# Report of Limited Geotechnical and Geophysical Services
First Quality Drive, David Jones Industrial Park
Anderson County, Tennessee
S&ME Project No. 211424

PREPARED FOR:

**Anderson County Economic Development Agency**
**245 North Main Street Suite 200**
**Clinton, TN 37716**

**PREPARED BY:**

**S&ME, Inc.**
**1413 Topside Road**
**Louisville, TN 37777**

**July 8, 2022**

July 8, 2022

Anderson County Economic Development Association
245 North Main Street
Suite 200
Clinton, TN 37716

Attention: Mr. Andy Wallace, President

Reference: **Report of Limited Geotechnical and Geophysical Services**
**First Quality Drive, David Jones Industrial Park**
Anderson County, Tennessee
S&ME Proposal No. 211424

Dear Mr. Wallace:

The following report presents the results of our geotechnical and geophysical services conducted at the referenced site in Anderson County, Tennessee. The work was performed in general accordance with S&ME Proposal No. 211424 Rev. 2, dated February 2, 2022, and was authorized by you on February 16, 2022. The purpose of this geotechnical exploration was to explore subsurface conditions and provide preliminary geotechnical recommendations for general site grading and design and construction of foundations.

Sincerely,

**S&ME, Inc.**

Daniel Boles
Jul 8 2022 4:14 PM

David W. Abston

David W. Abston, E.I.
Staff Professional

Daniel R. Boles, P.E.
Senior Engineer
TN Registration No. 103726

# Table of Contents

## Appendices

# 1.0 Introduction

The purpose of our geotechnical and geophysical services was to explore subsurface conditions and provide preliminary geotechnical recommendations for general site grading and design and construction of foundations. The geotechnical exploration involved a site reconnaissance, field exploration, laboratory testing, and engineering analysis. This report provides the following:

- A boring location plan and boring logs;
- A review of surface topographic features and existing site conditions;
- A review of area geologic conditions;
- A review of subsurface soil stratigraphy with pertinent available physical properties, including the presence of ground water, if encountered;
- Results of the geophysical survey;
- Preliminary recommendations regarding the presence of materials which would be difficult to excavate;
- Preliminary site preparation recommendations, including recommendations for compacted fills or backfills;
- Minimum allowable bearing pressures for use in preliminary shallow foundation design and corresponding elevations of the soils and rock encountered. General recommendations for potential use of deep foundations will be provided based on the conditions encountered and assumed loads;
- Estimates for the potential of long term and short-term settlements;
- Seismic Site Class based on the subsurface conditions encountered, Standard Penetration Testing resistance values (N-values), and our experience in the site geology;
- Recommended frost depth for shallow foundation design;
- Recommendations regarding the suitability of the site soils for re-use as new engineered fill based upon our visual-manual classification;
- Documentation of the following risks factors, including seismic vibration/activity, fault lines, sinkholes, past undermining; and
- Recommendations for additional geotechnical exploration

# 2.0 Site and Project Description

The site located at First Quality Drive consists of two land parcels, 42.03 and 42.10 and is approximately 31 acres. The property is primarily undeveloped, partially wooded, and previously utilized as farmland (Figure 1). We understand that the Anderson County Economic Development Association (ACEDA) intends to develop a 250,000 square foot pad ready site for future location of an industrial facility. ACEDA and the Anderson County government will utilize our services to develop a specification for use in a competitive bid for others to perform the site grading.

Based on current site grades, we expect cuts and fills of up to 10 feet will be required to bring the site to grade. Additionally, we anticipate maximum wall and column loads will not exceed 5 kips per linear foot and 150 kips, respectively.

The project information and any assumptions listed herein be reviewed and confirmed by the appropriate team members. Modifications to our recommendations may be required if the planned development differs from our stated information and/or assumptions. This exploration should be considered preliminary in nature as structure foundation loads had not been determined and building locations and planned grades are conceptual and have not been finalized. Once foundation loads and additional project information is available, additional exploration and testing may be needed.

## 3.0 Site Geology

The project site, and most of East Tennessee, lies in the Appalachian Valley and Ridge Physiographic Province. This Province is characterized by elongated, northeasterly-trending ridges formed on highly resistant sandstone and shale. Between ridges, broad valleys and rolling hills are formed primarily on less resistant limestone, dolomite, and shale.

Published geologic information indicates the site is underlain by bedrock from the Hurricane Bridge and Woodway Limestone formations of the Chickamauga Group. The Hurricane Bridge and Woodway Limestones typically consists of alternating thick beds of brownish-gray and yellowish-gray argillaceous limestone and light olive-gray limestone fine-grained, nodular limestone with minor amounts of dolomite. This formation typically weathers to produce a thick residual clay overburden. Locally, the upper portion of the geology is influenced by the presence of alluvium, resulting from the recent deposition of water borne sediments from nearby Buffalo Creek. Alluvium is normally found within the flood plains of major tributaries and typically consists of clay, silt, sand, and sandy gravel in poorly to well-stratified deposits.

Since the bedrock underlying this site contains carbonate rock, it is susceptible to the typical carbonate hazards of irregular weathering, cave and cavern conditions, and overburden sinkholes. Carbonate rock, while appearing very hard and resistant, is soluble in slightly acidic water. This characteristic, plus differential weathering of the bedrock mass is responsible for the hazards. Of these hazards, the occurrence of sinkholes is potentially the most damaging to overlying soil-supported structures. In East Tennessee, sinkholes occur primarily due to differential weathering of the bedrock and flushing or raveling of overburden soils into the cavities in the bedrock. The loss of solids creates a cavity or dome in the overburden. Growth of the dome over time or excavation over the dome can create a condition in which rapid, local subsidence or collapse of the roof of the dome occurs.

A certain degree of risk with respect to sinkhole formation and subsidence should be considered with any site located within geologic areas underlain by potentially soluble rock units. While a rigorous effort to assess the potential for sinkhole formation on this site was beyond the scope of this evaluation, our borings did not encounter obvious indications of sinkhole development. In addition, we did not observe any surface signs of sinkhole activity at the site. However, some closed depressions, which denote past sinkhole activity, are shown on the United States Geological Survey (USGS) topographic map in the area of the site. It is our opinion the risk of sinkhole development at this site is comparable to other sites located within similar geologic settings which have been developed successfully. However, the owner must be willing to accept the risk of future sinkhole development at this site.

# 4.0 Subsurface Conditions

## 4.1 Geotechnical Exploration Procedures

Subsurface conditions at the site were explored by twenty (20) soil test borings (designated B-01 through B-20). The boring locations and depths were selected by S&ME personnel and marked using a hand-held GPS unit. Because the boring locations were not determined in the field using surveying techniques, these locations should be considered approximate. The approximate boring locations are shown on the Boring Location Plan, Figure 2, in Appendix I of this report.

The borings were advanced using hollow-stem augering techniques with a Diedrich D-50 ATV mounted drill rig. During the soil test boring operations, standard penetration tests (ASTM D1586) were conducted at approximate 2½ foot intervals above a depth of 10 feet, and at 5-foot intervals for depths below 10 feet. All depths in this report reference the existing ground surface at the time of this exploration. Sampling of overburden soils while drilling was performed using a standard split spoon sampler (ASTM D1586). A bulk sample of the overburden soil was taken from a depth of 1 to 10 feet in boring B-01. Thin walled tube samples were taken from various depths in borings B-08, B-09, and B-15. Coring of auger refusal materials was performed in borings B-04, B-12, and B-20. The borings were backfilled with soil cuttings and hole plugs were set just below the ground surface before departing the site.

After completion of the field drilling and sampling phase of this project, the soil samples were returned to our laboratory where they were visually classified in general accordance with the Unified Soil Classification System (USCS) by a member of S&ME's professional staff. Representative soil specimens were then tested for moisture content (ASTM D2216), grain size analysis (ASTM D6913), Atterberg Limits (ASTM D4318), unconfined compressive strength of soil (ASTM D2166), and Moisture-Density Relationship (Standard Proctor, ASTM D698. Detailed information pertaining to each boring location can be found on the boring logs provided in Appendix II of this report. The laboratory test results are discussed in the following sections of the report and individual test reports are provided in Appendix III.

## 4.2 Soil Stratification

### *4.2.1 Surface Materials*

Each of the borings encountered an approximately 2 inch thick layer of topsoil at the ground surface.

### *4.2.2 Fill*

Fill was encountered in Borings B-08 and B-13 to depths of 8.0 feet and 1.3 feet, respectively. Fill is material that has been moved and placed by man and machine. The fill soils generally consisted of red-brown and brown lean clay with little sand. N-values of the fill soils ranged from 7 blows per foot (bpf) to 11 bpf, indicated soil consistencies of firm to stiff.

### 4.2.3 *Alluvium*

Alluvium was encountered in Boring B-03 to a depth of 3.0 feet. Alluvium is material that has been moved to its present location by flowing water. The alluvial soils consisted of olive with red-brown fat clay with silt and trace amounts of sand and gravel. The N-value of the alluvial soils was 6 bpf, indicating a consistency of firm.

### 4.2.4 *Residuum*

Residual soils were encountered beneath the fill layers in borings B-08 and B-13, beneath the alluvial layer in Boring B-03, and beneath the surface material in the remaining borings. Residual soils are soils weathered from the underlying parent bedrock. Residual soils extended to refusal or termination depths ranging from 5.5 feet to 22.2 feet. The residual soils generally consisted of fat clays with varying amounts of silt, sand, and weathered rock fragments. Boring B-02 encountered a thin interval of poorly graded gravel just prior to auger refusal. N-values of the fine-grained residual soils ranged from 3 bpf to 100 bpf, indicating consistencies of soft to very hard. Typically, the SPT N-values indicated stiff to very stiff soil consistencies.

### 4.2.5 *Refusal*

Auger refusal was encountered in each of the borings at depths ranging from about 5.5 to 22.2 feet below the existing ground surface. Auger refusal is a designation applied to any material that could not be penetrated by the power auger and drill rig used for the exploration (i.e., Diedrich D-50 drill rig). The refusal material typically consisted of gray to blue-gray interbedded limestone and dolomite.

