcite Crystals and Oxide Staining- Highly Fractured to Moderately Fractured- Medium Gray to Light Gray	RC1	114					Auger refusal at 9.1 feet. RC1 (9.1'-19.1') REC = 95% RQD = 51% GSI = 35 to 45 RMR = 56

END OF BORING AT 19.1 FEET.

GROUNDWATER & BACKFILL INFORMATION

GROUNDWATER WAS NOT ENCOUNTERED

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

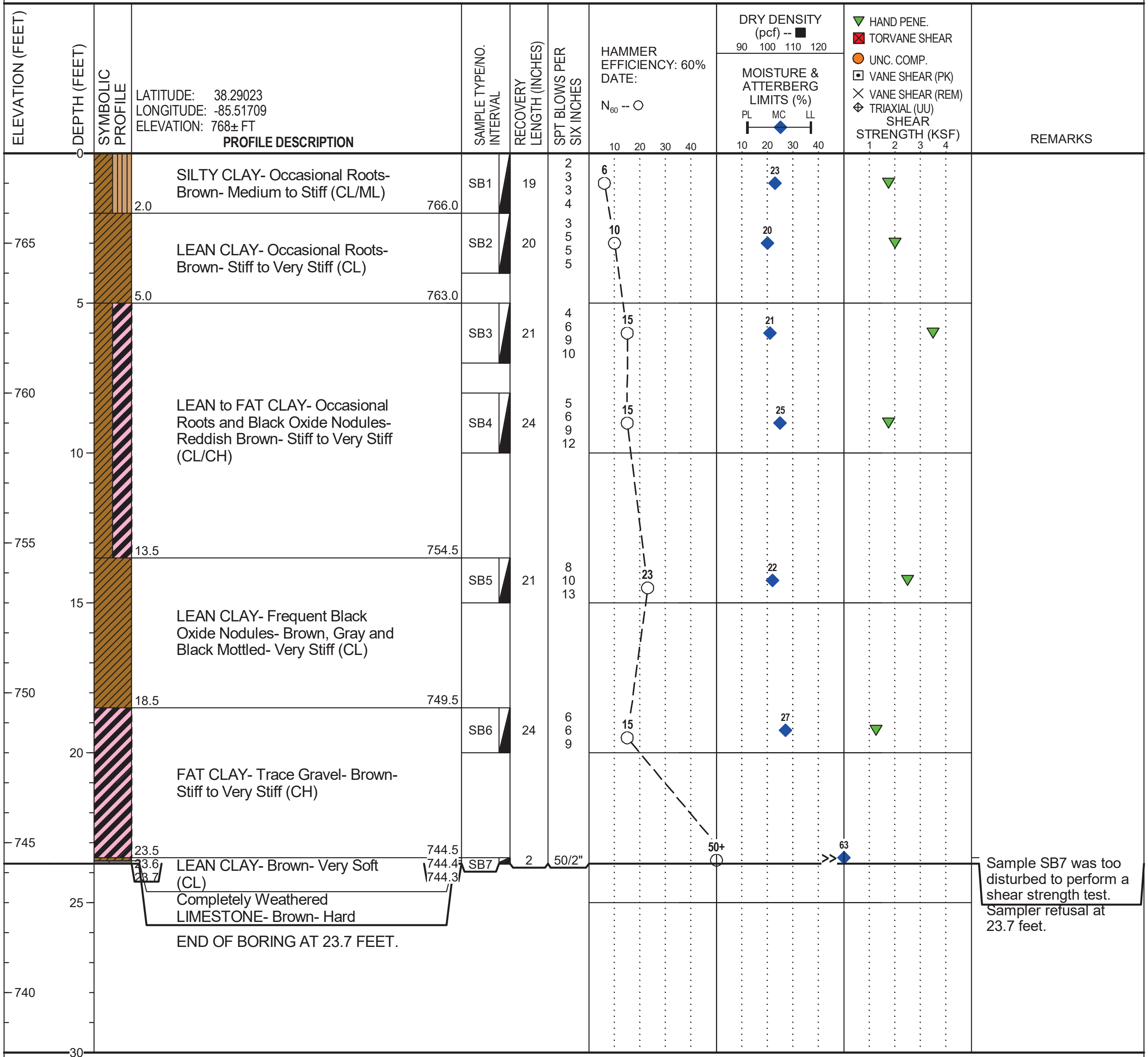
3/19/26 8:51:37 AM

BORING B62

PAGE 1 OF 1

BORING DEPTH: 23.7 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 12/23/25
COMPLETED: 12/23/25
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH



LATITUDE: 38.29023
LONGITUDE: -85.51709
ELEVATION: 768± FT

PROFILE DESCRIPTION

DEPTH (FEET)	PROFILE DESCRIPTION	ELEVATION (FEET)
2.0	SILTY CLAY- Occasional Roots- Brown- Medium to Stiff (CL/ML)	766.0
5.0	LEAN CLAY- Occasional Roots- Brown- Stiff to Very Stiff (CL)	763.0
13.5	LEAN to FAT CLAY- Occasional Roots and Black Oxide Nodules- Reddish Brown- Stiff to Very Stiff (CL/CH)	754.5
18.5	LEAN CLAY- Frequent Black Oxide Nodules- Brown, Gray and Black Mottled- Very Stiff (CL)	749.5
23.5	FAT CLAY- Trace Gravel- Brown- Stiff to Very Stiff (CH)	744.5
23.6	LEAN CLAY- Brown- Very Soft (CL)	744.4
23.7	Completely Weathered LIMESTONE- Brown- Hard	744.3

END OF BORING AT 23.7 FEET.

SAMPLE TYPE/NO.	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	N60	MC
SB1	19	2 3 3 4	6	23
SB2	20	3 5 5 5	10	20
SB3	21	4 6 9 10	15	21
SB4	24	5 6 9 12	15	25
SB5	21	8 10 13	23	22
SB6	24	6 6 9	15	27
SB7	2	50/2"	50+	63

REMARKS: Sample SB7 was too disturbed to perform a shear strength test. Sampler refusal at 23.7 feet.

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	Not Encountered	
▼ **AT END OF BORING:**	Note 3	
CAVE-IN OF BOREHOLE AT:	3.0	765.0
BACKFILL METHOD:	Auger Cuttings	

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. Groundwater was not encountered above the borehole cave in depth.

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SME

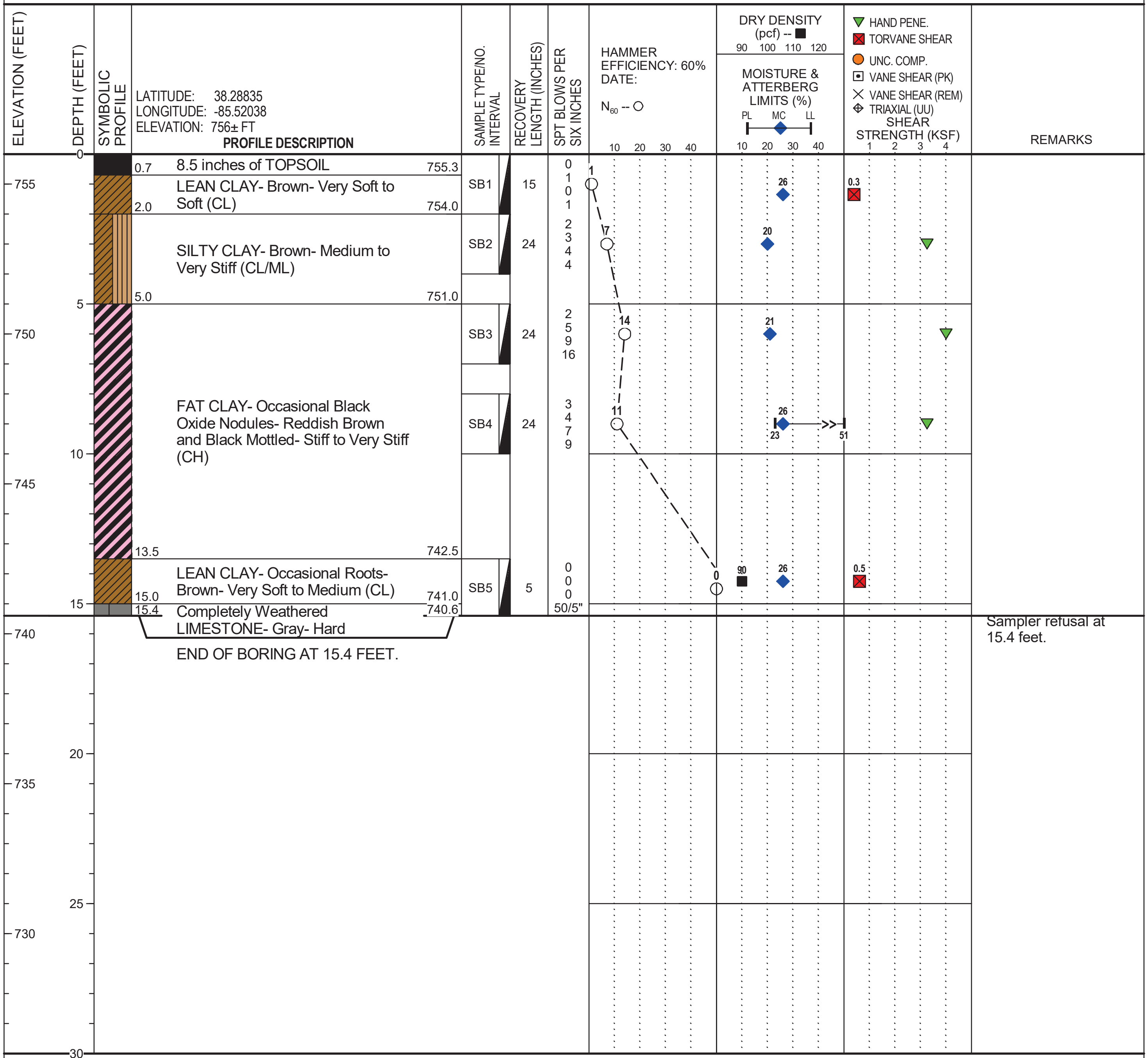
BORING B63

PAGE 1 OF 1

BORING DEPTH: 15.4 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 12/30/25
COMPLETED: 12/30/25
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.28835
LONGITUDE: -85.52038
ELEVATION: 756± FT



DEPTH (FEET)	ELEVATION (FEET)	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	N60	DRY DENSITY (pcf)	MOISTURE & ATTERBERG LIMITS (%)	SHEAR STRENGTH (KSF)	REMARKS
0.7	755.3	8.5 inches of TOPSOIL								
2.0	754.0	LEAN CLAY- Brown- Very Soft to Soft (CL)	SB1	15	0 1 0 1	1		26	0.3	
5.0	751.0	SILTY CLAY- Brown- Medium to Very Stiff (CL/ML)	SB2	24	2 3 4 4	7		20		
13.5	742.5	FAT CLAY- Occasional Black Oxide Nodules- Reddish Brown and Black Mottled- Stiff to Very Stiff (CH)	SB3	24	2 5 9 16	14		21		
			SB4	24	3 4 7 9	11		26 PL 23 LL 51		
15.0	741.0	LEAN CLAY- Occasional Roots- Brown- Very Soft to Medium (CL)	SB5	5	0 0 0 50/5"	0	90	26	0.5	
15.4	740.6	Completely Weathered LIMESTONE- Gray- Hard								Sampler refusal at 15.4 feet.

END OF BORING AT 15.4 FEET.

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
∇ **DURING BORING:**	Not Encountered	
▼ **AT END OF BORING:**	Note 3	
CAVE-IN OF BOREHOLE AT:	4.0	752.0
BACKFILL METHOD:	Auger Cuttings	

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. Groundwater was not encountered above the borehole cave in depth.

3/19/26 8:51:39 AM

BORING B63A

PAGE 1 OF 1

BORING DEPTH: 15.5 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky

DATE STARTED: 1/23/26
COMPLETED: 1/23/26
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH

LATITUDE: 38.28835
LONGITUDE: -85.52038
ELEVATION: 756± FT

HAMMER EFFICIENCY: 60%
DATE:
N₆₀ -- ○

DRY DENSITY (pcf) -- ■ (90 100 110 120)
MOISTURE & ATTERBERG LIMITS (%) PL MC LL (10 20 30 40)

▼ HAND PENE.
☒ TORVANE SHEAR
● UNC. COMP.
⊡ VANE SHEAR (PK)
× VANE SHEAR (REM)
⊕ TRIAXIAL (UU)
SHEAR STRENGTH (KSF) (1 2 3 4)

ELEVATION (FEET)	DEPTH (FEET)	SYMBOLIC PROFILE	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	REMARKS
756±	0					Boring B63A offset approximately 5 feet from boring B63. Bulk sample obtained from 2-4 feet.
	2-4			GS1		
	5-10			GS2		Bulk sample obtained from 5-10 feet.
	13-15			3ST1	10	Shelby tube obtained from 13-15 feet.

Elevation scale: 755, 750, 745, 740, 735, 730. Depth scale: 0, 5, 10, 15, 20, 25, 30.

GROUNDWATER & BACKFILL INFORMATION

GROUNDWATER WAS NOT ENCOUNTERED

BACKFILL METHOD: Auger Cuttings

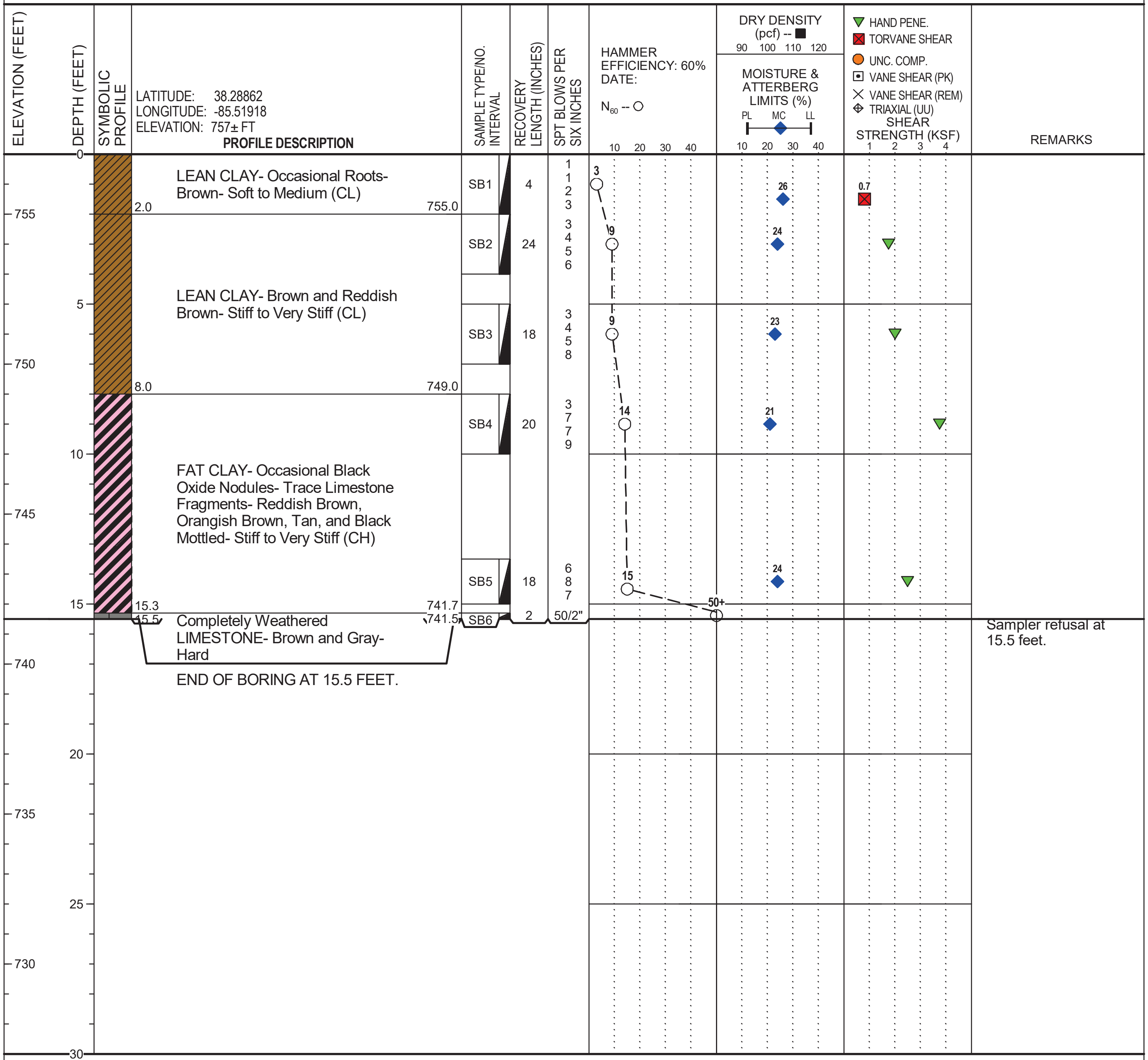
NOTES: 1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.

BORING B64

PAGE 1 OF 1

BORING DEPTH: 15.5 FEET

PROJECT NAME: Greenfield Site Development
PROJECT NUMBER: 102074.00
CLIENT: Luckett & Farley
PROJECT LOCATION: Louisville, Kentucky
DATE STARTED: 1/18/26
COMPLETED: 1/18/26
BORING METHOD: Hollow Stem Augers
DRILLER: CD (Black Sheep)
RIG NO.: Geoprobe 7822DT ATV
LOGGED BY: A. Dodson
CHECKED BY: WH



LEAN CLAY- Occasional Roots- Brown- Soft to Medium (CL)

LEAN CLAY- Brown and Reddish Brown- Stiff to Very Stiff (CL)

FAT CLAY- Occasional Black Oxide Nodules- Trace Limestone Fragments- Reddish Brown, Orangish Brown, Tan, and Black Mottled- Stiff to Very Stiff (CH)

Completely Weathered LIMESTONE- Brown and Gray- Hard

END OF BORING AT 15.5 FEET.

Sampler refusal at 15.5 feet.

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	Not Encountered	
▼ **AT END OF BORING:**	Note 3	
CAVE-IN OF BOREHOLE AT:	4.0	753.0
BACKFILL METHOD:	Auger Cuttings	

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. Groundwater not encountered above cave in depth.

LEGEND

🟥 APPROXIMATE PROJECT SITE BOUNDARY

NOTE:
IMAGE OBTAINED FROM NGMDB.USGS.GOV
SITE BOUNDARY INFORMATION APPROXIMATED FROM
DRAWING TITLED "ADVANCED SITE PLAN" (EXHIBIT A)
DATED SEPTEMBER 10, 2025.

No.	Revision Date		
		Date	01-13-2026
		Drawn By	AMD
		Designed By	AMD
		Scale	NTS
		Project	102074.00

1905 TOPOGRAPHIC MAP
GREENFIELD SITE DEVELOPMENT
LOUISVILLE, KENTUCKY

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Figure No. 3

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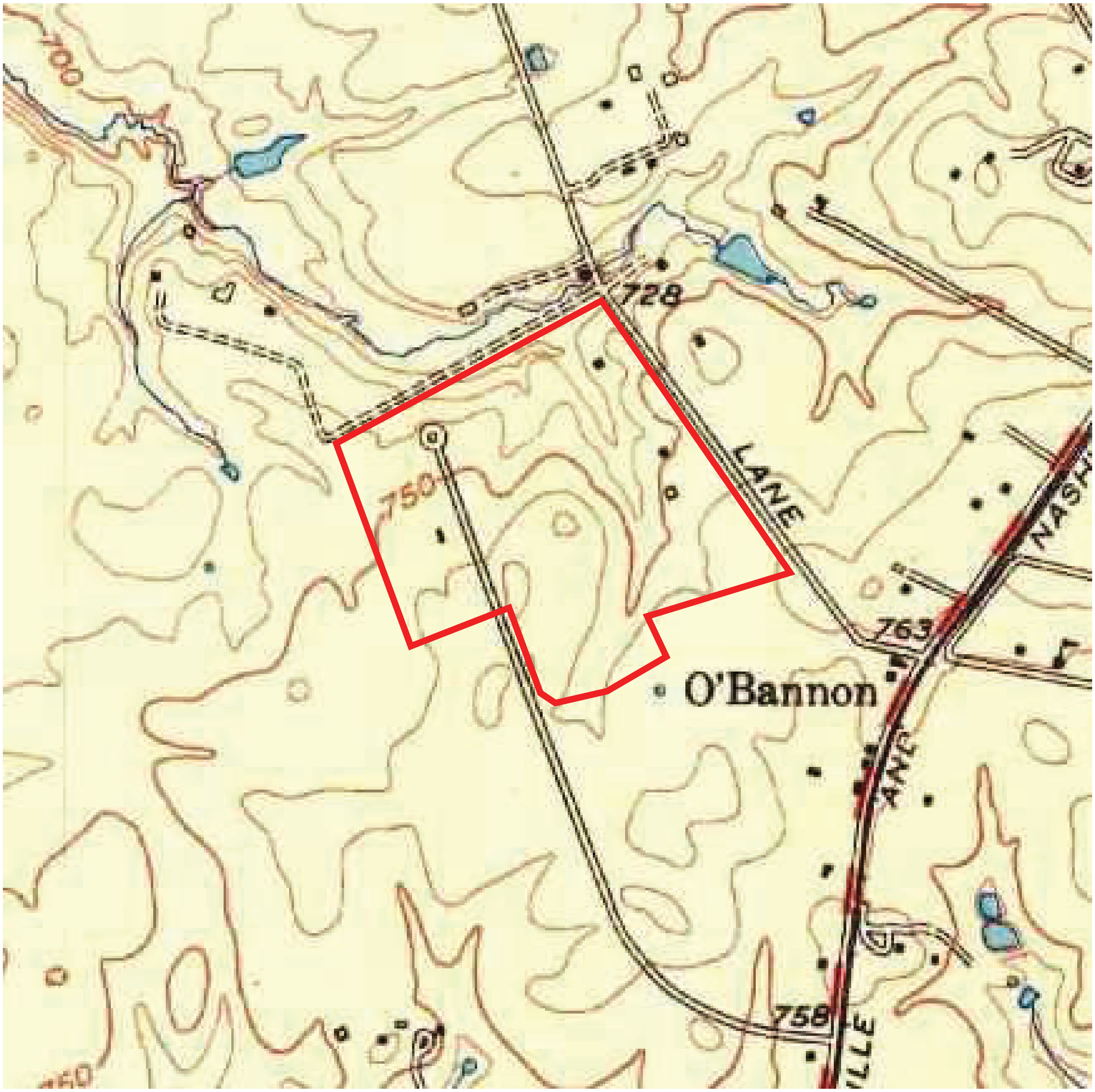

LEGEND

🟥 APPROXIMATE PROJECT SITE BOUNDARY

NOTE:
IMAGE OBTAINED FROM NGMDB.USGS.GOV
SITE BOUNDARY INFORMATION APPROXIMATED FROM
DRAWING TITLED "ADVANCED SITE PLAN" (EXHIBIT A)
DATED SEPTEMBER 10, 2025.

No.	Revision Date		
		Date	01-13-2026
		Drawn By	AMD
		Designed By	AMD
		Scale	NTS
		Project	102074.00

1951 TOPOGRAPHIC MAP
GREENFIELD SITE DEVELOPMENT
LOUISVILLE, KENTUCKY

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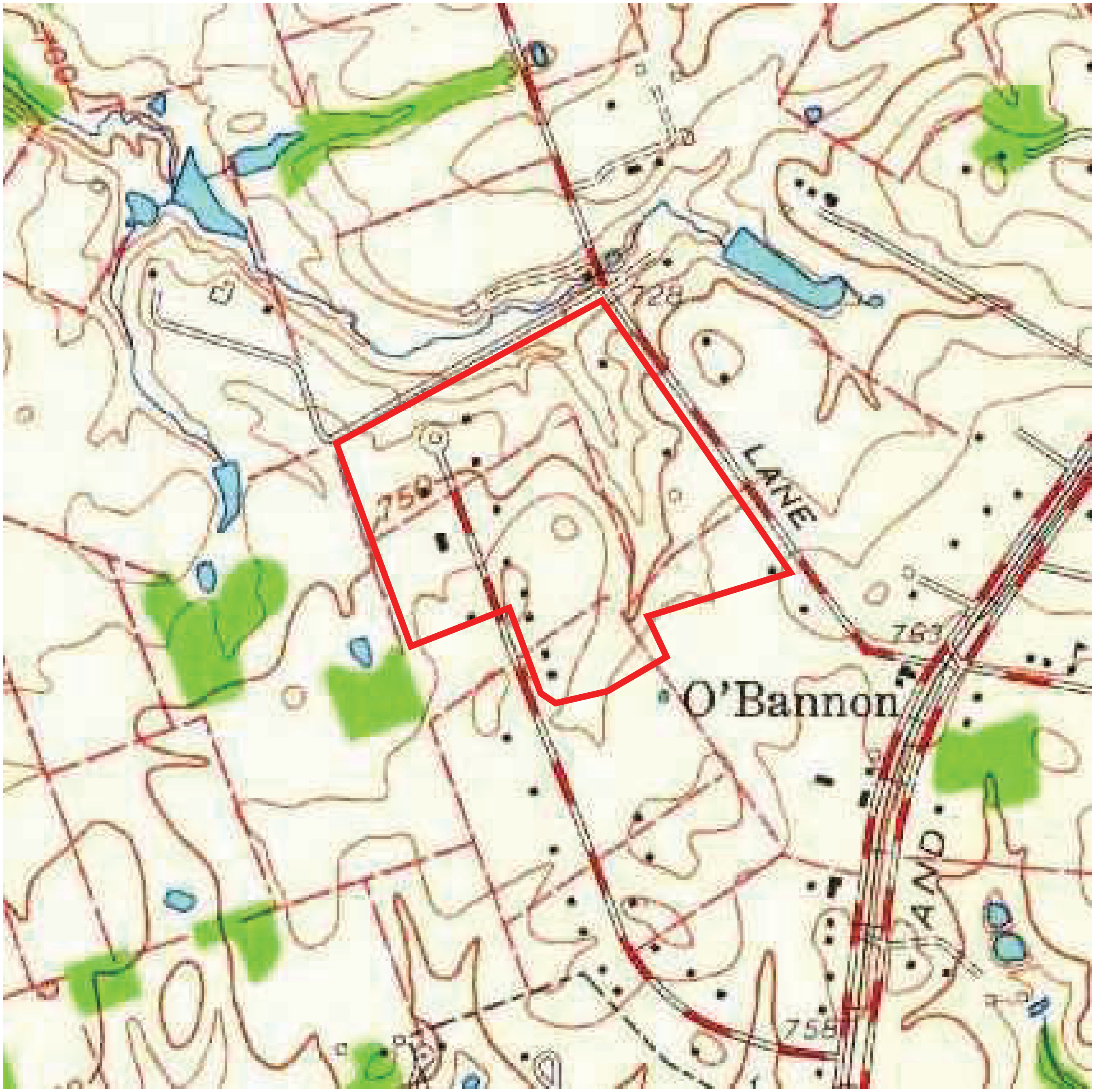
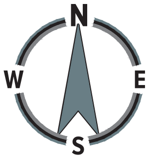
Figure No. 4



LEGEND

🟥 APPROXIMATE PROJECT SITE BOUNDARY

NOTE:
IMAGE OBTAINED FROM NGMDB.USGS.GOV
SITE BOUNDARY INFORMATION APPROXIMATED FROM
DRAWING TITLED "ADVANCED SITE PLAN" (EXHIBIT A)
DATED SEPTEMBER 10, 2025.



No.	Revision Date	Date	01-13-2026
		Drawn By	AMD
		Designed By	AMD
		Scale	NTS
		Project	102074.00

1960 TOPOGRAPHIC MAP
GREENFIELD SITE DEVELOPMENT
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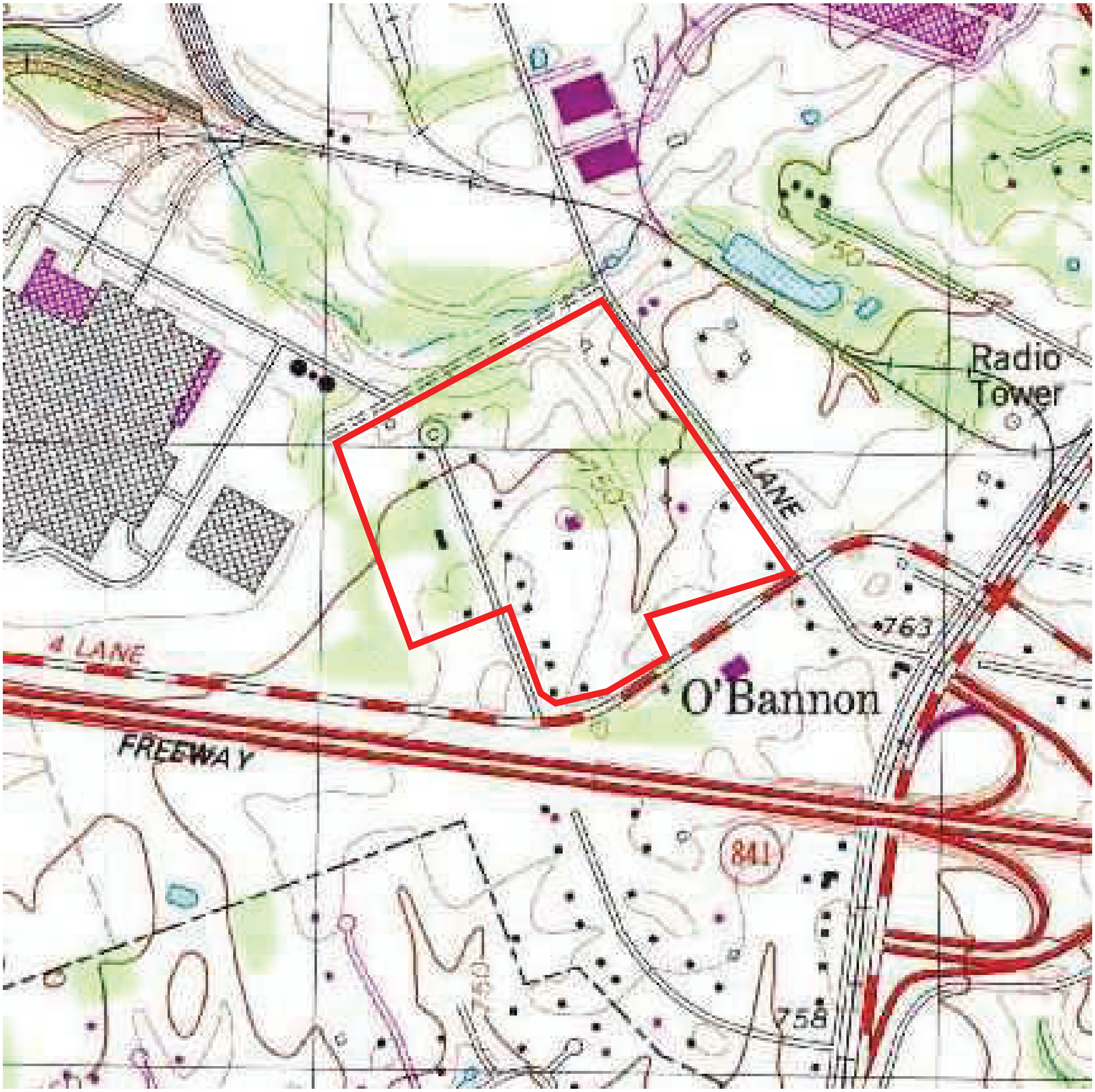
Figure No. 5



LEGEND

🟥 APPROXIMATE PROJECT SITE BOUNDARY

NOTE:
IMAGE OBTAINED FROM NGMDB.USGS.GOV
SITE BOUNDARY INFORMATION APPROXIMATED FROM
DRAWING TITLED "ADVANCED SITE PLAN" (EXHIBIT A)
DATED SEPTEMBER 10, 2025.

No.	Revision Date		
		Date	01-13-2026
		Drawn By	AMD
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		Scale	NTS
		Project	102074.00

1981 TOPOGRAPHIC MAP
GREENFIELD SITE DEVELOPMENT
LOUISVILLE, KENTUCKY

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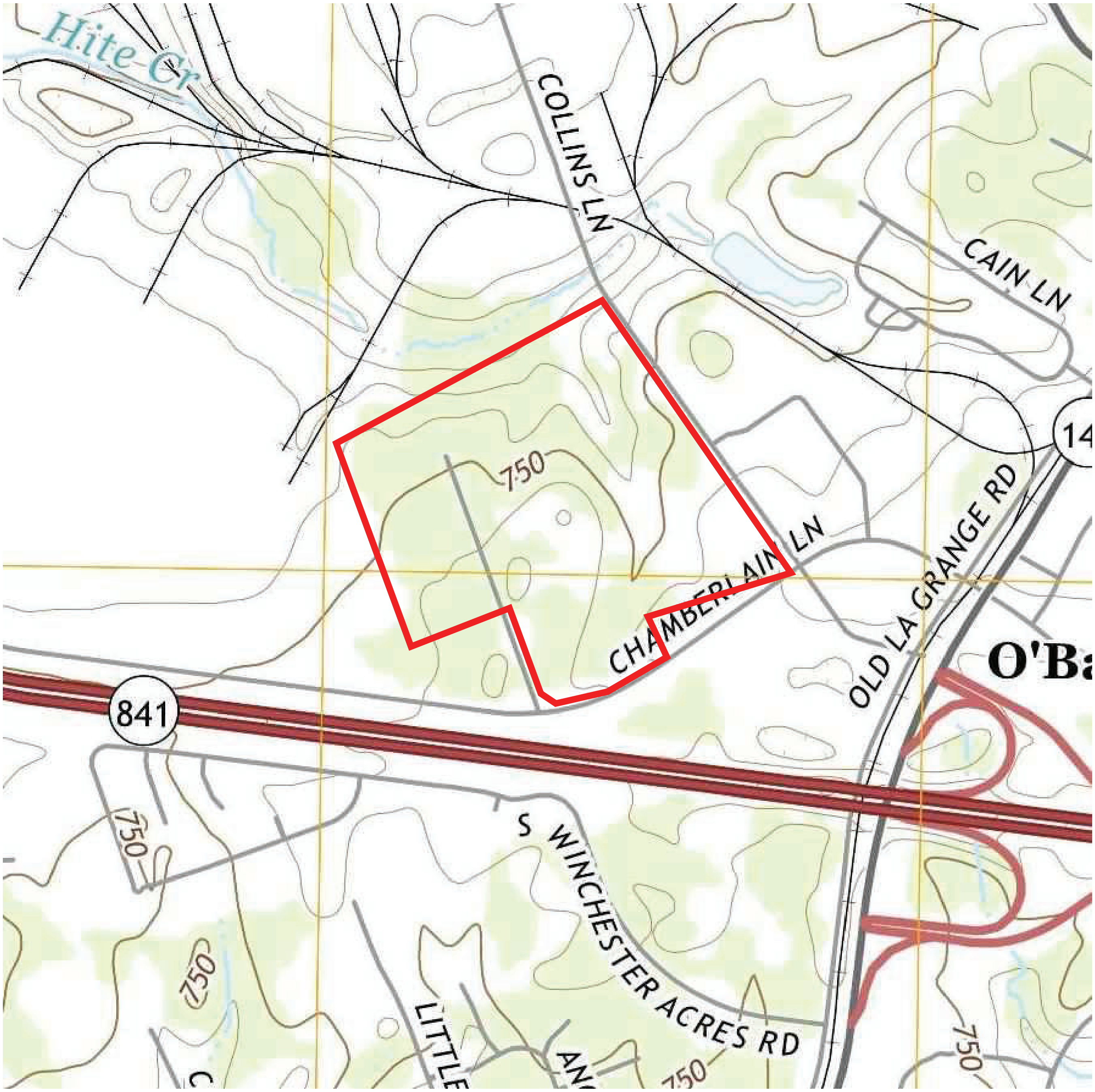
Figure No. 6



LEGEND

🟥 APPROXIMATE PROJECT SITE BOUNDARY

NOTE:
IMAGE OBTAINED FROM NGMDB.USGS.GOV
SITE BOUNDARY INFORMATION APPROXIMATED FROM
DRAWING TITLED "ADVANCED SITE PLAN" (EXHIBIT A)
DATED SEPTEMBER 10, 2025.

No.	Revision Date		
		Date	01-13-2026
		Drawn By	AMD
		Designed By	AMD
		Scale	NTS
		Project	102074.00

2013 TOPOGRAPHIC MAP
GREENFIELD SITE DEVELOPMENT
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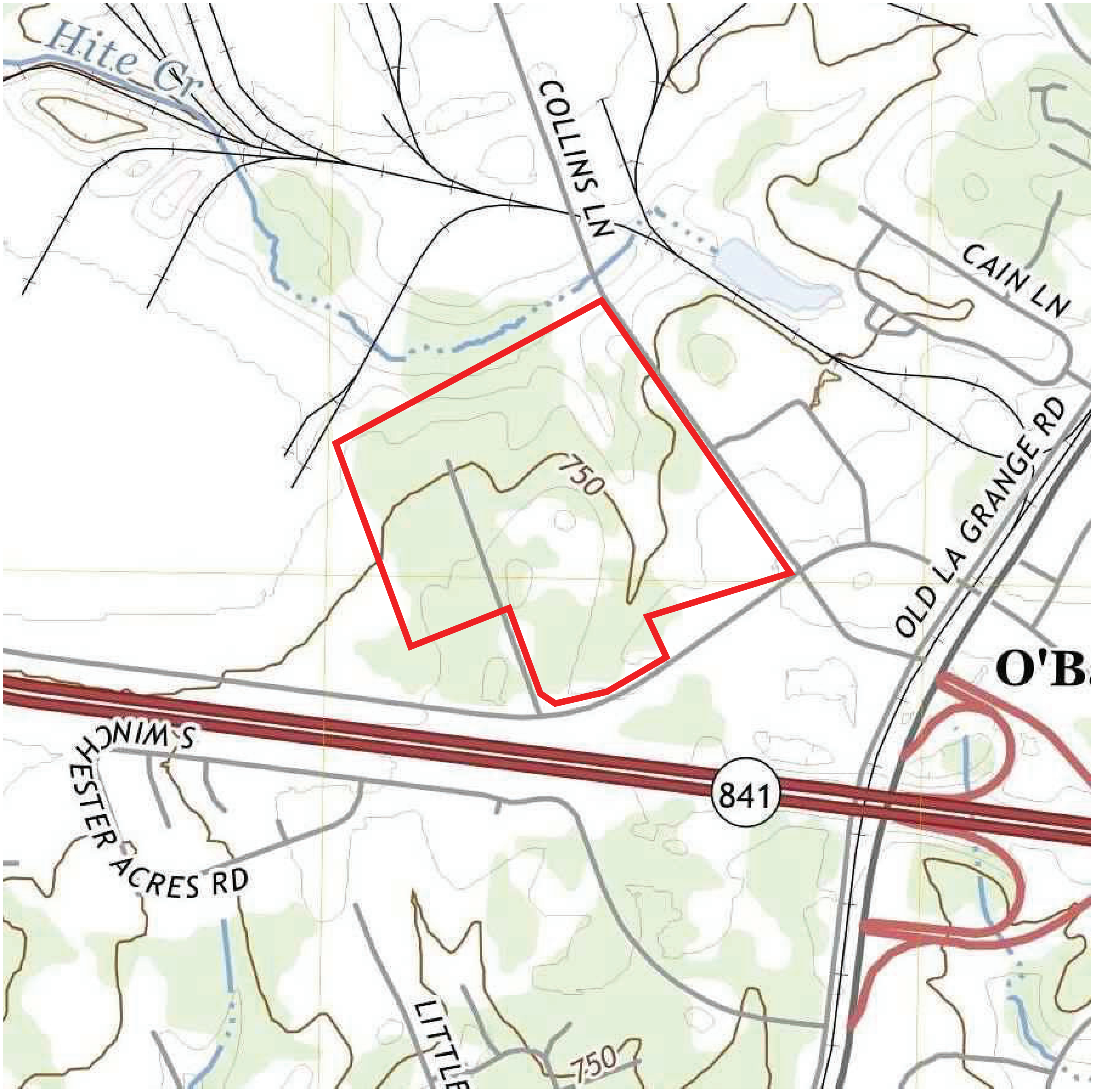

LEGEND

🟥 APPROXIMATE PROJECT SITE BOUNDARY

NOTE:
IMAGE OBTAINED FROM NGMDB.USGS.GOV
SITE BOUNDARY INFORMATION APPROXIMATED FROM
DRAWING TITLED "ADVANCED SITE PLAN" (EXHIBIT A)
DATED SEPTEMBER 10, 2025.