### 4.2.6 *Bedrock*

Bedrock was cored in Borings B-04, B-12, and B-20. The bedrock generally consisted of thinly interbedded blue-gray limestone and dolomite. A 5-inch void was encountered while coring in Boring B-12; however, the bedrock was generally competent to continuous. Zones of poor-quality rock were generally encountered near the soil rock interface, and the quality generally improved with depth.

### 4.2.7 *Ground Water*

Ground water was not encountered in the borings at the time of drilling/excavation. The borings were backfilled upon completion in consideration of safety and stabilized (24 hour) ground water levels were not measured.

Ground water levels also fluctuate due to seasonal changes in precipitation amounts, construction activities in the area, the level of nearby water features, and/or other factors. The ground water information presented in this report is the information collected at the time of our field activities.

## 4.3 Laboratory Test Results

The moisture content of the tested samples ranged from 22.6 to 36.2 percent. Additional test results are summarized in Tables 4-1, 4-2, and 4.3 below.

### Table 4-1 Soil Classification Test Results

| Boring No. | Depth (feet) | Liquid Limit | Plastic Limit | Plasticity Index | Percent Finer than the #200 Sieve | USCS Classification based on Plasticity Index and Percent Finer than the No. 200 Sieve |
|---|---|---|---|---|---|---|
| B-02 | 3.5-5 | 60 | 24 | 36 | 95.2 | CH |
| B-09 | 5-7 | 56 | 27 | 29 | 91.9 | CH |
| B-15 | 7.5-9 | 75 | 31 | 44 | 96.7 | CH |

### Table 4-2 Moisture Density Test Results

| Boring No. | Depth (feet) | Standard Proctor MDD & OMC (pcf @ %MC) | |
|---|---|---|---|
| | | Maximum Dry Density, MMD (pcf) | Optimum Moisture Content, OMC (%) |
| B-02 | 1-7.9 | 96.0 | 26.3 |
| B-16 | 1-7.5 | 95.9 | 26.3 |

### Table 4-3 Unconfined Compressive Strength of Soil

| Boring No. | Depth (feet) | Dry Unit Weight (pcf) | Natural Moisture Content (%) | Unconfined Compressive Strength (ksf) |
|---|---|---|---|---|
| B-09 | 5-7 | 96.7 | 27.4 | 8.042 |
| B-15 | 5-7 | 91.6 | 31.5 | 3.568 |

## 4.4 Geophysical Survey

### *4.4.1 Geophysical Methodology, Field Services, and Data Processing*

S&ME completed an Electrical Resistivity Tomography (ERT) survey between April 07, 2022, and April 14, 2022 to support the geotechnical exploration program with identifying lateral changes in subsurface materials with emphasis on potential features related to karst and depth to bedrock.

The ERT method introduces a known amount of direct current into the ground and measures the corresponding response to identify variations in subsurface electrical potentials. By introducing a known amount of current into the ground, the measured voltage potential at the surface is used to calculate the resistivity of subsurface material. In general, clayey, and moist soils result in lower resistivity (higher conductivity) readings, while dry sands, gravels, chert, and limestone/dolomite exhibit higher resistivity values. The resistivity of materials also partially depends on the substance filling its pore or void space. A highly resistive anomaly within limestone bedrock is expected if a cavity or fracture is air-filled. If a feature is water- or clay-filled, a more conductive anomaly within the limestone bedrock is expected. Natural variations in porosity and grain size distribution can also cause such anomalies.

An ERT survey typically uses a series of stainless-steel electrodes that are inserted into the ground along a linear array and attached to data cables, which are connected to a transmitter/recording instrument (resistivity meter), as shown to the right. The resistivity meter generates an induced current at two of the electrodes (current electrodes) and then measurements are acquired from the voltage potential difference between two other electrodes (potential electrodes). Material included between the potential electrodes is essentially averaged so the depth and resolution of the measurements are dependent upon the distance between these electrodes. Therefore, limitations of this method exist depending on the necessary resolution of data acquisition versus the depth of a target/feature. It is important to also note that actual ground resistivity is not collected during a resistivity survey. The survey is used to collect the apparent resistivity of a volume of material. Actual resistivities are later determined through a data inversion process. In addition, ERT data is collected using various array configurations set up in the software (Dipole-Dipole, Wenner, etc.), which is stored in the resistivity meter for later processing and analysis. Array considerations are dependent on the objectives of the survey (e.g., soil and bedrock profiling, karst exploration, etc.).

We used an Advanced Geosciences, Inc. (AGI) SuperSting$^{TM}$ R8/IP resistivity system in general accordance with ASTM D6431 "*Using DC Resistivity for Subsurface Investigations.*" A total of seven (7) ERT profiles ranging from about 370 feet to 830 feet in length were collected (Lines 1 through 7; Figure 3). The Dipole-Dipole array configuration was used, and electrodes were spaced at 10 feet. ERT data was processed using AGI's EarthImager 2D software and Golden Software's Surfer® was used to grid and plot the data. Elevations used for our models were extrapolated from LiDAR data from the USGS website rather than in-field surveying by S&ME, and as such, should be considered approximate.

### 4.4.2 Geophysical Results

The following summarizes the results of the geophysical survey as presented in Figures 4 and 5:

- Resistivity variations across the surveyed area generally range from approximately 10 ohmmeters (ohm-m) to 40,000 ohm-m.
- Presented depths of the ERT profiles are a function of line length and the inversion process, which are about 80 to 100 feet below ground surface (bgs) for this survey.

- Based on the geotechnical exploration borings, we identified two general layers: residual clayey soil overburden and the underlying bedrock.
  - The clayey soil overburden is characterized by materials with resistivity values less than about 1,000 ohm-m, with the relatively lower values (less than 200 ohm-m) likely related to fat clays while the relatively higher values (greater than about 200 ohm-m) are likely related to lean clays and/or increased sand/silt/gravel content.
  - Exposed rock was observed at the surface by our field staff, which may also account for some of the shallow higher resistive values.
  - The underlying relatively resistive bedrock is generally characterized by values greater than about 200 ohm-m.
  - In general, the interpreted top of bedrock ranges from less than 10 feet to about 30 feet bgs, which is highlighted on the ERT profiles as a black dashed line.
- Additionally, two types of anomalous features were interpreted in the ERT data sets (Type I and Type II anomalies):
  - Type I anomalies are generally associated with topographic changes along the interpreted top of bedrock. The upper portion of the interpreted top of bedrock within these areas also appears to exhibit relatively low resistivity zones (less than about 200 ohm-m) that may be related to increased solutioning and/or clay-filled joints/fractures within the upper portion of the interpreted bedrock.
  - Type II anomalies are characterized by relatively deeper low resistivity zones within the interpreted bedrock. These features are most likely related to deeper solutioning/karst features, which could include clay-filled cavities.

Prominent interpreted Type I and Type II anomalies are highlighted on the ERT profiles and survey location plans.

# 5.0 Preliminary Conclusions and Recommendations

## 5.1 Site Assessment

Several risks and challenges should be understood during the design and planning phases of the project. Provided these risks and challenges are acceptable, we anticipate the proposed structure can be supported by conventional shallow foundations.

  - Fill was encountered in two of borings to depths ranging from 1.3 to 8 feet. We have not been provided any documentation regarding the placement of the existing fill; therefore, we must classify this site as having undocumented fill. If documentation of the fill exists, we request it be forwarded to our office for review and inclusion into our analyses. There is some degree of risk inherent with developing a site on undocumented fill. Undocumented fills may be highly variable and can contain zones of debris or soft, highly compressible soils, which can result in excessive settlements and/or differential settlements of buildings supported on undocumented fill. Therefore, we generally recommend undocumented fill be undercut and replaced with compacted engineering fill in building areas. If the owner is willing to accept some additional risk with regard to excess total and differential settlement associated with the undocumented fill, the building could be supported on the existing fill and the existing fill could be undercut and replaced as needed based on proofrolling and evaluations of exposed foundation subgrades at the time of construction.

- Fat clays (higher plasticity clays) were generally encountered in the borings. Laboratory test results indicate the site soils are moderately plastic. Higher plasticity clays have a greater potential for volume change (shrinking and swelling) with changing moisture contents, which can detrimentally affect structures supported on these soils. Therefore, the volume change potential of the soils at the site should be considered in design and during construction. Soil moisture and plasticity considerations are discussed further in a subsequent section of this report.

Some of the borings encountered zones of soft soils are various depths. Where soft soils are encountered at subgrade levels and in foundation excavations, they will require remediation. Remediation of soft soils typically includes undercutting the soft soils to expose stiffer soils judged suitable for foundation support as recommended by the geotechnical engineer and backfilling to design foundation bearing levels with materials recommended by the geotechnical engineer.

- In general, the borings were drilled to depths of 10 feet or greater. However, several of the borings refused at a depth shallower than 10 feet. Therefore, some difficult/rock excavation may be required to achieve planned grades or in utility trenches.

- The site is located in a karst geologic area. The underlying carbonate rock units are susceptible to sinkhole development. Typically, the risk of sinkhole formation can be reduced somewhat by managed construction practices as provided in this report. While several possible karst features were identified by the geophysical survey, we note several sites with similar subsurface conditions have been developed successfully in this area. However, the inherent risk of sinkhole formation will exist. The owner should anticipate some contingency money be set aside for sinkhole remediation that can occur during site grading.

## 5.2 Site Preparation

Site preparation should be initiated by clearing all vegetation, topsoil, and other deleterious materials to a distance at least 10 feet outside the building limits. In addition, any pavements, utilities, old structures, foundations, etc. should be demolished during site preparation. As previously noted, undocumented fill should be removed at this time as well, unless the owner is willing to accept the risks associated with leaving all or some of the undocumented fill in-place.

After initial site preparation is complete, the stability of the exposed subgrade in areas to receive fill and/or at grade should be evaluated by the geotechnical engineer. This evaluation may be aided by methodically proofrolling the exposed subgrade with a loaded tandem-axle dump truck weighing at least 20 tons, or other rubber-tired construction equipment with similar wheel loads. Any areas which are determined by the geotechnical engineer to rut, pump or deflect excessively should be undercut to firm bearing soils and backfilled with well-compacted soil or repaired in-place by scarifying, drying, and recompacting the in-place soils.

Subgrade repair can be expected to be much more extensive if grading operations are performed during wet periods of the year because the in-place soils can be moisture sensitive and can be softened by rubber-tired construction traffic when wet. Once any areas identified by proofrolling have been repaired, the site should be brought to grade by making the necessary fills.

Stable subgrade surfaces at the time of grading will become unstable during wet weather and/or as heavy construction equipment traffic traverse the prepared surface. Subgrade damage can be reduced by maintaining positive surface drainage during grading operations and construction to prevent water from ponding on the surface. Additionally, the surface should be rolled smooth to enhance drainage if precipitation is expected.

Subgrades damaged by construction equipment should be promptly repaired to avoid further degradation in adjacent areas and to prevent water ponding. Construction traffic should be limited to specific areas during grading to avoid degrading subgrades throughout the site, particularly after precipitation events. The geotechnical engineer should be contacted to provide recommendations for treatment if the soils become excessively wet, dry, or frozen.

## 5.3 Excavation

Most of borings were drilled to depths of 10 feet or greater. Therefore, we anticipate excavations to depths of 10 feet or less will generally be able to be performed with conventional earthmoving equipment (backhoes, excavators, pans/scrapers, etc.). However, several of the borings refused on limestone at a depth shallower than 10 feet. Therefore, some difficult/rock excavation may be required to achieve planned grades or in utility trenches. The volume of difficult/rock excavation needed will depend on the selected project finished grades and the variability of the bedrock surface.

Pinnacles, ribs, or mounds of weathered rock may require hydraulic or pneumatic hammers and/or splitters to excavate. Competent rock will likely require hydraulic or pneumatic hammers and/or splitters or blasting to excavate. If blasting is needed and allowed, we suggest all blasting be completed prior to new construction. Pre-blast and post-blast surveys should be accomplished on nearby structures to document building conditions prior to and following blasting operations in the event blast-damage claims are made. Blasting operations should conform to applicable state laws. Safety is solely the responsibility of the contractor.

Excavation for temporary or permanent conditions should comply with Occupational Safety and Health Administration (OSHA) requirements.

## 5.4 Fill Placement and Compaction

Soil fill should have a maximum dry unit density of at least 90 pounds per cubic foot (pcf), have a maximum plasticity index (PI) of 35 or less, and be free of topsoil, vegetation, debris, trash, or other deleterious material. Any soil fill placed as structural fill should be compacted to 98 percent of the standard Proctor maximum dry density within plus or minus three percentage points of its optimum moisture content in accordance with ASTM D698.

We recommend testing of the fill soils by a representative of the geotechnical engineer during site grading to confirm the recommended compaction and moisture levels are attained. The recommendations in this report are contingent on these observations and tests.

Due to some soils exhibiting higher plasticities and the associated higher potential for shrink/swell, we recommend only the lower and more moderately plasticity soils (soils with PIs of 35 or less) be used beneath the building foundations and slabs. Soils tested from Boring B-15 had a PI of 44. These higher plasticity soils are not desirable for re-use as structural fill within the building footprints (i.e., immediately beneath foundations or slabs). Where these higher plasticity soils need to be used in compacted fills, they may be used in deeper fills, pavement areas, or fill slope construction. The higher plasticity soils (soils with PIs greater than 35) should be placed at depths greater than 3 feet below subgrade levels.

On-site soils are typically slightly to moderately plastic clays exist at moisture contents higher than optimum compaction moistures. Therefore, moisture control of the soils during compaction will be very important. The grading contractor must be prepared to mobilize adequate equipment for continuous disking, aerating, and mixing of the site soils during placement and compaction of engineered fill. Given the plasticity of the soils, drying of the soils to obtain proper compaction will require a significant period of dry weather conditions. Also, the time of year that this grading takes place will strongly impact the amount of drying time needed for the on-site soils.

## 5.5 Dense-Graded Aggregate Fill

Dense Graded aggregate may be used as fill and for utility backfill. The dense graded aggregate used for this section should be Type A, Grading D or E in accordance with Section 903.05 of the Tennessee Department of Transportation (TDOT) specifications. Dense graded aggregate should be placed in loose, horizontal lifts not exceeding 10 inches in thickness. Each lift should be compacted to at least 95 percent of the aggregate's maximum dry density per the standard Proctor test method (ASTM D698). Each lift should be compacted by the Contractor and then tested and observed by geotechnical personnel before placing any subsequent lifts.

## 5.6 Drainage and Surface Water Concerns

To help reduce the potential for instability in the exposed soil during wet weather conditions, water should not be allowed to collect within undercut or foundation excavations, on floor slab areas, or on prepared subgrades either during or after construction. Positive site surface drainage should be provided to reduce infiltration of surface water around the perimeter of structures and beneath floor slabs. The grades should be sloped away from structures and surface drainage should be collected and discharged such that water is not permitted to infiltrate backfill and floor slab areas of the structures.

## 5.7 Groundwater Considerations

Groundwater was not encountered in during the geotechnical exploration; however, Buffalo creek traverses along the northwestern edge of the site. Relatively shallow groundwater may be encountered in excavations along the northwestern edge of the site. Groundwater depths can vary based upon season and prevailing weather conditions. The groundwater information presented in this report is the information collected at the time of our field activities.

We do not expect significant groundwater will be encountered during site grading or in the shallow excavations for the building structure as we expect the southern portion of the site will generally be fill. However, wet saturated soils will likely be encountered near the creek, and shallow groundwater will likely be present near the creek as indicated above. If water is encountered in excavations, we anticipate it can be controlled by pumping from a sump and/or by sloping the area to drain away from the construction area. Any water encountered during excavation for foundation placement should be reported to the Geotechnical Engineer for evaluation.

## 5.8 Moisture Sensitive Soils

The fine-grained soils encountered at this site are expected to be slightly to moderately sensitive to disturbances caused by construction traffic and changes in moisture content. During periods of wet weather, increases in the moisture content of the soil can cause reduction in the soil strength and support capabilities. In addition, soils which become wet may be slow to dry and thus retard construction progress. It will, therefore, be advantageous to perform earthwork and foundation construction activities during warmer and drier months of the year.

## 5.9 Plastic Soil Considerations

Based on our experience in East Tennessee, soils with plasticity indices (PI) less than 30 percent have a slight potential for volume changes with changes in moisture content, and soils with a PI greater than 50 percent are highly susceptible to volume changes. Between these values, we consider the soils to be slightly susceptible to volume changes. Based on our observations (visual-manual logging) and the laboratory testing the site soils are slightly to moderately plastic. The samples of site soils tested had a PI ranging from 29 to 44.

Higher plasticity soils have a higher potential to shrink or swell with significant changes in moisture content. Unlike other areas of the country where moderately to highly plastic soils cause considerable foundation problems East Tennessee does not typically endure long periods of severe drought or wet weather. However, in some years, drought conditions can be severe enough to cause significant soil shrinkage and after a period of drought the soils can swell with increasing moisture. If moderately to highly plastic foundation and subgrade soils dry significantly or moisture contents increase significantly after completion of construction, there is the potential for volume change that can result in distress in buildings, floor slabs and pavements. Therefore, the volume change potential of the soils at the site should be considered, and the following construction precautions are recommended.

- The foundation excavations should be excavated, checked, and backfilled in the same day to prevent excessive wetting or drying of the foundation subgrade soils.
- Floor slab subgrades should not be allowed to become excessively wet or dry prior to floor slab construction.
- The site should be graded to drain surface water away from the structure both during and after construction. In addition, any drains should discharge water well away from foundation and slab areas.
- Heat sources should be isolated from foundation soils to minimize drying of the foundation soils.
- Plantings with high water demands should not be planted near foundations and grade slabs.

To further reduce the potential for moisture content changes and associated volume changes to affect foundations, we recommend foundations bear at least 30 inches below exterior grades as previously stated. Additionally, the owner may want to consider undercutting and replacing higher plasticity soils in building areas with lower plasticity soils to provide a lower plasticity buffer between the bottoms of grade slabs and the underlying higher plasticity soils. We recommend a buffer of at least 24 inches in grade slab areas.

Structural details to make structures flexible should be considered to accommodate potential volume changes in the subgrade. Slabs should be liberally jointed to control cracking and should not be structurally connected to any walls. Walls should incorporate sufficient expansion/contraction joints to allow for differential movement.

## 5.10 Sinkhole Risk Reduction and Corrective Action

Based on our experience, we have found several measures useful in the design and site development to reduce the potential for sinkhole development at sites. These measures would decrease but not eliminate the potential for sinkhole development. Much can be accomplished to decrease the potential of future sinkhole activity by proper grade selection and positive site drainage.

The portions of the site excavated to achieve the desired grades will have a higher risk of sinkhole development than the areas to be filled, because of the exposure of the numerous relict fractures in the soil to rainfall and runoff. On the other hand, those portions of the site receiving a modest amount of fill will have a decreased risk of sinkhole development caused by rainfall or runoff because the placement of a cohesive soil fill over these areas effectively caps the area with a relatively impervious layer of remolded soil.

Although it is our opinion the risk of ground subsidence associated with sinkhole formation cannot be eliminated, we have found several measures are useful in design and site development to reduce this potential risk. These measures include:

- The scarification and recompaction of the upper nine inches of soil exposed in at grade and cut sections, thereby creating a blanket of less permeable material.
- Maintaining positive site drainage to route surface waters well away from structural areas both during construction and over the life of the structures.
- Verifying subsurface piping structures is carefully constructed and pressure tested prior to its placement in service.
- Using watertight seals in the storm drainage system.
- Using soil, compacted dense-graded aggregate, or flowable fill to backfill site utilities. The use of No. 57 stone as utility backfill should be avoided.