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No.	Revision Date		
		Date	01-13-2026
		Drawn By	AMD
		Designed By	AMD
		Scale	NTS
		Project	102074.00

2022 TOPOGRAPHIC MAP
GREENFIELD SITE DEVELOPMENT
LOUISVILLE, KENTUCKY

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Figure No. 8

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🟥 APPROXIMATE PROJECT SITE BOUNDARY

NOTE:
IMAGE (DATED 1949) OBTAINED FROM
WWW.HISTORICAERIALS.COM
SITE BOUNDARY INFORMATION APPROXIMATED FROM
DRAWING TITLED "ADVANCED SITE PLAN" (EXHIBIT A)
DATED SEPTEMBER 10, 2025.

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No.	Revision Date		
		Date	01-14-2026
		Drawn By	AMD
		Designed By	AMD
		Scale	NTS
		Project	102074.00

1949 AERIAL IMAGE
GREENFIELD SITE DEVELOPMENT
LOUISVILLE, KENTUCKY

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Figure No. 9

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🟥 APPROXIMATE PROJECT SITE BOUNDARY

NOTE:
IMAGE (DATED 1955) OBTAINED FROM
WWW.HISTORICAERIALS.COM
SITE BOUNDARY INFORMATION APPROXIMATED FROM
DRAWING TITLED "ADVANCED SITE PLAN" (EXHIBIT A)
DATED SEPTEMBER 10, 2025.

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No.	Revision Date		
		Date	01-14-2026
		Drawn By	AMD
		Designed By	AMD
		Scale	NTS
		Project	102074.00

1955 AERIAL IMAGE
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Figure No. 10

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🟥 APPROXIMATE PROJECT SITE BOUNDARY

NOTE:
IMAGE (DATED 1960) OBTAINED FROM
WWW.HISTORICAERIALS.COM
SITE BOUNDARY INFORMATION APPROXIMATED FROM
DRAWING TITLED "ADVANCED SITE PLAN" (EXHIBIT A)
DATED SEPTEMBER 10, 2025.

No.	Revision Date		
		Date	01-14-2026
		Drawn By	AMD
		Designed By	AMD
		Scale	NTS
		Project	102074.00

1960 AERIAL IMAGE
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Figure No. 11

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🟥 APPROXIMATE PROJECT SITE BOUNDARY

NOTE:
IMAGE (DATED 1971) OBTAINED FROM
WWW.HISTORICAERIALS.COM
SITE BOUNDARY INFORMATION APPROXIMATED FROM
DRAWING TITLED "ADVANCED SITE PLAN" (EXHIBIT A)
DATED SEPTEMBER 10, 2025.

No.	Revision Date	Date	01-14-2026
		Drawn By	AMD
		Designed By	AMD
		Scale	NTS
		Project	102074.00

1971 AERIAL IMAGE
GREENFIELD SITE DEVELOPMENT
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🟥 APPROXIMATE PROJECT SITE BOUNDARY

NOTE:
IMAGE (DATED 1986) OBTAINED FROM
WWW.HISTORICAERIALS.COM
SITE BOUNDARY INFORMATION APPROXIMATED FROM
DRAWING TITLED "ADVANCED SITE PLAN" (EXHIBIT A)
DATED SEPTEMBER 10, 2025.

No.	Revision Date		
		Date	01-14-2026
		Drawn By	AMD
		Designed By	AMD
		Scale	NTS
		Project	102074.00

1986 AERIAL IMAGE
GREENFIELD SITE DEVELOPMENT
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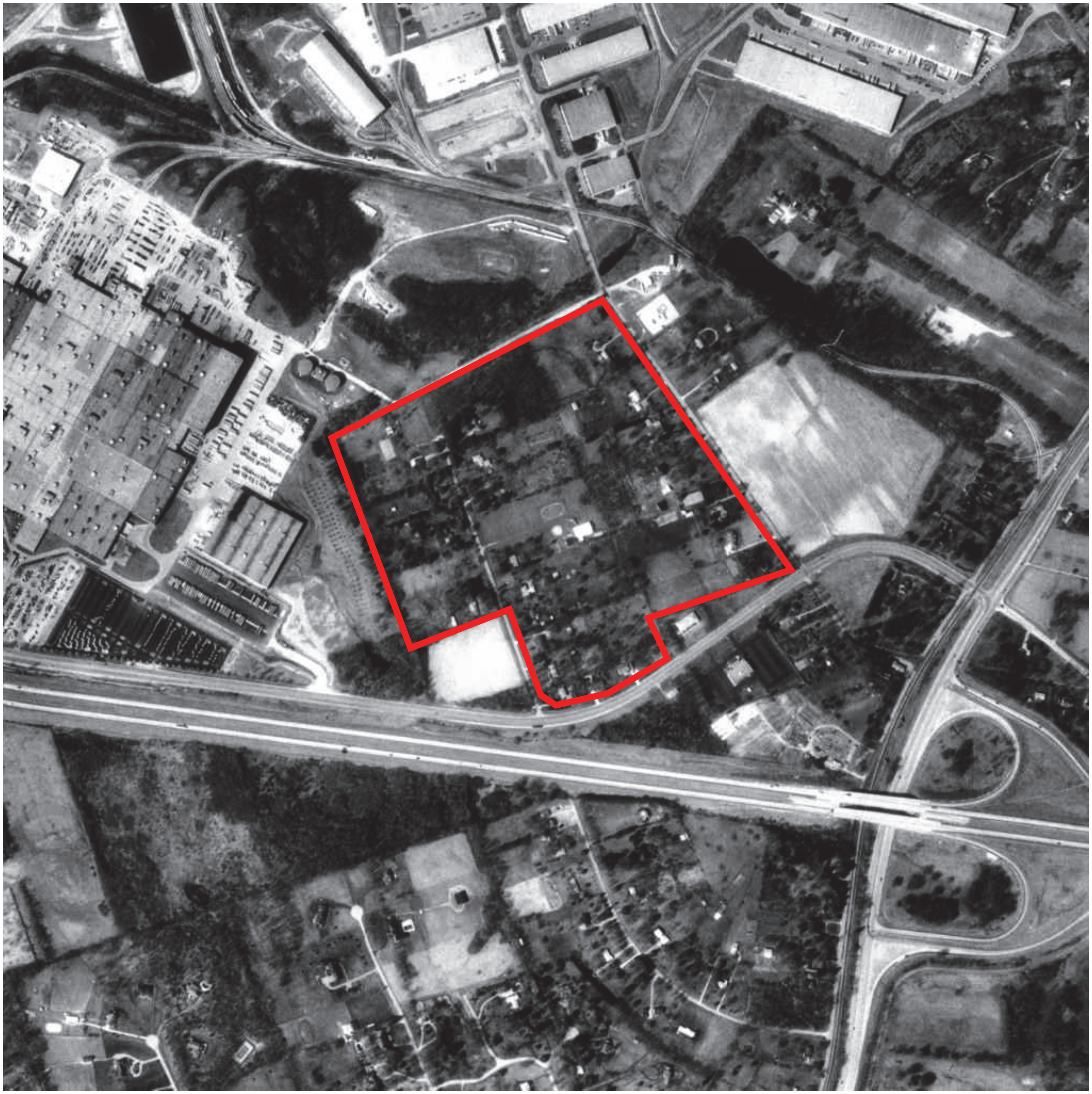
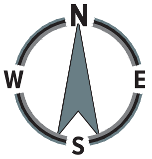
Figure No. 13



LEGEND

━━ APPROXIMATE PROJECT SITE BOUNDARY

NOTE:
IMAGE (DATED MARCH 28, 1993) OBTAINED FROM
WWW.EARTH.GOOGLE.COM
SITE BOUNDARY INFORMATION APPROXIMATED FROM
DRAWING TITLED "ADVANCED SITE PLAN" (EXHIBIT A)
DATED SEPTEMBER 10, 2025.



No.	Revision Date		
		Date	01-14-2026
		Drawn By	AMD
		Designed By	AMD
		Scale	NTS
		Project	102074.00

1993 AERIAL IMAGE
GREENFIELD SITE DEVELOPMENT
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Figure No. 14

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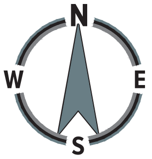
🟥 APPROXIMATE PROJECT SITE BOUNDARY



NOTE:
IMAGE (DATED DECEMBER 31, 2001) OBTAINED FROM WWW.EARTH.GOOGLE.COM
SITE BOUNDARY INFORMATION APPROXIMATED FROM DRAWING TITLED "ADVANCED SITE PLAN" (EXHIBIT A) DATED SEPTEMBER 10, 2025.

No.	Revision Date		
		Date	01-14-2026
		Drawn By	AMD
		Designed By	AMD
		Scale	NTS
		Project	102074.00

2001 AERIAL IMAGE
GREENFIELD SITE DEVELOPMENT
LOUISVILLE, KENTUCKY

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Figure No. 15

LEGEND

🟥 APPROXIMATE PROJECT SITE BOUNDARY

NOTE:
IMAGE (DATED MARCH 18, 2015) OBTAINED FROM
WWW.NEARMAP.COM
SITE BOUNDARY INFORMATION APPROXIMATED FROM
DRAWING TITLED "ADVANCED SITE PLAN" (EXHIBIT A)
DATED SEPTEMBER 10, 2025.

No.	Revision Date		
		Date	01-14-2026
		Drawn By	AMD
		Designed By	AMD
		Scale	NTS
		Project	102074.00

2015 AERIAL IMAGE
GREENFIELD SITE DEVELOPMENT
LOUISVILLE, KENTUCKY

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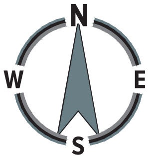
Figure No. 16

LEGEND

🟥 APPROXIMATE PROJECT SITE BOUNDARY

NOTE:
IMAGE (DATED SEPTEMBER 10, 2019) OBTAINED FROM
WWW.NEARMAP.COM
SITE BOUNDARY INFORMATION APPROXIMATED FROM
DRAWING TITLED "ADVANCED SITE PLAN" (EXHIBIT A)
DATED SEPTEMBER 10, 2025.



No.	Revision Date		
		Date	01-14-2026
		Drawn By	AMD
		Designed By	AMD
		Scale	NTS
		Project	102074.00

2019 AERIAL IMAGE
GREENFIELD SITE DEVELOPMENT
LOUISVILLE, KENTUCKY

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Figure No. 17

LEGEND

🟥 APPROXIMATE PROJECT SITE BOUNDARY

NOTE:
IMAGE (DATED SEPTEMBER 13, 2025) OBTAINED FROM WWW.NEARMAP.COM
SITE BOUNDARY INFORMATION APPROXIMATED FROM DRAWING TITLED "ADVANCED SITE PLAN" (EXHIBIT A) DATED SEPTEMBER 10, 2025.

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No.	Revision Date		
		Date	01-14-2026
		Drawn By	AMD
		Designed By	AMD
		Scale	NTS
		Project	102074.00

2025 AERIAL IMAGE
GREENFIELD SITE DEVELOPMENT
LOUISVILLE, KENTUCKY

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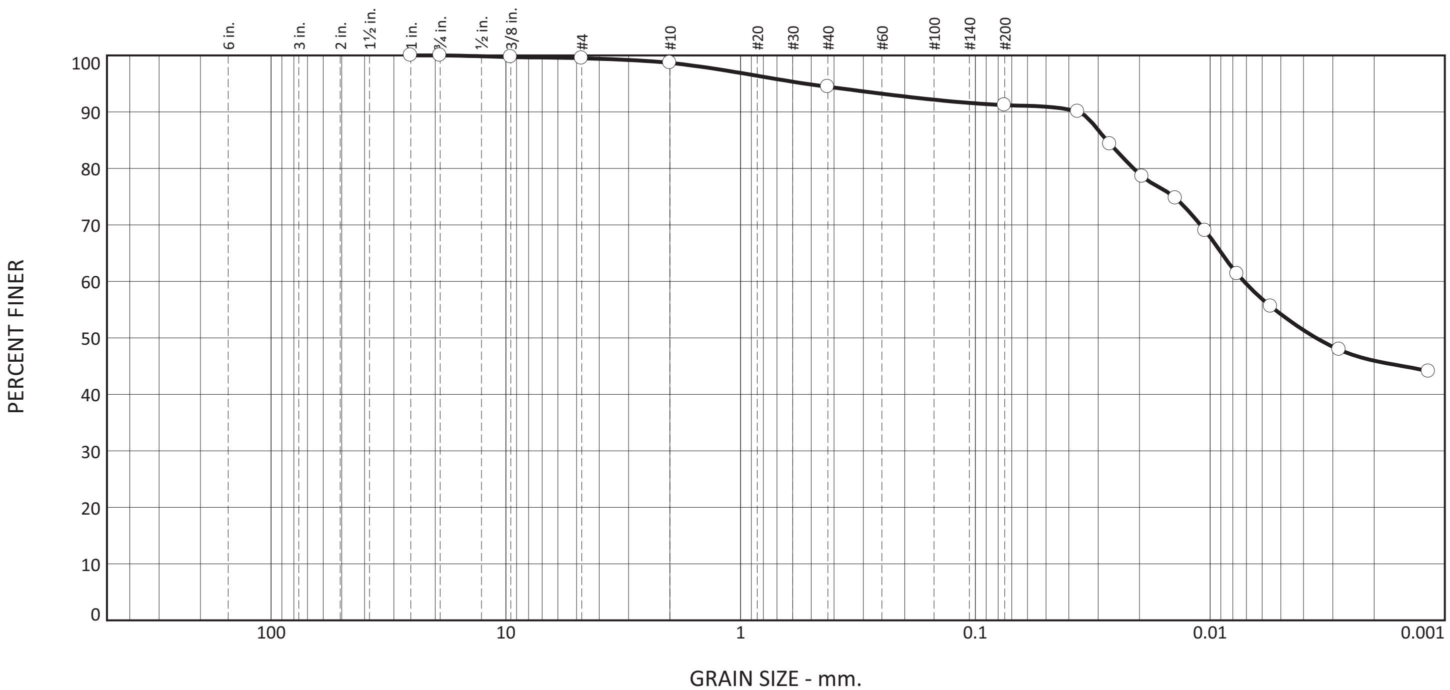
Figure No. 18

APPENDIX B

LABORATORY TESTING RESULTS
INFILTRATION TEST RESULTS (2 PAGES)
FIELD TESTING PROCEDURES
LABORATORY TESTING PROCEDURES
LIMITATIONS PERTAINING TO SUBSURFACE CONDITIONS

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.5	0.8	4.2	3.3	45.2	46.0

Test Results (ASTM D422)

Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)
1	100.0		
.75	100.0		
.375	99.7		
#4	99.5		
#10	98.7		
#40	94.5		
#200	91.2		
0.0366 mm.	90.1		
0.0267 mm.	84.3		
0.0194 mm.	78.6		
0.0140 mm.	74.7		
0.0105 mm.	69.0		
0.0077 mm.	61.3		
0.0055 mm.	55.6		
0.0028 mm.	47.9		
0.0012 mm.	44.1		

* (no specification provided)

Material Description

Fat Clay (CH)

Sieve Test (ASTM D422)

Test Date: 1/28/2026 **Technician:** ADodson

Test Notes

Sample air dried prior to testing.

Hydrometer Test (ASTM D422)

Test Date: 1/29/2026 **Technician:** ADodson

Test Notes

Sample air dried prior to testing.

Atterberg (ASTM D4318)

PL= 22 **LL=** 55 **PI=** 33

Coefficients

D_{90}= 0.0362 D_{85}= 0.0276
D_{60}= 0.0072 D_{50}= 0.0035
D_{30}= D_{15}=
D_{10}=
C_u= C_c=

USCS (ASTM D2487)

CH

Date Sampled: 12/27/2025
Date Received: 1/5/2026
Checked By:
Title:

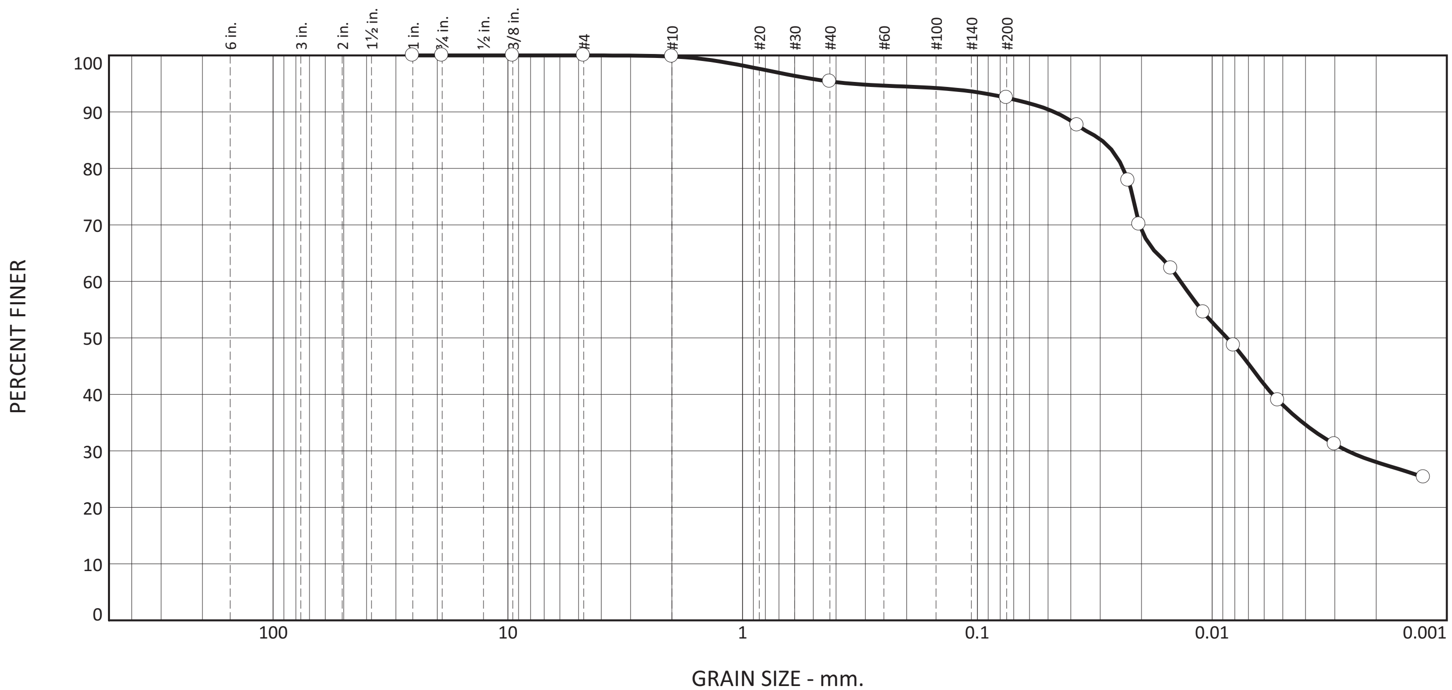
Source of Sample: B9 **Depth:** 2-7'
Sample Number: SB2 and SB3

SME®

Client: Luckett & Farley
Project: Greenfield Site Development

Project No: 102074.00 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.2	4.4	2.9	64.5	28.0

Test Results (ASTM D422)

Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)
1	100.0		
.75	100.0		
.375	100.0		
#4	100.0		
#10	99.8		
#40	95.4		
#200	92.5		
0.0375 mm.	87.6		
0.0227 mm.	77.9		
0.0204 mm.	70.1		
0.0150 mm.	62.3		
0.0109 mm.	54.5		
0.0081 mm.	48.7		
0.0052 mm.	38.9		
0.0030 mm.	31.2		
0.0013 mm.	25.3		

* (no specification provided)

Material Description

Lean Clay (CL)

Atterberg (ASTM D4318)

PL= 21 **LL=** 34 **PI=** 13

Coefficients

D_{90}=	0.0470	D_{85}=	0.0296
D_{60}=	0.0136	D_{50}=	0.0086
D_{30}=	0.0027	D_{15}=	
D_{10}=			
C_u=		C_c=	

Sieve Test (ASTM D422)

Test Date: 1/28/2026 **Technician:** ADodson

Test Notes

Sample air dried prior to testing.

Hydrometer Test (ASTM D422)

Test Date: 1/29/2026 **Technician:** ADodson

Test Notes

Sample air dried prior to testing.

USCS (ASTM D2487)

CL

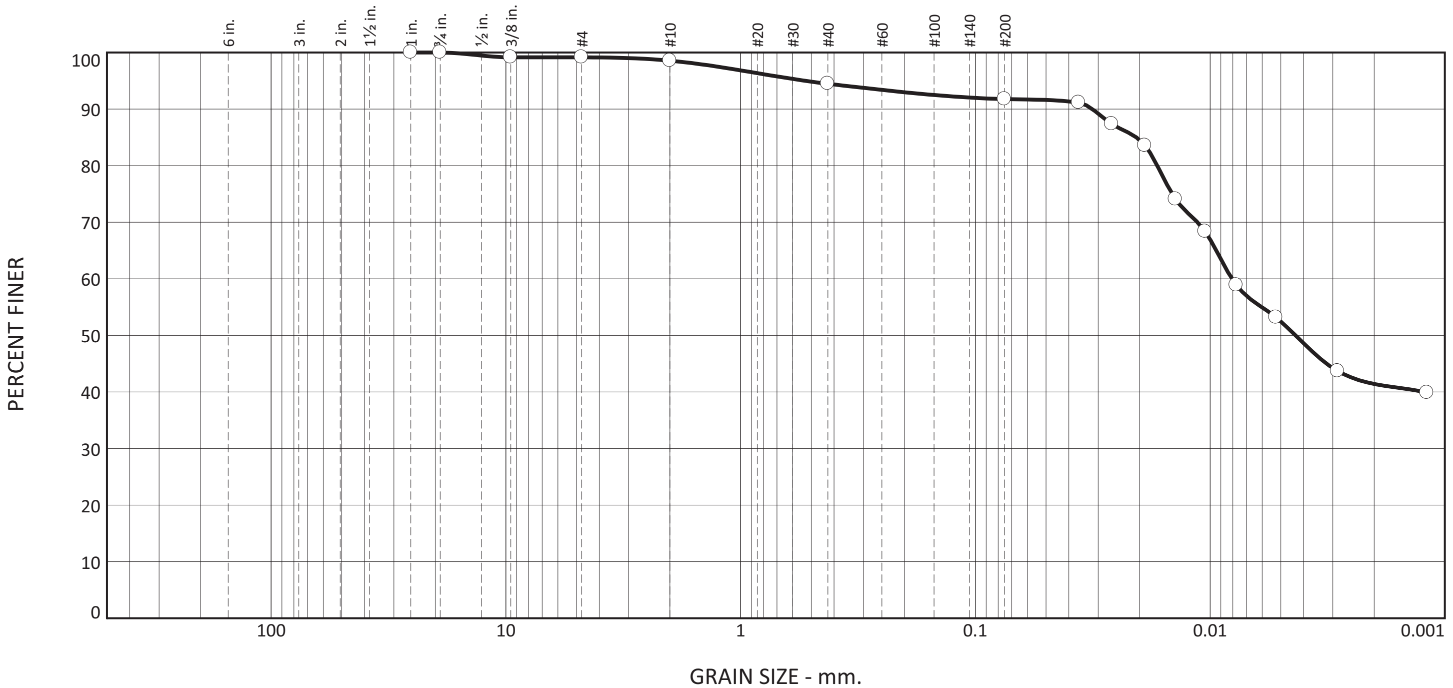
Date Sampled: 1/13/2026
Date Received: 1/14/2026
Checked By:
Title:

Source of Sample: B14 **Depth:** 2-7'
Sample Number: SB2 and SB3

SME®

Client: Luckett & Farley
Project: Greenfield Site Development
Project No: 102074.00 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.8	0.6	4.1	2.7	50.4	41.4

Test Results (ASTM D422)

Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)
1	100.0		
.75	100.0		
.375	99.2		
#4	99.2		
#10	98.6		
#40	94.5		
#200	91.8		
0.0363 mm.	91.2		
0.0262 mm.	87.4		
0.0189 mm.	83.6		
0.0140 mm.	74.1		
0.0105 mm.	68.4		
0.0077 mm.	58.9		
0.0052 mm.	53.2		
0.0029 mm.	43.7		
0.0012 mm.	39.9		

* (no specification provided)

Material Description

Lean to Fat Clay (CL/CH)

Atterberg (ASTM D4318)

PL= 22 **LL=** 50 **PI=** 28

Coefficients

D_{90}= 0.0317 D_{85}= 0.0206
D_{60}= 0.0081 D_{50}= 0.0043
D_{30}= D_{15}=
D_{10}=
C_u= C_c=

Sieve Test (ASTM D422)

Test Date: 1/28/2026 **Technician:** ADodson

Test Notes

Sample air dried prior to testing.

Hydrometer Test (ASTM D422)

Test Date: 1/29/2026 **Technician:** ADodson

Test Notes

Sample air dried prior to testing.

USCS (ASTM D2487)

CH/CL

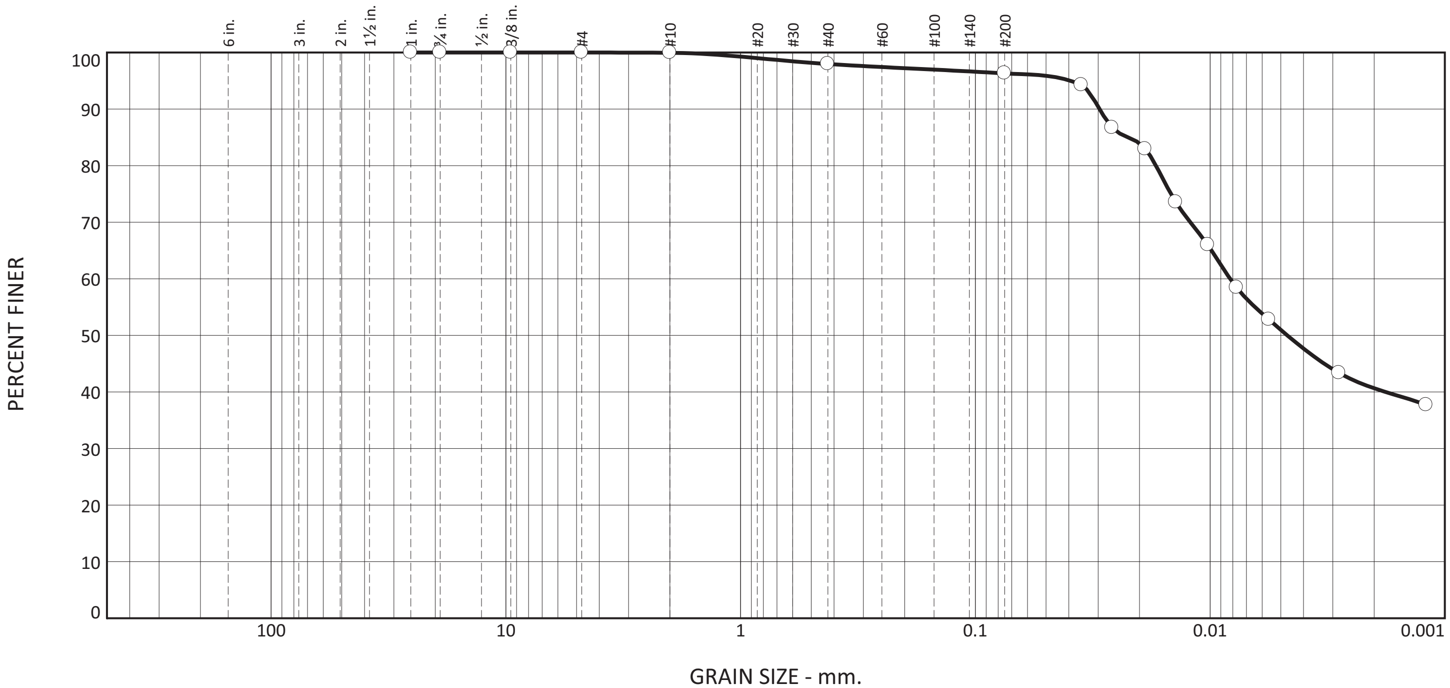
Date Sampled: 12/22/2025
Date Received: 1/5/2026
Checked By:
Title:

Source of Sample: B29 **Depth:** 2-7'
Sample Number: SB2 and SB3

SME®

Client: Luckett & Farley
Project: Greenfield Site Development
Project No: 102074.00
Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	2.0	1.7	55.7	40.6

Test Results (ASTM D422)

Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)
1	100.0		
.75	100.0		
.375	100.0		
#4	100.0		
#10	100.0		
#40	98.0		
#200	96.3		
0.0353 mm.	94.3		
0.0261 mm.	86.8		
0.0189 mm.	83.0		
0.0140 mm.	73.6		
0.0102 mm.	66.0		
0.0077 mm.	58.5		
0.0056 mm.	52.8		
0.0028 mm.	43.4		
0.0012 mm.	37.7		

* (no specification provided)

Material Description

Lean Clay (CL)

Atterberg (ASTM D4318)

PL= 22 **LL=** 47 **PI=** 25

Coefficients

D_{90}= 0.0296 **D_{85}=** 0.0223

D_{60}= 0.0082 **D_{50}=** 0.0047

D_{30}= **D_{15}=**

D_{10}=

C_u= **C_c=**

Sieve Test (ASTM D422)

Test Date: 1/28/2026 **Technician:** ADodson

Test Notes

Sample air dried prior to testing.

Hydrometer Test (ASTM D422)

Test Date: 1/29/2026 **Technician:** ADodson

Test Notes

Sample air dried prior to testing.

USCS (ASTM D2487)

CL

Date Sampled: 12/30/2025

Date Received: 1/5/2026

Checked By:

Title:

Source of Sample: B32 **Depth:** 5-7'

Sample Number: SB3

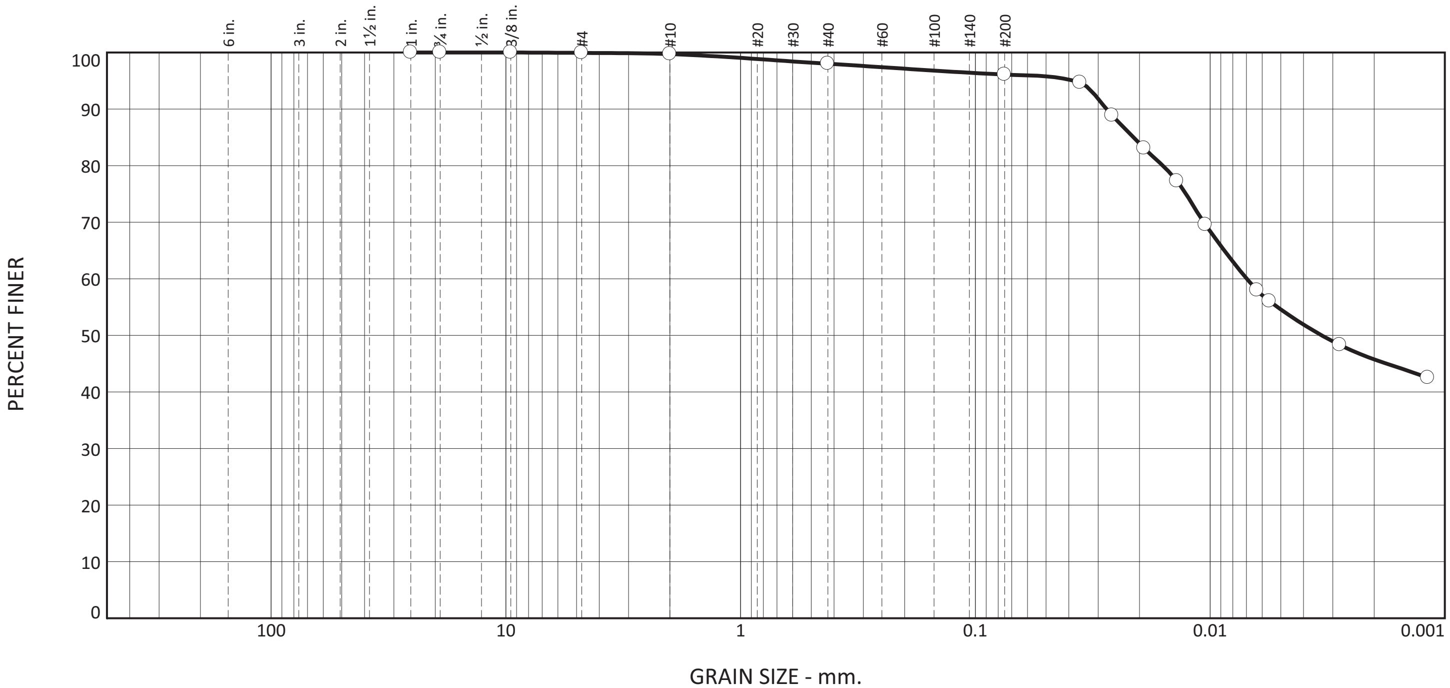
SME®

Client: Luckett & Farley

Project: Greenfield Site Development

Project No: 102074.00 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.2	1.7	1.9	50.3	45.8

Test Results (ASTM D422)

Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)
1	100.0		
.75	100.0		
.375	100.0		
#4	99.9		
#10	99.7		
#40	98.0		
#200	96.1		
0.0358 mm.	94.6		
0.0261 mm.	88.8		
0.0191 mm.	83.1		
0.0138 mm.	77.3		
0.0105 mm.	69.5		
0.0063 mm.	57.9		
0.0056 mm.	56.0		
0.0028 mm.	48.3		
0.0012 mm.	42.5		

* (no specification provided)

Material Description

Fat Clay (CH)

Sieve Test (ASTM D422)

Test Date: 1/28/2026 **Technician:** ADodson

Test Notes

Sample air dried prior to testing.

Hydrometer Test (ASTM D422)

Test Date: 1/29/2026 **Technician:** ADodson

Test Notes

Sample air dried prior to testing.