If a sinkhole develops, the appropriate corrective action is dependent on the size and location of the sinkhole. As described herein, S&ME should be retained to observe site and subgrade preparation activities. If sinkhole conditions are observed, the type of corrective action is most appropriately determined by S&ME on a case-by-case basis.

## 5.11 Shallow Foundation Recommendations

Assuming those challenges/risks previously discussed are acceptable and properly addressed, support for the wall and column loads up to 5 kips per linear foot and 150 kips, respectively, on shallow, soil-supported foundations will be appropriate. Foundation subgrades will require remediation in areas containing soils not recommended for foundation support. Shallow foundations bearing on properly compacted fill may typically be proportioned for an allowable bearing capacity 2,500 pounds per square foot (psf).

While shallow foundations are recommended for the general building area, deep foundations may be necessary for specific equipment loads exceeding the assumed loads presented in this report. If equipment loads exceed our assumed foundation loads, modifications to our recommendations may be required. If necessary, deep foundations in the form drilled shafts or micropiles would be acceptable.

Variations in the consistency of the bearing materials could affect the performance of these foundations, regardless of the allowable bearing pressure; therefore, it is critical that foundation observations be performed by a representative of the geotechnical engineer of record and that undercutting or improvement of the subgrade occurs as needed. Continuous wall foundations should typically be designed to have a minimum width of 24 inches and column footings should have a minimum width of 36 inches. All spread foundations should bear at least 30 inches below subgrade to provide confinement, frost protection and to reduce the potential for moisture content changes to affect foundations.

The foundation bearing soils should be observed by the geotechnical engineer or their representative prior to placing reinforcing steel or concrete. In selected foundation excavations, Dynamic Cone Penetrometer (DCP) testing in hand auger borings may be performed to provide additional data on foundation bearing soils. The engineer can provide geotechnical guidance to the owner's design team should poor bearing conditions be identified during construction. Provided the loads do not exceed those discussed and low consistency soils are removed as necessary, we anticipate settlements of less than 1 inch. A more precise estimate of settlement, including time rate of settlement, can be provided with additional exploration and testing, should that be needed.

Foundation bearing surfaces should not be disturbed or left exposed during inclement weather. Excavations for foundations should be hand cleaned to remove loose soil, rock, or mud from the foundation bearing surface. If construction occurs during inclement weather and it is not possible to place concrete immediately after excavation, we recommend a thin layer (approximately 2 inches) of lean concrete be placed on the bearing surface for protection after we have observed and evaluated the exposed bearing surfaces. The foundation excavation depth should account for the mud mat thickness. Seismic

### 5.12 Site Classification

Seismic Site Classification was performed based on the IBC 2018 and ASCE 7-16. In accordance with the IBC 2018 and ASCE 7-16, the project site is classified as Seismic Site Class C. The Seismic Site Class C is based on SPT N-values obtained during the exploration, as well as our knowledge of the site geology.

## 6.0 Additional Services

Once the final building and parking locations and grades are determined and structural loading information is available, S&ME should meet with the design team to determine if additional subsurface information is needed in the form of additional borings, observation trenches or rock coring.

## 7.0 Limitations

This report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. The conclusions and recommendations contained in this report are based upon applicable standards of our practice in this geographic area at the time this report was prepared. No other representation or warranty either express or implied, is made.

We relied on project information given to us to develop our conclusions and recommendations. If project information described in this report is not accurate, or if it changes during project development, we should be notified of the changes so that we can modify our recommendations based on this additional information if necessary.

Our conclusions and recommendations are based on limited data from a field exploration program. Subsurface conditions can vary widely between explored areas. Some variations may not become evident until construction. If conditions are encountered which appear different than those described in our report, we should be notified. This report should not be construed to represent subsurface conditions for the entire site.

Unless specifically noted otherwise, our field exploration program did not include an assessment of regulatory compliance, environmental conditions or pollutants, or presence of any biological materials (mold, fungi, bacteria). If there is a concern about these items, other studies should be performed. S&ME can provide a proposal and perform these services if requested.

S&ME should be retained to review the final plans and specifications to confirm that earthwork, foundation, and other recommendations are properly interpreted and implemented. The recommendations in this report are contingent on S&ME's review of final plans and specifications followed by our observation and monitoring of earthwork and foundation construction activities.

Regardless of the thoroughness of a geophysical survey, there is always a possibility that actual conditions may not match the interpretations. The results should be considered accurate only to the degree implied by the methods used and the method's limitations and data coverage. Accordingly, the possibility exists that not all features at a project site will be located due to either subsurface soil conditions or the occurrence of features outside the lateral limits and below the depth of penetration of the methods used. As with most surface geophysical methods, resolution of the subsurface also decreases with depth. As such, the size and/or contrast of geologic layers and/or features compared to the imaged subsurface media must be significant enough to produce the anticipated response.

# Appendices

# Appendix I – Figures

Drawing Path: T:\ENV\Projects\2022\211424_Anderson County Economic Development Association_First Quality Drive_Andersonville, TN\GEO\CAD\Figure 1_SVM.dwg

Notes:

1) Base map from Google Earth Pro accessed on June 13, 2022.

## Site Vicinity Map

David Jones Industrial Park
First Quality Drive
Anderson County,Tennessee

SCALE:
Not to Scale
DATE:
6-20-2022
PROJECT NUMBER
211424

FIGURE NO.
1

Legend:

⊕ Approximate Location of Soil Test Borings

Notes:

1) Boring locations are shown in general arrangement only.
2) Do not use boring locations for determination of distances or quantities.
3) Base map from Google Earth Pro accessed on June 13, 2022.

S&ME

**Boring Location Plan**

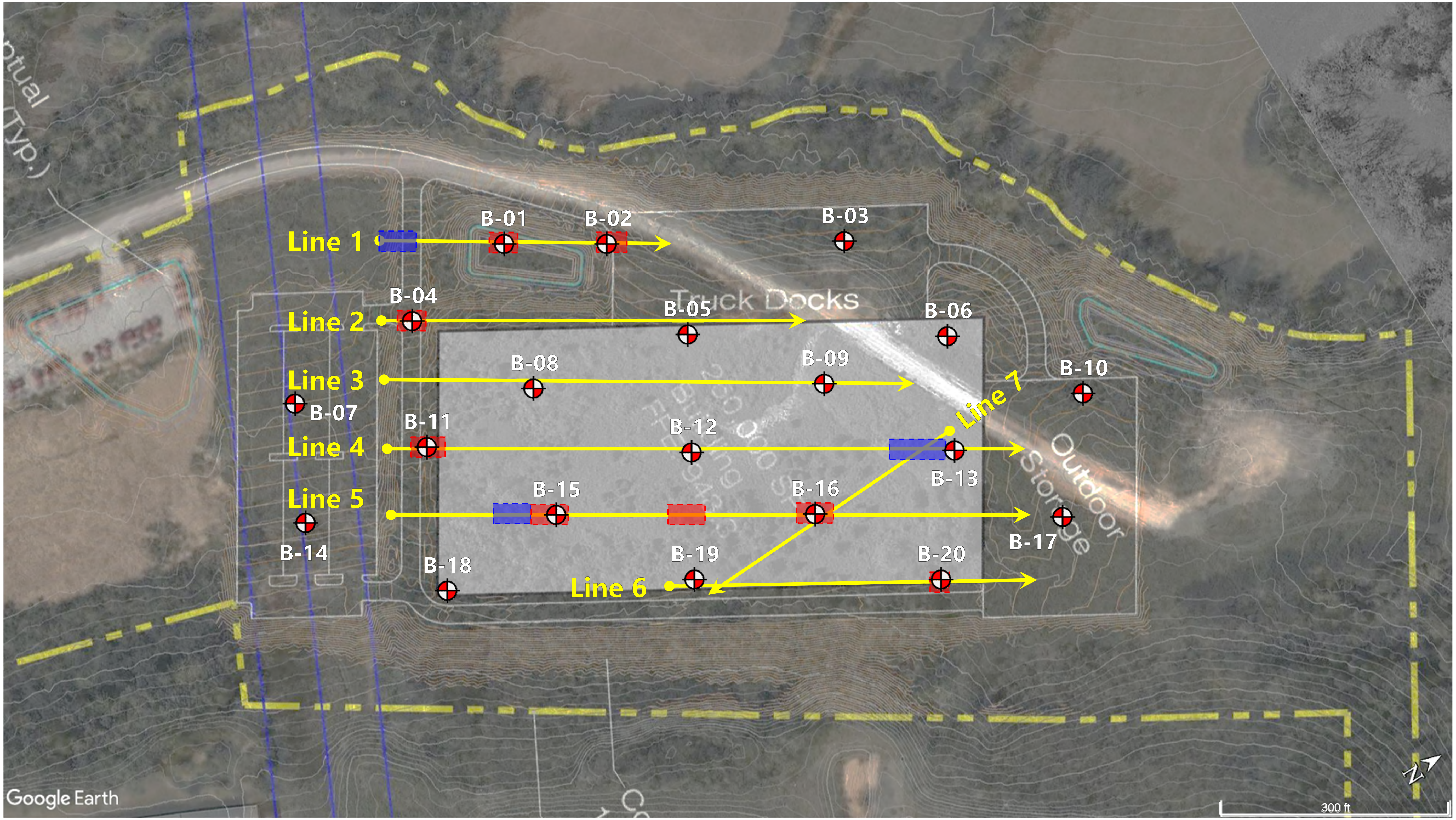
David Jones Industrial Park
First Quality Drive
Anderson County, Tennessee

SCALE:
Not to Scale
DATE:
6-20-2022
PROJECT NUMBER
211424

FIGURE NO.
2

Drawing Path: T:\ENV\Projects\2022\211424_Anderson County Economic Development Association_First Quality Drive_Andersonville, TN\GEO\CAD\Figure 2_BLP.dwg

**REFERENCE:**
GOOGLE EARTH PRO AERIAL PHOTOGRAPH (DATED APRIL 3, 2021).
THIS PLAN IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED AND NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.