Atterberg (ASTM D4318)

PL= 23 **LL=** 53 **PI=** 30

Coefficients

D_{90}=	0.0276	D_{85}=	0.0212
D_{60}=	0.0070	D_{50}=	0.0033
D_{30}=		D_{15}=	
D_{10}=			
C_u=		C_c=	

USCS (ASTM D2487)

CH

Date Sampled: 1/13/2026

Date Received: 1/14/2026

Checked By:

Title:

Source of Sample: B45 **Depth:** 8-10'

Sample Number: SB4

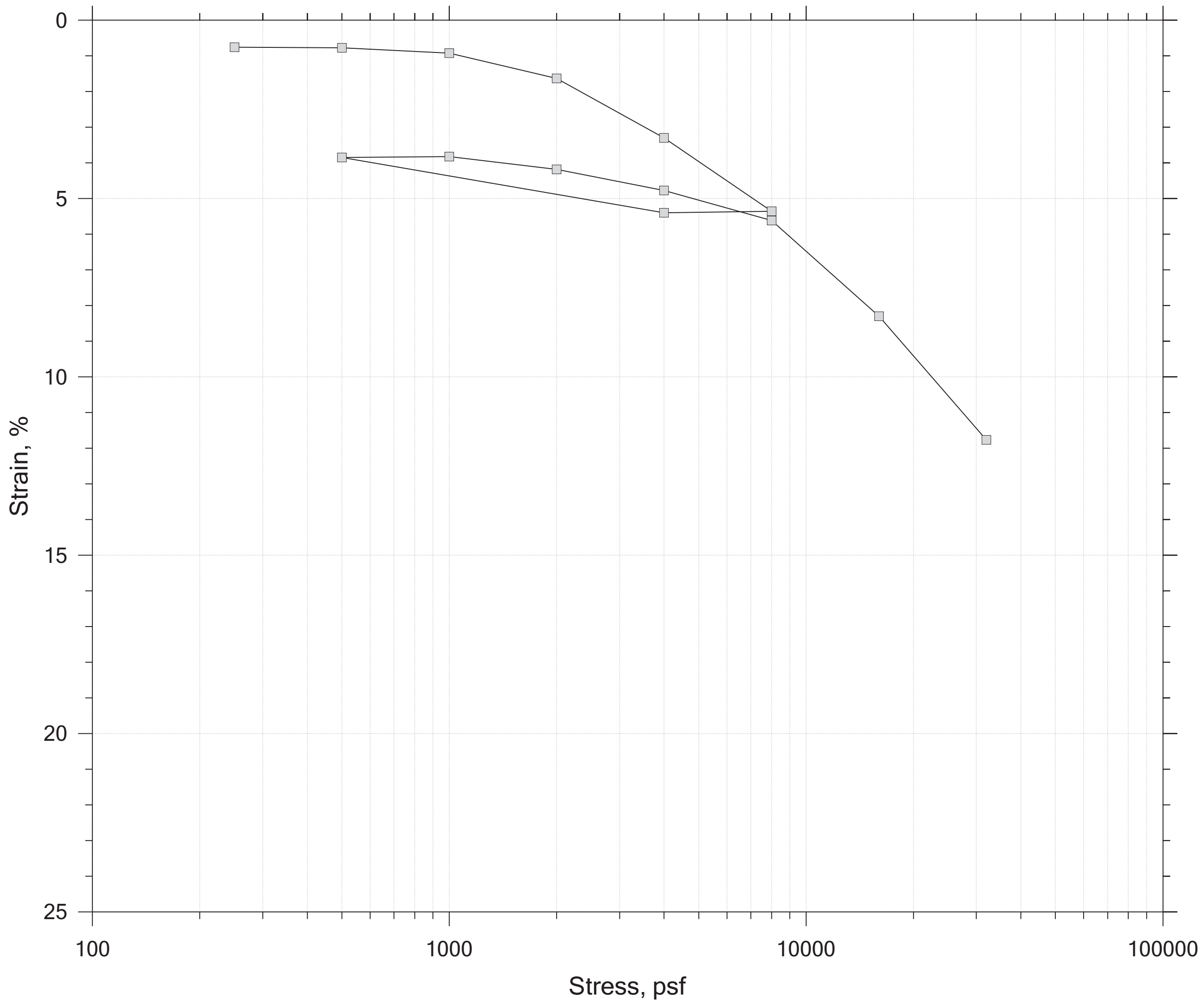
Client: Luckett & Farley

Project: Greenfield Site Development

Project No: 102074.00 **Figure**

One-Dimensional Consolidation by ASTM D2435 - Method A

Summary Report

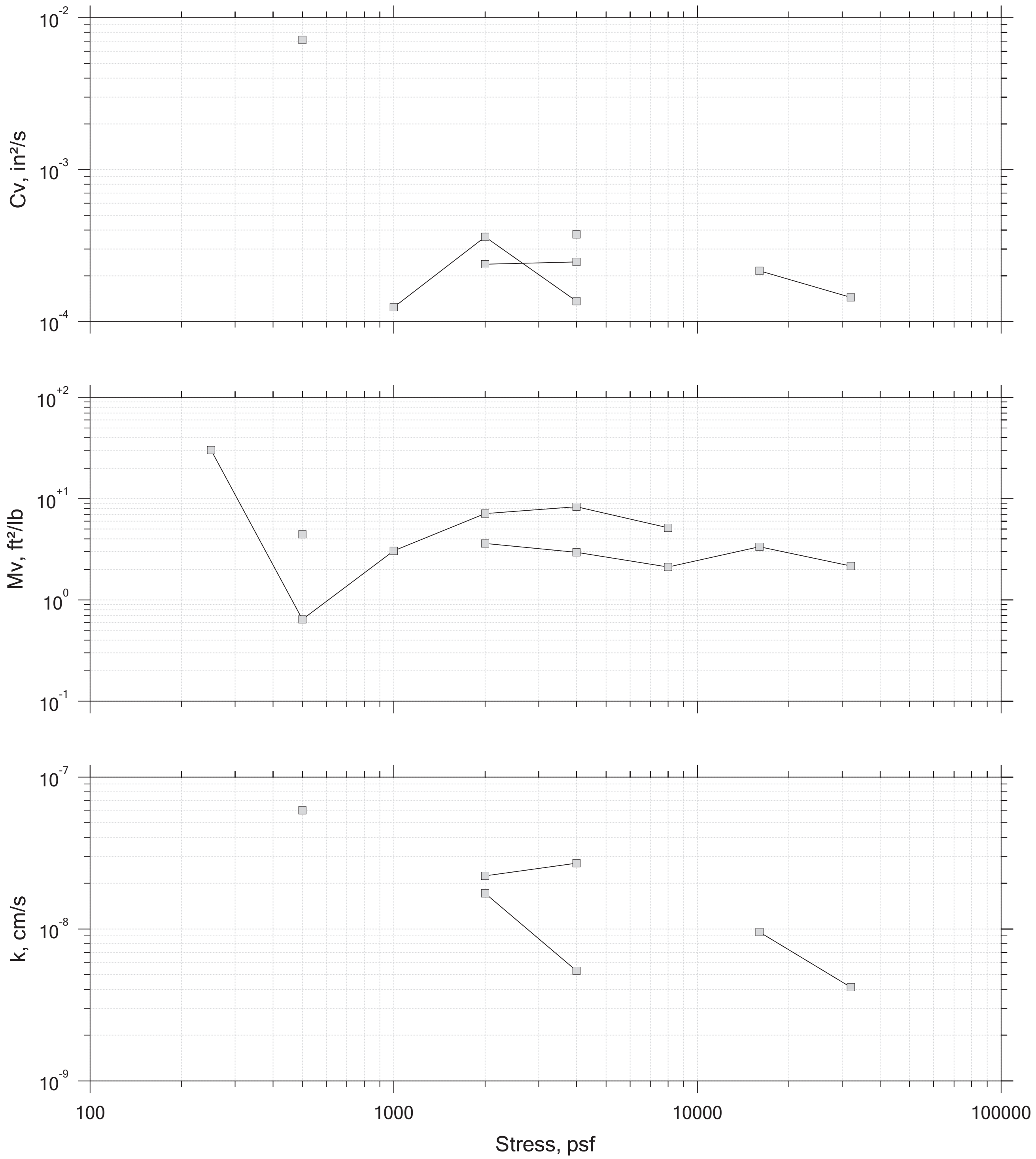


				Before Test	After Test
Current Vertical Effective Stress, psf: 0				Water Content, %	29.22	25.13
Preconsolidation Stress, psf: 4918				Dry Unit Weight, pcf	92.366	105.18
Compression Ratio: 0				Saturation, %	87.57	100.00
Specimen Diameter, in: 2.5		Specimen Height, in: 1		Void Ratio	0.98	0.73
LL: Unknown	PL: Unknown	PI: Unknown	GS: 2.92			

SME	Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
	Boring Number: B32	Tester: EY	Checker: AD
	Sample Number: 3ST	Test Date: 2/13/26	Depth: 23-25 Feet
	Test Number: 1	Preparation: Moist	Elevation: 730-732 Feet
	Description: LEAN CLAY- Brown		
	Remarks:		
	Displacement at End of Primary		

One-Dimensional Consolidation by ASTM D2435 - Method A

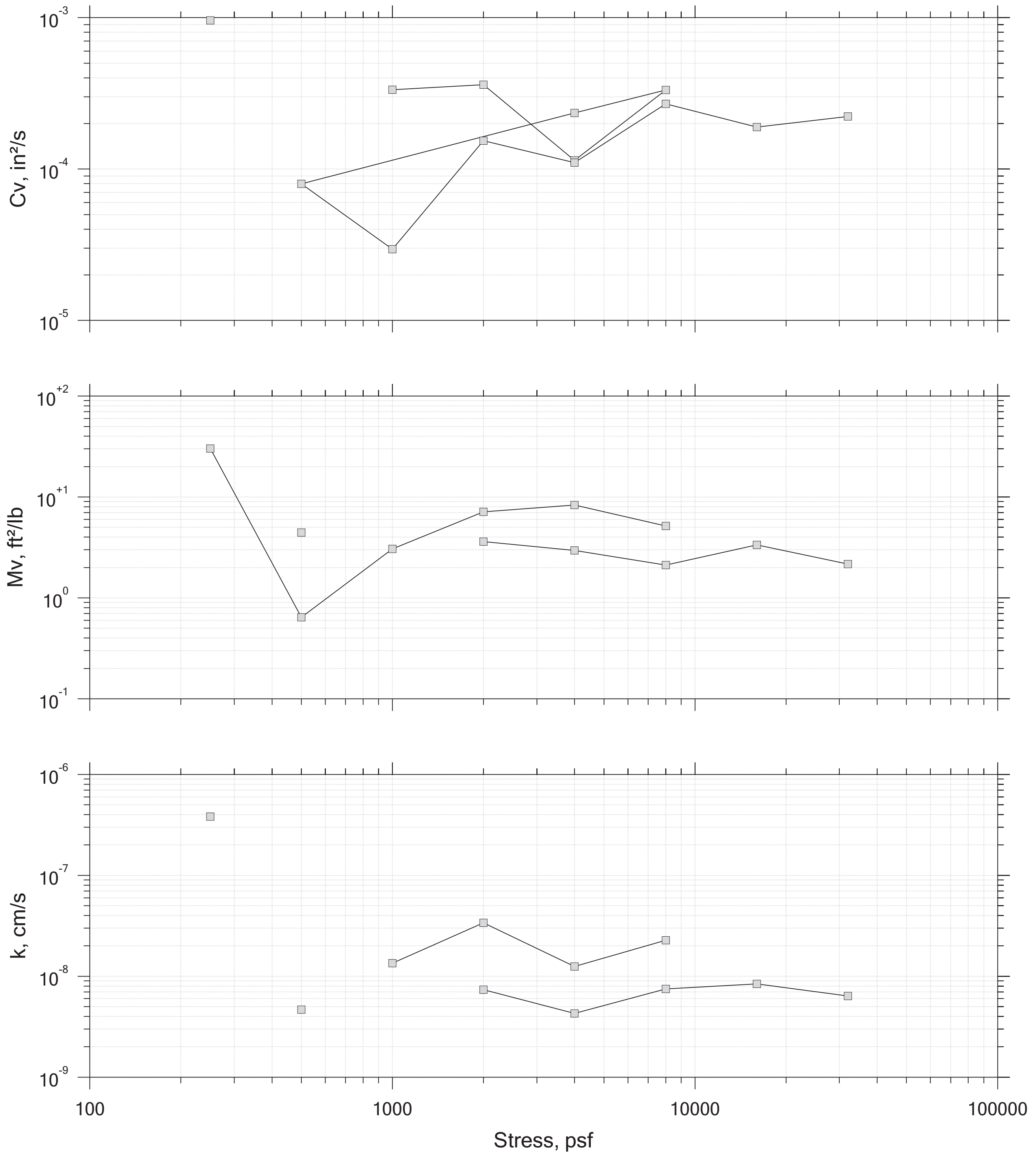
Log of Time Coefficients



	Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
	Boring Number: B-32	Tester: EY	Checker: AD
	Sample Number: 3ST	Test Date: 2/13/26	Depth: 23-25
SME	Test Number: 1	Preparation: Moist	Elevation:
	Description: Brown LEAN to FAT CLAY with sand		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method A

Sqrt of Time Coefficients



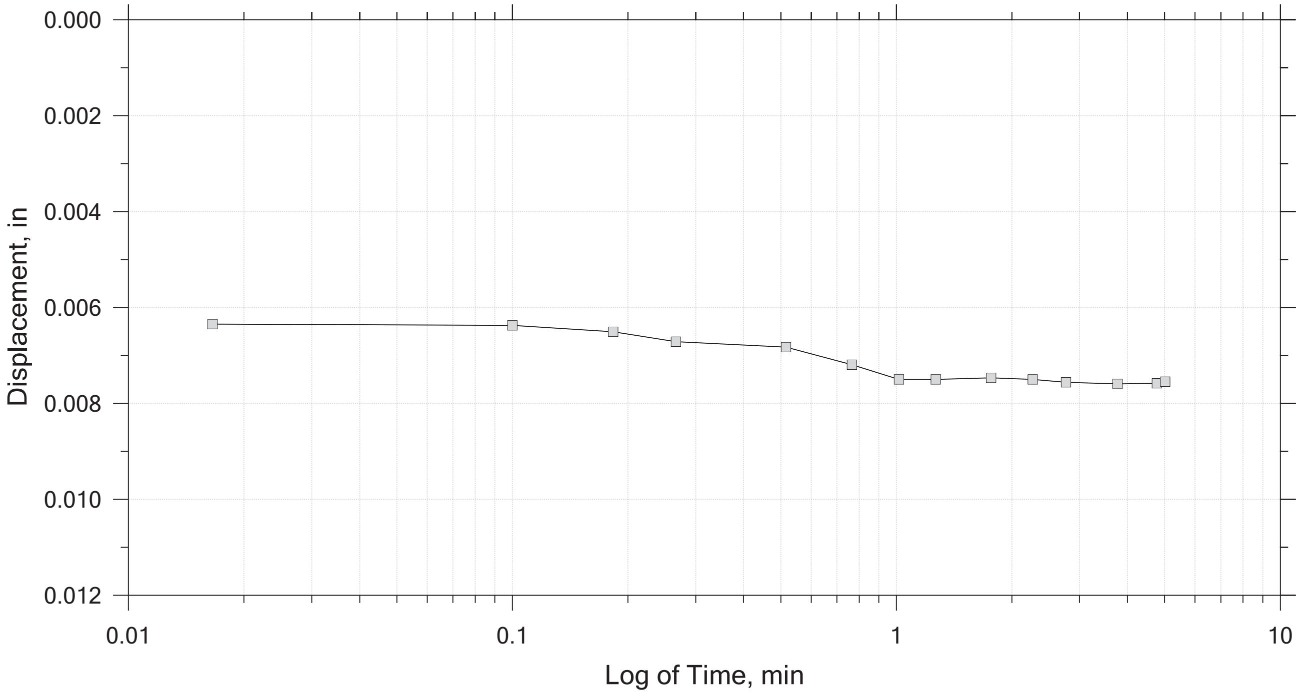
Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
Boring Number: B-32	Tester: EY	Checker: AD
Sample Number: 3ST	Test Date: 2/13/26	Depth: 23-25
Test Number: 1	Preparation: Moist	Elevation:
Description: Brown LEAN to FAT CLAY with sand		
Remarks:		

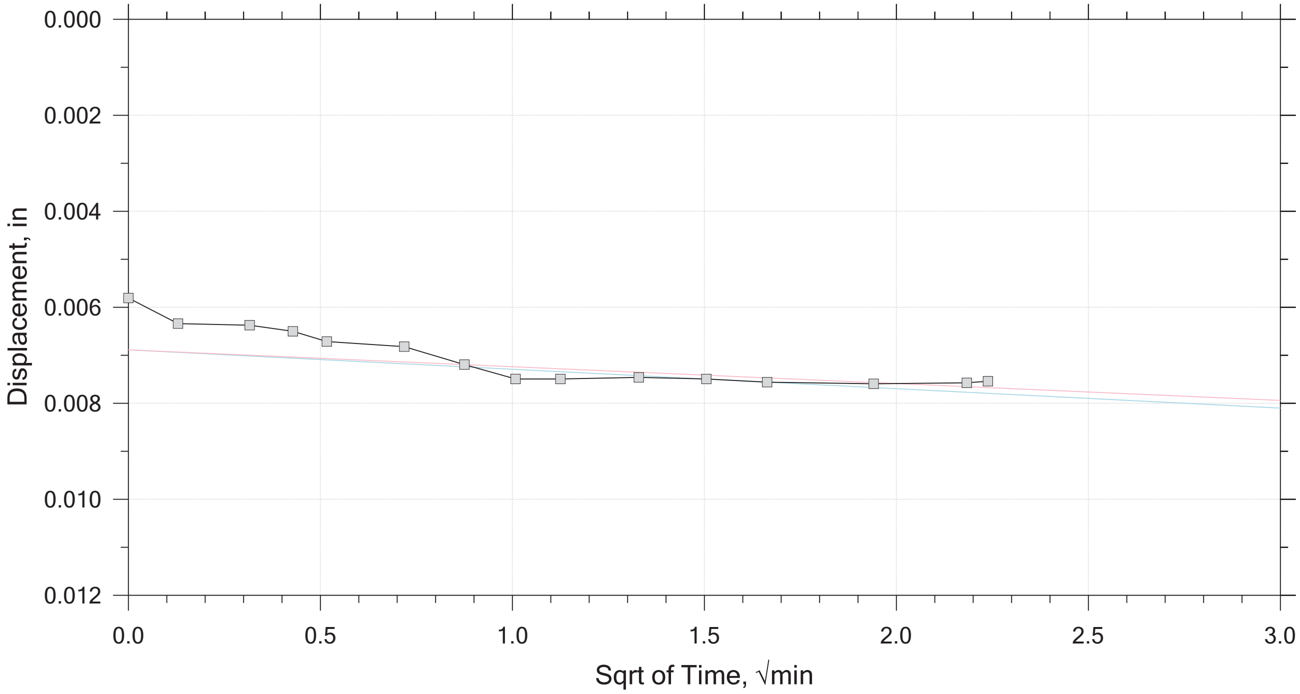
One-Dimensional Consolidation by ASTM D2435 - Method A

Time Curve 1 of 14

Constant Load Step

Stress: 250 psf





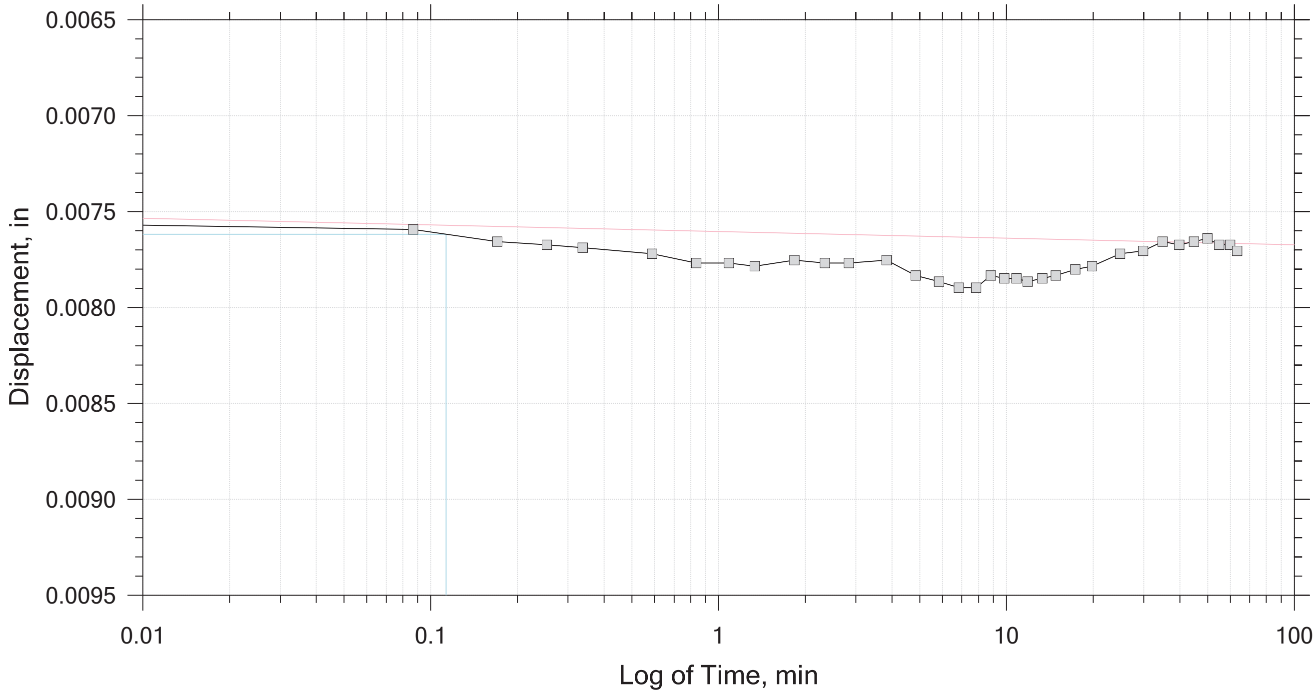
Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
Boring Number: B-32	Tester: EY	Checker: AD
Sample Number: 3ST	Test Date: 2/13/26	Depth: 23-25
Test Number: 1	Preparation: Moist	Elevation:
Description: Brown LEAN to FAT CLAY with sand		
Remarks:		

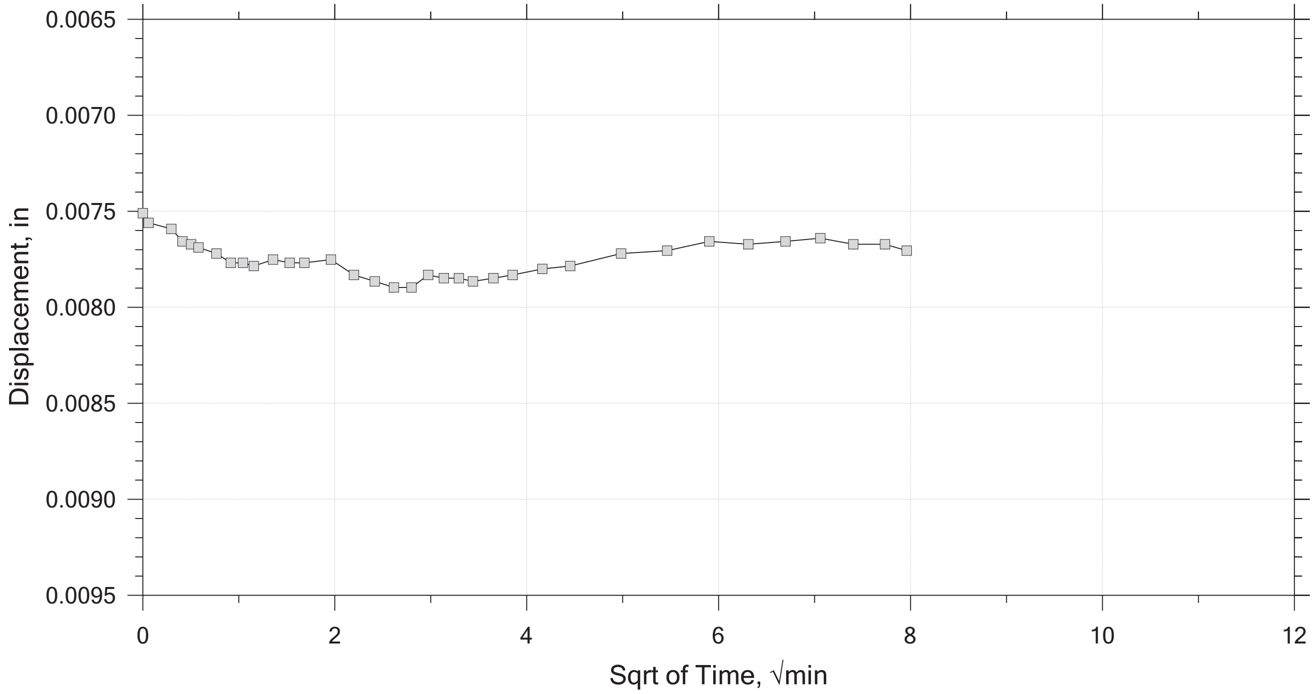
One-Dimensional Consolidation by ASTM D2435 - Method A

Time Curve 2 of 14

Constant Load Step

Stress: 500 psf





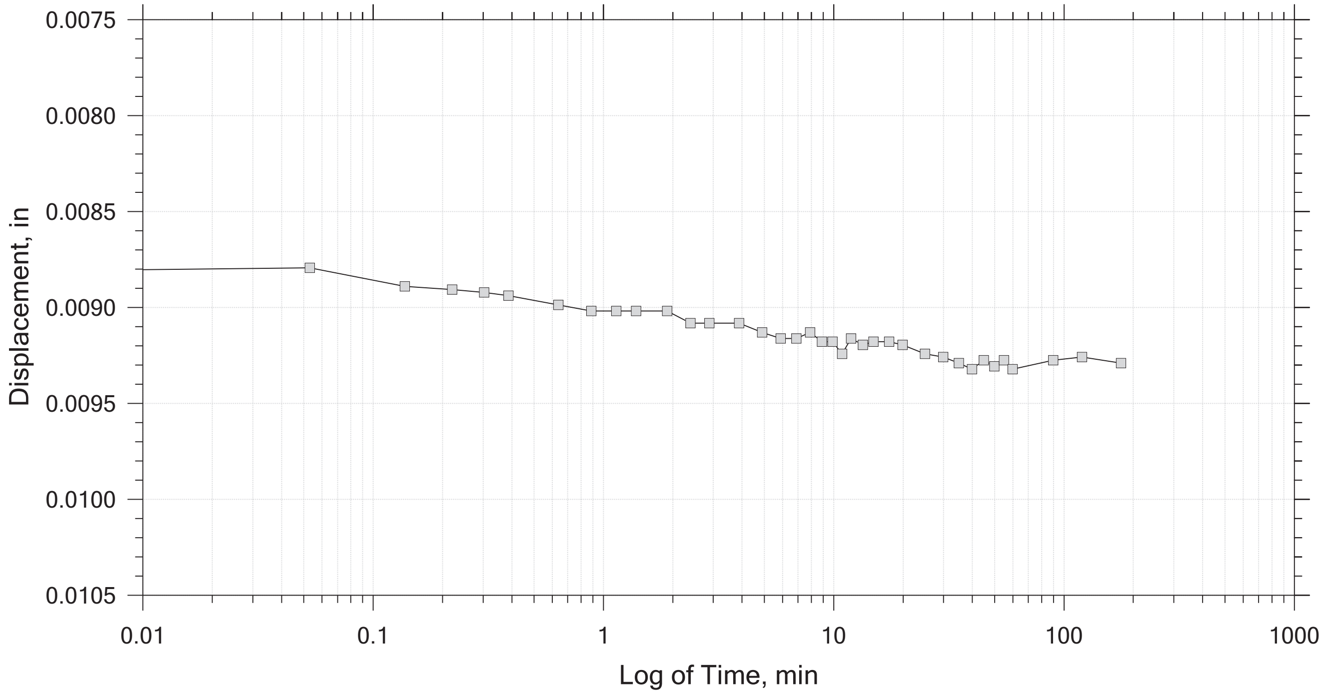
Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
Boring Number: B-32	Tester: EY	Checker: AD
Sample Number: 3ST	Test Date: 2/13/26	Depth: 23-25
Test Number: 1	Preparation: Moist	Elevation:
Description: Brown LEAN to FAT CLAY with sand		
Remarks:		

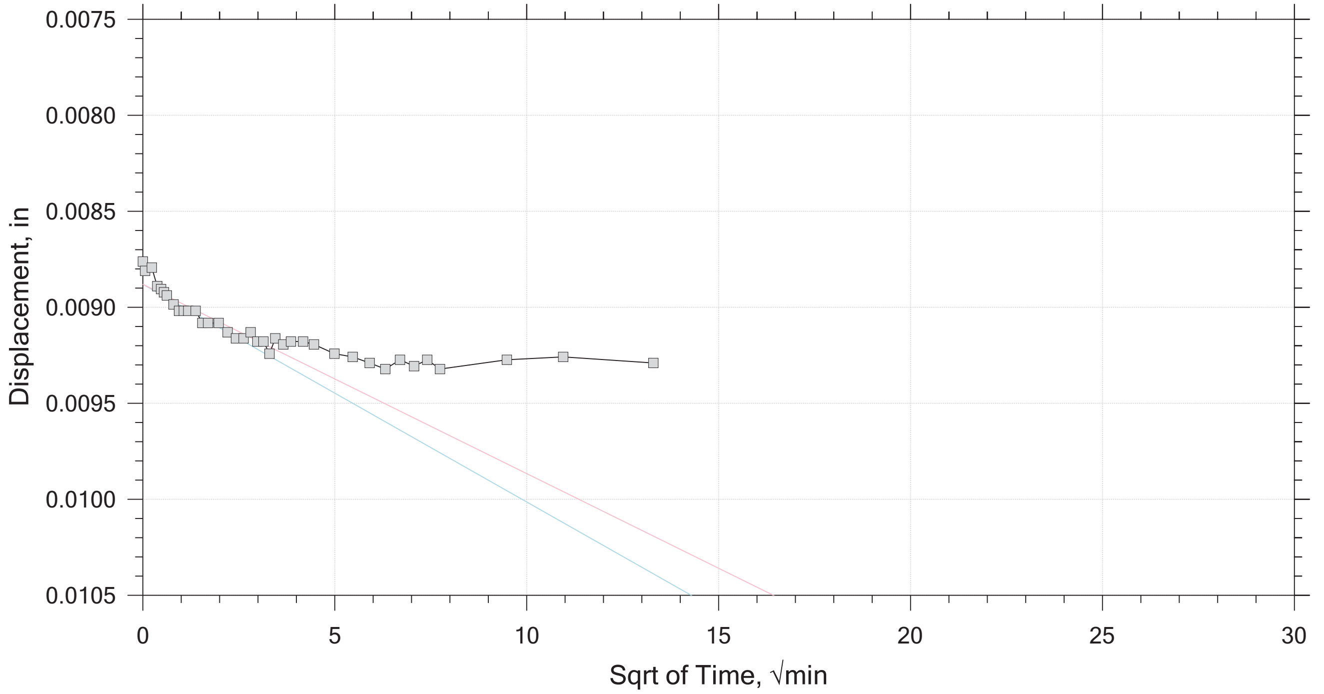
One-Dimensional Consolidation by ASTM D2435 - Method A

Time Curve 3 of 14

Constant Load Step

Stress: 1e+03 psf





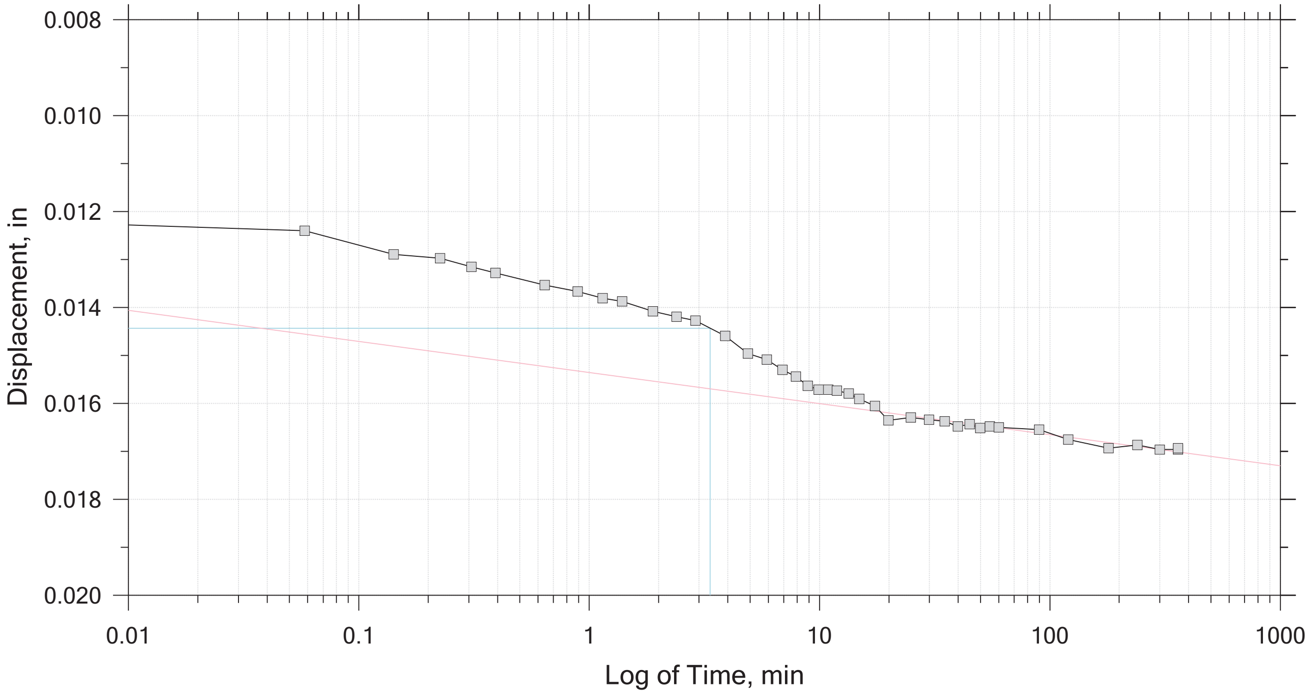
Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
Boring Number: B-32	Tester: EY	Checker: AD
Sample Number: 3ST	Test Date: 2/13/26	Depth: 23-25
Test Number: 1	Preparation: Moist	Elevation:
Description: Brown LEAN to FAT CLAY with sand		
Remarks:		

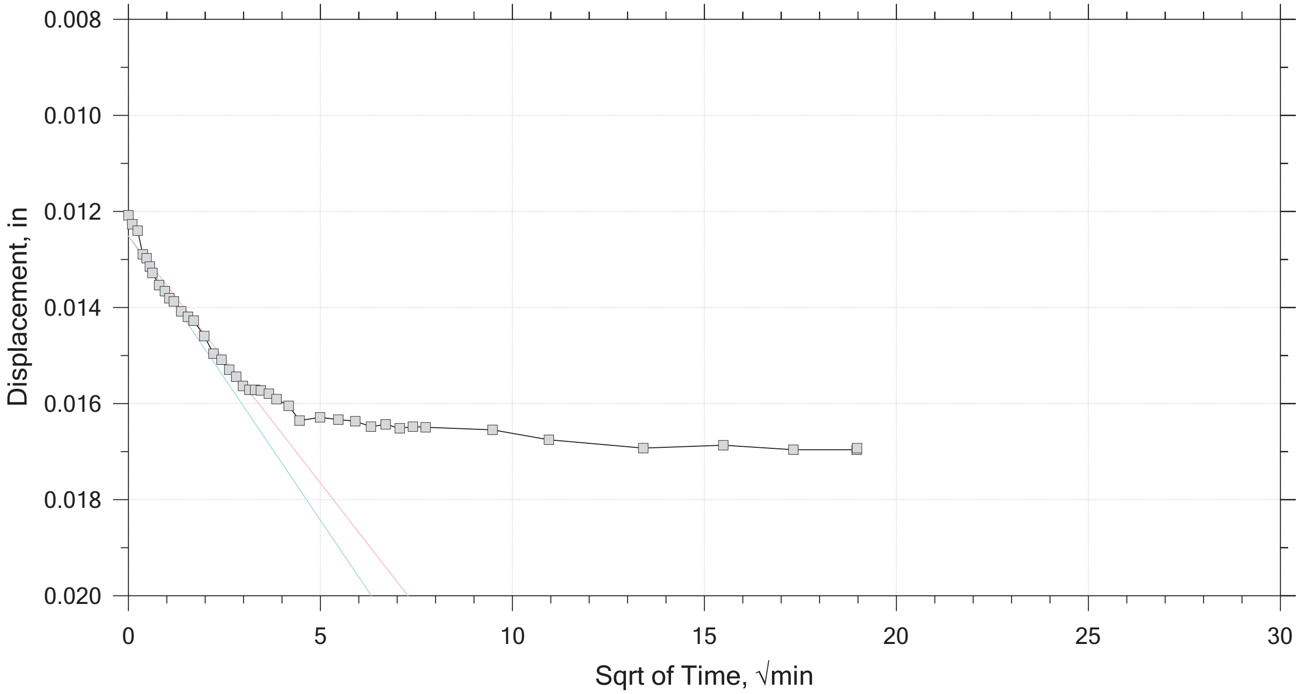
One-Dimensional Consolidation by ASTM D2435 - Method A

Time Curve 4 of 14

Constant Load Step

Stress: 2e+03 psf





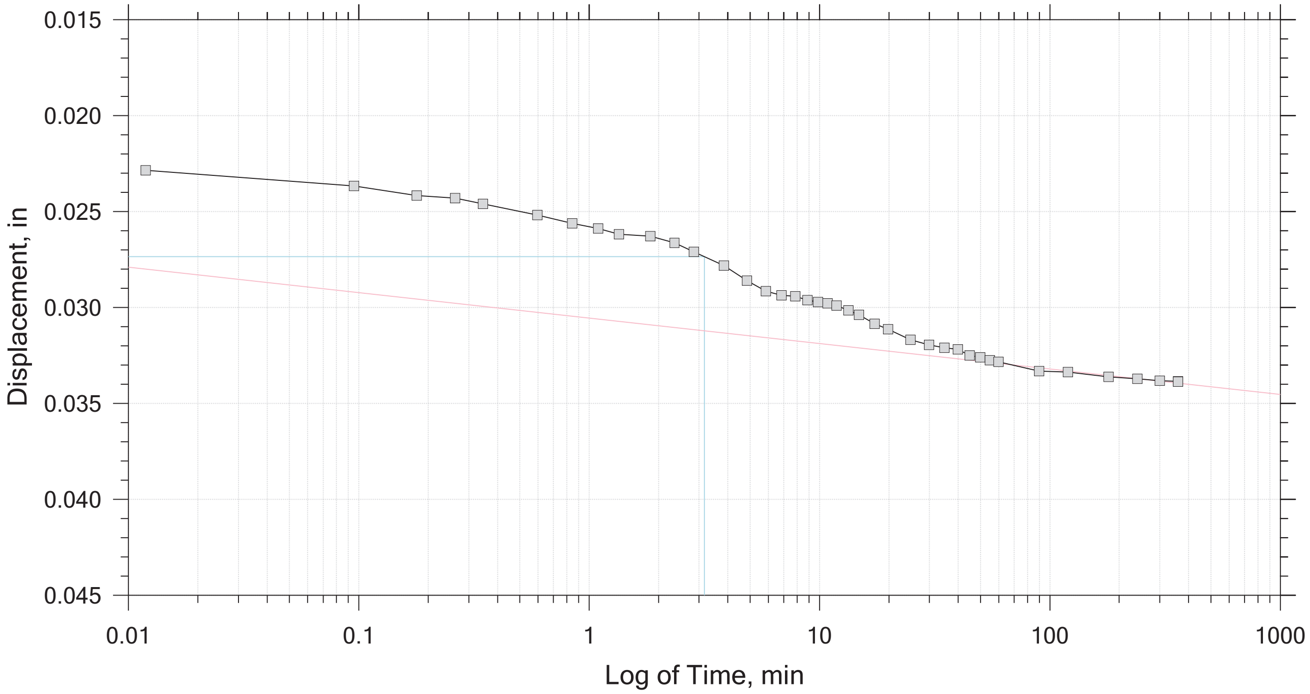
Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
Boring Number: B-32	Tester: EY	Checker: AD
Sample Number: 3ST	Test Date: 2/13/26	Depth: 23-25
Test Number: 1	Preparation: Moist	Elevation:
Description: Brown LEAN to FAT CLAY with sand		
Remarks:		

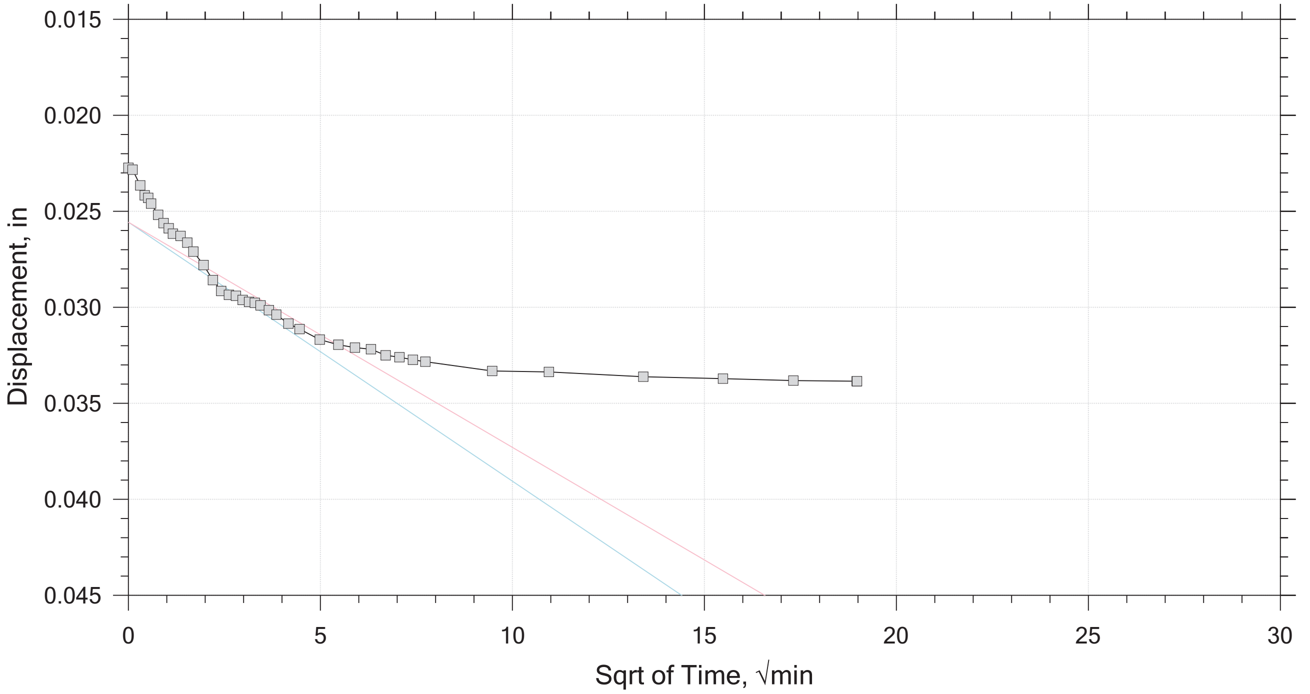
One-Dimensional Consolidation by ASTM D2435 - Method A