**LEGEND**

- ERT Profile
- ⊕ Boring Location (S&ME; 2022)
- 🟥 Location of Type I Anomaly
- 🟦 Location of Type II Anomaly

## GEOPHYSICAL SURVEY LOCATION PLAN

FIRST QUALITY DRIVE, DAVID JONES INDUSTRIAL PARK
ANDERSON COUNTY, TENNESSEE

SCALE:
AS SHOWN

DATE:
7/6/2022

PROJECT NUMBER
211424

FIGURE NO.
3

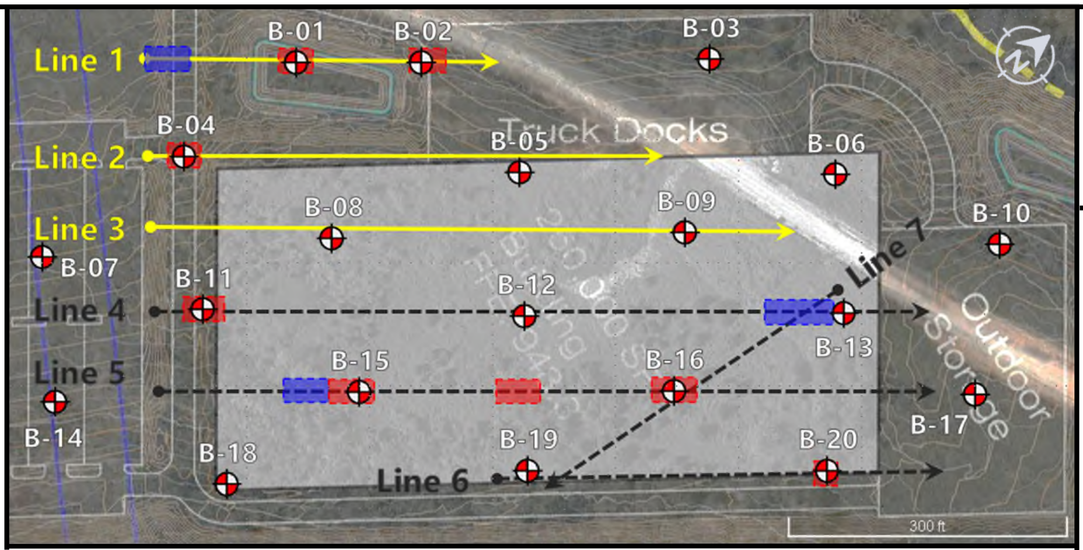
Approximate
Boring Location

**B-XX**

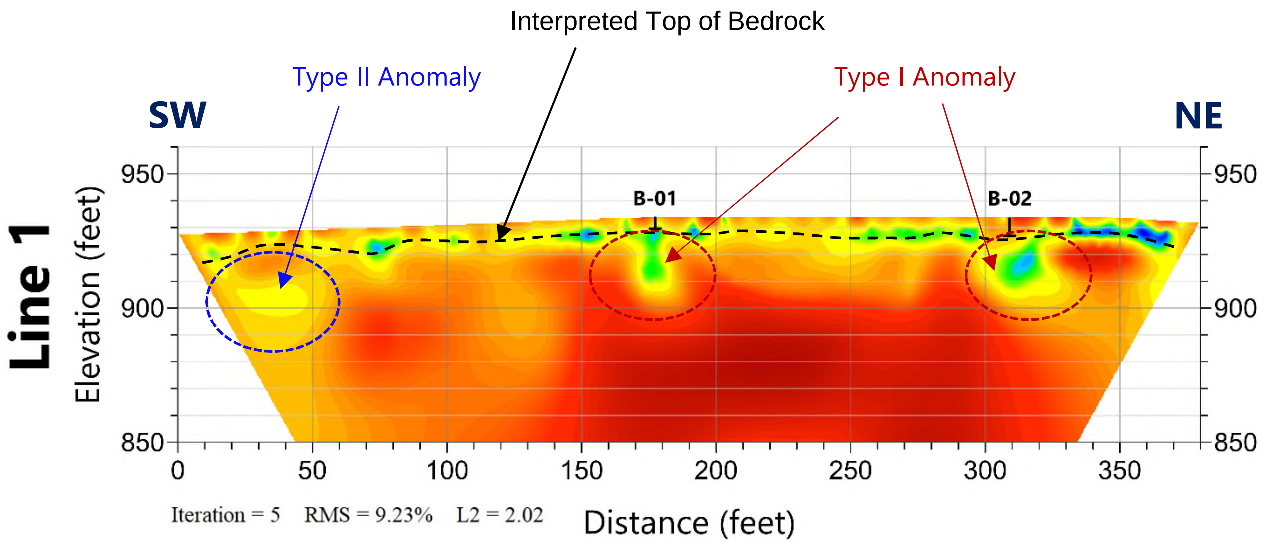
Indicates
Auger Refusal

**LEGEND**

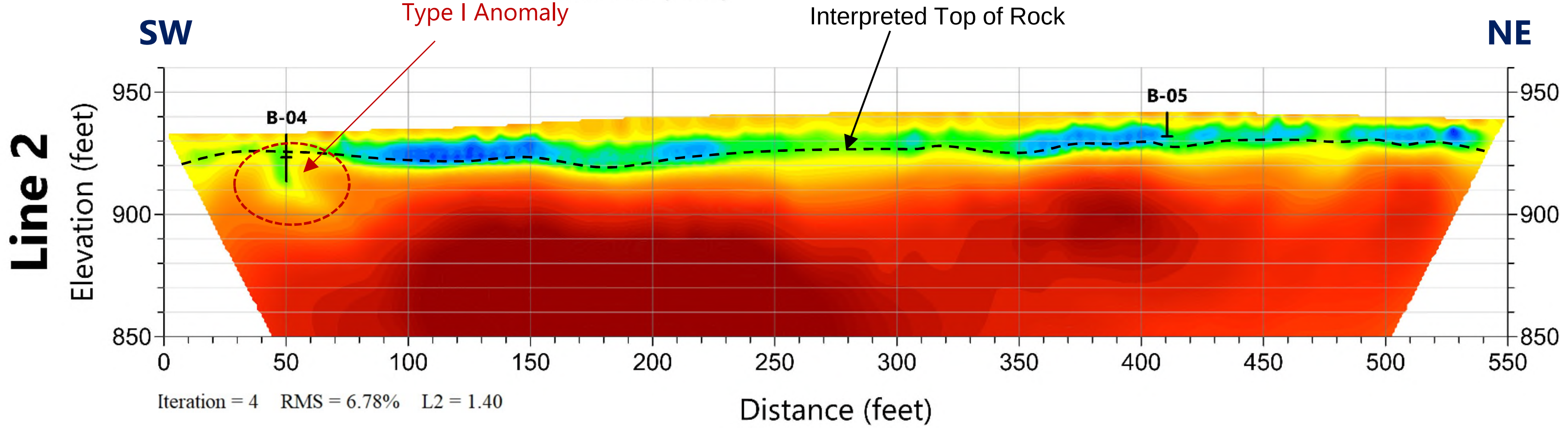
- ERT Profile Location (Presented)
- ERT Profile Location
- ⊕ Boring Location (S&ME; 2022)
- 🟥 Location of Type I Anomaly
- 🟦 Location of Type II Anomaly



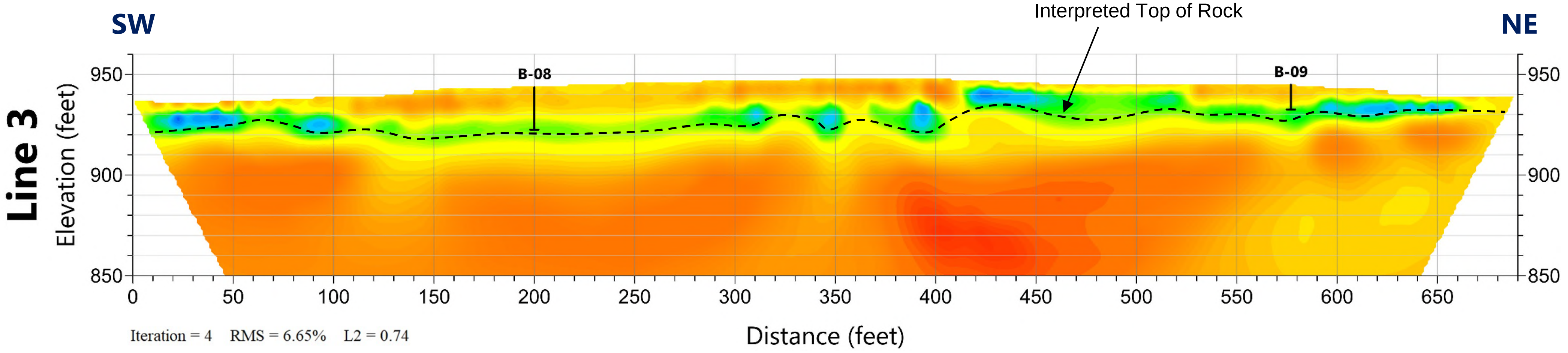
REFERENCE:
GOOGLE EARTH PRO AERIAL PHOTOGRAPH (DATED APRIL 3, 2021). THIS PLAN IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED AND NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.