Time Curve 5 of 14

Constant Load Step

Stress: 4e+03 psf





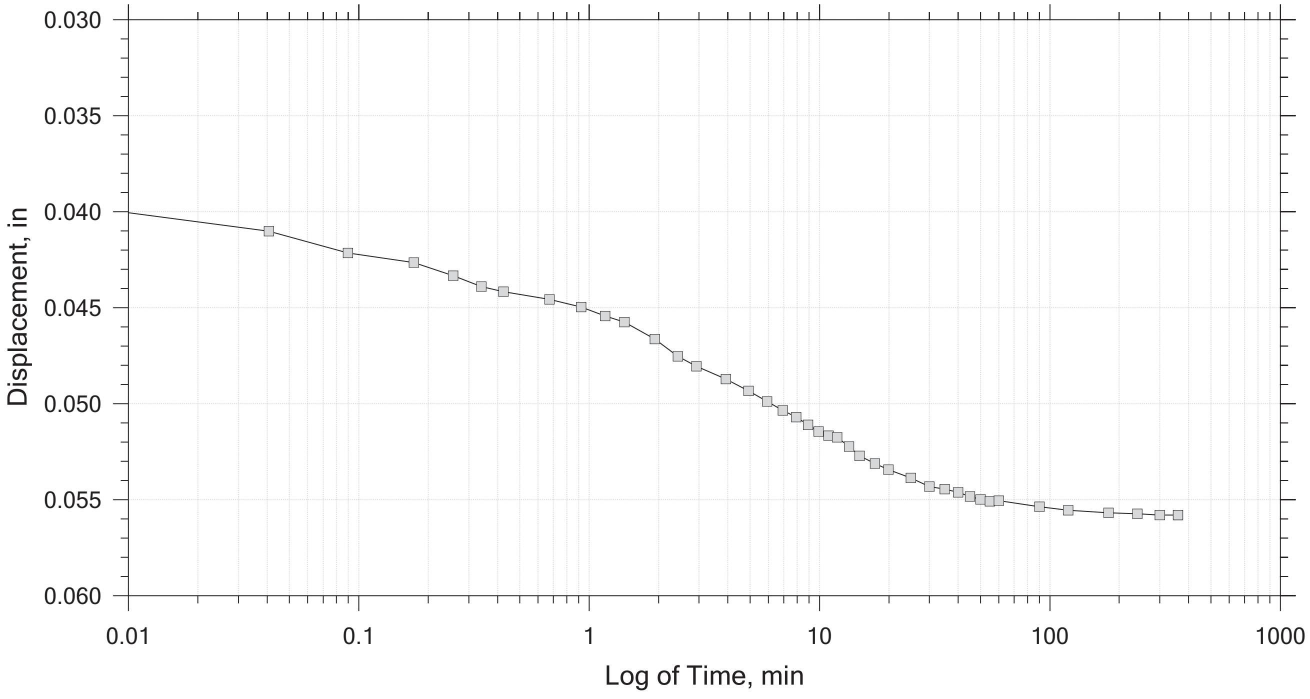
Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
Boring Number: B-32	Tester: EY	Checker: AD
Sample Number: 3ST	Test Date: 2/13/26	Depth: 23-25
Test Number: 1	Preparation: Moist	Elevation:
Description: Brown LEAN to FAT CLAY with sand		
Remarks:		

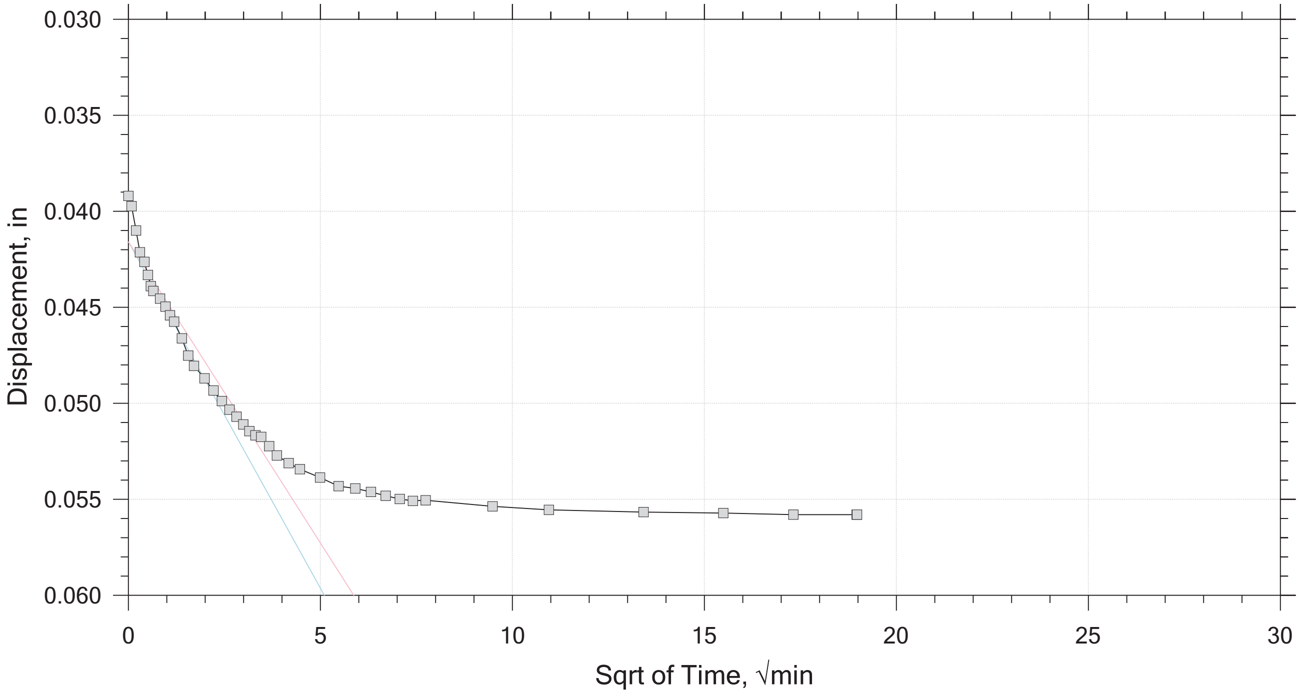
One-Dimensional Consolidation by ASTM D2435 - Method A

Time Curve 6 of 14

Constant Load Step

Stress: 8e+03 psf





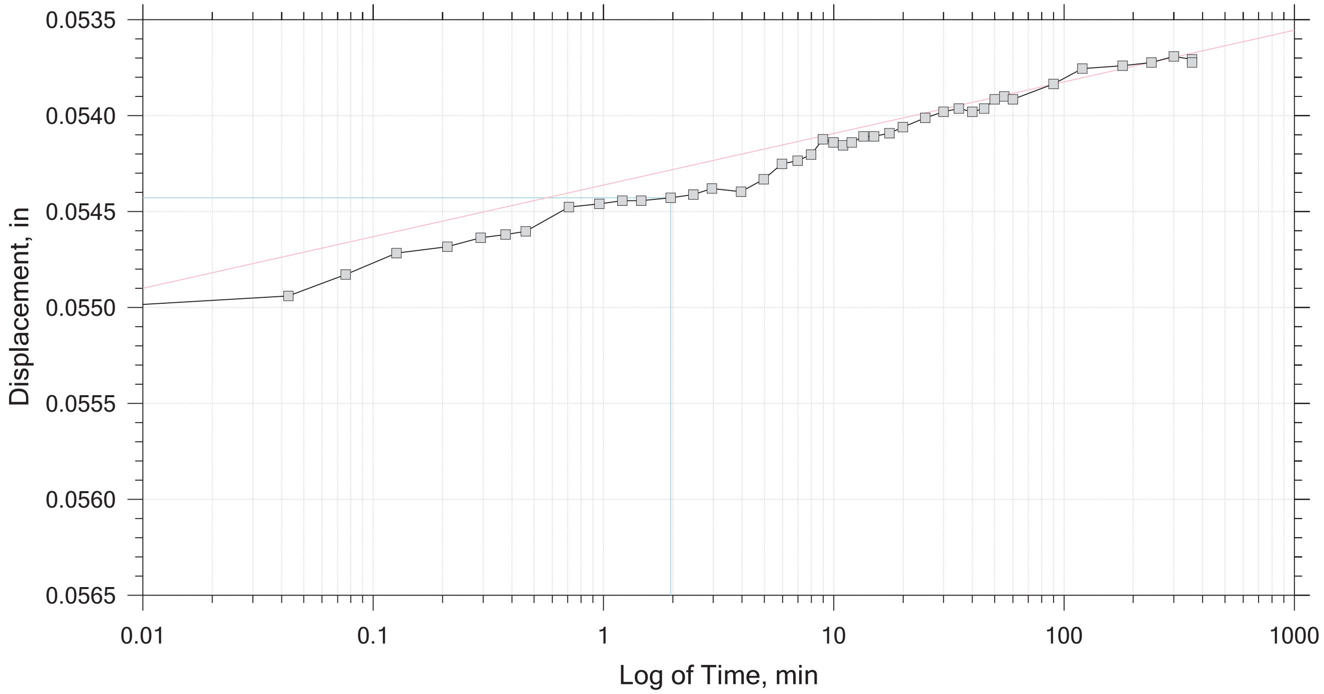
	Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
	Boring Number: B-32	Tester: EY	Checker: AD
SME	Sample Number: 3ST	Test Date: 2/13/26	Depth: 23-25
	Test Number: 1	Preparation: Moist	Elevation:
	Description: Brown LEAN to FAT CLAY with sand		
	Remarks:		

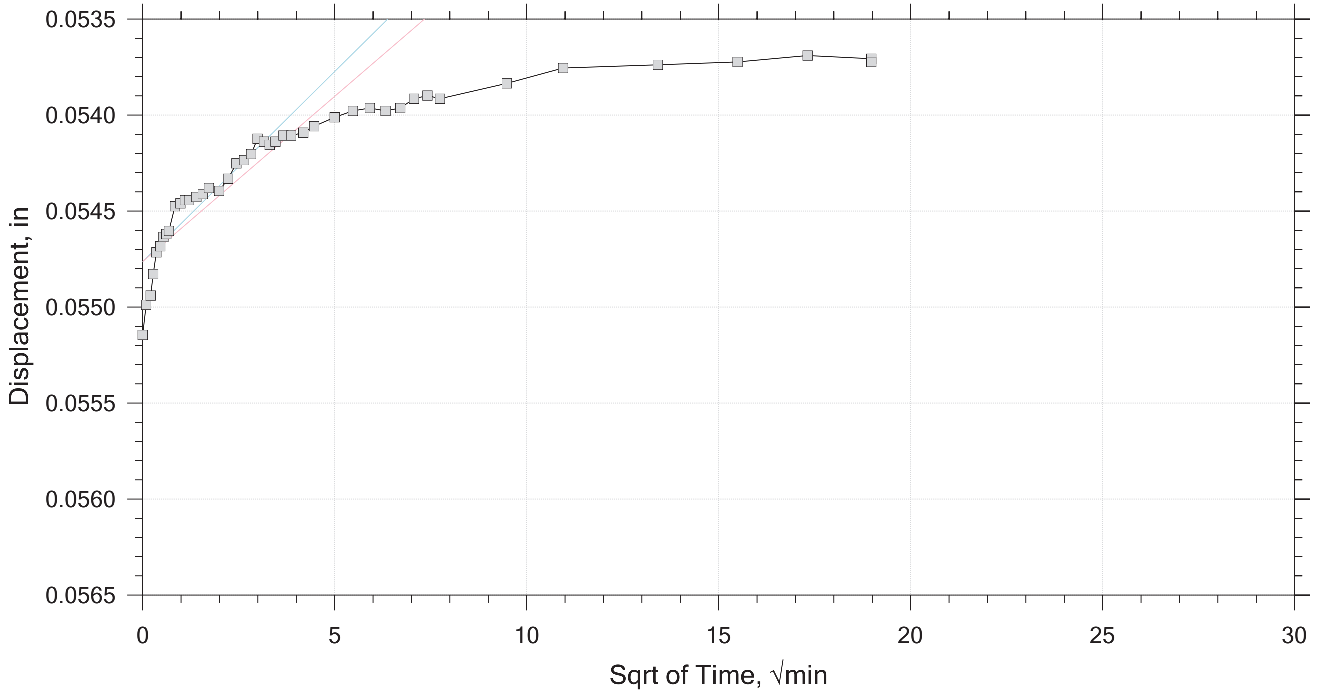
One-Dimensional Consolidation by ASTM D2435 - Method A

Time Curve 7 of 14

Constant Load Step

Stress: 4e+03 psf





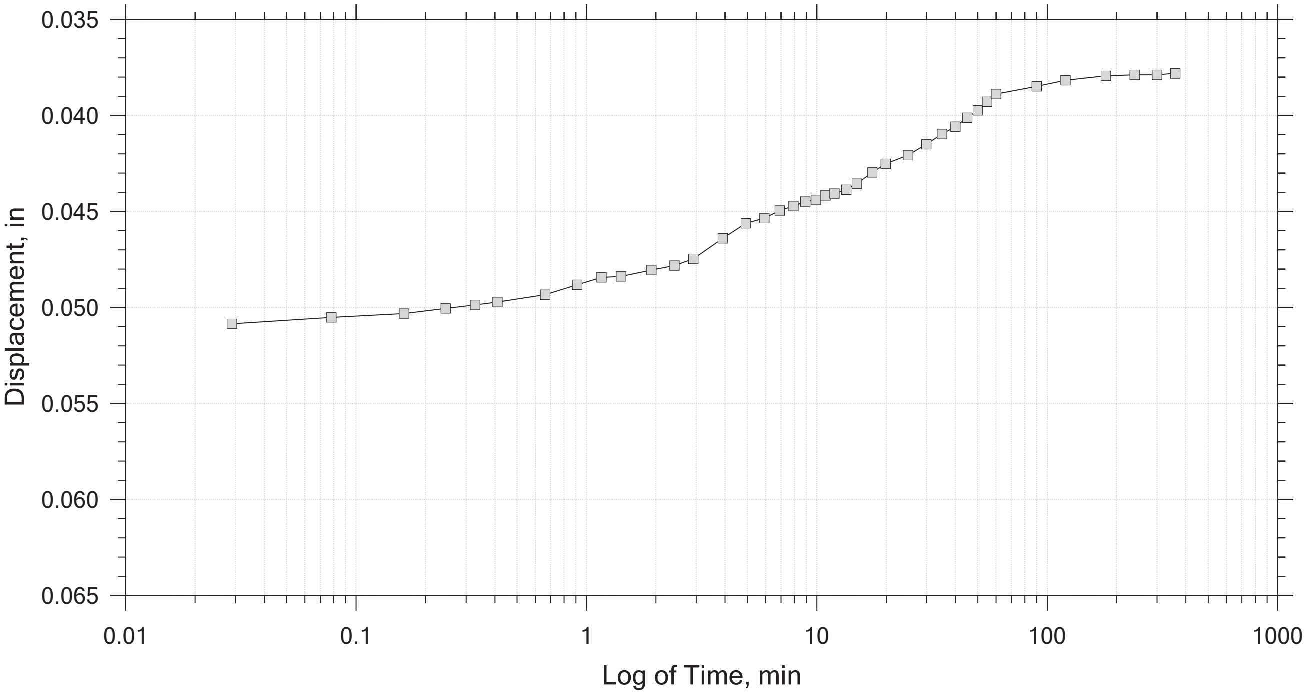
Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
Boring Number: B-32	Tester: EY	Checker: AD
Sample Number: 3ST	Test Date: 2/13/26	Depth: 23-25
Test Number: 1	Preparation: Moist	Elevation:
Description: Brown LEAN to FAT CLAY with sand		
Remarks:		

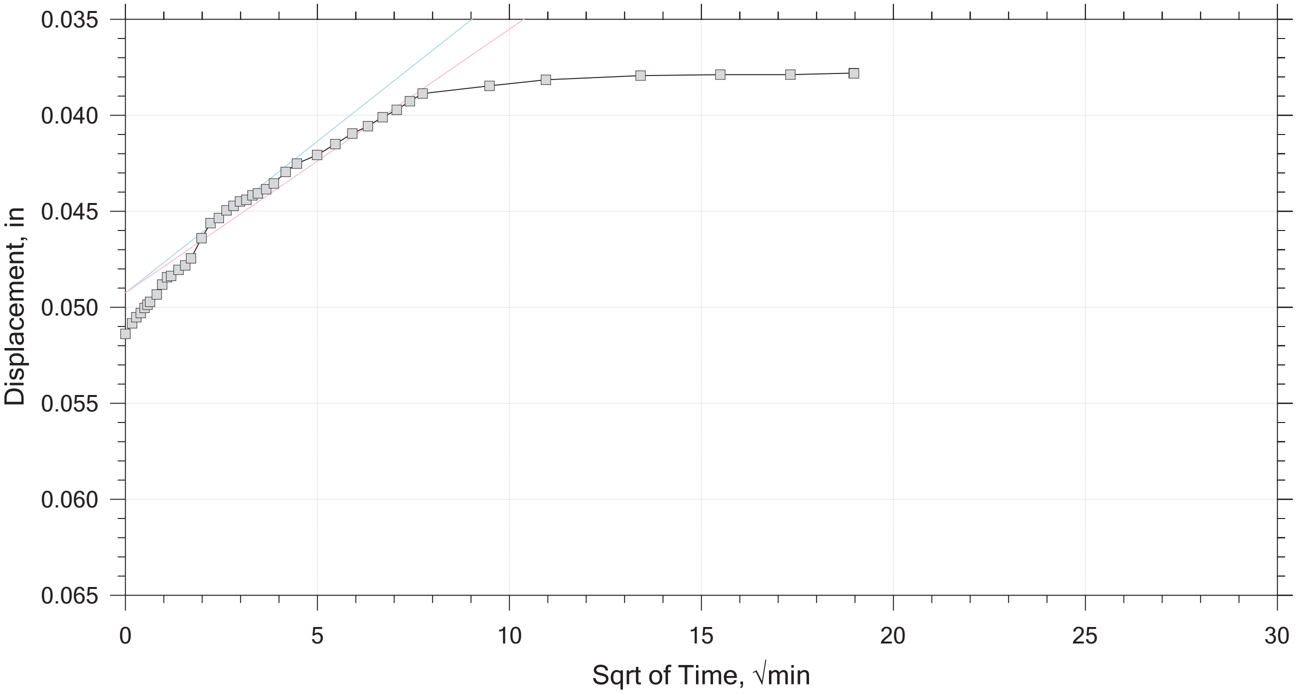
One-Dimensional Consolidation by ASTM D2435 - Method A

Time Curve 8 of 14

Constant Load Step

Stress: 500 psf





SME	Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
	Boring Number: B-32	Tester: EY	Checker: AD
	Sample Number: 3ST	Test Date: 2/13/26	Depth: 23-25
	Test Number: 1	Preparation: Moist	Elevation:
	Description: Brown LEAN to FAT CLAY with sand		
	Remarks:		

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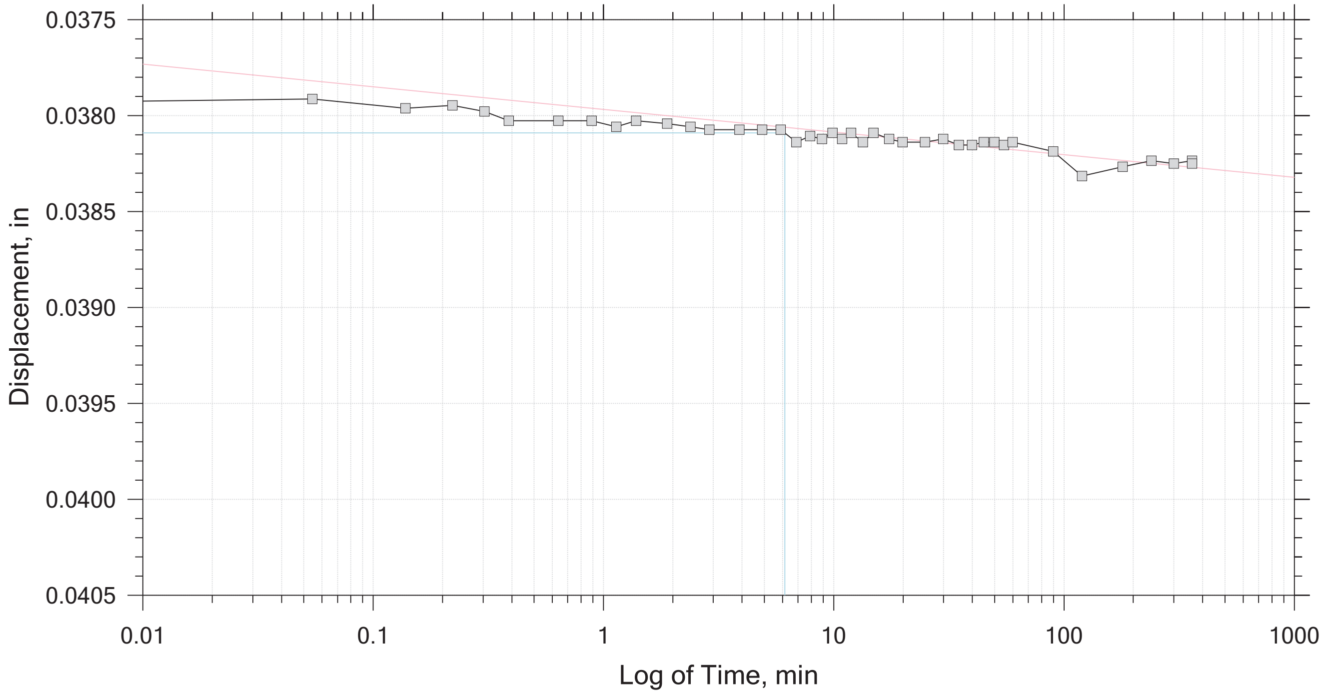
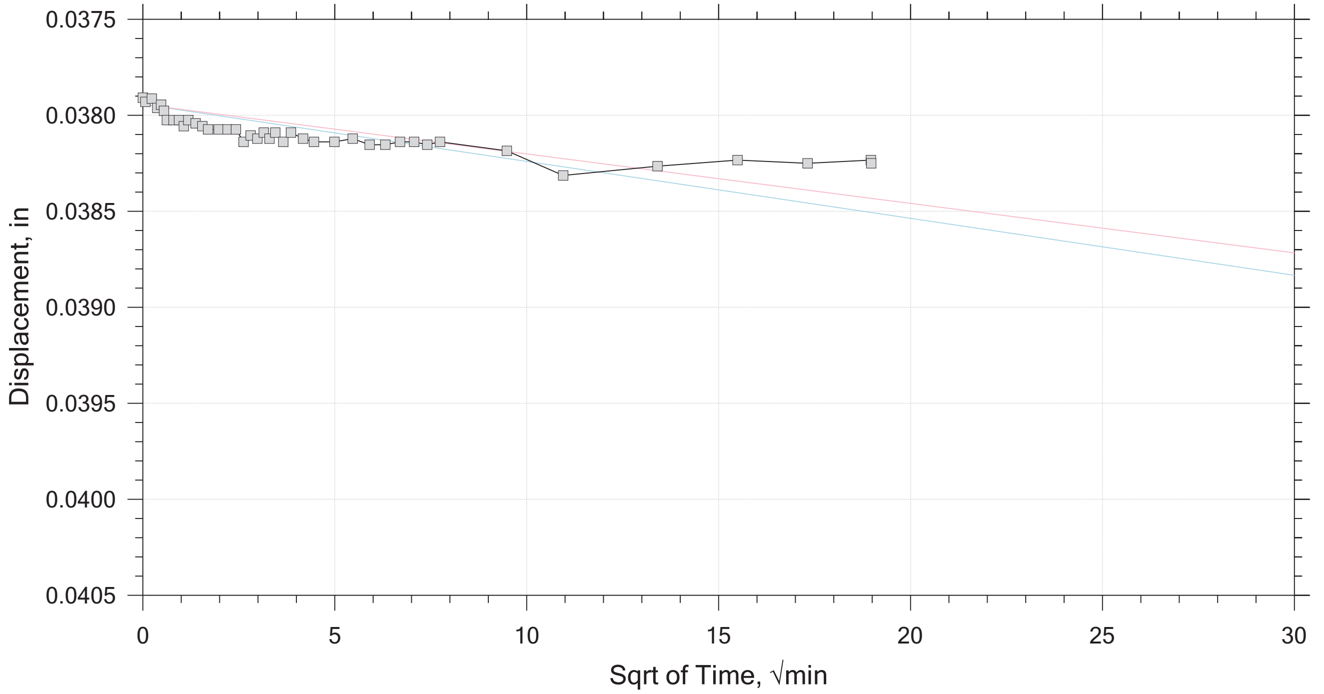
One-Dimensional Consolidation by ASTM D2435 - Method A

Time Curve 9 of 14

Constant Load Step

Stress: 1e+03 psf





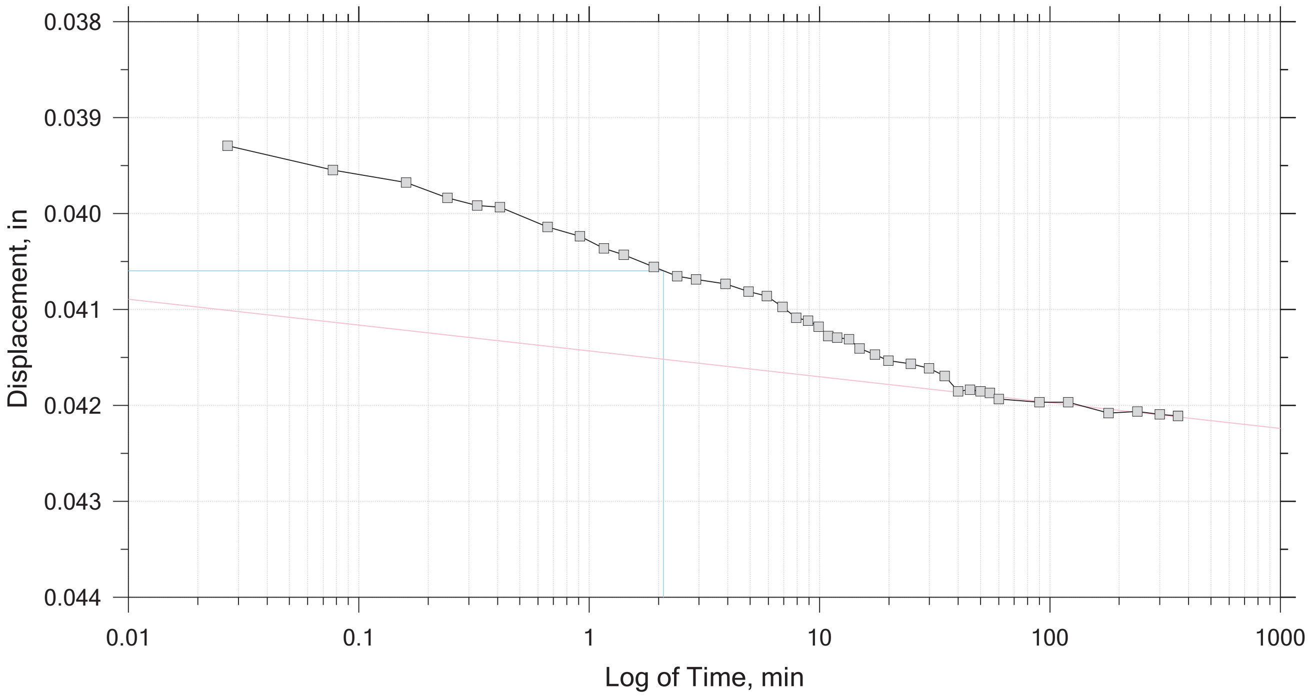
Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
Boring Number: B-32	Tester: EY	Checker: AD
Sample Number: 3ST	Test Date: 2/13/26	Depth: 23-25
Test Number: 1	Preparation: Moist	Elevation:
Description: Brown LEAN to FAT CLAY with sand		
Remarks:		

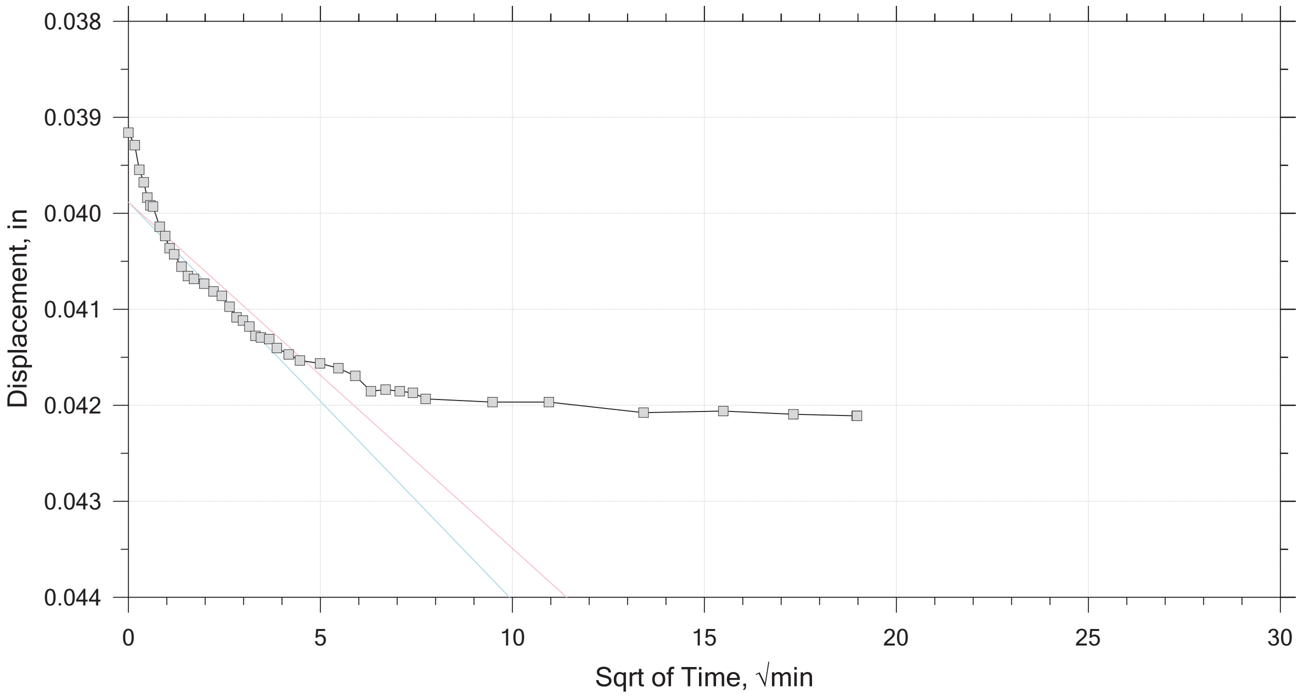
One-Dimensional Consolidation by ASTM D2435 - Method A

Time Curve 10 of 14

Constant Load Step

Stress: 2e+03 psf





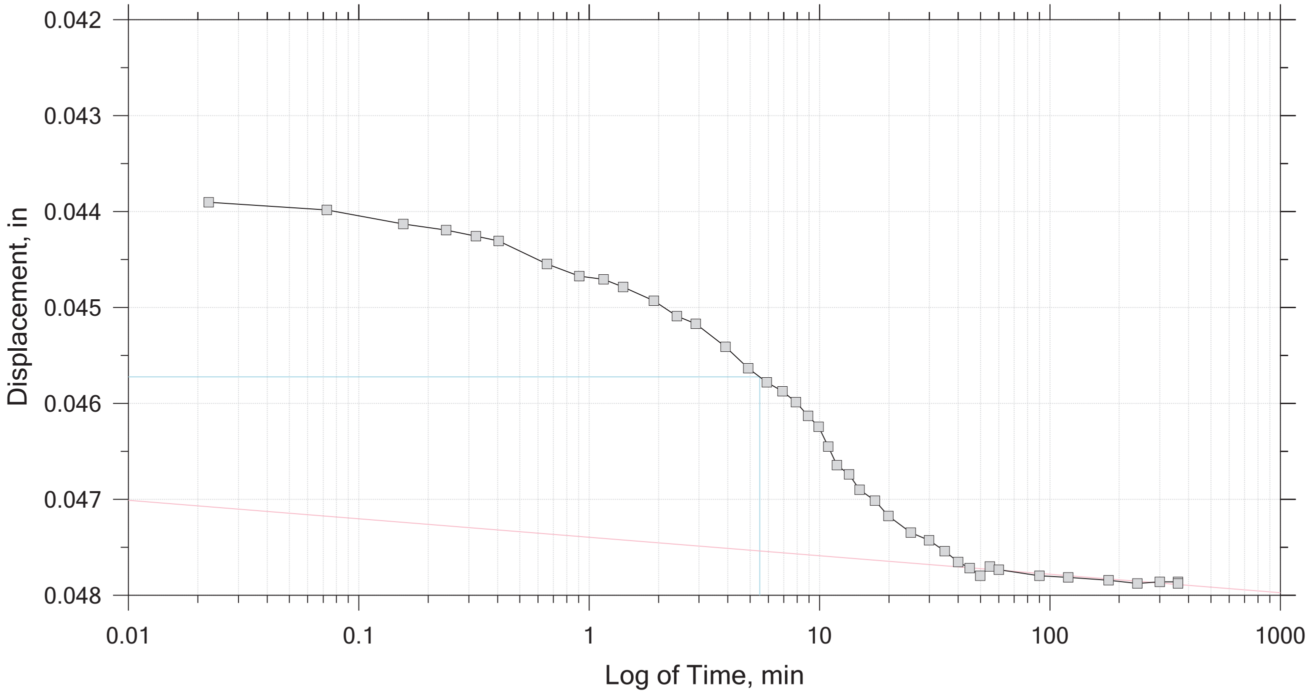
SME	Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
	Boring Number: B-32	Tester: EY	Checker: AD
	Sample Number: 3ST	Test Date: 2/13/26	Depth: 23-25
	Test Number: 1	Preparation: Moist	Elevation:
	Description: Brown LEAN to FAT CLAY with sand		
	Remarks:		

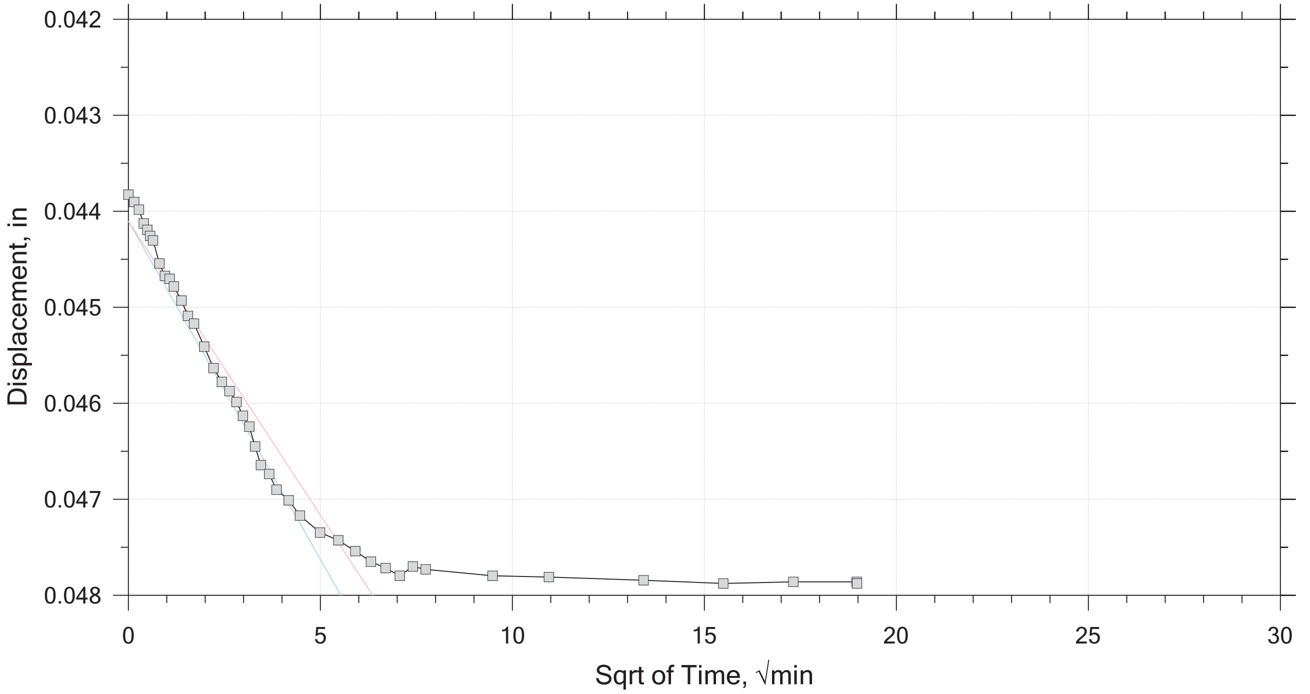
One-Dimensional Consolidation by ASTM D2435 - Method A

Time Curve 11 of 14

Constant Load Step

Stress: 4e+03 psf

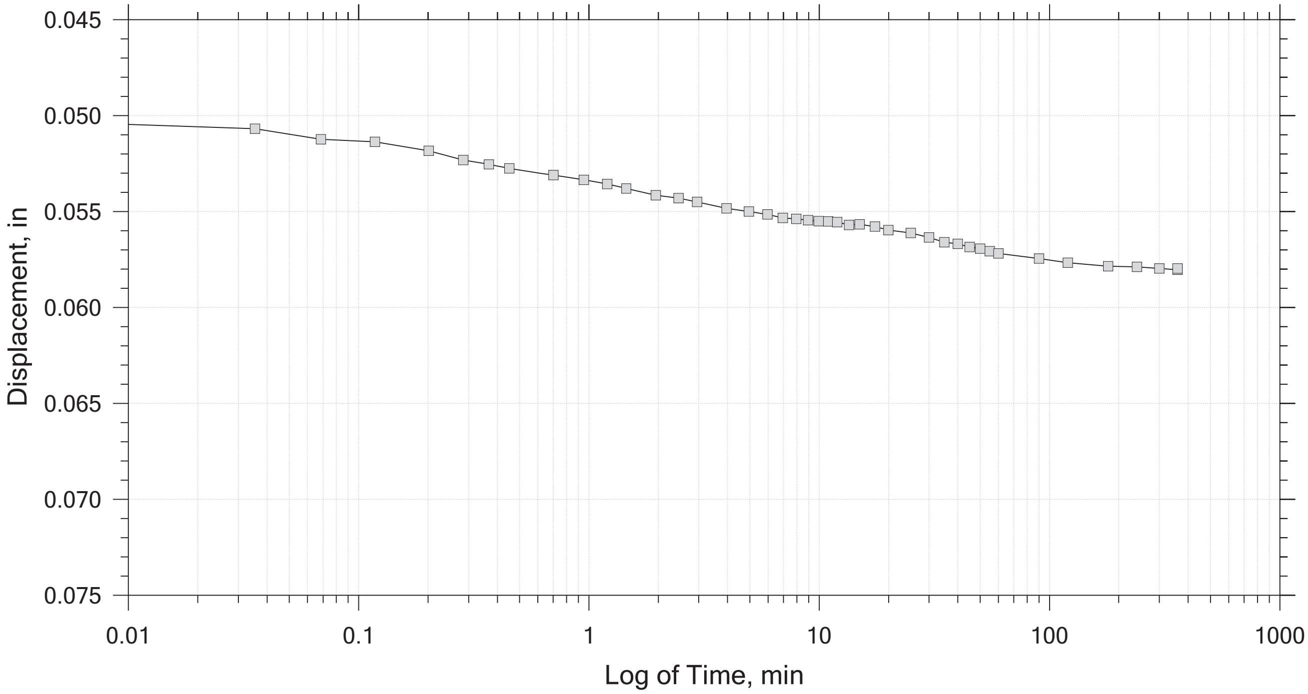


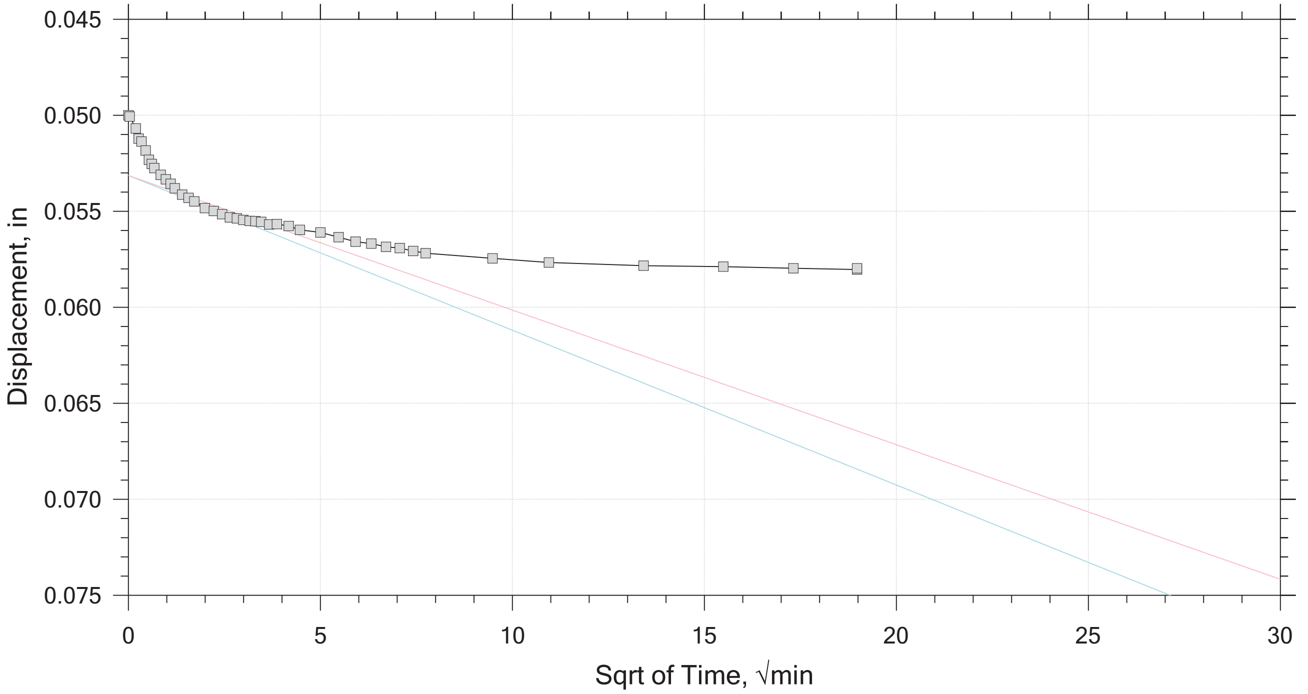


	Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
	Boring Number: B-32	Tester: EY	Checker: AD
	Sample Number: 3ST	Test Date: 2/13/26	Depth: 23-25
SME	Test Number: 1	Preparation: Moist	Elevation:
	Description: Brown LEAN to FAT CLAY with sand		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method A