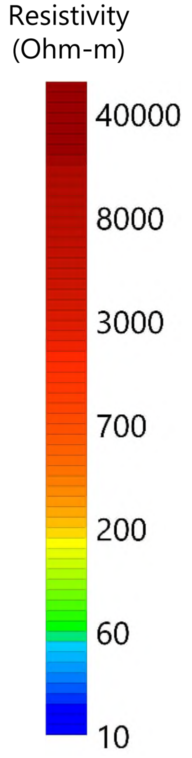
Iteration = 5 RMS = 9.23% L2 = 2.02



Iteration = 4 RMS = 6.78% L2 = 1.40



Iteration = 4 RMS = 6.65% L2 = 0.74



## GEOPHYSICAL DATA PROFILES – LINES 1 THROUGH 3

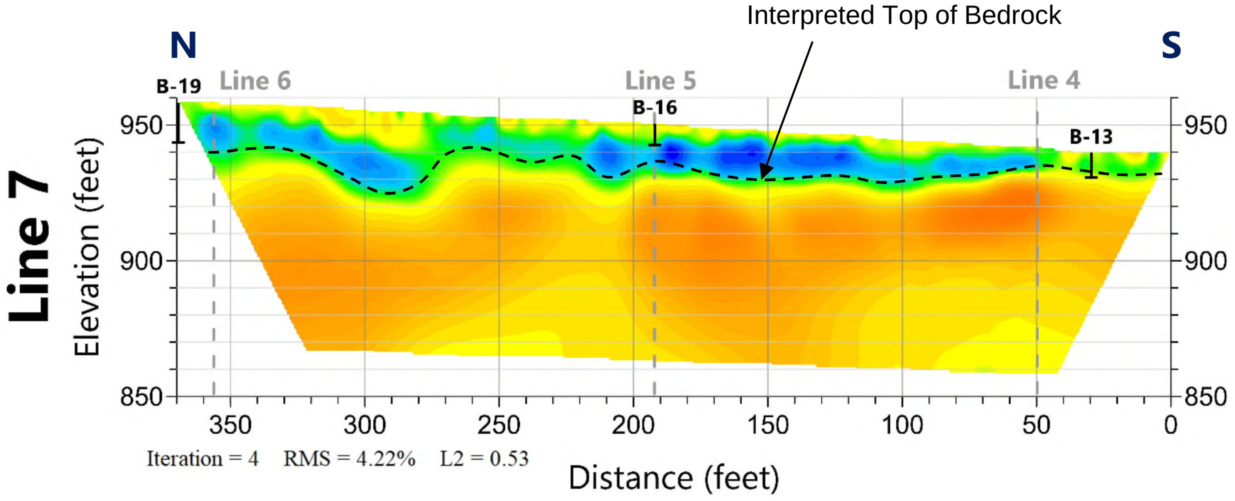
FIRST QUALITY DRIVE, DAVID JONES INDUSTRIAL PARK
ANDERSON COUNTY, TENNESSEE

SCALE:
AS SHOWN

DATE:
7/6/2022

PROJECT NUMBER
211424

FIGURE NO.
4



**LEGEND**

➔ ERT Profile Location (Presented)

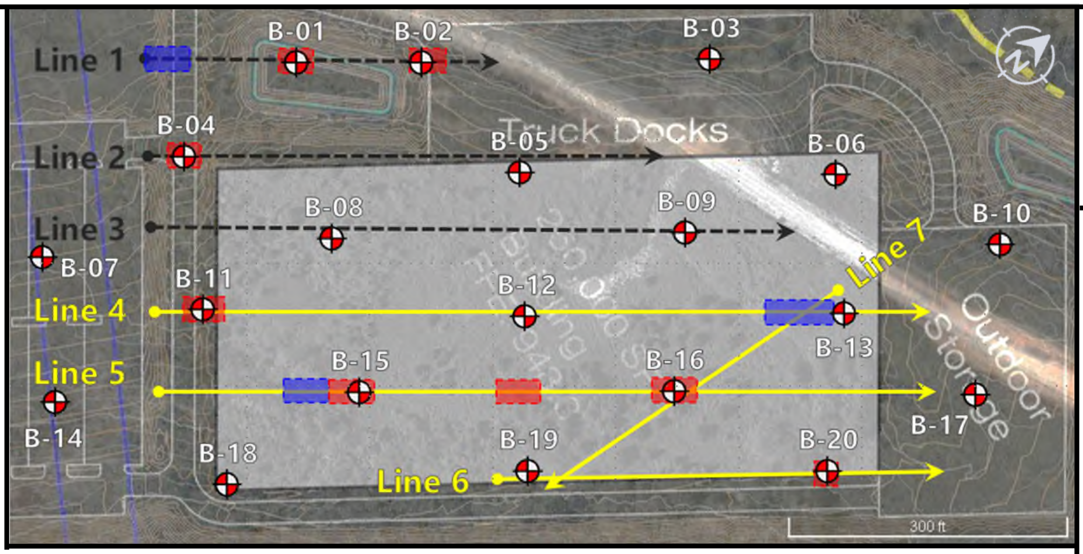
- - ➔ ERT Profile Location

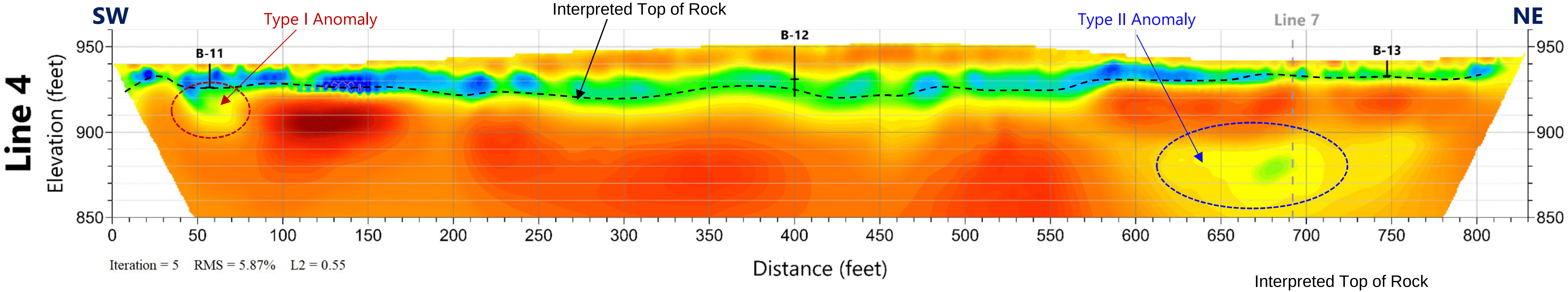
⊕ Boring Location (S&ME; 2022)

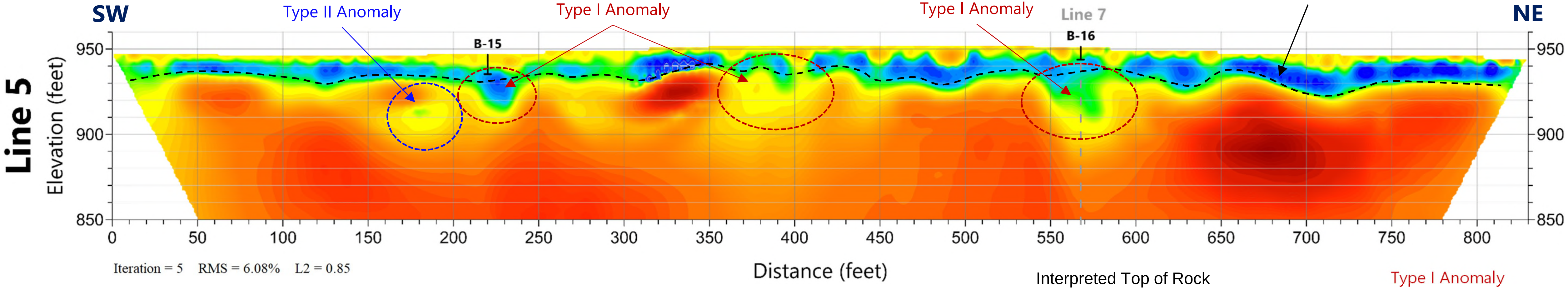
🟥 Location of Type I Anomaly

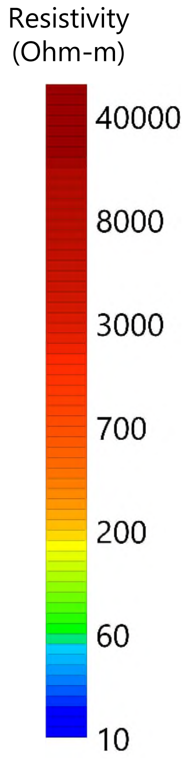
🟦 Location of Type II Anomaly

**REFERENCE:**
GOOGLE EARTH PRO AERIAL PHOTOGRAPH (DATED APRIL 3, 2021). THIS PLAN IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED AND NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.





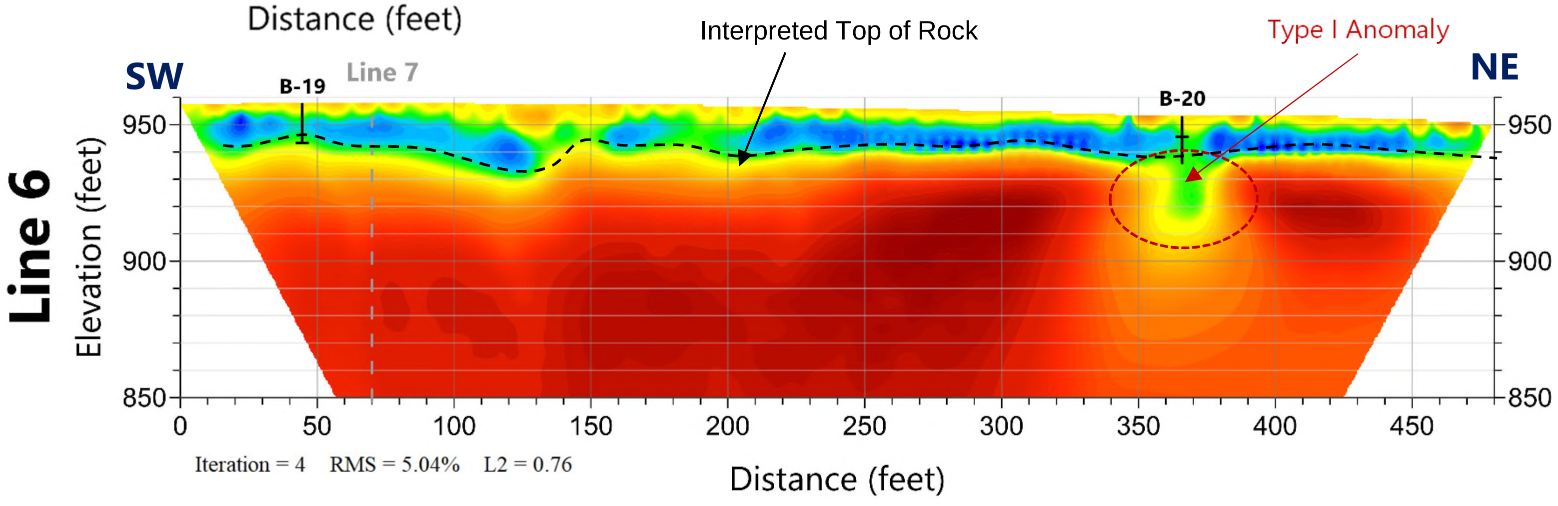




Approximate
Boring Location

**B-XX**

Indicates
Auger Refusal



GEOPHYSICAL DATA PROFILES – LINES 4 THROUGH 7

FIRST QUALITY DRIVE, DAVID JONES INDUSTRIAL PARK
ANDERSON COUNTY, TENNESSEE

SCALE:
AS SHOWN

DATE:
7/6/2022

PROJECT NUMBER
211424

FIGURE NO.
5

# Appendix II – Boring Logs

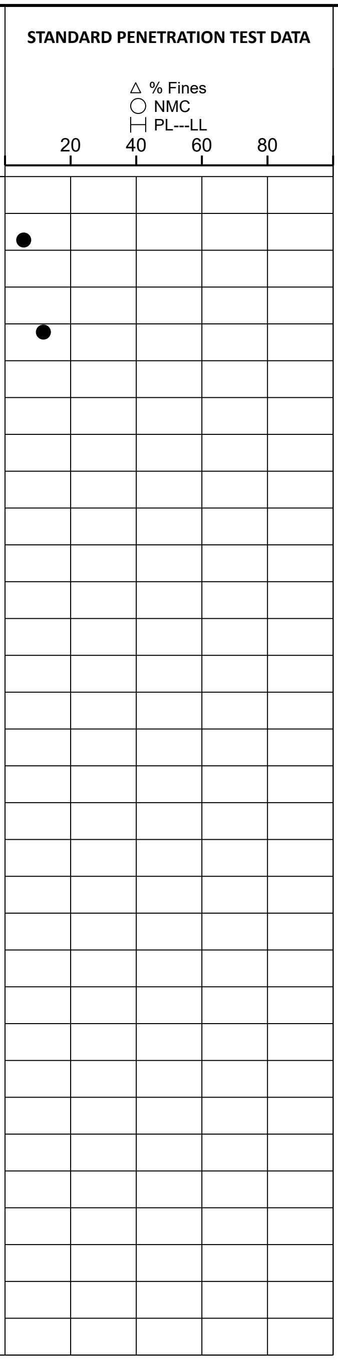
**PROJECT:**
David Jones Industrial Park
Anderson County, Tennessee
**S&ME Project No. 211424**

## BORING LOG: B-01

*Sheet 1 of 1*

| | | |
|---|---|---|
| **DATE DRILLED:** 05/03/2022 | **ELEVATION:** | **NOTES:** Sample descriptions based on visual observation of obtained samples. |
| **DRILL RIG:** Diedrich D-50 | **DATUM:** NAVD88 | |
| **DRILLER:** T Bunch | **BORING DEPTH:** 5.5 ft | |
| **HAMMER TYPE:** Automatic hammer | **CLOSURE:** Cuttings with Hole Closure Device | |
| **DRILLING METHOD:** 3-1/4" HSA | **LOGGED BY:** David Abston | **LATITUDE:** **LONGITUDE:** |
| **SAMPLING METHOD:** SS | **PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Tennessee FIPS 4100 Feet | |

| DEPTH (feet) | NOTES | Origin/Identifier | GRAPHIC | SAMPLE NO. (RECOVERY) | MATERIAL DESCRIPTION | BLOW COUNT DATA (SPT N-value) | ELEVATION |
|---|---|---|---|---|---|---|---|
| 0 | 0.2 | | | | TOPSOIL, 2 inches | | 0 |
| | | Residuum | | SS-01 | FAT CLAY (CH), trace sand, firm to stiff, brown with tan, slightly moist to moist | 3-3-3<br>N = 6 | |
| | | | | SS-02 | | 3-5-7<br>N = 12 | |
| 5 | Auger refusal at 5.5 feet 5.5 | | | | Borehole terminated at 5.5 feet | | -5 |
| 10 | | | | | | | -10 |
| 15 | | | | | | | -15 |
| 20 | | | | | | | -20 |
| 25 | | | | | | | -25 |
| 30 | | | | | | | -30 |



| GROUNDWATER | | DATE | DEPTH (FT) | REMARKS |
|---|---|---|---|---|
| ATD | ▽ | 05/03/2022 | | not encountered |
| END OF DRILLING | ▼ | | | |
| AFTER DRILLING | ▼ | | | |
| AFTER DRILLING | ▼ | | | |

**GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING**
**LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),**
**AR = Auger Refusal**

**PROJECT:** David Jones Industrial Park
Anderson County, Tennessee
**S&ME Project No. 211424**

# BORING LOG: B-02

*Sheet 1 of 1*

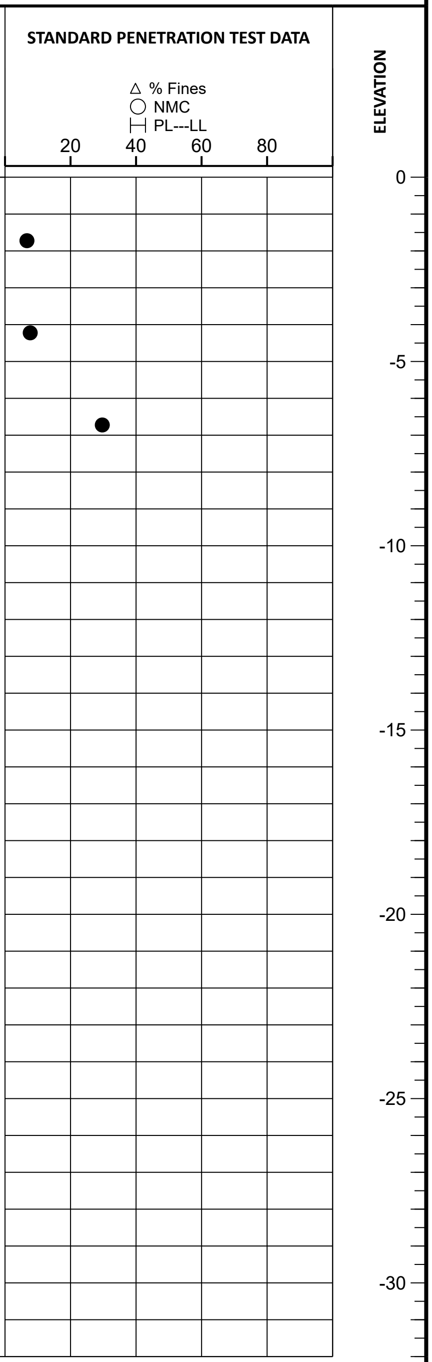
| | |
|---|---|
| **DATE DRILLED:** 05/03/2022 | **ELEVATION:** |
| **DRILL RIG:** Diedrich D-50 | **DATUM:** NAVD88 |
| **DRILLER:** T Bunch | **BORING DEPTH:** 7.9 ft |
| **HAMMER TYPE:** Automatic hammer | **CLOSURE:** Cuttings with Hole Closure Device |
| **DRILLING METHOD:** 3-1/4" HSA | **LOGGED BY:** David Abston |
| **SAMPLING METHOD:** SS | **PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Tennessee FIPS 4100 Feet |

**NOTES:** Sample descriptions based on visual observation of obtained samples.

**LATITUDE:**

**LONGITUDE:**

| DEPTH (feet) | NOTES | Origin/Identifier | GRAPHIC | SAMPLE NO. (RECOVERY) | MATERIAL DESCRIPTION | BLOW COUNT DATA (SPT N-value) |
|---|---|---|---|---|---|---|
| 0 | 0.2 | | | | TOPSOIL, 2 inches | |
| | | Residuum | | | FAT CLAY (CH), trace sand, firm to very stiff, red brown with tan, slightly moist to moist | |
| | | | | SS-01 | | 3-3-4<br>N = 7 |
| 5 | | | | SS-02 | | 4-3-5<br>N = 8 |
| | | | | SS-03 | | 3-8-22<br>N = 30 |
| | 7.7 | | | | POORLY GRADED GRAVEL (GP), weathered rock fragments, dense, gray, slightly moist | |
| | Auger refusal at 7.9 feet 7.9 | | | | Borehole terminated at 7.9 feet | |
| 10 | | | | | | |
| 15 | | | | | | |
| 20 | | | | | | |
| 25 | | | | | | |
| 30 | | | | | | |



| GROUNDWATER | | DATE | DEPTH (FT) | REMARKS |
|---|---|---|---|---|
| ATD | ▽ | 05/03/2022 | | not encountered |
| END OF DRILLING | ▼ | | | |
| AFTER DRILLING | ▼ | | | |
| AFTER DRILLING | ▼ | | | |

**GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING**
**LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),**
**AR = Auger Refusal**

**PROJECT:**

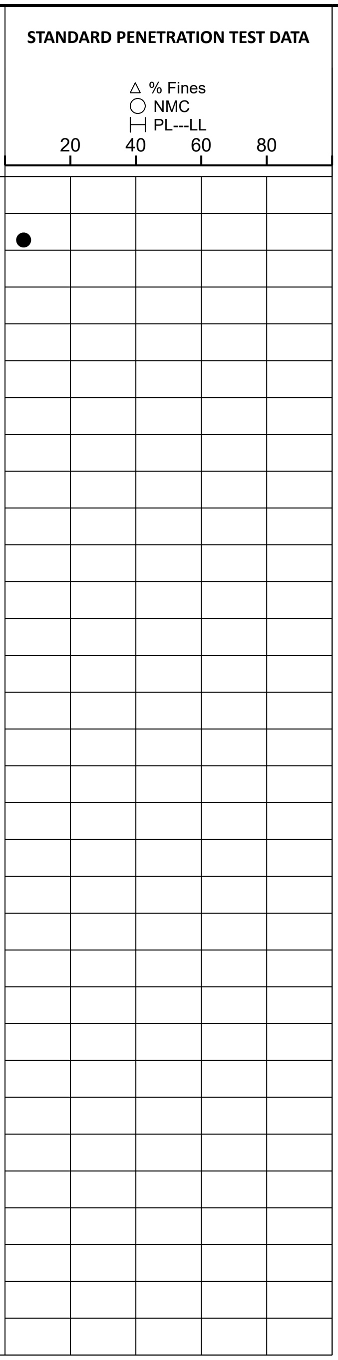
David Jones Industrial Park
Anderson County, Tennessee
**S&ME Project No. 211424**