Time Curve 12 of 14
Constant Load Step
Stress: 8e+03 psf





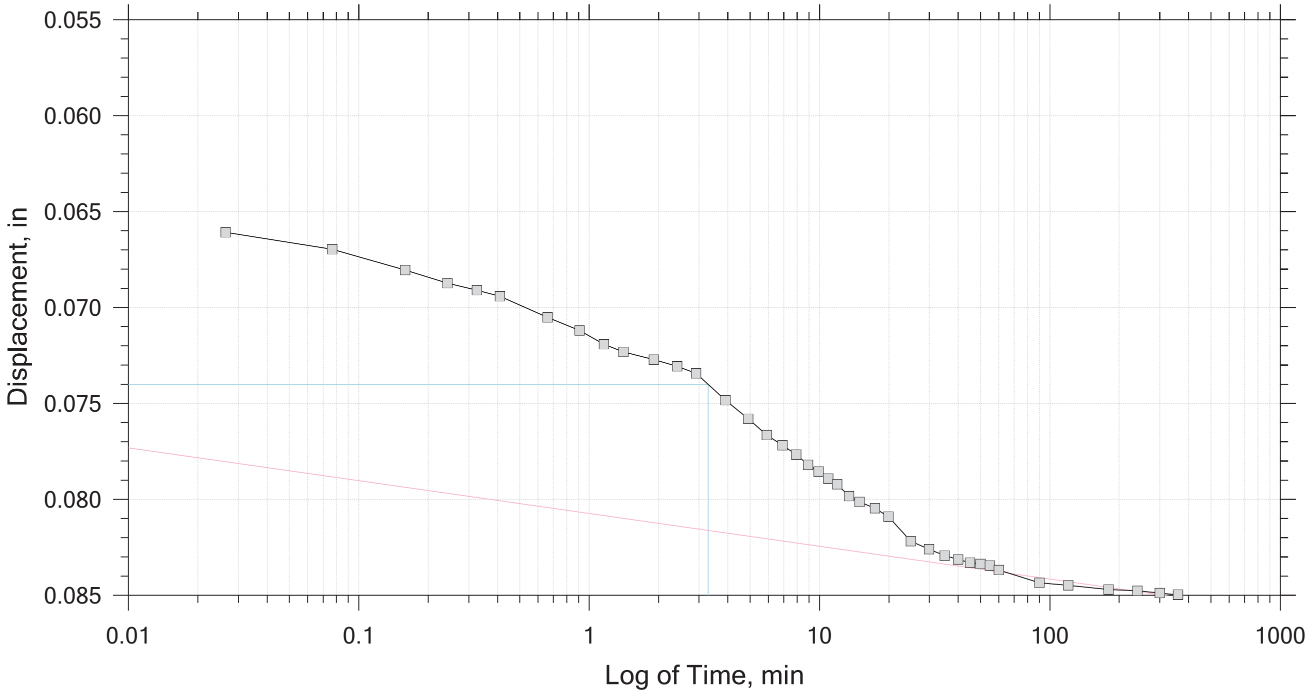
SME	Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
	Boring Number: B-32	Tester: EY	Checker: AD
	Sample Number: 3ST	Test Date: 2/13/26	Depth: 23-25
	Test Number: 1	Preparation: Moist	Elevation:
	Description: Brown LEAN to FAT CLAY with sand		
	Remarks:		

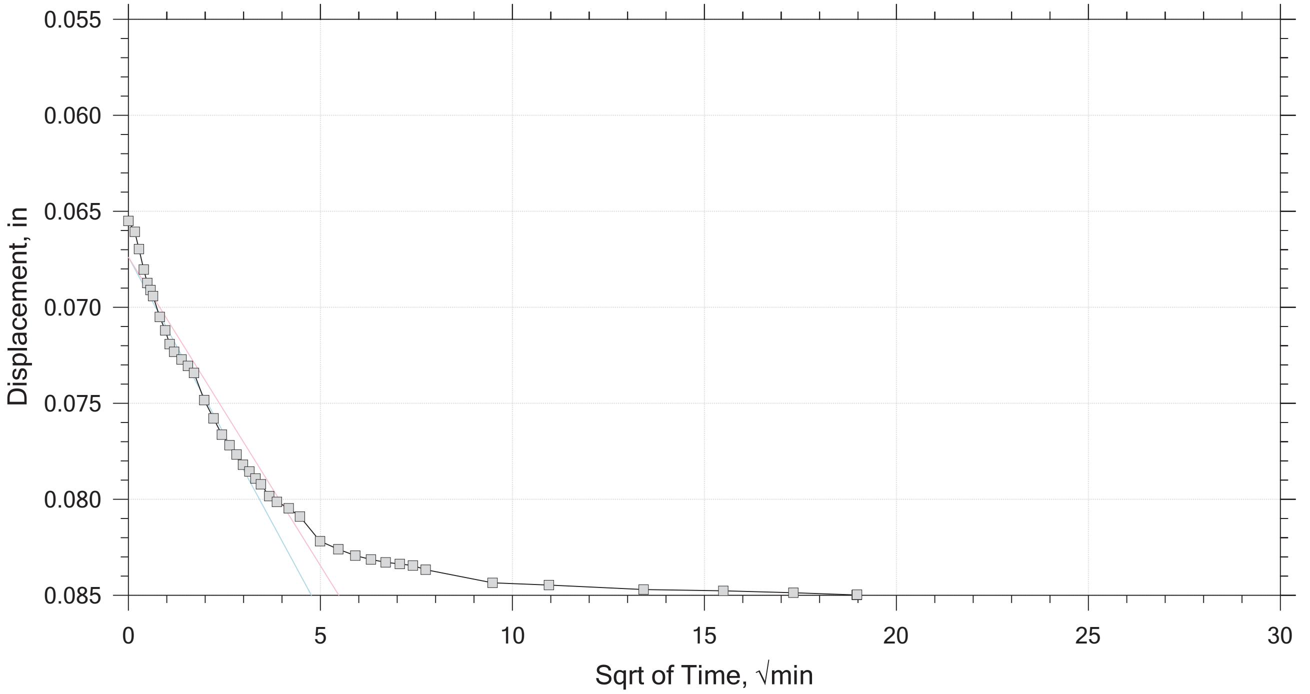
One-Dimensional Consolidation by ASTM D2435 - Method A

Time Curve 13 of 14

Constant Load Step

Stress: 1.6e+04 psf





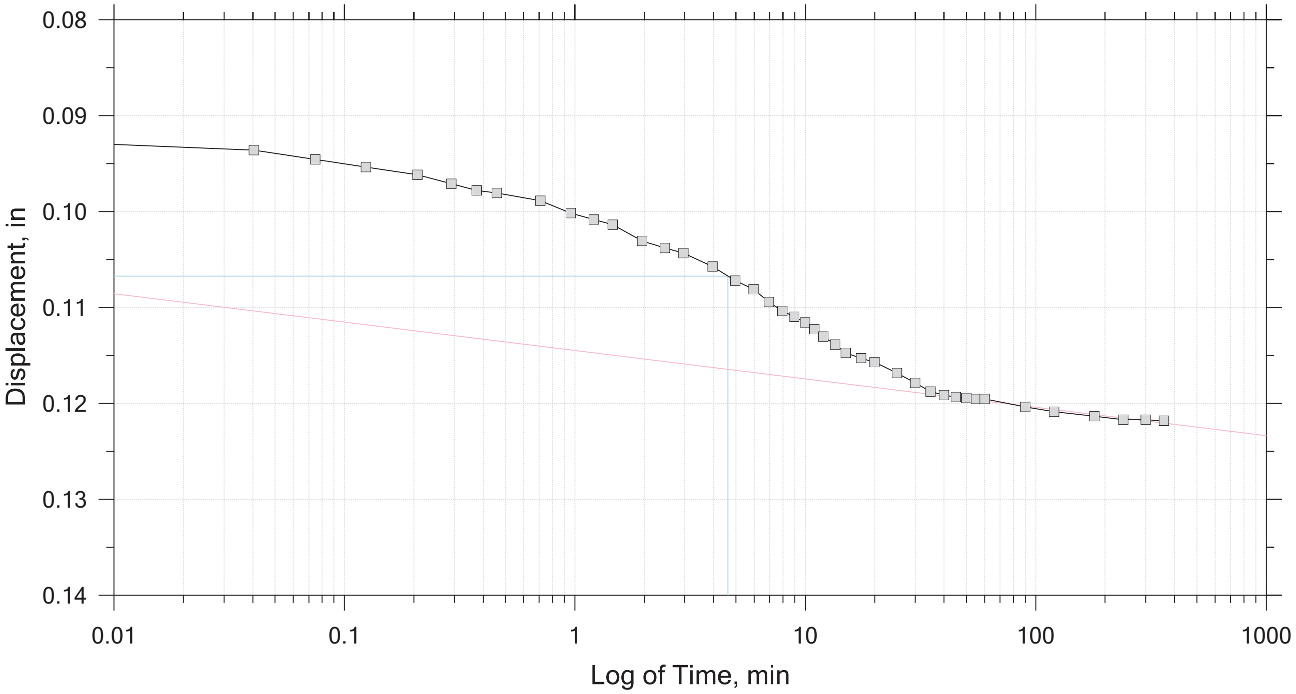
	Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
	Boring Number: B-32	Tester: EY	Checker: AD
	Sample Number: 3ST	Test Date: 2/13/26	Depth: 23-25
SME	Test Number: 1	Preparation: Moist	Elevation:
	Description: Brown LEAN to FAT CLAY with sand		
	Remarks:		

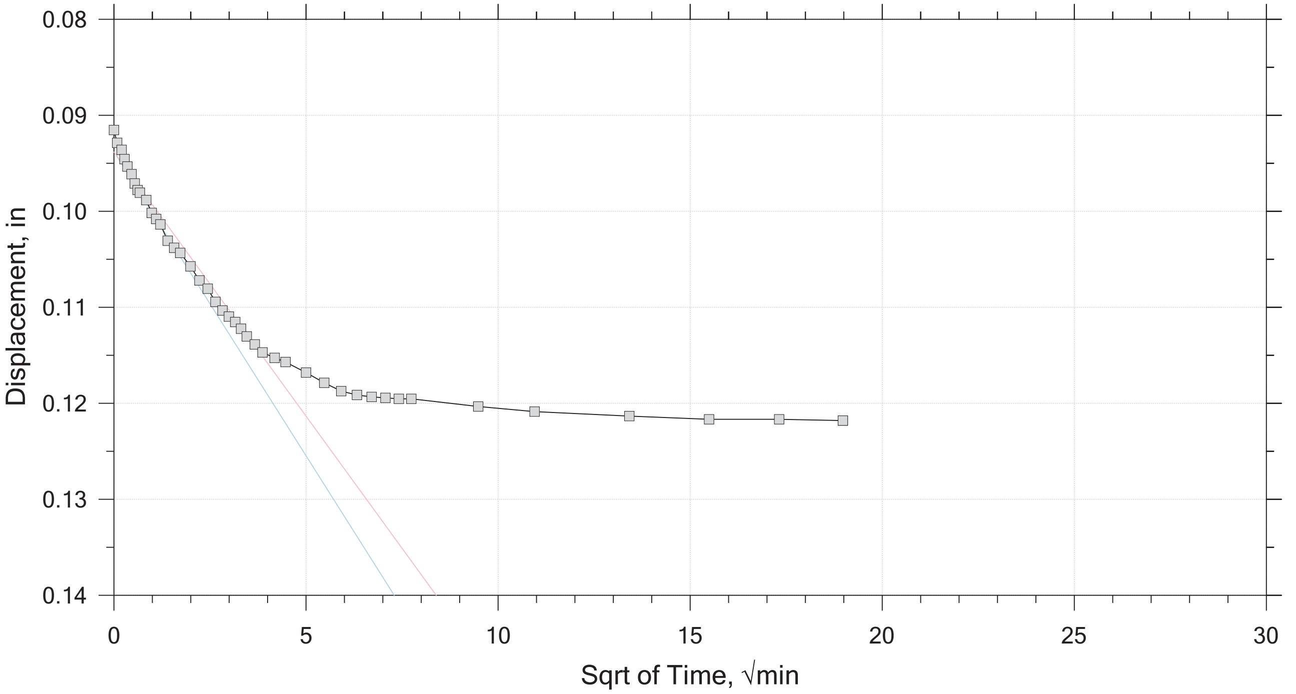
One-Dimensional Consolidation by ASTM D2435 - Method A

Time Curve 14 of 14

Constant Load Step

Stress: 3.2e+04 psf





	Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
	Boring Number: B-32	Tester: EY	Checker: AD
	Sample Number: 3ST	Test Date: 2/13/26	Depth: 23-25
SME	Test Number: 1	Preparation: Moist	Elevation:
	Description: Brown LEAN to FAT CLAY with sand		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method A

Specimen Diameter, in: 2.50	Specific Gravity: 2.92 (Estimated)	Liquid Limit: Unknown
Specimen Height, in: 1.00	Initial Void Ratio: 0.975	Plastic Limit: Unknown
Final Height, in: 0.88	Final Void Ratio: 0.734	Plasticity Index: Unknown

	Before Test Trimmings	Before Test Specimen	After Test Specimen	After Test Trimmings
Container ID		---		
Mass Container, gm	49.76	0	0	50.18
Mass Container + Wet Soil, gm	190.28	153.79	148.93	198.74
Mass Container + Dry Soil, gm	159.19	119.02	119.02	168.9
Mass Dry Soil, gm	109.43	119.02	119.02	118.72
Water Content, %	28.41	29.22	25.13	25.13
Void Ratio	---	0.98	0.73	---
Degree of Saturation, %	---	87.57	100.00	---
Dry Unit Weight, pcf	---	92.366	105.18	---

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test.
Therefore, values may not represent actual values for the specimen.

SME

Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
Boring Number: B-32	Tester: EY	Checker: AD
Sample Number: 3ST	Test Date: 2/13/26	Depth: 23-25
Test Number: 1	Preparation: Moist	Elevation:
Description: Brown LEAN to FAT CLAY with sand		
Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method A

Log of Time Coefficients

Step	Applied Stress psf	Final Displacement in	Void Ratio	Strain at End %	Log T50 min	Cv in²/s	Mv ft²/lb	k cm/s	Ca %
1	250.	0.007544	0.960	0.754	0.000	0.00e+00	3.02e+01	0.00e+00	0.00e+00
2	500.	0.007704	0.960	0.770	0.113	7.14e-03	6.41e-01	6.05e-08	0.00e+00
3	1.00e+03	0.009228	0.957	0.923	0.000	0.00e+00	3.05e+00	0.00e+00	0.00e+00
4	2.00e+03	0.01633	0.943	1.63	3.355	2.38e-04	7.11e+00	2.24e-08	0.00e+00
5	4.00e+03	0.03294	0.910	3.29	3.162	2.47e-04	8.30e+00	2.71e-08	0.00e+00
6	8.00e+03	0.05360	0.869	5.36	0.000	0.00e+00	5.17e+00	0.00e+00	0.00e+00
7	4.00e+03	0.05398	0.868	5.40	1.959	3.75e-04	-9.36e-02	-4.64e-10	0.00e+00
8	500.	0.03847	0.899	3.85	0.000	0.00e+00	4.43e+00	0.00e+00	0.00e+00
9	1.00e+03	0.03824	0.900	3.82	6.123	1.24e-04	-4.61e-01	-7.55e-10	0.00e+00
10	2.00e+03	0.04185	0.892	4.18	2.098	3.60e-04	3.61e+00	1.72e-08	0.00e+00
11	4.00e+03	0.04774	0.881	4.77	5.503	1.36e-04	2.95e+00	5.30e-09	0.00e+00
12	8.00e+03	0.05619	0.864	5.62	0.000	0.00e+00	2.11e+00	0.00e+00	0.00e+00
13	1.60e+04	0.08299	0.811	8.30	3.291	2.16e-04	3.35e+00	9.56e-09	0.00e+00
14	3.20e+04	0.1176	0.743	11.8	4.607	1.44e-04	2.17e+00	4.13e-09	0.00e+00

Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
Boring Number: B-32	Tester: EY	Checker: AD
Sample Number: 3ST	Test Date: 2/13/26	Depth: 23-25
Test Number: 1	Preparation: Moist	Elevation:
Description: Brown LEAN to FAT CLAY with sand		
Remarks:		
Displacement at End of Primary		

One-Dimensional Consolidation by ASTM D2435 - Method A

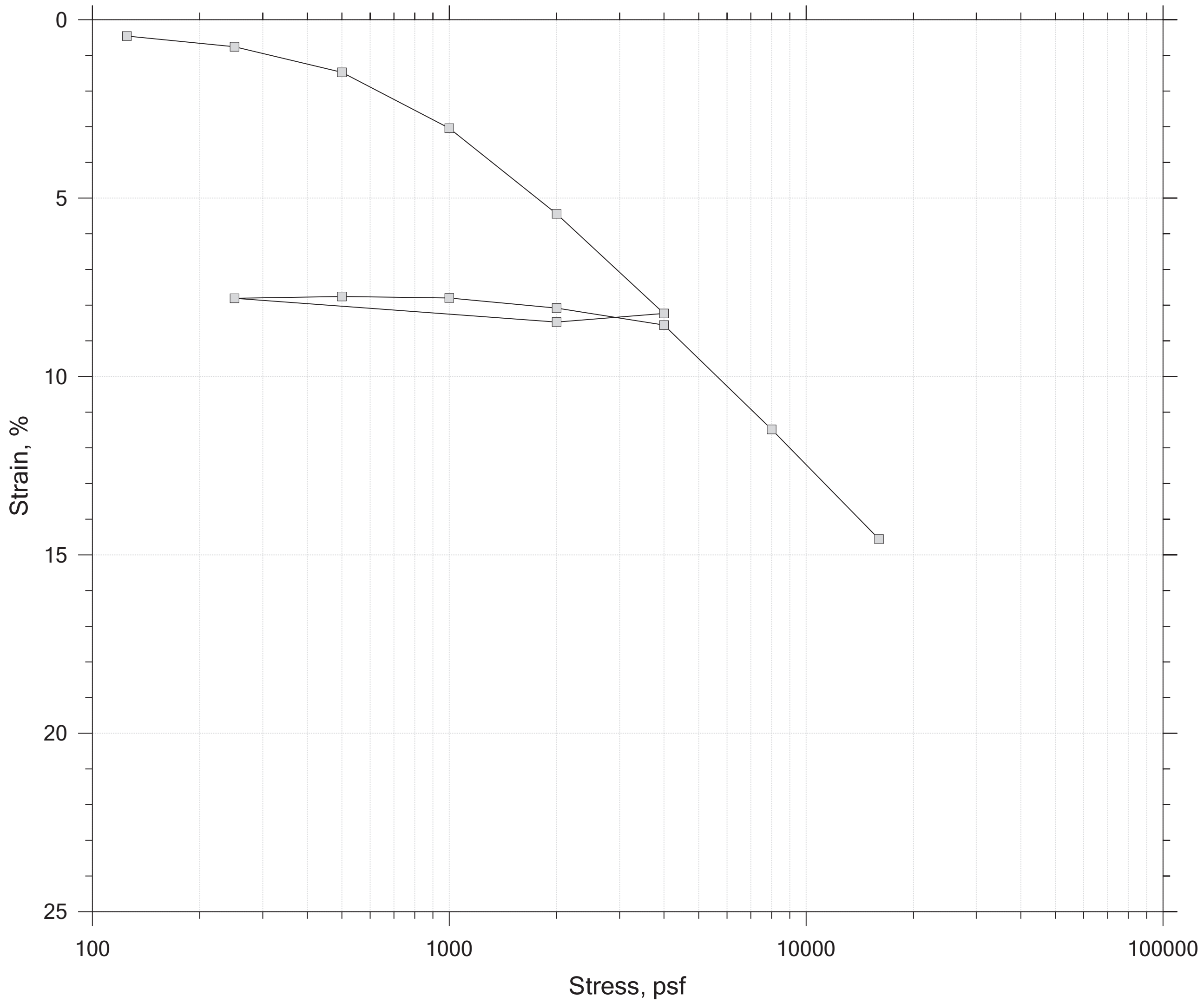
Sqrt of Time Coefficients

Step	Applied Stress psf	Final Displacement in	Void Ratio	Strain at End %	Sq.Rt. T90 min	Cv in²/s	Mv ft²/lb	k cm/s
1	250.	0.007544	0.960	0.754	3.649	9.61e-04	3.02e+01	3.83e-07
2	500.	0.007704	0.960	0.770	0.000	0.00e+00	6.41e-01	0.00e+00
3	1.00e+03	0.009228	0.957	0.923	10.401	3.34e-04	3.05e+00	1.34e-08
4	2.00e+03	0.01633	0.943	1.63	9.537	3.61e-04	7.11e+00	3.39e-08
5	4.00e+03	0.03294	0.910	3.29	29.446	1.14e-04	8.30e+00	1.25e-08
6	8.00e+03	0.05360	0.869	5.36	9.723	3.33e-04	5.17e+00	2.27e-08
7	4.00e+03	0.05398	0.868	5.40	13.459	2.35e-04	-9.36e-02	-2.91e-10
8	500.	0.03847	0.899	3.85	40.270	7.98e-05	4.43e+00	4.67e-09
9	1.00e+03	0.03824	0.900	3.82	110.566	2.96e-05	-4.61e-01	-1.80e-10
10	2.00e+03	0.04185	0.892	4.18	21.125	1.54e-04	3.61e+00	7.35e-09
11	4.00e+03	0.04774	0.881	4.77	29.271	1.10e-04	2.95e+00	4.29e-09
12	8.00e+03	0.05619	0.864	5.62	11.807	2.69e-04	2.11e+00	7.50e-09
13	1.60e+04	0.08299	0.811	8.30	16.136	1.90e-04	3.35e+00	8.39e-09
14	3.20e+04	0.1176	0.743	11.8	12.843	2.23e-04	2.17e+00	6.37e-09

Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
Boring Number: B-32	Tester: EY	Checker: AD
Sample Number: 3ST	Test Date: 2/13/26	Depth: 23-25
Test Number: 1	Preparation: Moist	Elevation:
Description: Brown LEAN to FAT CLAY with sand		
Remarks:		
Displacement at End of Primary		

One-Dimensional Consolidation by ASTM D2435 - Method A

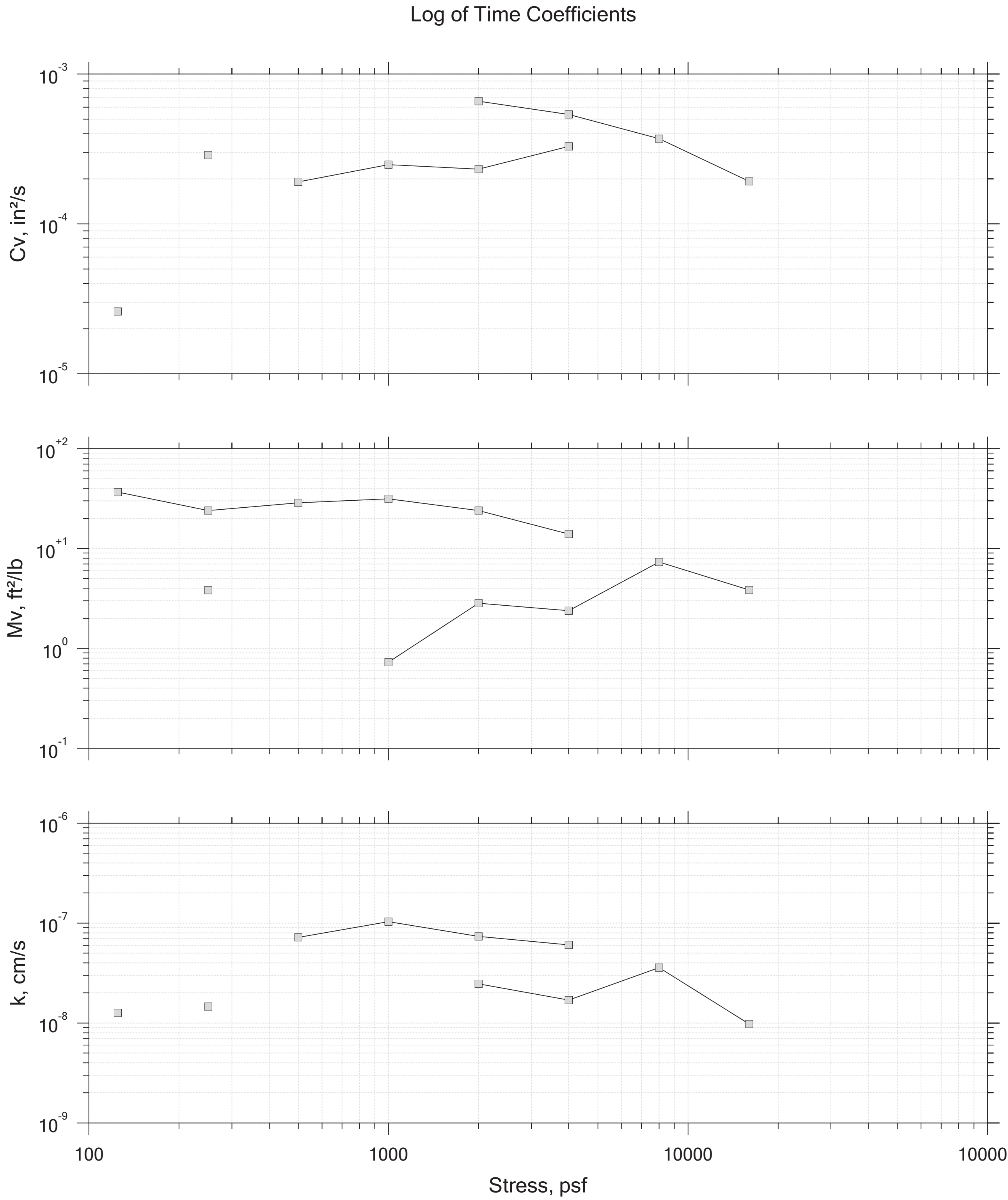
Summary Report



					Before Test	After Test
Current Vertical Effective Stress, psf: 0				Water Content, %	26.55	21.99
Preconsolidation Stress, psf: 1085				Dry Unit Weight, pcf	92.225	108.28
Compression Ratio: 0				Saturation, %	82.87	100.00
Specimen Diameter, in: 2.5		Specimen Height, in: 1		Void Ratio	0.90	0.62
LL: Unknown	PL: Unknown	PI: Unknown	GS: 2.80			

Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
Boring Number: B41	Tester: SM	Checker: AD
Sample Number: 3ST	Test Date: 2/13/26	Depth: 3-5 Feet
Test Number:	Preparation: Moist	Elevation: 736.5-738.5 Feet
Description: LEAN CLAY- Reddish Brown		
Remarks:		
Displacement at End of Primary		

One-Dimensional Consolidation by ASTM D2435 - Method A



	Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
	Boring Number: B-41	Tester: SM	Checker: AD
SME	Sample Number: 3ST	Test Date: 2/13/26	Depth: 3-5
	Test Number:	Preparation: Moist	Elevation:
	Description: Red CLAY		
	Remarks:		

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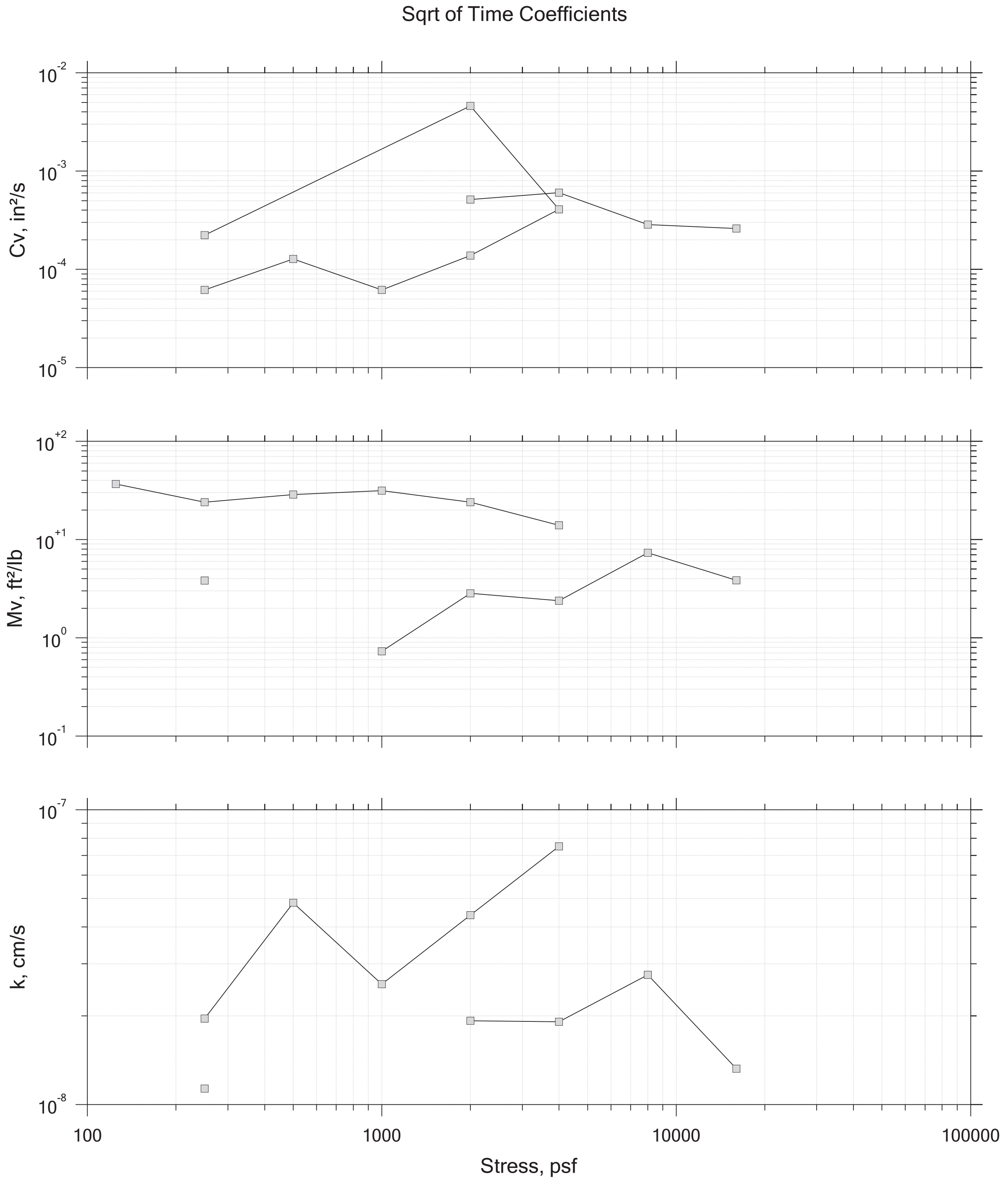
One-Dimensional Consolidation by ASTM D2435 - Method A



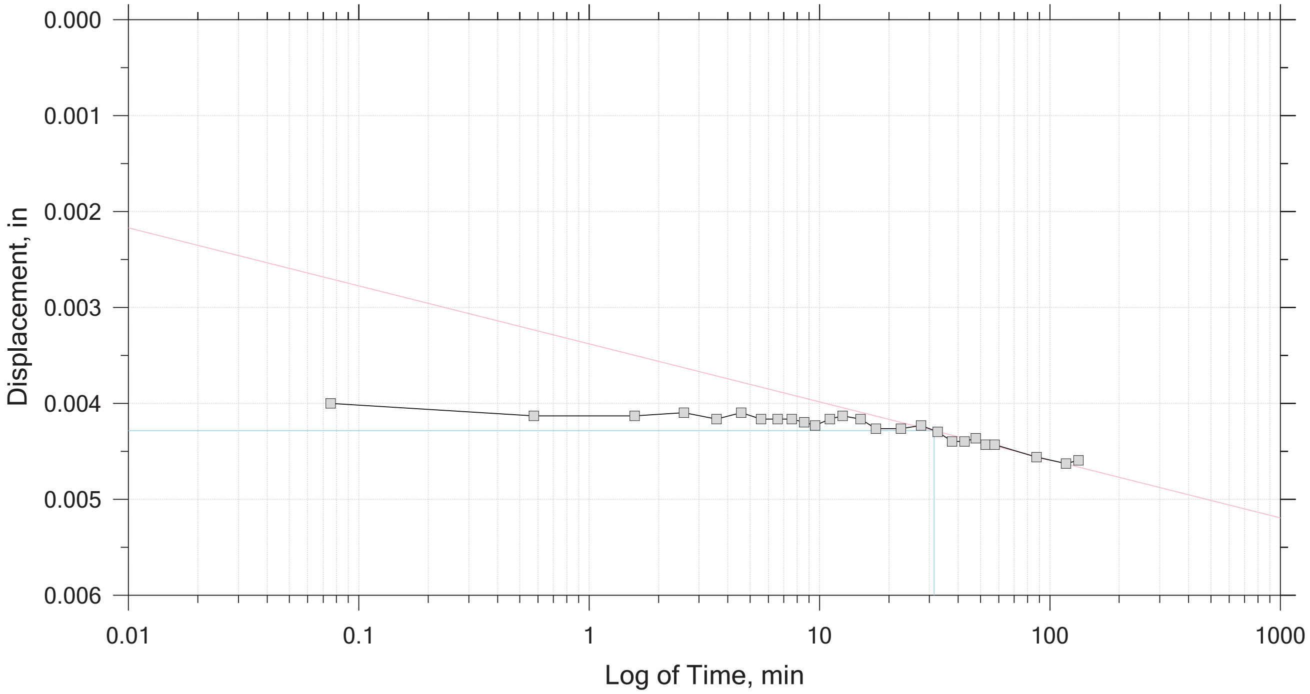
Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
Boring Number: B-41	Tester: SM	Checker: AD
Sample Number: 3ST	Test Date: 2/13/26	Depth: 3-5
Test Number:	Preparation: Moist	Elevation:
Description: Red CLAY		
Remarks:		

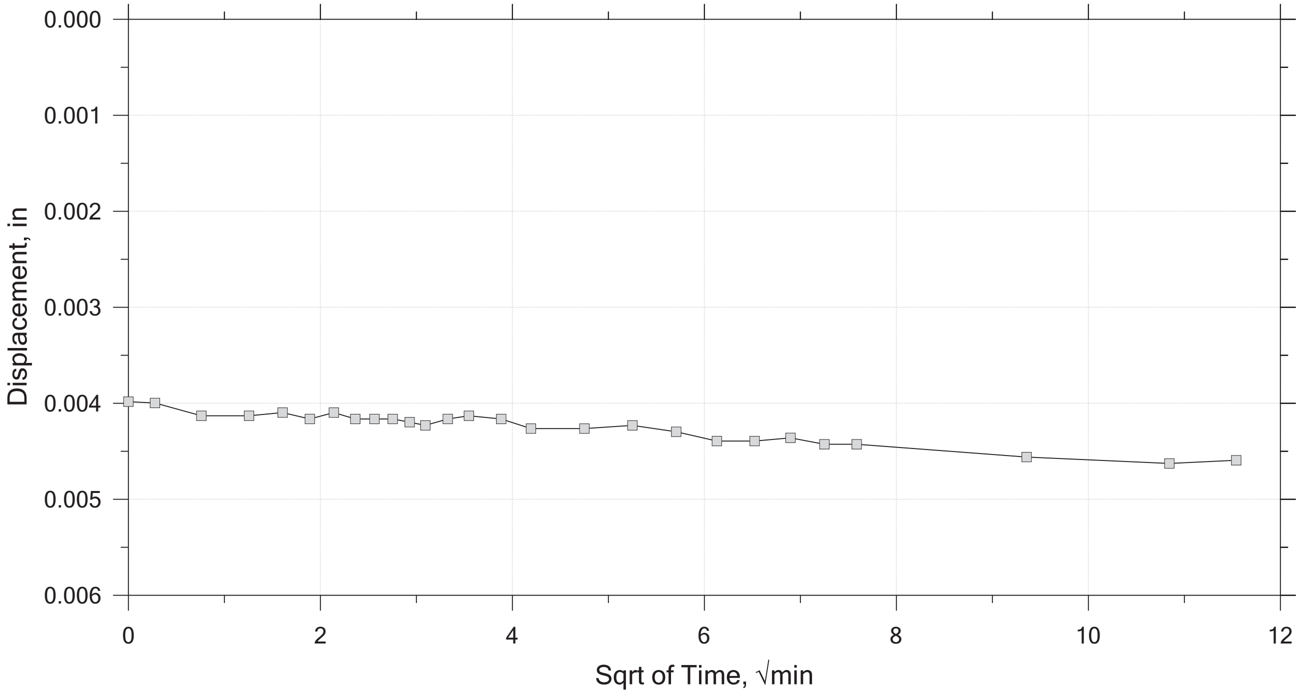
One-Dimensional Consolidation by ASTM D2435 - Method A

Time Curve 1 of 14

Constant Load Step

Stress: 125 psf

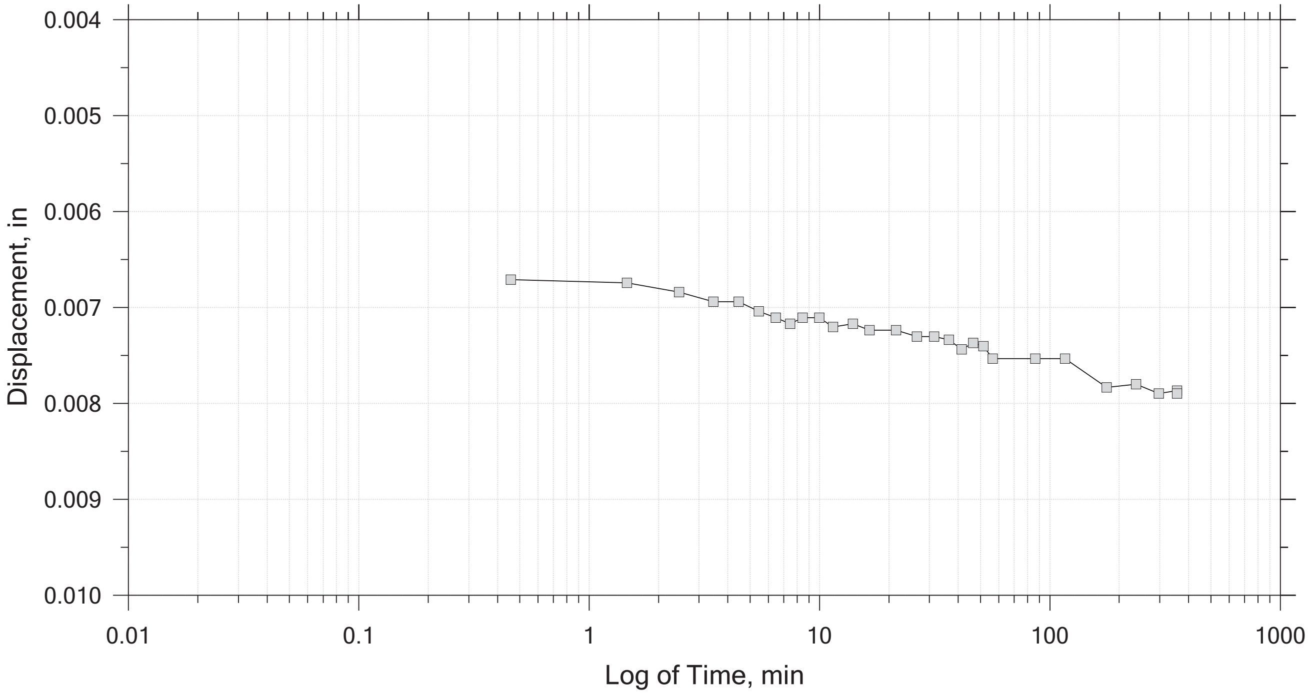


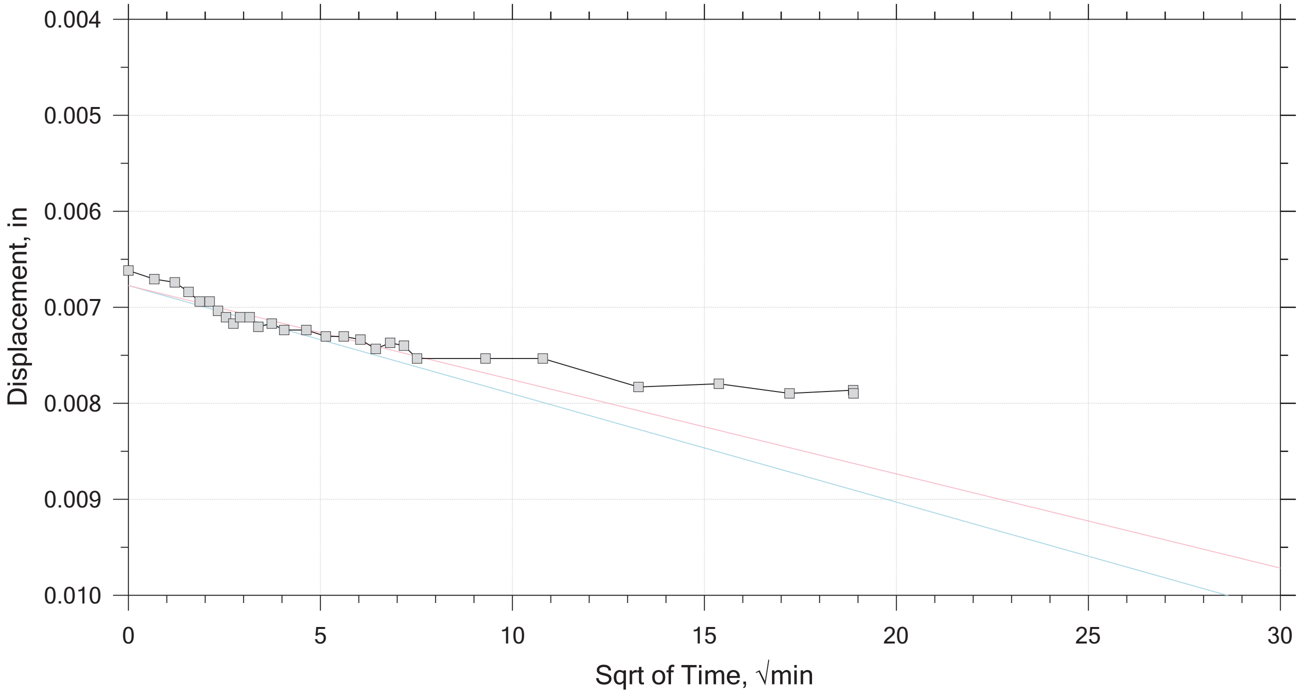


SME	Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
	Boring Number: B-41	Tester: SM	Checker: AD
	Sample Number: 3ST	Test Date: 2/13/26	Depth: 3-5
	Test Number:	Preparation: Moist	Elevation:
	Description: Red CLAY		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method A

Time Curve 2 of 14
Constant Load Step
Stress: 250 psf





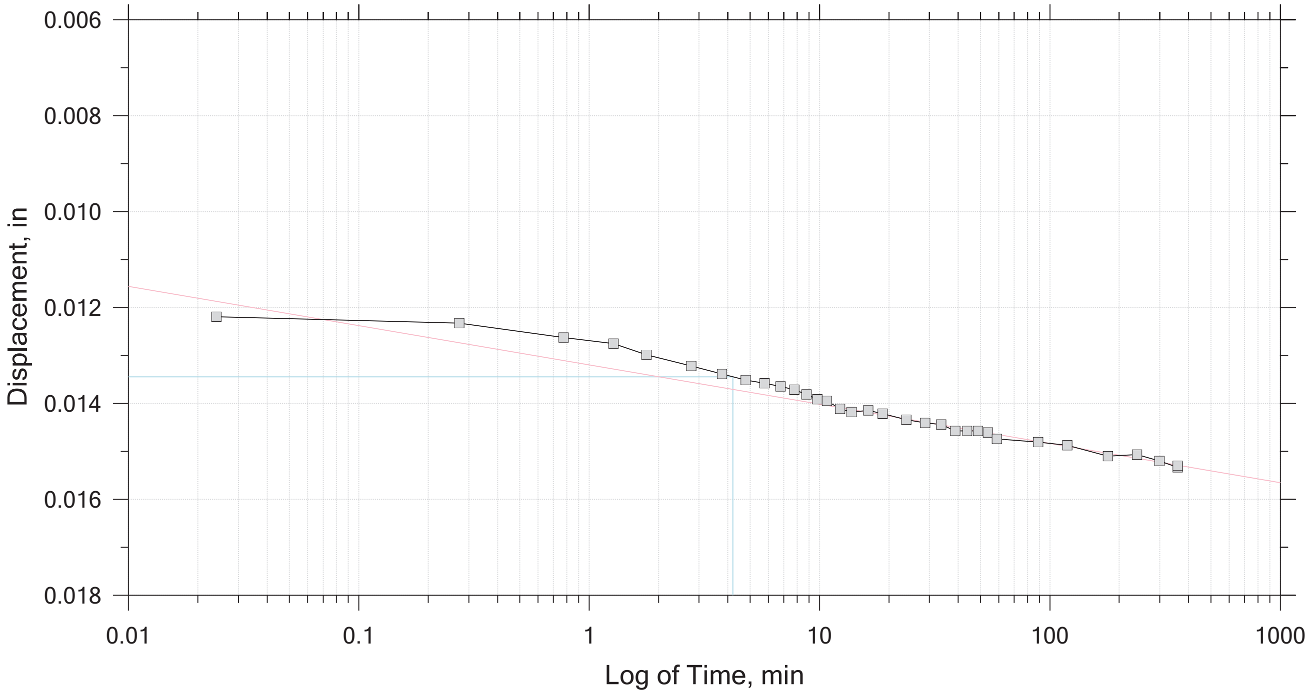
	Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
	Boring Number: B-41	Tester: SM	Checker: AD
	Sample Number: 3ST	Test Date: 2/13/26	Depth: 3-5
SME	Test Number:	Preparation: Moist	Elevation:
	Description: Red CLAY		
	Remarks:		

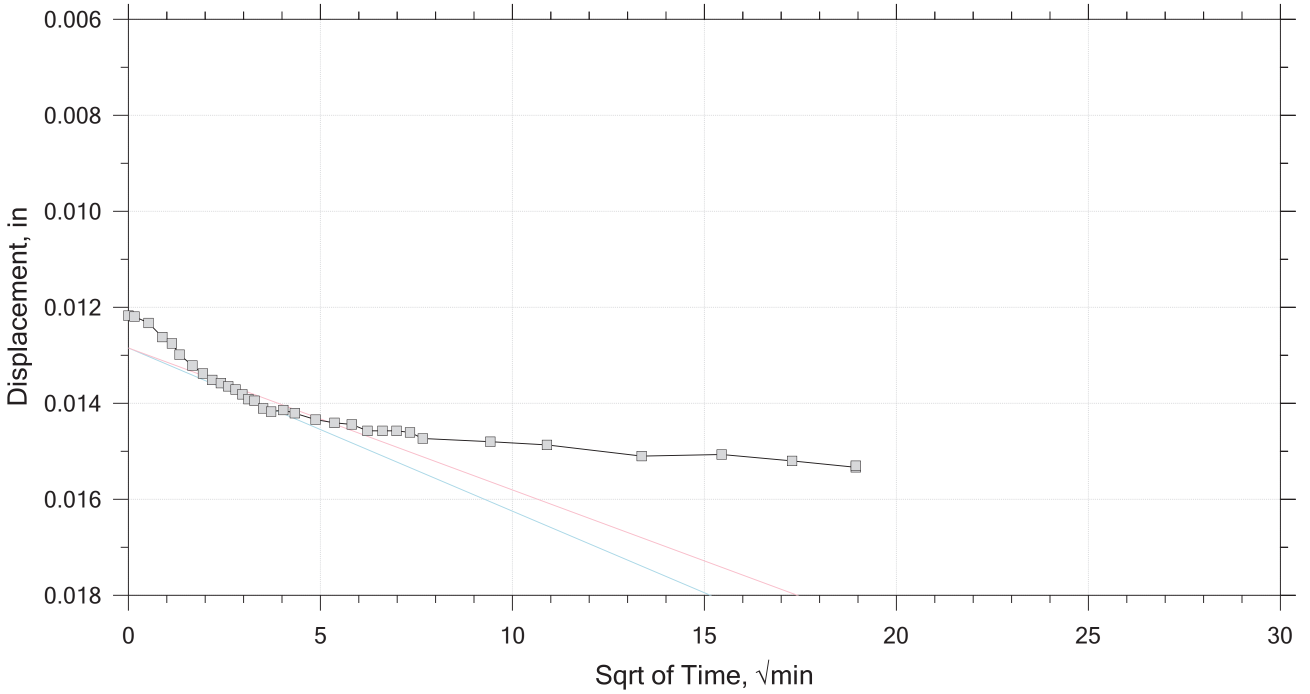
One-Dimensional Consolidation by ASTM D2435 - Method A

Time Curve 3 of 14

Constant Load Step

Stress: 500 psf





SME	Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
	Boring Number: B-41	Tester: SM	Checker: AD
	Sample Number: 3ST	Test Date: 2/13/26	Depth: 3-5
	Test Number:	Preparation: Moist	Elevation:
	Description: Red CLAY		
	Remarks:		

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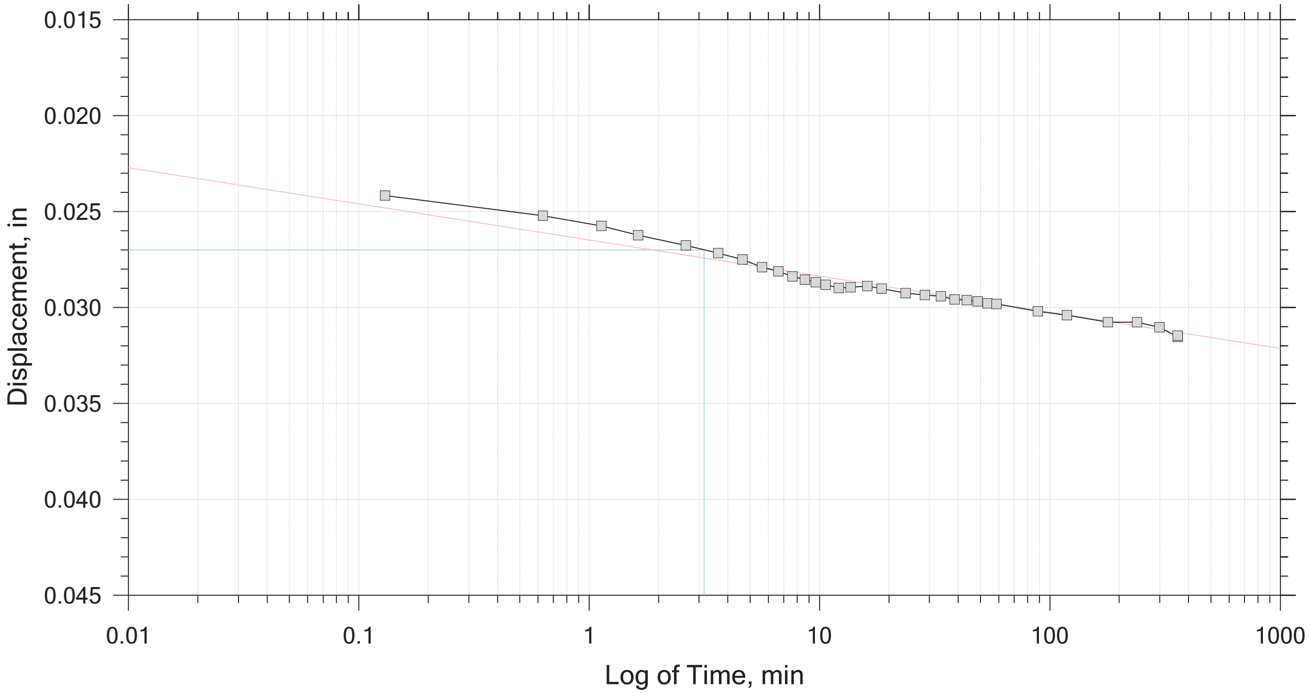
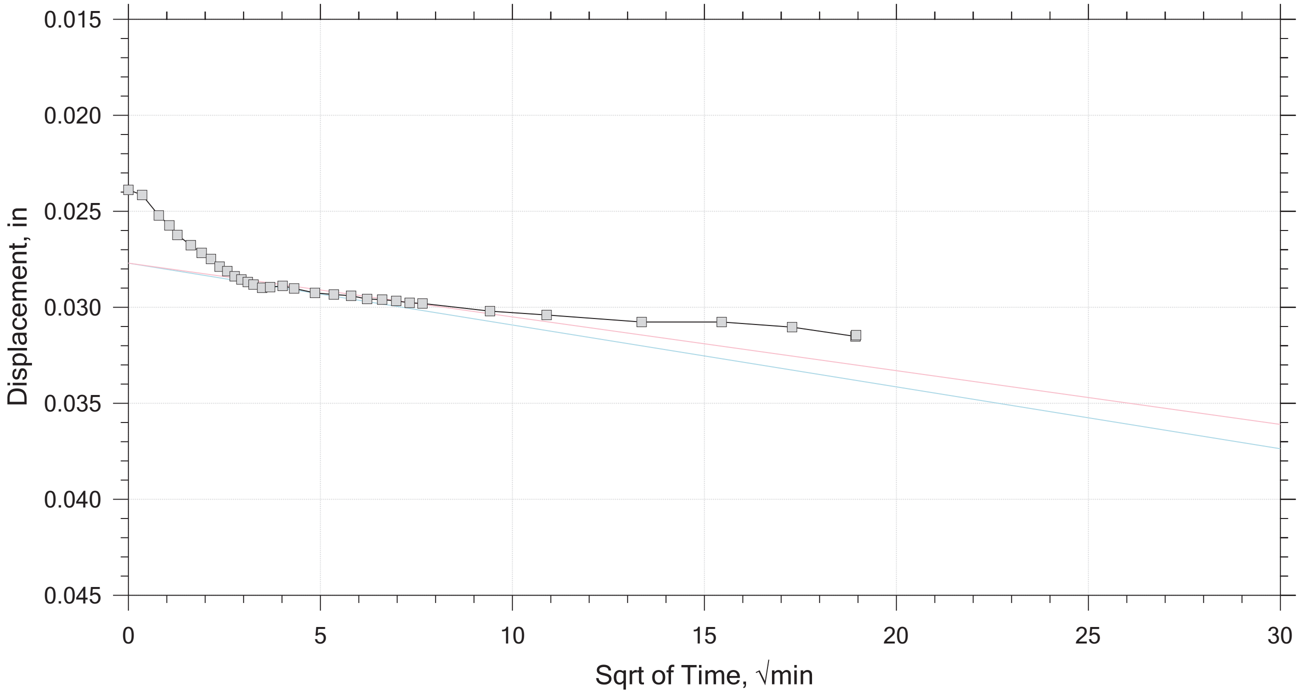
One-Dimensional Consolidation by ASTM D2435 - Method A

Time Curve 4 of 14

Constant Load Step

Stress: 1e+03 psf





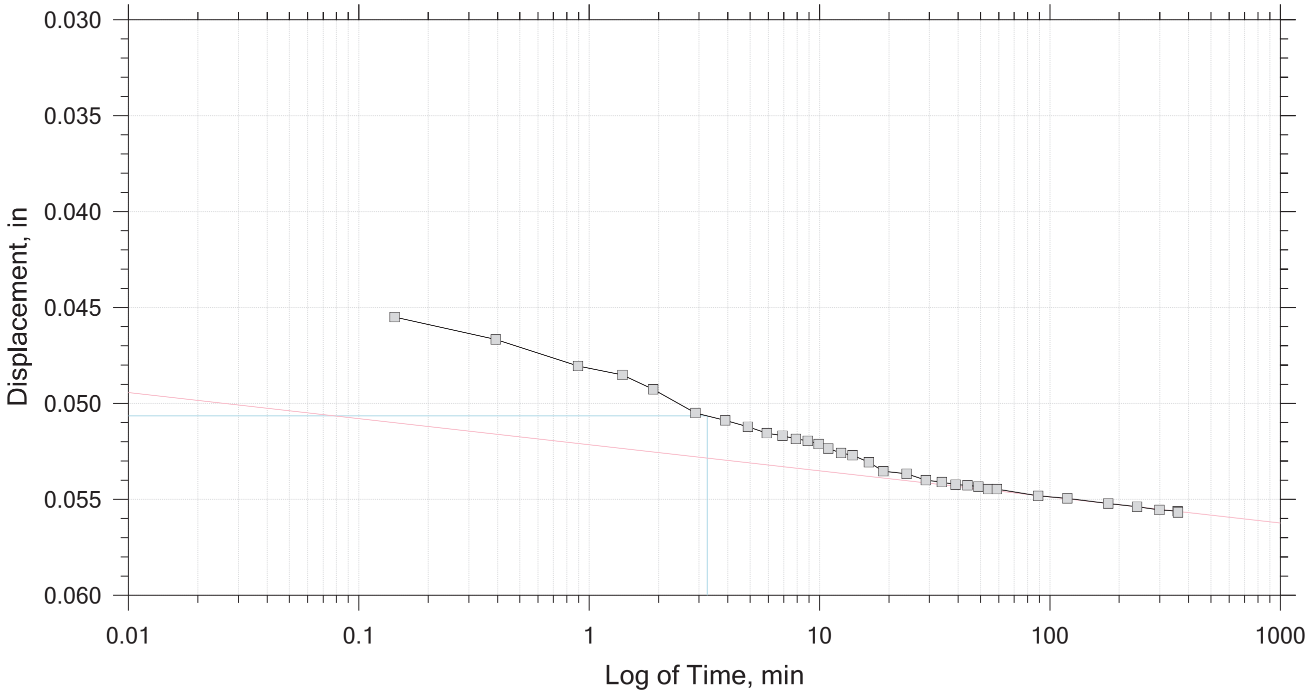
	Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
	Boring Number: B-41	Tester: SM	Checker: AD
SME	Sample Number: 3ST	Test Date: 2/13/26	Depth: 3-5
	Test Number:	Preparation: Moist	Elevation:
	Description: Red CLAY		
	Remarks:		

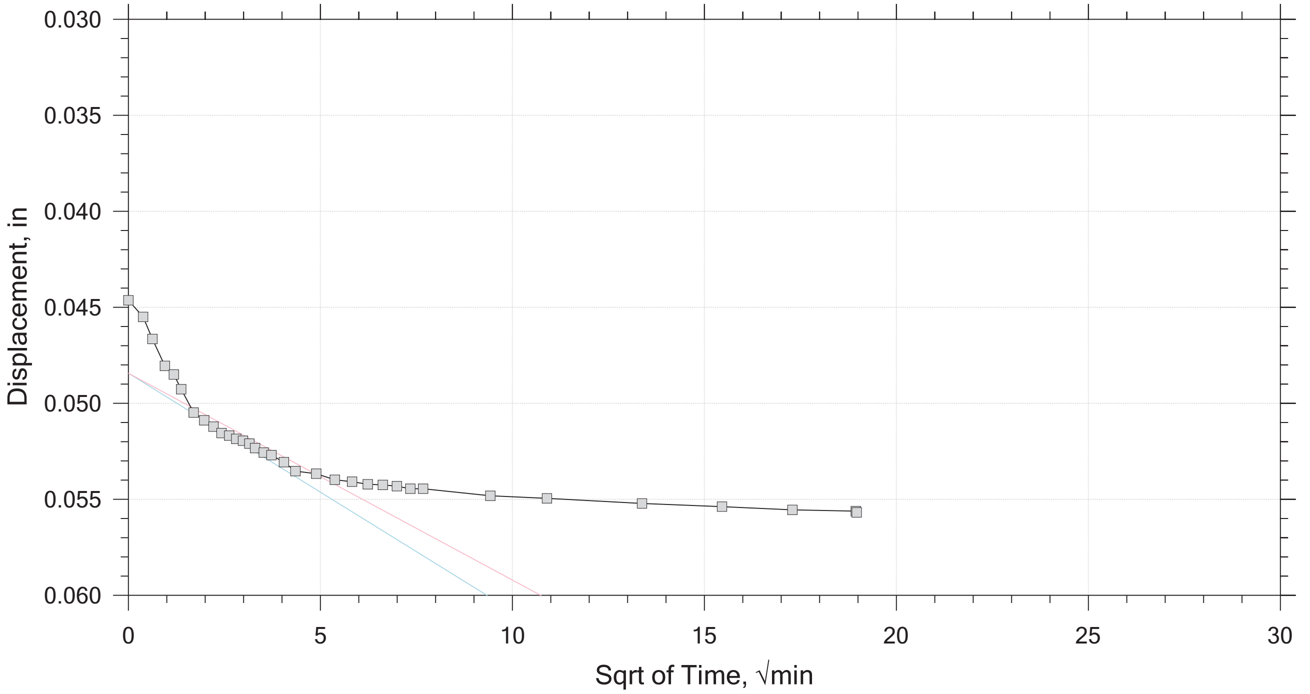
One-Dimensional Consolidation by ASTM D2435 - Method A

Time Curve 5 of 14

Constant Load Step

Stress: 2e+03 psf





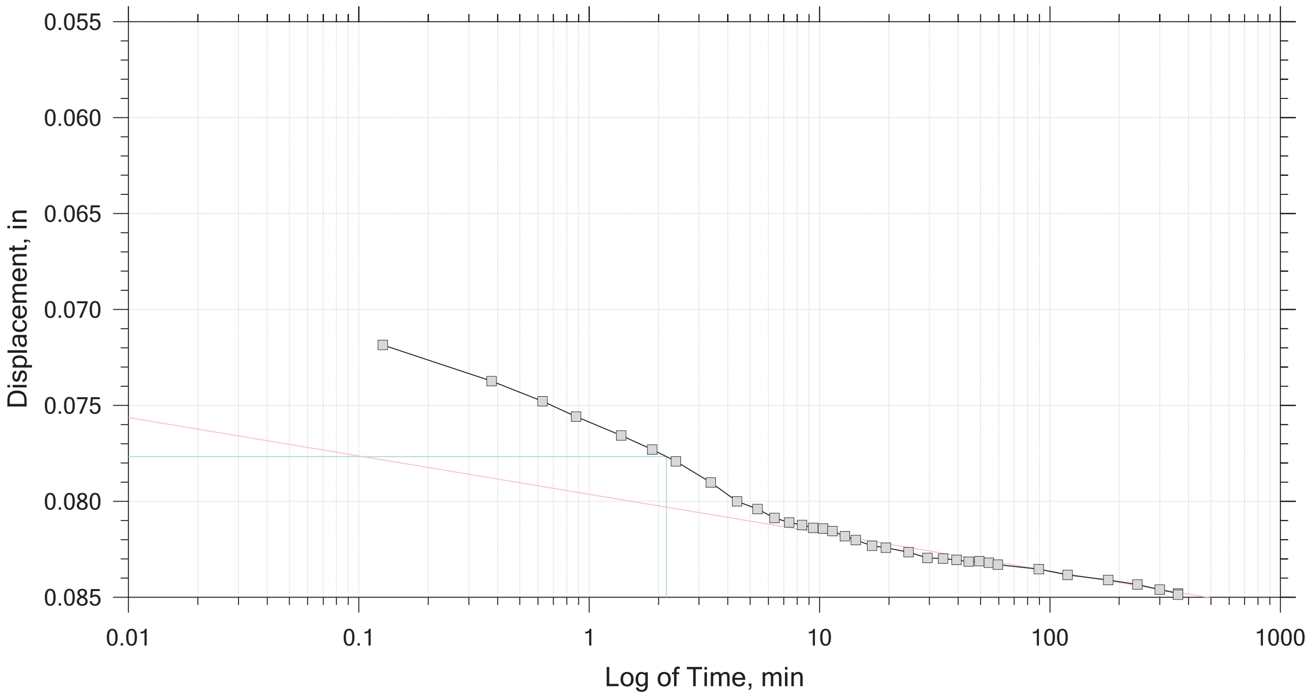
	Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
	Boring Number: B-41	Tester: SM	Checker: AD
	Sample Number: 3ST	Test Date: 2/13/26	Depth: 3-5
SME	Test Number:	Preparation: Moist	Elevation:
	Description: Red CLAY		
	Remarks:		

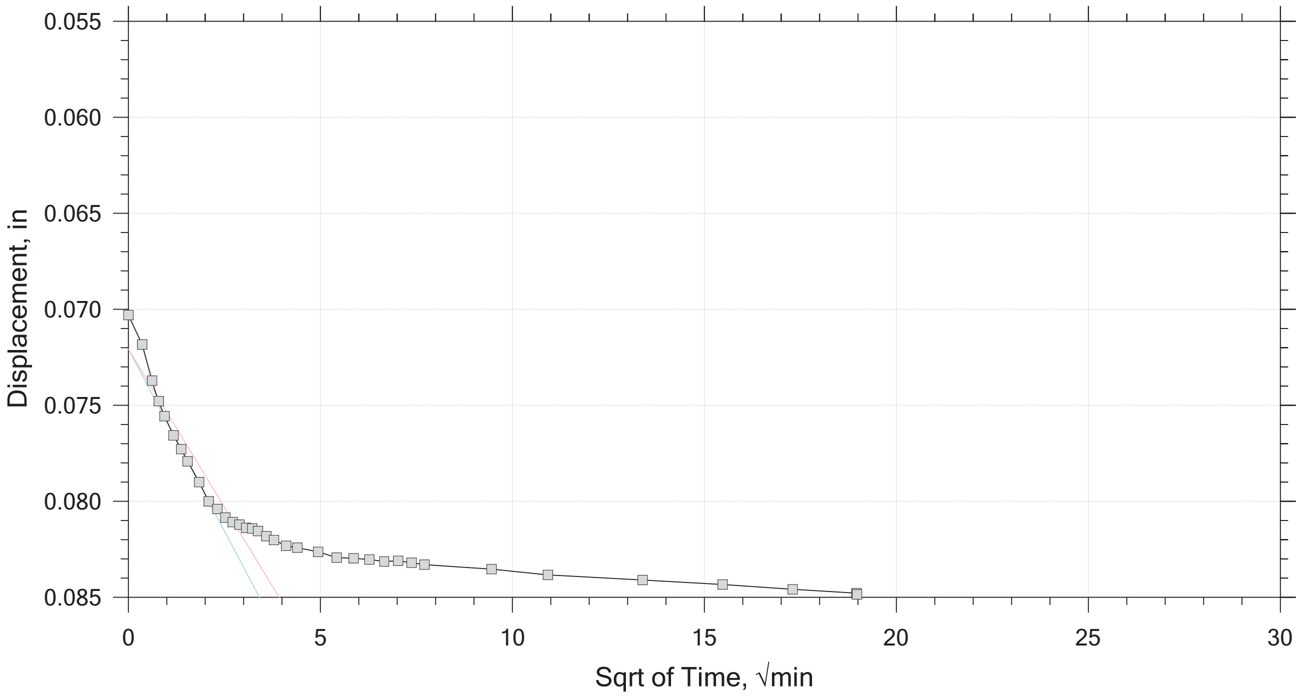
One-Dimensional Consolidation by ASTM D2435 - Method A

Time Curve 6 of 14

Constant Load Step

Stress: 4e+03 psf

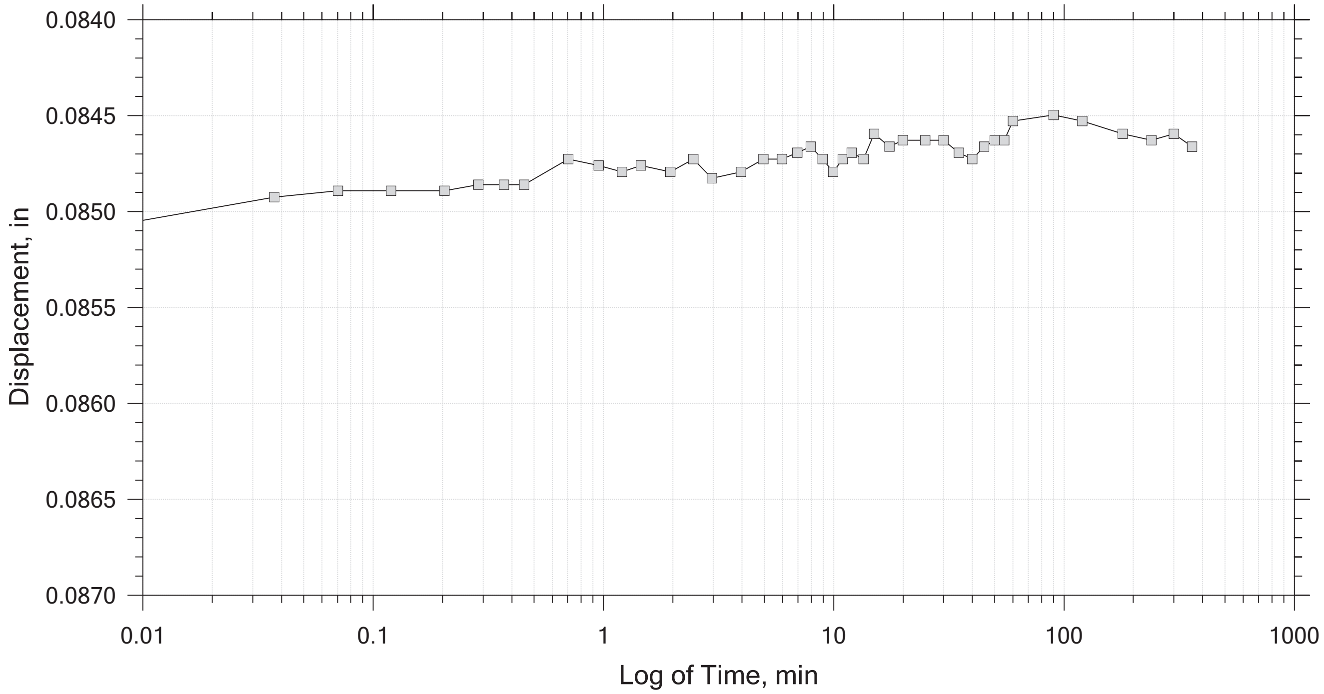


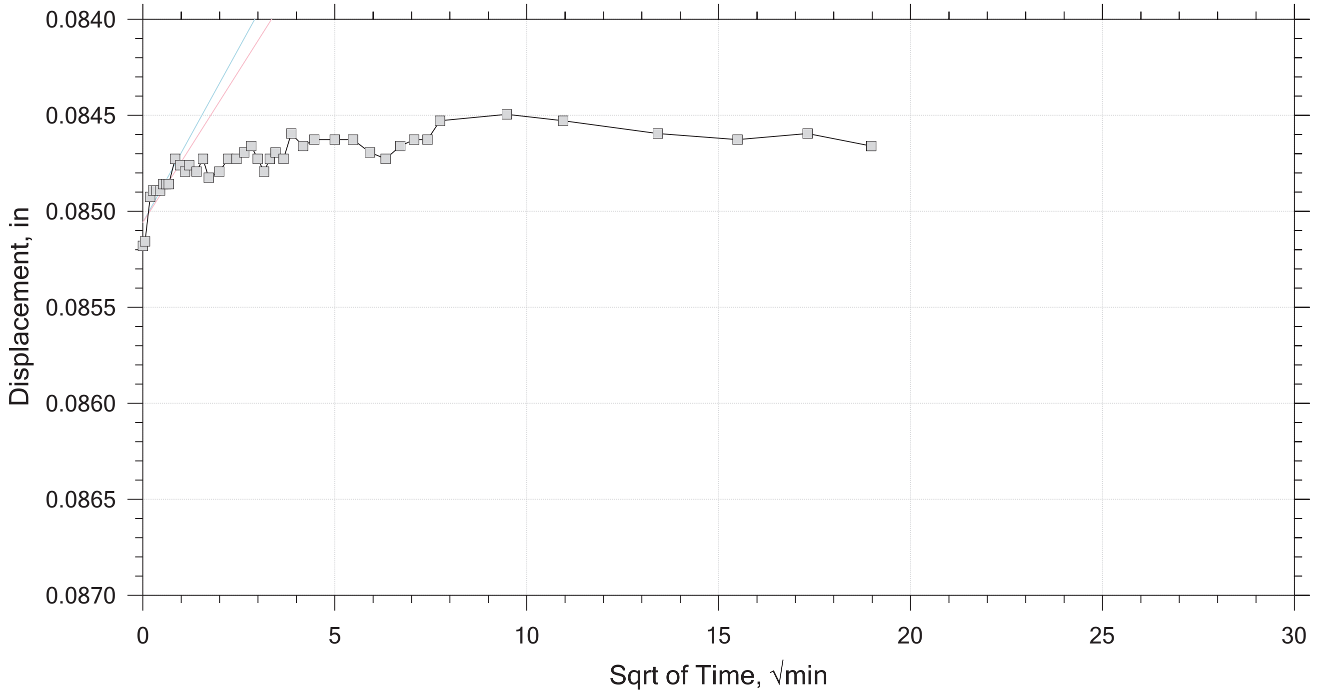


Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
Boring Number: B-41	Tester: SM	Checker: AD
Sample Number: 3ST	Test Date: 2/13/26	Depth: 3-5
Test Number:	Preparation: Moist	Elevation:
Description: Red CLAY		
Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method A

Time Curve 7 of 14
Constant Load Step
Stress: 2e+03 psf





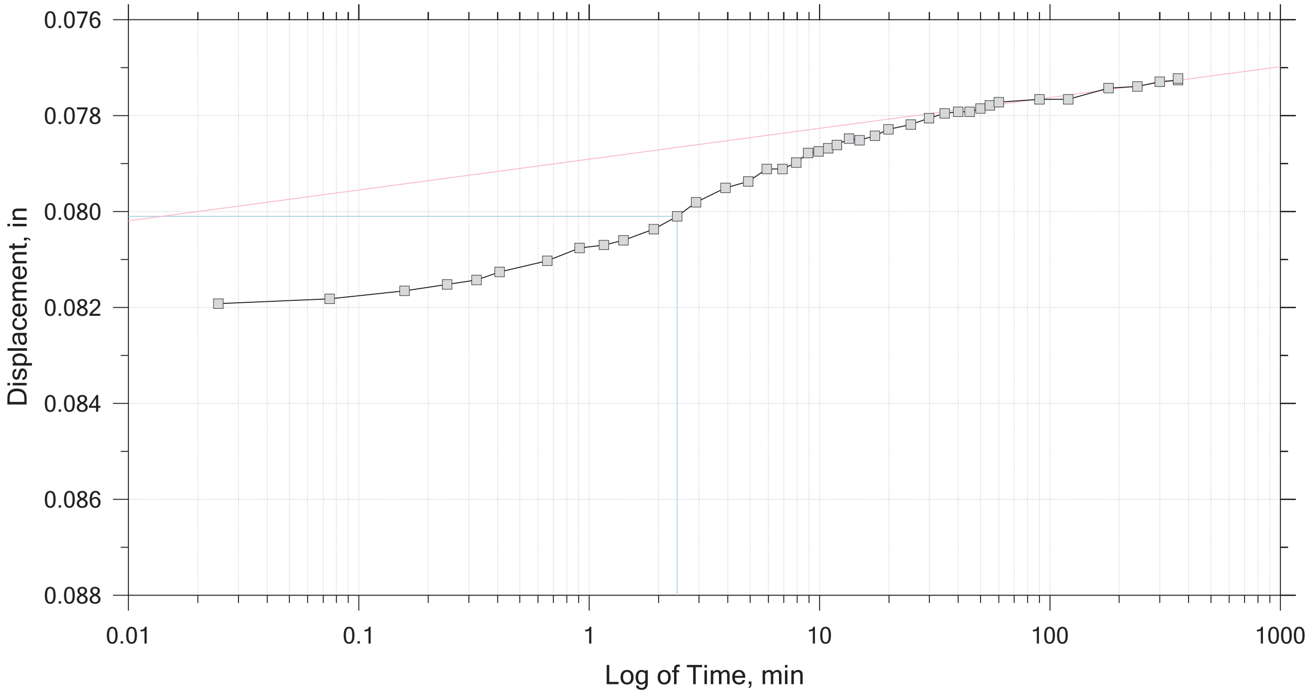
SME	Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
	Boring Number: B-41	Tester: SM	Checker: AD
	Sample Number: 3ST	Test Date: 2/13/26	Depth: 3-5
	Test Number:	Preparation: Moist	Elevation:
	Description: Red CLAY		
	Remarks:		

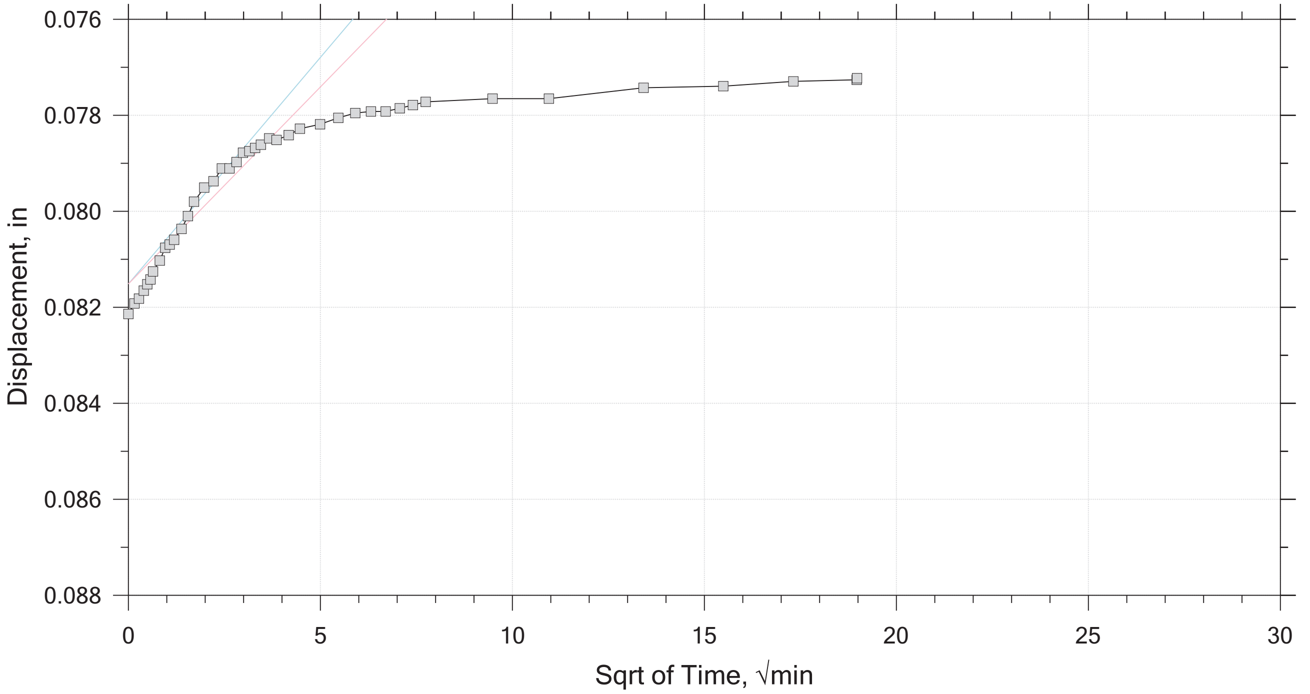
One-Dimensional Consolidation by ASTM D2435 - Method A

Time Curve 8 of 14

Constant Load Step

Stress: 250 psf





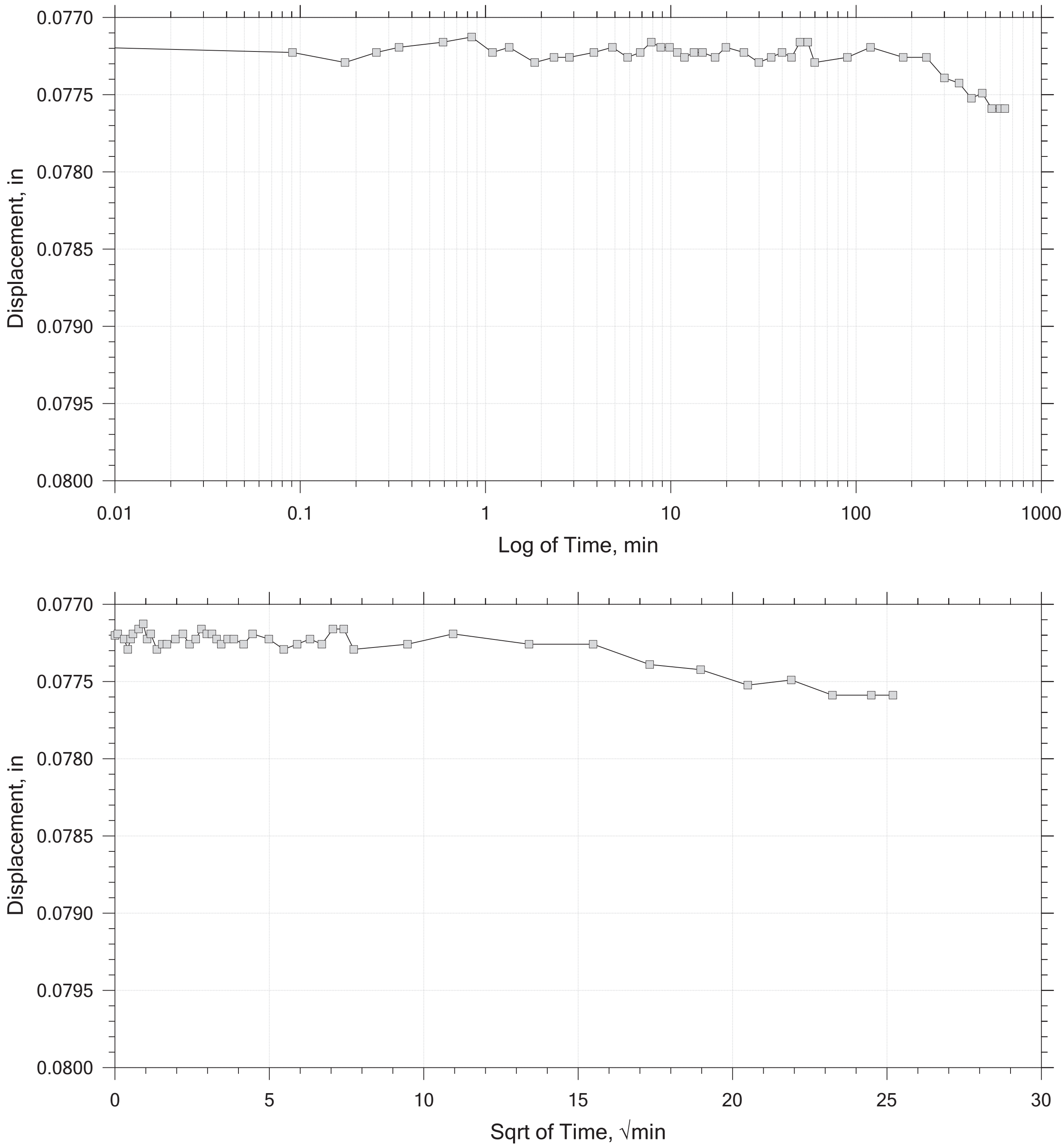
Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
Boring Number: B-41	Tester: SM	Checker: AD
Sample Number: 3ST	Test Date: 2/13/26	Depth: 3-5
Test Number:	Preparation: Moist	Elevation:
Description: Red CLAY		
Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method A

Time Curve 9 of 14

Constant Load Step

Stress: 500 psf



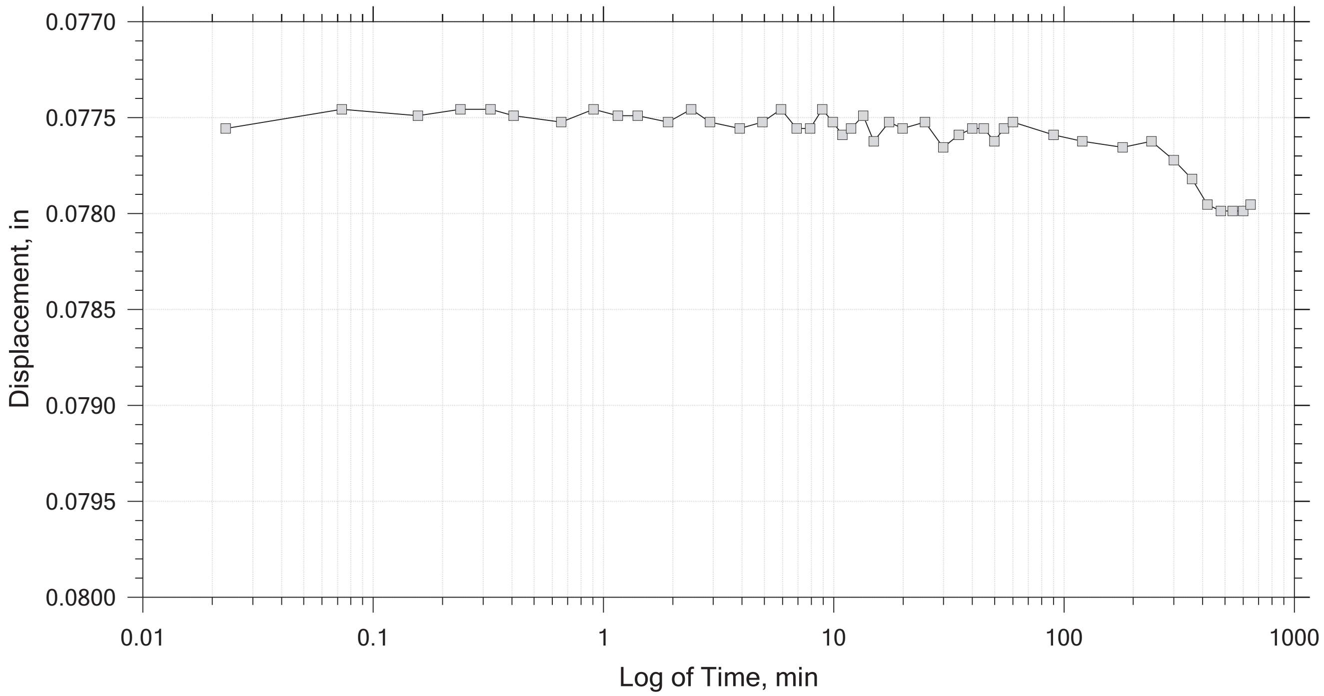
Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
Boring Number: B-41	Tester: SM	Checker: AD
Sample Number: 3ST	Test Date: 2/13/26	Depth: 3-5
Test Number:	Preparation: Moist	Elevation:
Description: Red CLAY		
Remarks:		

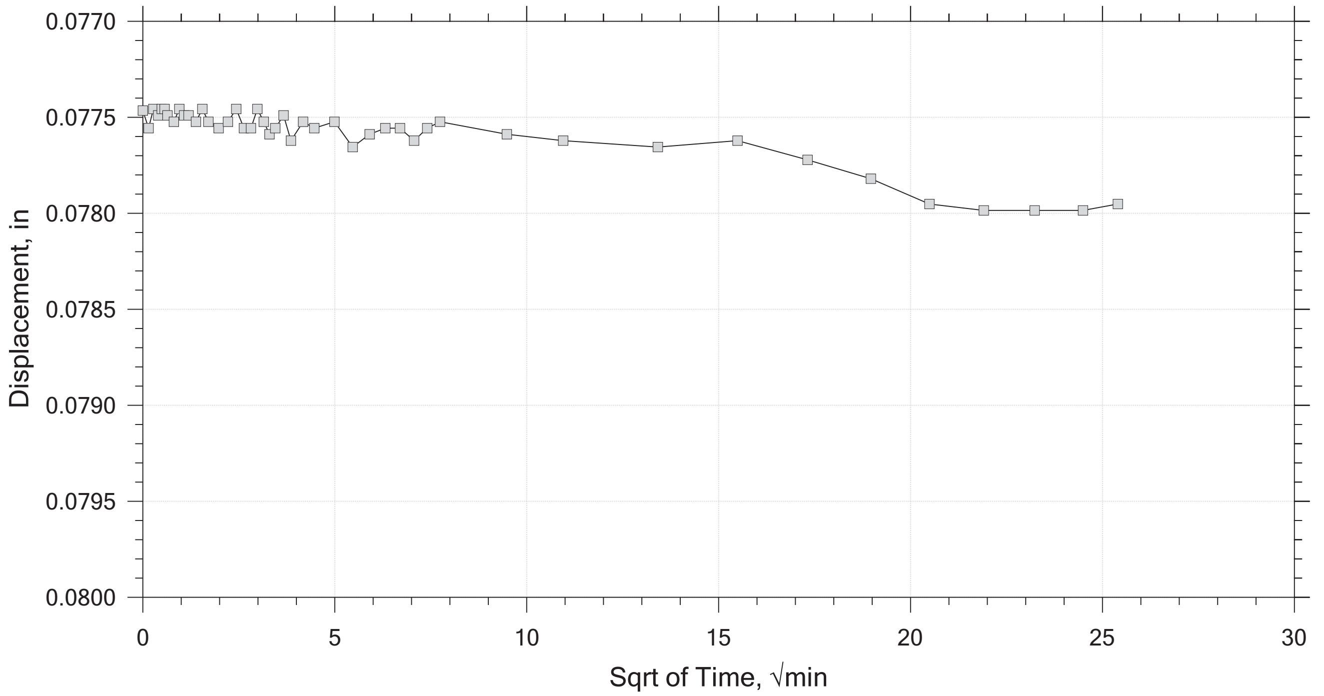
One-Dimensional Consolidation by ASTM D2435 - Method A

Time Curve 10 of 14

Constant Load Step

Stress: 1e+03 psf





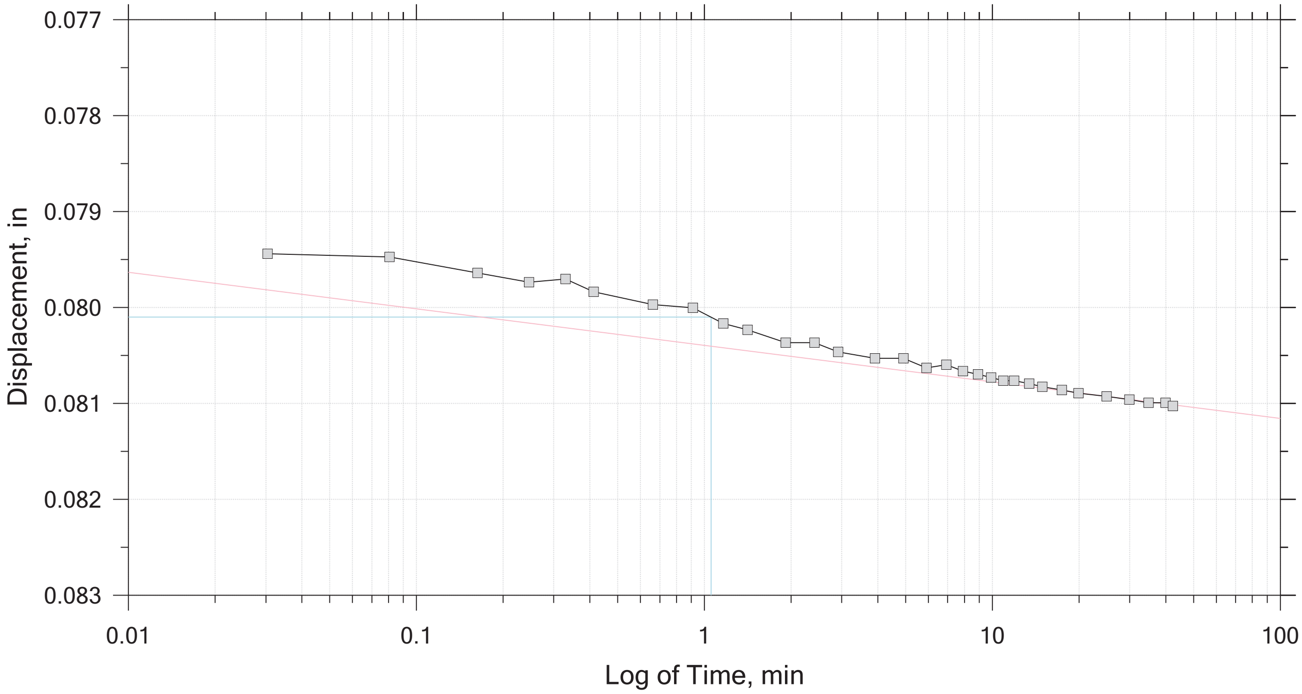
Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
Boring Number: B-41	Tester: SM	Checker: AD
Sample Number: 3ST	Test Date: 2/13/26	Depth: 3-5
Test Number:	Preparation: Moist	Elevation:
Description: Red CLAY		
Remarks:		

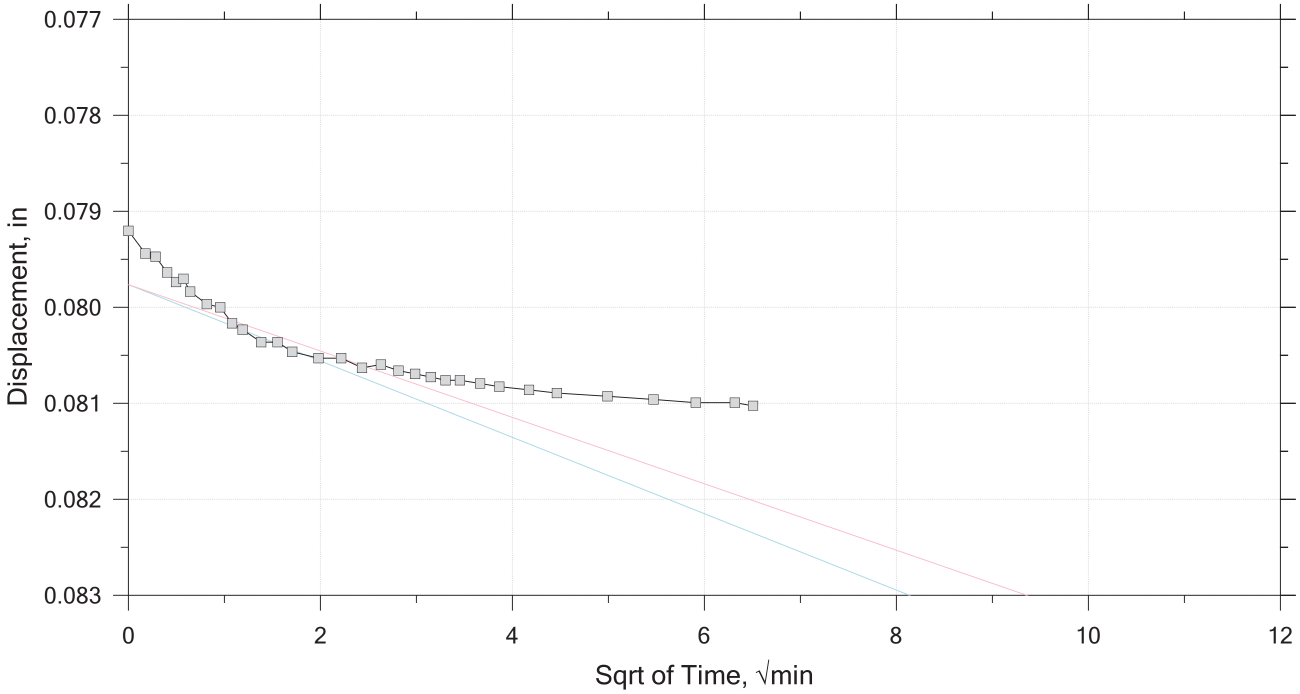
One-Dimensional Consolidation by ASTM D2435 - Method A

Time Curve 11 of 14

Constant Load Step

Stress: 2e+03 psf





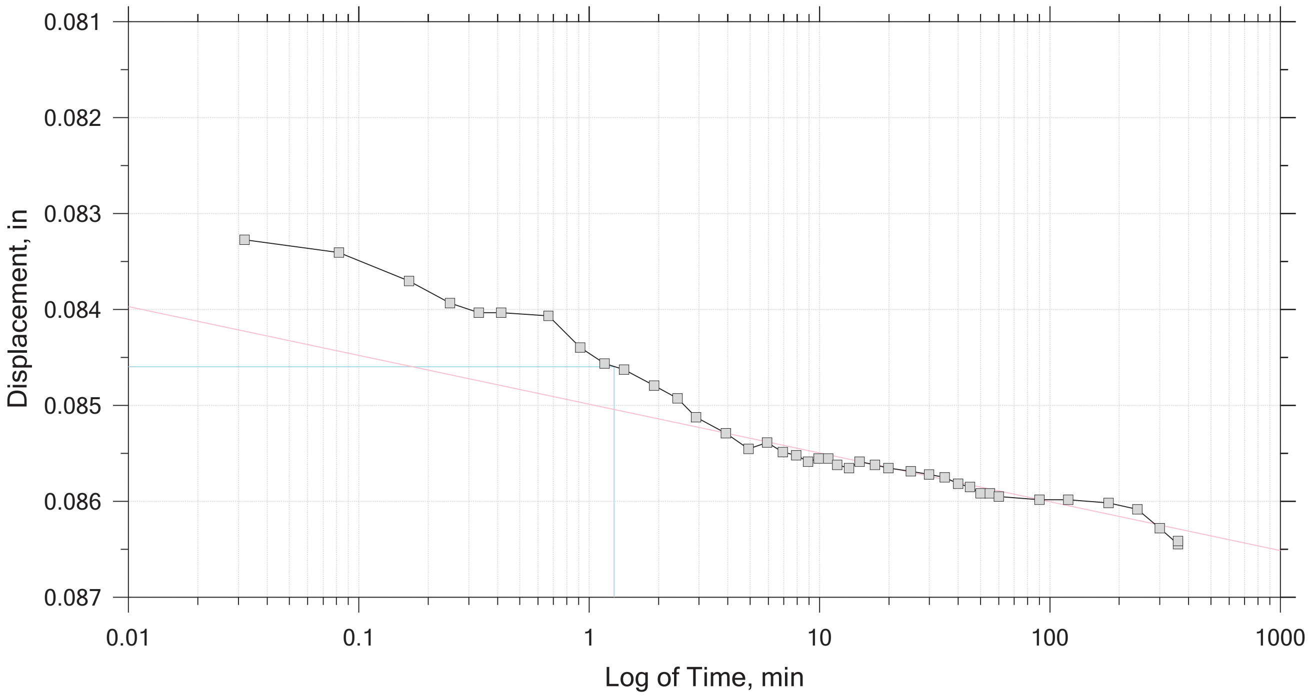
Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
Boring Number: B-41	Tester: SM	Checker: AD
Sample Number: 3ST	Test Date: 2/13/26	Depth: 3-5
Test Number:	Preparation: Moist	Elevation:
Description: Red CLAY		
Remarks:		

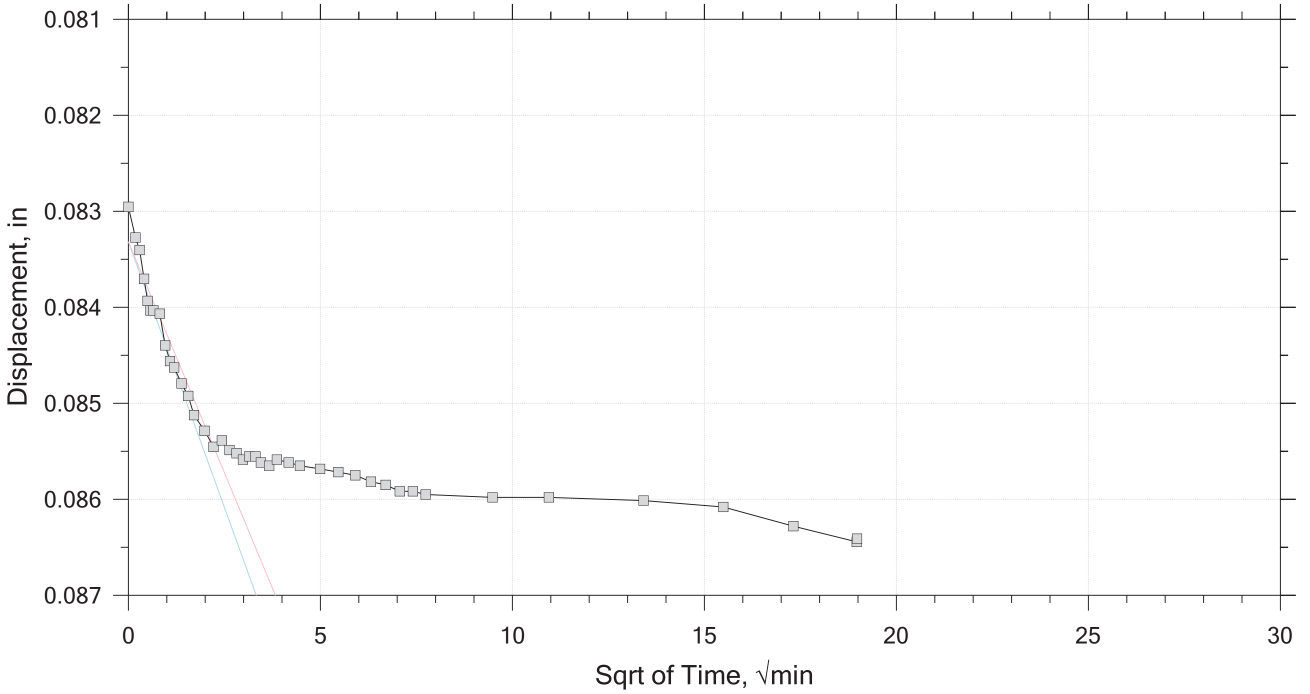
One-Dimensional Consolidation by ASTM D2435 - Method A

Time Curve 12 of 14

Constant Load Step

Stress: 4e+03 psf

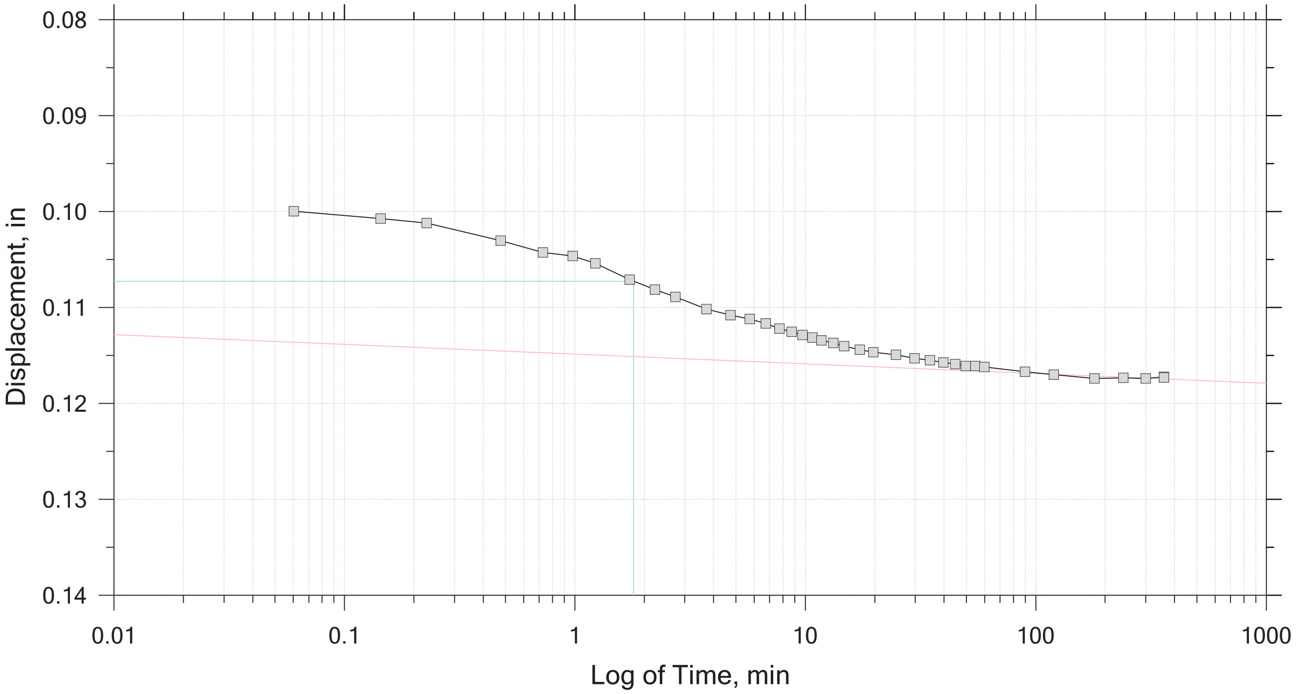


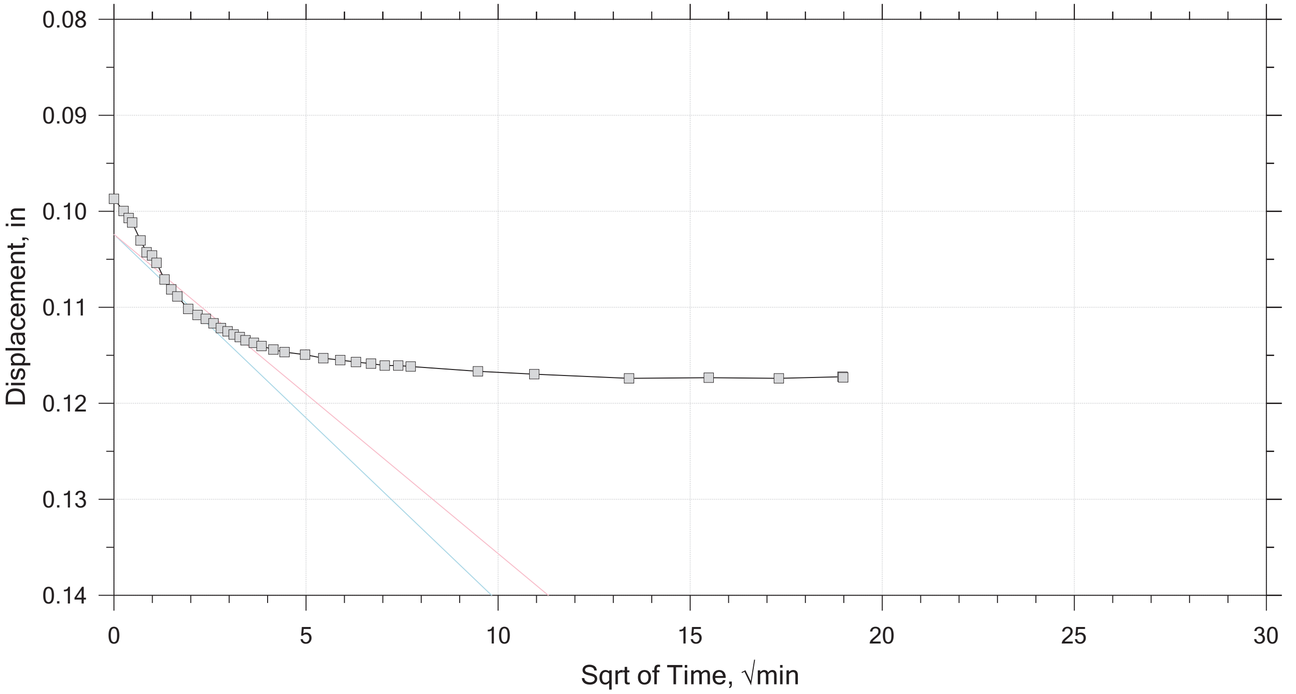


Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
Boring Number: B-41	Tester: SM	Checker: AD
Sample Number: 3ST	Test Date: 2/13/26	Depth: 3-5
Test Number:	Preparation: Moist	Elevation:
Description: Red CLAY		
Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method A

Time Curve 13 of 14
Constant Load Step
Stress: 8e+03 psf





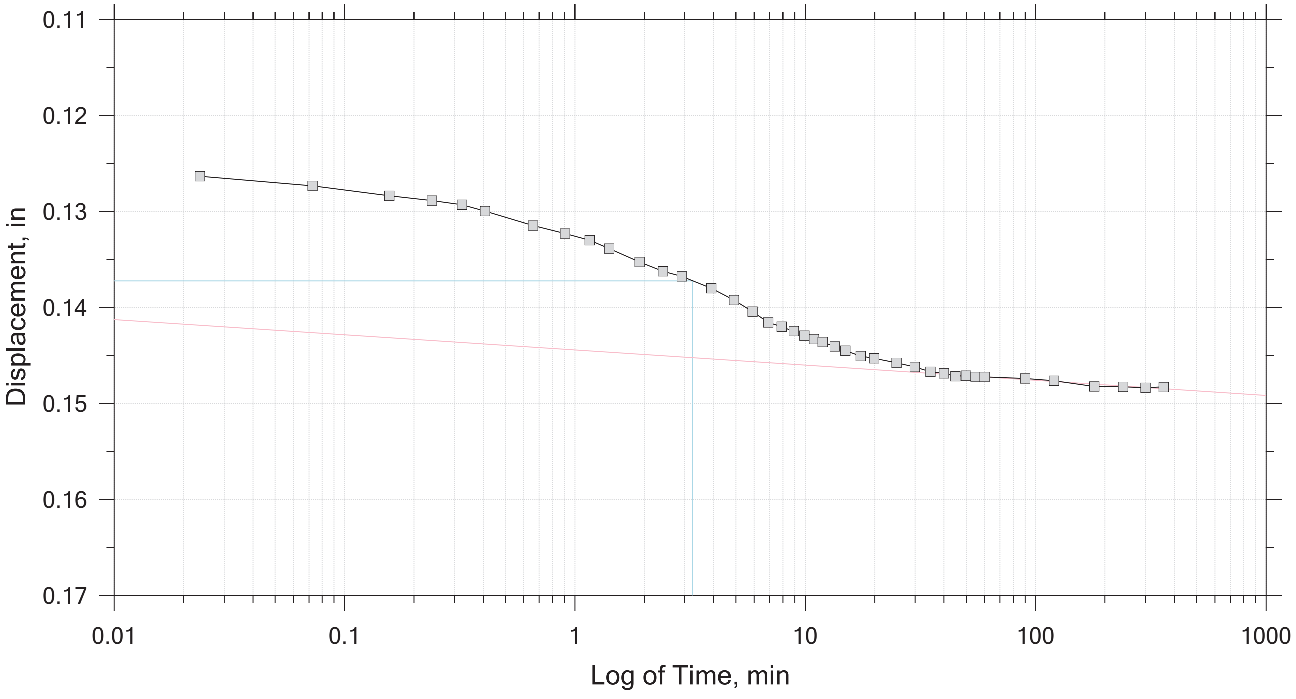
Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
Boring Number: B-41	Tester: SM	Checker: AD
Sample Number: 3ST	Test Date: 2/13/26	Depth: 3-5
Test Number:	Preparation: Moist	Elevation:
Description: Red CLAY		
Remarks:		

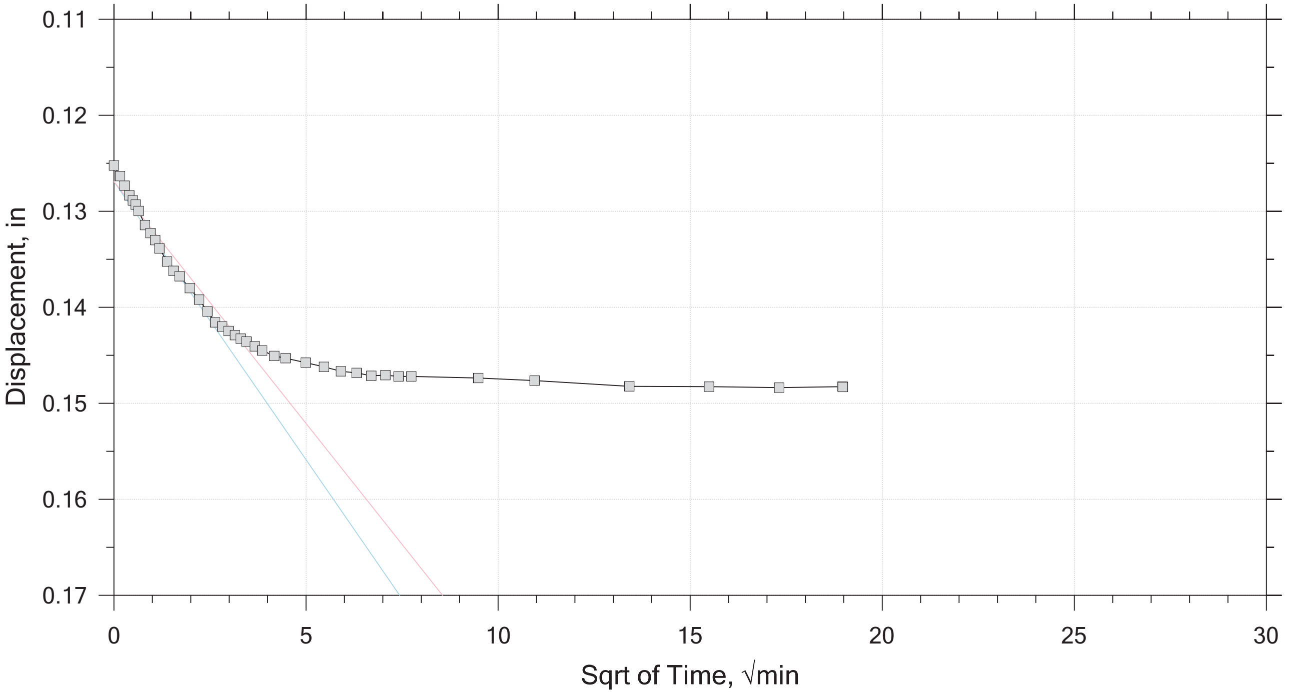
One-Dimensional Consolidation by ASTM D2435 - Method A

Time Curve 14 of 14

Constant Load Step

Stress: 1.6e+04 psf





SME	Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
	Boring Number: B-41	Tester: SM	Checker: AD
	Sample Number: 3ST	Test Date: 2/13/26	Depth: 3-5
	Test Number:	Preparation: Moist	Elevation:
	Description: Red CLAY		
	Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method A

Specimen Diameter, in: 2.50	Specific Gravity: 2.80 (Estimated)	Liquid Limit: Unknown
Specimen Height, in: 1.00	Initial Void Ratio: 0.898	Plastic Limit: Unknown
Final Height, in: 0.85	Final Void Ratio: 0.617	Plasticity Index: Unknown

	Before Test Trimmings	Before Test Specimen	After Test Specimen	After Test Trimmings
Container ID		---		49.03
Mass Container, gm	50.24	0	0	49.03
Mass Container + Wet Soil, gm	235.47	150.38	144.97	193.52
Mass Container + Dry Soil, gm	195.89	118.83	118.83	167.47
Mass Dry Soil, gm	145.65	118.83	118.83	118.44
Water Content, %	27.17	26.55	21.99	21.99
Void Ratio	---	0.90	0.62	---
Degree of Saturation, %	---	82.87	100.00	---
Dry Unit Weight, pcf	---	92.225	108.28	---

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test.
Therefore, values may not represent actual values for the specimen.

Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
Boring Number: B-41	Tester: SM	Checker: AD
Sample Number: 3ST	Test Date: 2/13/26	Depth: 3-5
Test Number:	Preparation: Moist	Elevation:
Description: Red CLAY		
Remarks:		

One-Dimensional Consolidation by ASTM D2435 - Method A

Log of Time Coefficients

Step	Applied Stress psf	Final Displacement in	Void Ratio	Strain at End %	Log T50 min	Cv in^2/s	Mv ft^2/lb	k cm/s	Ca %
1	125.	0.004593	0.890	0.459	31.433	2.60e-05	3.67e+01	1.26e-08	0.00e+00
2	250.	0.007587	0.884	0.759	0.000	0.00e+00	2.39e+01	0.00e+00	0.00e+00
3	500.	0.01474	0.870	1.47	4.209	1.91e-04	2.86e+01	7.21e-08	0.00e+00
4	1.00e+03	0.03043	0.841	3.04	3.149	2.49e-04	3.14e+01	1.03e-07	0.00e+00
5	2.00e+03	0.05442	0.795	5.44	3.250	2.32e-04	2.40e+01	7.34e-08	0.00e+00
6	4.00e+03	0.08232	0.742	8.23	2.164	3.29e-04	1.39e+01	6.07e-08	0.00e+00
7	2.00e+03	0.08476	0.737	8.48	0.000	0.00e+00	-1.22e+00	-0.00e+00	0.00e+00
8	250.	0.07805	0.750	7.80	2.407	2.88e-04	3.84e+00	1.46e-08	0.00e+00
9	500.	0.07759	0.751	7.76	0.000	0.00e+00	-1.84e+00	-0.00e+00	0.00e+00
10	1.00e+03	0.07795	0.750	7.80	0.000	0.00e+00	7.27e-01	0.00e+00	0.00e+00
11	2.00e+03	0.08079	0.745	8.08	1.056	6.59e-04	2.84e+00	2.47e-08	0.00e+00
12	4.00e+03	0.08556	0.736	8.56	1.284	5.37e-04	2.39e+00	1.69e-08	0.00e+00
13	8.00e+03	0.1148	0.680	11.5	1.795	3.70e-04	7.31e+00	3.58e-08	0.00e+00
14	1.60e+04	0.1456	0.622	14.6	3.232	1.92e-04	3.85e+00	9.77e-09	0.00e+00

Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
Boring Number: B-41	Tester: SM	Checker: AD
Sample Number: 3ST	Test Date: 2/13/26	Depth: 3-5
Test Number:	Preparation: Moist	Elevation:
Description: Red CLAY		
Remarks:		
Displacement at End of Primary		

One-Dimensional Consolidation by ASTM D2435 - Method A

Sqrt of Time Coefficients

Step	Applied Stress psf	Final Displacement in	Void Ratio	Strain at End %	Sq.Rt. T90 min	Cv in²/s	Mv ft²/lb	k cm/s
1	125.	0.004593	0.890	0.459	0.000	0.00e+00	3.67e+01	0.00e+00
2	250.	0.007587	0.884	0.759	56.457	6.18e-05	2.39e+01	1.96e-08
3	500.	0.01474	0.870	1.47	27.024	1.28e-04	2.86e+01	4.84e-08
4	1.00e+03	0.03043	0.841	3.04	54.678	6.17e-05	3.14e+01	2.56e-08
5	2.00e+03	0.05442	0.795	5.44	23.397	1.38e-04	2.40e+01	4.39e-08
6	4.00e+03	0.08232	0.742	8.23	7.523	4.08e-04	1.39e+01	7.51e-08
7	2.00e+03	0.08476	0.737	8.48	0.644	4.61e-03	-1.22e+00	-7.45e-08
8	250.	0.07805	0.750	7.80	13.355	2.23e-04	3.84e+00	1.13e-08
9	500.	0.07759	0.751	7.76	0.000	0.00e+00	-1.84e+00	-0.00e+00
10	1.00e+03	0.07795	0.750	7.80	0.000	0.00e+00	7.27e-01	0.00e+00
11	2.00e+03	0.08079	0.745	8.08	5.832	5.13e-04	2.84e+00	1.92e-08
12	4.00e+03	0.08556	0.736	8.56	4.910	6.05e-04	2.39e+00	1.91e-08
13	8.00e+03	0.1148	0.680	11.5	10.035	2.85e-04	7.31e+00	2.76e-08
14	1.60e+04	0.1456	0.622	14.6	10.280	2.60e-04	3.85e+00	1.32e-08

Project Name: Greenfield Site Development	Location: Louisville, KY	Project Number: 102074.00
Boring Number: B-41	Tester: SM	Checker: AD
Sample Number: 3ST	Test Date: 2/13/26	Depth: 3-5
Test Number:	Preparation: Moist	Elevation:
Description: Red CLAY		
Remarks:		
Displacement at End of Primary		

SME®

Compressive Strength of Intact Rock Core Specimens
ASTM D7012

PROJECT	Greenfield Site Development
LOCATION	Louisville, Kentucky
DATE	December 13, 2026
PROJECT #	102074.00
CLIENT	Luckett & Farley

SAMPLE	**1**	**2**	**3**	**4**
				
SAMPLE LOCATION	B6 25.9' - 26.2'	B6 29.9' - 30.2'	B12 10.3' - 10.6'	B12 16.9' - 17.2'
DATE TESTED	February 12, 2026	February 12, 2026	February 12, 2026	February 12, 2026
SAMPLE DESCRIPTION	Limestone	Limestone	Limestone	Limestone
LENGTH BEFORE CAPPING, in	3.91	4.07	4.04	4.09
CAPPED LENGTH, in	3.91	4.07	4.04	4.09
DIAMETER, in	1.83	1.84	1.83	1.83
AREA, sq. in.	2.63	2.64	2.64	2.63
WEIGHT, gr	441.80	485.34	469.01	452.67
WET DENSITY, pcf	163.4	171.9	167.3	160.1
LOAD AT FAILURE, lbs.	18,640	20,030	19,210	13,000
GROSS UNIT STRESS, psi	7,075	7,574	7,276	4,934
LENGTH/DIAMETER RATIO	2.1	2.2	2.2	2.2
UNIT STRESS CORRECTED, psi	**7,080**	**7,570**	**7,280**	**4,930**
MOISTURE CONDITION WHEN TESTED	MOIST	MOIST	MOIST	MOIST

SAMPLE	**5**	**6**	**7**	**8**
				
SAMPLE LOCATION	B27 18.4' - 18.7'	B27 26.0' - 26.3'	B42 16.6' - 16.9'	B42 20.5' - 20.8'
DATE TESTED	February 12, 2026	February 12, 2026	February 12, 2026	February 12, 2026
SAMPLE DESCRIPTION	Limestone	Limestone	Limestone	Limestone
LENGTH BEFORE CAPPING, in	4.02	3.99	4.04	4.06
CAPPED LENGTH, in	4.02	3.99	7.04	4.06
DIAMETER, in	1.83	1.83	1.83	1.84
AREA, sq. in.	2.64	2.64	2.64	2.65
WEIGHT, gr	437.26	446.33	437.26	437.26
WET DENSITY, pcf	156.8	161.4	156.4	155.1
LOAD AT FAILURE, lbs.	9,390	10,370	5,280	4,740
GROSS UNIT STRESS, psi	3,553	3,928	2,002	1,791
LENGTH/DIAMETER RATIO	2.2	2.2	3.8	2.2
UNIT STRESS CORRECTED, psi	**3,550**	**3,930**	**2,000**	**1,790**
MOISTURE CONDITION WHEN TESTED	MOIST	MOIST	MOIST	MOIST

SAMPLE	**9**	**10**		
				
SAMPLE LOCATION	B45 36.3' - 36.6'	B45 40.1' - 40.4'		
DATE TESTED	February 12, 2026	February 12, 2026		
SAMPLE DESCRIPTION	Limestone	Limestone		
LENGTH BEFORE CAPPING, in	4.09	4.09		
CAPPED LENGTH, in	4.09	4.09		
DIAMETER, in	1.83	1.83		
AREA, sq. in.	2.64	2.63		
WEIGHT, gr	460.85	476.27		
WET DENSITY, pcf	162.8	168.4		
LOAD AT FAILURE, lbs.	9,660	13,450		
GROSS UNIT STRESS, psi	3,663	5,105		
LENGTH/DIAMETER RATIO	2.2	2.2		
UNIT STRESS CORRECTED, psi	**3,660**	**5,110**		
MOISTURE CONDITION WHEN TESTED	MOIST	MOIST		

REMARKS:

LAB-47 (12)

4 & 6 Inch Double Ring Infiltrometer Test

Project Name:	Greenfield Site Development			**Constants**	**Area (in^2)**	**Pipe Lengths (ft)**	**Pipe Length at Start Test (ft)**	**Penetration Depth of Rings (ft)**
Project Number:	102074.00			**Inner Ring**	12.56	3		0.17
Test Location:	IT1	**Tested By:**	A. Dodson	**Annular Space**	28.26	3		0.17
Surface Elev., ft:	722	**G.W. Elev, ft:**	Not Encountered	**Water level maintained by:** Buckets				
Test Elev., ft:	719.7	**Test Depth, ft:**	2.3					

								Infiltration Rate		**Remarks**
Trial #	**Start / End**	**Date**	**Time**	**Inner Ring Reading, ft**	**Inner Ring Infiltrated Water, ft**	**Annular Space Reading, ft**	**Anular Space Infiltrated Water, ft**	**Inner Infiltration, inches/hour**	**Annular Infiltration, inches/hour**	**Test Conditions, etc**
1	Start Test	1/22/2026	3:30	1.35		1.35				
	End Test	1/22/2026	4:00	1.35	0.00	1.35	0.00	0.0	0.0	
2	Start Test	1/22/2026	4:00	1.35		1.35				
	End Test	1/22/2026	4:30	1.35	0.00	1.35	0.00	0.0	0.0	
3	Start Test	1/22/2026	4:30	1.35		1.35				
	End Test	1/22/2026	5:00	1.35	0.00	1.35	0.00	0.0	0.0	
4	Start Test	1/22/2026	5:00	1.35		1.35				
	End Test	1/22/2026	5:30	1.35	0.00	1.35	0.00	0.0	0.0	
5	Start Test	1/22/2026	5:30	1.35		1.35				
	End Test	1/22/2026	6:00	1.35	0.00	1.35	0.00	0.0	0.0	
6	Start Test	1/22/2026	6:00	1.35		1.35				
	End Test	1/22/2026	6:30	1.35	0.00	1.35	0.00	0.0	0.0	
7	Start Test	1/22/2026	6:30	1.35		1.35				
	End Test	1/22/2026	7:00	1.35	0.00	1.35	0.00	0.0	0.0	
8	Start Test	1/22/2026	7:00	1.35		1.35				
	End Test	1/22/2026	7:30	1.35	0.00	1.35	0.00	0.0	0.0	
9	Start Test									
	End Test									
10	Start Test									
	End Test									
11	Start Test									
	End Test									
12	Start Test									
	End Test									

PRE-SOAK

Time	2:30	3:00	3:30							
Inner Ring Level	1.3	1.35	1.35							
Annular Space Level	1.3	1.35	1.35							

SME

4 & 6 Inch Double Ring Infiltrometer Test

Project Name:	Greenfield Site Development			**Constants**	**Area (in^2)**	**Pipe Lengths (ft)**	**Pipe Length at Start Test (ft)**	**Penetration Depth of Rings (ft)**
Project Number:	102074.00			**Inner Ring**	12.56	10		0.17
Test Location:	IT2	**Tested By:**	A. Dodson	**Annular Space**	28.26	10		0.17
Surface Elev., ft:	728.5	**G.W. Elev, ft:**	Not Encountered	**Water level maintained by:** Buckets				
Test Elev., ft:	719.2	**Test Depth, ft:**	9.3					

								Infiltration Rate		**Remarks**
Trial #	**Start / End**	**Date**	**Time**	**Inner Ring Reading, ft**	**Inner Ring Infiltrated Water, ft**	**Annular Space Reading, ft**	**Anular Space Infiltrated Water, ft**	**Inner Infiltration, inches/hour**	**Annular Infiltration, inches/hour**	**Test Conditions, etc**
1	Start Test	1/22/2026	2:23	8.65	0.00	8.65	0.00	0.0	0.0	
	End Test	1/22/2026	2:53	8.65		8.65				
2	Start Test	1/22/2026	2:53	8.65	0.00	8.65	0.00	0.0	0.0	
	End Test	1/22/2026	3:23	8.65		8.65				
3	Start Test	1/22/2026	3:23	8.65	0.00	8.65	0.00	0.0	0.0	
	End Test	1/22/2026	3:53	8.65		8.65				
4	Start Test	1/22/2026	3:53	8.65	0.00	8.65	0.00	0.0	0.0	
	End Test	1/22/2026	4:23	8.65		8.65				
5	Start Test	1/22/2026	4:23	8.65	0.00	8.65	0.00	0.0	0.0	
	End Test	1/22/2026	4:53	8.65		8.65				
6	Start Test	1/22/2026	4:53	8.65	0.00	8.65	0.00	0.0	0.0	
	End Test	1/22/2026	5:23	8.65		8.65				
7	Start Test	1/22/2026	5:23	8.65	0.00	8.65	0.00	0.0	0.0	
	End Test	1/22/2026	5:53	8.65		8.65				
8	Start Test	1/22/2026	5:53	8.65	0.00	8.65	0.00	0.0	0.0	
	End Test	1/22/2026	6:23	8.65		8.65				
9	Start Test									
	End Test									
10	Start Test									
	End Test									
11	Start Test									
	End Test									
12	Start Test									
	End Test									

PRE-SOAK

Time	1:23	1:53	2:23
Inner Ring Level	8.65	8.65	8.65
Annular Space Level	8.65	8.65	8.65

FIELD TESTING PROCEDURES

STANDARD PENETRATION TESTS

The Standard Penetration Tests (SPT) generally follow the American Standard Test Method (ASTM) D-1586 "Standard Test Method for SPT and Split-Barrel Sampling of Soils". It is typically performed using a 2-inch O.D. split-spoon sampler, which is driven to obtain samples at selected intervals. The number of blows of a 140-pound hammer dropping 30 inches is recorded for each of three or four, 6-inch penetration intervals for an 18 or 24-inch drive at each sample location. The sum of blow counts for the second and third 6-inch penetration intervals equals the raw (uncorrected) N-value for a given sample interval (i.e. 5-4-2, N = 6). We periodically calibrate SME's drill rig auto-hammers. The hammer efficiency determined from this calibration is used to calculate the corrected N-values (N_{60}), as reported on the logs. When sampling in rock or hard soil, where a penetration of 6 inches or less was obtained for 50 hammer blows, the actual blow count and depth of penetration in inches for that interval is recorded (i.e. 50/2"). When sampling in very loose or very soft soil, where a penetration of more than 6 inches is obtained for a single hammer blow, the actual depth of penetration for that hammer blow is recorded (i.e. 1-0-0). Where the sampling equipment advanced under its own weight, "WOH" (weight of hammer) and the corresponding penetration depth are shown on the boring logs.

INFILTRATION TESTS

In-situ infiltration tests generally follow the double-ring infiltrometer field test procedures outlined in Appendix E in the Low Impact Development (LID) Manual for Michigan (dated 2008) prepared by the Southeast Michigan Council of Governments (SEMCOG). This procedure is also referenced in the States of Indiana, Ohio, and Kentucky applicable local manuals. The double-ring infiltrometer field test set-up consists of performing a boring or test pit to the test depth, installing an outer 6-inch-diameter standpipe and an inner 4-inch-diameter standpipe, and then driving the standpipes a suitable distance, per the referenced manual, below the bottom of the test depth. Soil is pre-soaked with approximately 12 inches of water for approximately one hour. The water drop rate per the last 30 minutes of the soaking period determines the subsequent interval for infiltration readings (i.e., 10- or 30-minute intervals). After completing the soaking period, standpipes are filled with water to a height of approximately 12 inches above the test depth, and water level changes in the standpipes are measured with a water level measuring tape with markings every 0.01 feet and recorded after the time intervals. This procedure is repeated until a minimum of four consecutive height changes within 1/4-inch of one another are measured. The height drop that occurred during the final time interval or the average stabilized rate is used to calculate the infiltration rate. After completion of the double-ring infiltrometer field test, the standpipes are removed, and the test hole is backfilled.

DYNAMIC CONE PENETROMETER (DCP)

USACE TESTS

Dynamic Cone Penetrometer (DCP) testing designed by the U.S. Army Corps of Engineers (USACE) is conducted to estimate the California Bearing Ratio (CBR) of the subgrade materials and existing pavement sub-layers. The USACE DCP consists of a 5/8-inch-diameter steel rod with a steel cone attached to one end driven by a sliding dual mass hammer. The rate of penetration per blow is measured at selected penetration, or hammer drop, intervals. CBR is an index commonly used in pavement design that provides an indication of subgrade support characteristics. The Corps of Engineers developed relationships to estimate the CBR value from the results of the USACE DCP test.

SME DCP TESTS

SME Dynamic Cone Penetrometer (DCP) test consists of dropping a 10-pound slide hammer that falls 24 inches and drives a rod with a 1-1/8-inch conical tip into the subgrade. The number of hammer drops required to drive the cone penetrometer are recorded for each six-inch increment and are used to estimate the relative density of the granular soils. The DCP blow counts were used to estimate Standard Penetration Test resistances (N-values) commonly used in geotechnical evaluations, based on empirical correlations developed by SME.

PRESSUREMETER TESTING

Pressuremeter testing in the field models the static loading characteristics of the soil and the resulting analyses based on pressuremeter test results are considered to be a more accurate indicator of the ultimate foundation bearing pressure, and associated settlement, than analyses using empirical correlations based on dynamic test methods, such as the Standard Penetration Test (SPT) and/or dynamic cone penetrometer (DCP) tests. Results of the SPT and/or DCP were recorded, at the pressuremeter test locations and depths to provide additional information on the relative density of the in-place subgrade, and to correlate the pressuremeter test results with data obtained at other site locations. The pressuremeter test depths were selected to provide representative information corresponding to the bearing soils anticipated within the stress influence zone of the proposed footings at the design bearing levels.

In the pressuremeter test, a radial expandable cylindrical probe is inserted into a prepared borehole at the selected testing depth. After obtaining N-values from driving a standard 2-inch O.D. diameter split-spoon sampler, borehole preparation consisted of then driving a 3-inch O.D. split-spoon sampler (or using a roller bit with wash rotary methods) to develop the appropriately sized borehole diameter for the pressuremeter probe. The cylindrical probe was inserted into the borehole to the sampling depth and then expanded against the sides of the borehole by pressurizing fluid within the system using a hydraulic screw-jack console positioned at the ground surface.

Simultaneous measurements of pressure and volume change within the probe were observed at the pressuremeter console and recorded. The pressure was incrementally increased until the maximum probe volume was reached, or until significant creep deformation (soil failure) was observed.

MUCK PROBE

The muck probe consists of a smooth rod about 1/2-inch in diameter manually pushed into the subgrade until encountering significant resistance (determined “by feel”), presumably indicating the bottom of organic soil stratum.

VANE SHEAR TESTING

In-situ vane shear testing generally follows the American Standard Test Method (ASTM) D-2573 “Standard Test Method for Field Vane Shear Test in Cohesive Soil”. Per the ASTM, the field vane shear test consists of placing a four-bladed vane (sized based on the expected cohesive soil strength) in the undisturbed soil and rotating it from the surface at a constant rate to determine the torque required to shear a cylindrical surface with the vane. This torque, or moment, is then converted to the unit shearing resistance of the failure surface by limit equilibrium analysis. Friction of the vane rod and instrument is either minimized during readings by an open hole, casing, or accounted for and subtracted from the total torque to determine the torque applied to the vane. After initially shearing the soil to determine the peak “undisturbed” ultimate shear strength, the test can be repeated to determine the remolded “residual” ultimate shear strength. The ratio of the peak shear strength divided by the remolded shear strength equals the degree of sensitivity.

DEGREE OF SENSITIVITY

DEGREE OF SENSITIVITY	DESCRIPTION
2	Insensitive
4	Moderately Sensitive
8	Extra Sensitive

ELECTRICAL RESISTIVITY TESTING

Field or laboratory resistivity testing generally follows the American Standard Test Method (ASTM) G-57 “Standard Test Method for Measurement of Soil Resistivity Using the Four-Electrode Method”.

FIELD TESTING

Per the ASTM, the field Wenner four-electrode method requires four metal electrode probes placed with equal separation at various distances in a straight line. The probes are inserted in the surface of the soil to a depth not exceeding 5 percent of the minimum separation of the electrodes (or 12 inches maximum, whichever is less). The electrode separation is selected with consideration of the soil strata location and depth of interest. A voltage is impressed between the outer electrodes and the voltage drop between the inner electrodes is measured. The resulting resistivity measurement represents the average resistivity of a hemisphere of soil of a radius equal to the electrode separation.

LABORATORY TESTING

Soil is tamped into a soil box to resemble the compaction where the soil sample was taken until the soil is level with the top of the box. Two brass pins are inserted at the premanufactured distances into the soil sample with two endpins connected to the box. The four test leads are connected to the soil box. A voltage is impressed between the two endpins to measure the resistance, and soil resistivity is calculated based on the product-specified conversion.

CONE PENETRATION TESTING

Cone Penetration Tests (CPT) measures the soil resistance to the penetration of a standard 10 square centimeter (cm) projected area. The cone is hydraulically pushed into the soil at approximately a 2 cm per second rate. Soil resistance is recorded in kilograms per square cm at 20 cm depth intervals. Soil friction values are measured by a friction sleeve at each test interval.

LABORATORY TESTING PROCEDURES

VISUAL ENGINEERING CLASSIFICATION

Visual classification was performed on recovered samples. The appended General Notes and Unified Soil Classification System (USCS) sheets include a brief summary of the general method used visually classify the soil and assign an appropriate USCS group symbol. The estimated group symbol, according to the USCS, is shown in parentheses following the textural description of the various strata on the boring logs appended to this report. The soil descriptions developed from visual classifications are sometimes modified to reflect the results of laboratory testing.

MOISTURE CONTENT

Moisture content tests were performed by weighing samples from the field at their in-situ moisture condition. These samples were then dried at a constant temperature (approximately 110° C) overnight in an oven. After drying, the samples were weighed to determine the dry weight of the sample and the weight of the water that was expelled during drying. The moisture content of the specimen is expressed as a percent and is the weight of the water compared to the dry weight of the specimen.

HAND PENETROMETER TESTS

In the hand penetrometer test, the unconfined compressive strength of a cohesive soil sample is estimated by measuring the resistance of the sample to the penetration of a small calibrated, spring-loaded cylinder. The maximum capacity of the penetrometer is 4.5 tons per square-foot (tsf). Theoretically, the undrained shear strength of the cohesive sample is one-half the unconfined compressive strength. The undrained shear strength (based on the hand penetrometer test) presented on the boring logs is reported in units of kips per square-foot (ksf).

TORVANE SHEAR TESTS

In the Torvane test, the shear strength of a low strength, cohesive soil sample is estimated by measuring the resistance of the sample to a torque applied through vanes inserted into the sample. The undrained shear strength of the samples is measured from the maximum torque required to shear the sample and is reported in units of kips per square-foot (ksf).

LOSS-ON-IGNITION (ORGANIC CONTENT) TESTS

Loss-on-ignition (LOI) tests are conducted by first weighing the sample and then heating the sample to dry the moisture from the sample (in the same manner as determining the moisture content of the soil). The sample is then re-weighed to determine the dry weight and then heated for four hours in a muffle furnace at a high temperature (approximately 440° C). After cooling, the sample is re-weighed to calculate the amount of ash remaining, which in turn is used to determine the amount of organic matter burned from the original dry sample. The organic matter content of the specimen is expressed as a percent compared to the dry weight of the sample.

ATTERBERG LIMITS TESTS

Atterberg limits tests consist of two components. The plastic limit of a cohesive sample is determined by rolling the sample into a thread and the plastic limit is the moisture content where a 1/8-inch thread begins to crumble. The liquid limit is determined by placing a 1/2-inch-thick soil pat into the liquid limits cup and using a grooving tool to divide the soil pat in half. The cup is then tapped on the base of the liquid limits device using a crank handle. The number of drops of the cup to close the gap formed by the grooving tool 1/2 inch is recorded along with the corresponding moisture content of the sample. This procedure is repeated several times at different moisture contents and a graph of moisture content, and the corresponding number of blows is plotted. The liquid limit is defined as the moisture content at a nominal 25 drops of the cup. From this test, the plasticity index can be determined by subtracting the plastic limit from the liquid limit.

GRAIN SIZE DISTRIBUTION ANALYSIS

COARSE-GRAINED (GRANULAR) SAMPLES WITH LOW FINES CONTENT

Grain size distribution tests performed on granular samples involves oven-drying a representative sample of soil and washing out the fines (passing the No. 200 sieve) with tap water. The sample retained on the No. 200 sieve is then oven-dried, cooled and sieved on a series of stacked sieves beginning with the largest sieve on top and progressing to the smallest on the bottom. The portions of the sample retained on each sieve are then weighed and used to develop the grain size distribution curve in the report for each sample tested.

FINE-GRAINED (SILT OR CLAY) SAMPLES OR COARSE-GRAINED SAMPLES WITH HIGH FINES CONTENT

Particle size distribution tests performed on fine-grained or coarse-grained samples with a high fines content involves oven-drying a representative sample and mixing the sample with a liquid deflocculant to disperse the soil particles. The slurry is placed in a graduated cylinder and shaken to suspend the soil particles in the slurry. The graduated cylinder is then placed on a tabletop; a calibrated hydrometer is floated in the slurry to determine its density. The hydrometer measurements are made at selected time intervals as the soil in the cylinder settles and slurry density decreases. When the hydrometer measurements are completed, the slurry is poured onto a No. 200 sieve and the fines are washed out with tap water. The sample retained on the No. 200 sieve is then oven-dried, cooled and sieved on a series of stacked sieves beginning with the largest sieve on top and progressing to the smallest on the bottom. The portions of the sample retained on each sieve are then weighed and used with the hydrometer data to develop the grain size distribution curve in the report for each sample tested.

WET/DRY DENSITY TESTS

Wet/dry density tests involve extracting a representative soil sample from either a Shelby tube or sample liner, trimming the ends perpendicular to the length of the sample and measuring the length and diameter. The sample is then weighed, oven-dried and weighed again after drying. The wet density is equal to the wet weight of the sample (prior to drying) divided by the volume, while the dry density is the dry weight of the sample divided by the volume.

UNCONFINED COMPRESSIVE STRENGTH TESTS

In addition to the hand penetrometer and Torvane tests, unconfined compression tests were performed to better estimate the undrained shear strength of selected cohesive samples recovered from either Shelby tubes or liners taken in conjunction with the Standard Penetration Test. In the unconfined compression test, the unconfined compressive strength of a soil sample is determined by axially loading the soil sample at a slow, constant rate of strain. The unconfined compressive strength is the maximum compressive stress in the soil sample, up to 15 percent strain. Theoretically, the undrained shear strength of the cohesive sample is one-half the unconfined compressive strength. The undrained shear strength presented on the boring logs is reported in units of kips per square-foot (ksf).

CORROSION TESTS

The soil corrosion tests may include measuring the electrical resistivity, pH and concentrations of soluble chlorides and sulfates. Soil samples tested are generally taken from a composite of two or more selected soil samples with generally similar visual characteristics. The electrical resistivity of the selected soil samples was performed on natural-state and saturated samples using a Miller multi-combination meter with a soil box configured in a four-pin arrangement. pH tests are typically conducted using litmus test paper. The soil samples for the soluble sulfates and chlorides were prepared as a water-soil solution, typically at a water-to-soil ratio of 20:1, and tested in general accordance with local laboratory methods for measuring sulfate and chloride concentrations.

MOISTURE-DRY DENSITY RELATIONSHIPS (COMPACTION) TESTS

Moisture-dry density tests involve the preparation of a bulk soil sample by compacting the sample at a given energy into a calibrated mold with a known volume of 0.0333 cubic feet at various moisture contents. A graph of the moisture content vs. dry density is developed, which results in an inverted U-shaped curve. The maximum dry density is the peak of the curve, and the corresponding moisture content is the optimum moisture. Two methods can be performed, namely:

STANDARD PROCTOR METHOD

This method involves a standard energy of 12,400 ft-lbs. per cubic foot of soil volume to compact the sample. The sample is compacted in three layers of equal thickness using a 5.5-pound hammer dropped 12 inches using 25 blows per layer.

MODIFIED PROCTOR METHOD

This method involves a modified energy of 56,000 ft-lbs. per cubic foot of soil volume to compact the sample. The sample is compacted in five layers of equal thickness using a 10-pound hammer dropped 18 inches using 25 blows per layer.

SPECIFIC GRAVITY TESTS

This test involves the determination of the ratio of the weight of a known volume of soil particles in air to weight of the same volume of water in air. The test is performed by oven drying a soil sample and placing the sample with water into a calibrated pycnometer, boiling the soil/water mixture, filling the pycnometer with distilled water to its calibration mark, weighing the pycnometer and soil/water mixture and measuring the temperature of the mixture. The specific gravity is equal to the weight of the dry soil particles multiplied by the specific gravity of distilled water at the temperature measured for the soil/water mixture divided by the sum of the weight of the dry soil particles plus the weight of the pycnometer, soil/water mixture plus the weight of the pycnometer plus water from the calibration curve developed for the pycnometer.

DIRECT SHEAR TESTS

A bulk sample is compacted in a direct shear mold at a specified density and moisture content. Shear tests are then performed using the direct shear procedure. The direct shear test is performed at several overburden pressures or normal stresses that represent approximate potential stresses in the proposed construction. Values of both peak friction angle and residual friction angle are determined from the tests for each overburden pressure.

CONSOLIDATION TESTS

Consolidation tests are used to evaluate the magnitude and rate of consolidation of soil when it is restrained laterally and drained on the top and bottom while subjected to vertical load applied in controlled increments. The range of test loads applied is generally selected to represent the anticipated vertical stress conditions resulting from existing conditions and the proposed construction. Plots of the percent strain vs. log pressure are constructed from the data to assess consolidation characteristics, while the rate of consolidation is evaluated from plots of deformation vs. time for each vertical load increment.

PERMEABILITY TESTS

The permeability of either relatively undisturbed or compacted soils can be determined by various laboratory test equipment including a triaxial cell, permeameter mold or from a liner sample. The type of permeability equipment used and test performed will be based on the soil type being evaluated.

CLAY, SILT AND OTHER LOW PERMEABLE SOIL SAMPLES

For samples with relatively low permeability characteristics, an undisturbed or compacted soil sample is placed in a triaxial cell. Prior to performing the permeability test, the sample must be fully saturated by forcing water into the sample using a backpressure (water under pressure from an air supply) which is slightly less than the cell pressure. Once the sample is saturated, water is forced through the top of the sample with pressure from an air supply (which is slightly less than the cell pressure) and water forced out of the bottom of the sample is measured in a burette. The volume of water displaced from the sample is recorded with time and from that information, the coefficient of permeability is calculated. This method is a constant head permeability test.

SAND SAMPLES

Due to the nature of relatively clean granular soils, the use of a triaxial cell is generally not practical and the permeability of these types of soils is typically determined from either a liner sample (either recovered directly from a split-spoon in the field or a sample compacted in the liner) or a bulk sample compacted in a 6-inch diameter permeameter mold. A falling head permeability test can be performed on most granular samples by filling a standpipe with water and measuring the head drop with time. For highly permeable soils, the rate of drop in a falling head test may be too rapid to obtain reliable volume and time measurements. Thus, a constant head test will be required where a constant head of water is maintained, and the volume of water discharged from the sample is measured with time.

TRIAXIAL TESTS

Triaxial tests were conducted on samples trimmed from Shelby tubes or liners. There are several types of triaxial tests which can be performed, and each are described below:

UNCONSOLIDATED-UNDRAINED TRIAXIAL TEST METHOD

The strength and stress-strain relationships of a cylindrical soil sample are determined for a sample subjected to a selected confining fluid pressure in a triaxial chamber. No drainage of the sample is permitted during the test, and the sample is sheared in compression at a constant rate of axial deformation. The peak stress measured for the sample is recorded, up to a maximum 15 percent strain. At least three triaxial tests are performed at various confining fluid pressures to model in-situ stress conditions for loading.

CONSOLIDATED-DRAINED TRIAXIAL TEST METHOD

The strength and stress-strain relationships of a cylindrical soil sample are determined for a sample subjected to a selected confining fluid pressure in a triaxial chamber. The sample is isotropically consolidated prior to applying axial loads and sheared in compression at a slow constant rate of axial deformation while allowing the sample to drain. The peak stress measured for the sample is recorded, up to a maximum 15 percent strain. At least three triaxial tests are performed at various confining fluid pressures to model in-situ stress conditions for loading.

CONSOLIDATED-UNDRAINED TRIAXIAL TEST METHOD

The strength and stress-strain relationships of a cylindrical soil sample are determined for a sample subjected to a selected confining fluid pressure in a triaxial chamber. The sample is isotropically consolidated prior to applying axial loads and sheared undrained in compression at a constant rate of axial deformation. Pore water pressure measurements can also be measured during the shearing of the sample. The peak stress measured for the sample is recorded, up to a maximum 15 percent strain. At least three triaxial tests are performed at various confining fluid pressures to model in-situ stress conditions for loading.

DENSITY TESTS ON ROCK CORES

Density tests involve trimming the ends of an intact rock core sample perpendicular to the length of the sample and measuring the length and diameter. The sample is then weighed, and the weight is divided by the volume to calculate the density.

UNCONFINED COMPRESSIVE STRENGTH TESTS ON ROCK CORES

Unconfined compression tests were performed to estimate the compressive strength of selected rock core samples. Representative rock cores were selected and cut perpendicular to the length of the sample on both ends to a specified length with a wet saw. In the unconfined compression test, the unconfined compressive strength of a rock core sample is determined by axially loading the rock core sample at a slow, constant rate of strain. The unconfined compressive strength is the maximum compressive stress in the rock core sample, or the load applied when a predetermined amount of strain is achieved.

LIMITATIONS PERTAINING TO SUBSURFACE CONDITIONS

EXISTING FILL

It is sometimes difficult to distinguish between existing fill present at a site and natural soils based on samples and cuttings from small-diameter boreholes, especially if portions of the fill do not contain man-made materials, debris, topsoil, or organic layers, and when the fill appears similar in composition to the local natural soils. Therefore, consider the delineation of fill described on the logs, if encountered, to be approximate.

The composition of existing site fill, if encountered, may change abruptly over short distances and will vary from what is reported on the logs. The descriptions of debris within fill may not accurately indicate the quantity, composition, or size of the debris, and may not fully include the types of debris existing within the site fills. Perform test pits if existing fill is encountered to further evaluate the condition of the fill, particularly if the fill will be utilized for support of overlying structures and/or other improvements.

GROUNDWATER

Hydrostatic groundwater levels, and perched groundwater conditions, will fluctuate throughout the year, based on variations in precipitation, evaporation, run-off, and other factors. The groundwater information reported on the logs represent conditions at the time the readings were taken and may vary from the groundwater conditions encountered at other times.

SUBSURFACE PROFILE

The profile described in this report and included on the logs is a generalized description of the conditions observed. The stratification depths described in this report and shown on the logs indicate a zone of transition from one soil type to another. They are not meant to delineate exact depths of change between soil types. Soil conditions may vary between or away from the exploration locations. Refer to the logs for the soil descriptions, rock descriptions (when applicable), and results of the field and laboratory tests at the specific exploration locations.

If only borings with hollow-stem or solid-stem augers are performed, consider thickness measurements of surficial materials reported on the logs (e.g., gravel, asphalt, concrete, aggregate base) to be approximate since mixing of the surface materials with the underlying subgrade can occur while advancing the augers, and it is difficult to measure the thickness of surface materials in small-diameter boreholes. Perform additional evaluations for more accurate measurements of surface materials, such as test pits for topsoil and gravel thicknesses, coring for pavement thicknesses, and hand sampling for aggregate thickness.

RADON

The need for radon control systems for this project was not evaluated as part of our current scope of services. Contact the local building authority to verify whether radon control systems are necessary to meet the applicable local building codes or other requirements. If radon control methods are required, incorporate the recommendations regarding the below-slab leveling course materials and vapor retarders presented in this report with the specific materials and measures necessary to meet the applicable radon control methods. Contact SME for further recommendations.

APPENDIX C

IMPORTANT INFORMATION ABOUT THIS GEOTECHNICAL-ENGINEERING REPORT

GENERAL COMMENTS

Important Information about This

Geotechnical-Engineering Report

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

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

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

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

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled.* No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

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

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be*, and, in general, *if you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying it. A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.*

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration.*** Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL
BUSINESS
ASSOCIATION

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GENERAL COMMENTS

BASIS OF GEOTECHNICAL REPORT

This report has been prepared in accordance with generally accepted geotechnical engineering practices to assist in the design and/or evaluation of this project. If the project plans, design criteria, and/or other project information referenced in this report and utilized by SME to prepare our recommendations are changed, the conclusions and recommendations contained in this report are not considered valid unless the changes are reviewed, and the conclusions and recommendations of this report are modified or approved in writing.

The discussions and recommendations contained in this report are based on the available project information, described in this report, and the geotechnical data obtained from the field exploration at the locations indicated in the report. Variations in soil and groundwater conditions commonly occur between or away from sampling locations. The nature and extent of the variations may not become evident until the time of construction. If significant variations are observed during construction, SME must be contacted to reevaluate the recommendations of this report.

In the process of obtaining and testing samples and preparing this report, procedures are followed that represent reasonable and accepted practice in the field of geotechnical engineering. Specifically, field logs are prepared during the field exploration that describe field occurrences, sampling locations, and other information. Samples obtained in the field are frequently subjected to additional testing and reclassification in the laboratory and differences may exist between the field logs and the report logs.

The engineer preparing the report reviews the field logs, laboratory classifications, and test data and then prepares the report logs. Our recommendations are based on the contents of the report logs and the information contained therein.

REVIEW OF DESIGN DETAILS, PLANS, AND SPECIFICATIONS

Retain SME to review the design details, project plans, and specifications to verify those documents are consistent with the recommendations contained in this report.

REVIEW OF REPORT INFORMATION WITH PROJECT TEAM

Implementation of our recommendations may affect the design, construction, and performance of the proposed improvements, along with the potential inherent risks involved with the proposed construction. The client and key members of the design team, including SME, should discuss the issues covered in this report so the issues are understood and applied in a manner consistent with the owner’s budget, tolerance of risk, and expectations for performance and maintenance.

FIELD VERIFICATION OF GEOTECHNICAL CONDITIONS

SME needs to be retained to continue our services through construction so we may observe and evaluate the actual subsurface conditions relative to the recommendations made in this report, and so we can verify the recommendations of this report are properly implemented during construction. This may avoid misinterpretation of our recommendations by other parties and will allow us to review and modify our recommendations if variations in the site subsurface conditions are encountered.

PROJECT INFORMATION FOR CONTRACTOR

This report and any future addenda or other reports regarding this site needs to be made available to prospective contractors prior to submitting their proposals for their information only and to supply them with facts relative to the subsurface evaluation and laboratory test results. If the selected contractor encounters subsurface conditions during construction, which differ from those presented in this report, the contractor needs to promptly describe the nature and extent of the differing conditions in writing and SME needs to be notified so we can verify those conditions. The construction contract needs to include provisions for dealing with differing conditions, and contingency funds for potential problems during earthwork and foundation construction. We would be pleased to assist with the development of contract provisions based on our experience.

The contractor needs to be prepared to handle environmental conditions encountered at this site, which may affect the excavation, removal, or disposal of soil; dewatering of excavations; and health and safety of workers. Any Environmental Assessment reports prepared for this site need to be made available for review by bidders and the successful contractor.

THIRD PARTY RELIANCE/REUSE OF THIS REPORT

This report has been prepared solely for the use of our Client for the project specifically described in this report. This report cannot be relied upon by other parties not involved in the project, unless specifically allowed by SME in writing. SME also is not responsible for the interpretation by other parties of the geotechnical data and the recommendations provided herein.

Passionate People Building
and Revitalizing our World

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