## BORING LOG: B-03

*Sheet 1 of 1*

**DATE DRILLED:** 05/02/2022
**ELEVATION:**
**DRILL RIG:** Diedrich D-50
**DATUM:** NAVD88
**DRILLER:** T Bunch
**BORING DEPTH:** 3.3 ft
**HAMMER TYPE:** Automatic hammer
**CLOSURE:** Cuttings with Hole Closure Device
**DRILLING METHOD:** 3-1/4" HSA
**LOGGED BY:** David Abston
**NOTES:** Sample descriptions based on visual observation of obtained samples.
**LATITUDE:**
**LONGITUDE:**
**SAMPLING METHOD:** SS
**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Tennessee FIPS 4100 Feet

| DEPTH (feet) | NOTES | | Origin/Identifier | GRAPHIC | SAMPLE NO. (RECOVERY) | MATERIAL DESCRIPTION | BLOW COUNT DATA (SPT N-value) | ELEVATION |
|---|---|---|---|---|---|---|---|---|
| 0 | | 0.2 | | | | TOPSOIL, 2 inches | | 0 |
| | | | Alluvium | ▨ | ☒ SS-01 | FAT CLAY (CH), with silt, trace sand and gravel, firm, olive with red brown, moist | 11-3-3<br>N = 6 | |
| | Auger refusal at 3.3 feet | 3.3 | | | | Borehole terminated at 3.3 feet | | |
| 5 | | | | | | | | -5 |
| 10 | | | | | | | | -10 |
| 15 | | | | | | | | -15 |
| 20 | | | | | | | | -20 |
| 25 | | | | | | | | -25 |
| 30 | | | | | | | | -30 |



| GROUNDWATER | | DATE | DEPTH (FT) | REMARKS |
|---|---|---|---|---|
| ATD | ▽ | 05/02/2022 | | not encountered |
| END OF DRILLING | ▼ | | | |
| AFTER DRILLING | ▼ | | | |
| AFTER DRILLING | ▼ | | | |

**GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING**
**LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),**
**AR = Auger Refusal**

**PROJECT:** David Jones Industrial Park
Anderson County, Tennessee
**S&ME Project No. 211424**

# BORING LOG: B-04

*Sheet 1 of 1*

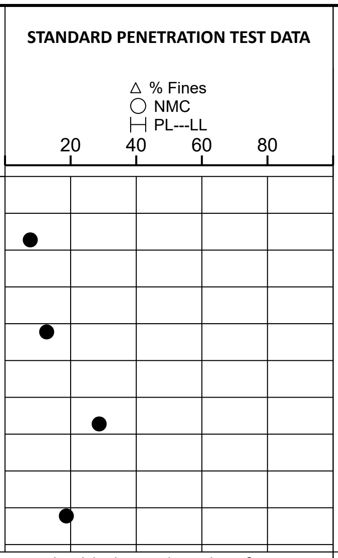
| | |
|---|---|
| **DATE DRILLED:** 05/06/2022 | **ELEVATION:** |
| **DRILL RIG:** Diedrich D-50 | **DATUM:** NAVD88 |
| **DRILLER:** T Bunch | **BORING DEPTH:** 20.2 ft |
| **HAMMER TYPE:** Automatic hammer | **CLOSURE:** Cuttings with Hole Closure Device |
| **DRILLING METHOD:** 3-1/4" HSA, NQ | **LOGGED BY:** David Abston |
| **SAMPLING METHOD:** CORE, SS | **PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Tennessee FIPS 4100 Feet |

**NOTES:** Sample descriptions based on visual observation of obtained samples.

**LATITUDE:**

**LONGITUDE:**

| DEPTH (feet) | NOTES | Origin/Identifier | GRAPHIC | SAMPLE NO. (RECOVERY) | MATERIAL DESCRIPTION | BLOW COUNT DATA (SPT N-value) | ELEVATION |
|---|---|---|---|---|---|---|---|
| 0 | 0.2 | | | | TOPSOIL, 2 inches | | 0 |
| | | Residuum | | SS-01 | FAT CLAY (CH), trace sand, firm to very stiff, brown with tan, slightly moist to moist | 3-3-5<br>N = 8 | |
| | | | | SS-02 | | 3-4-9<br>N = 13 | |
| 5 | | | | | | | -5 |
| | | | | SS-03 | | 8-12-17<br>N = 29 | |
| | | | | SS-04 | | 5-8-11<br>N = 19 | |
| 10 | Auger refusal at 10.2 feet 10.2 | | | Run-01<br>REC-89%<br>RQD-80% | LIMESTONE AND DOLOMITE, light blue gray with blue, thinly interbedded, good quality, fine grained, close jointed, 30°, slightly weathered, very hard | | -10 |
| 15 | | | | Run-02<br>REC-100%<br>RQD-94% | | | -15 |
| 20 | 20.2 | | | Run-03<br>REC-100%<br>RQD-100% | Borehole terminated at 20.2 feet | | -20 |
| 25 | | | | | | | -25 |
| 30 | | | | | | | -30 |



| GROUNDWATER | | DATE | DEPTH (FT) | REMARKS |
|---|---|---|---|---|
| ATD | ▽ | 05/06/2022 | | not encountered |
| END OF DRILLING | ▼ | | | |
| AFTER DRILLING | ▼ | | | |
| AFTER DRILLING | ▼ | | | |

**GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING**
**LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal**

**PROJECT:** David Jones Industrial Park
Anderson County, Tennessee
**S&ME Project No. 211424**

# BORING LOG: B-05

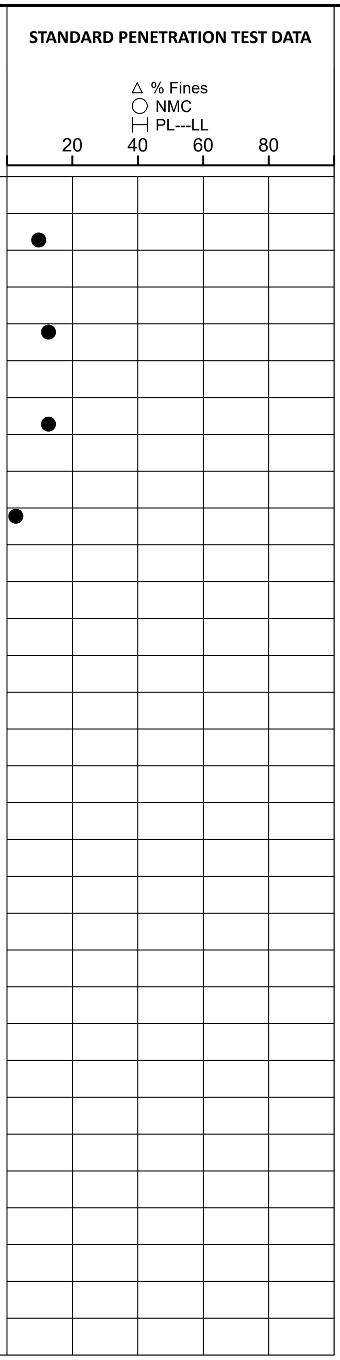
*Sheet 1 of 1*

| | |
|---|---|
| **DATE DRILLED:** 05/03/2022 | **ELEVATION:** |
| **DRILL RIG:** Diedrich D-50 | **DATUM:** NAVD88 |
| **DRILLER:** T Bunch | **BORING DEPTH:** 10.4 ft |
| **HAMMER TYPE:** Automatic hammer | **CLOSURE:** Cuttings with Hole Closure Device |
| **DRILLING METHOD:** 3-1/4" HSA | **LOGGED BY:** David Abston |
| **SAMPLING METHOD:** SS | **PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Tennessee FIPS 4100 Feet |

**NOTES:** Sample descriptions based on visual observation of obtained samples.

**LATITUDE:** **LONGITUDE:**

| DEPTH (feet) | NOTES | | Origin/Identifier | SAMPLE NO. (RECOVERY) | MATERIAL DESCRIPTION | BLOW COUNT DATA (SPT N-value) | ELEVATION |
|---|---|---|---|---|---|---|---|
| 0 | | 0.2 | | | TOPSOIL, 2 inches | | 0 |
| | | 1.5 | Residuum | SS-01 | FAT CLAY (CH), trace sand, firm, brown with tan, slightly moist to moist | 4-4-6<br>N = 10 | |
| | | | | SS-02 | FAT CLAY (CH), little sand, stiff to soft, red brown, slightly moist | 3-6-7<br>N = 13 | |
| 5 | | | | SS-03 | | 5-6-7<br>N = 13 | -5 |
| | | | | SS-04 | | 2-2-1<br>N = 3 | |
| 10 | Auger refusal at 10.4 feet | 10.4 | | | Borehole terminated at 10.4 feet | | -10 |
| 15 | | | | | | | -15 |
| 20 | | | | | | | -20 |
| 25 | | | | | | | -25 |
| 30 | | | | | | | -30 |



| GROUNDWATER | | DATE | DEPTH (FT) | REMARKS |
|---|---|---|---|---|
| ATD | ▽ | 05/03/2022 | | not encountered |
| END OF DRILLING | ▼ | | | |
| AFTER DRILLING | ▼ | | | |
| AFTER DRILLING | ▼ | | | |

**GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING**
**LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),**
**AR = Auger Refusal**

**PROJECT:** David Jones Industrial Park
Anderson County, Tennessee
**S&ME Project No. 211424**

# BORING LOG: B-06

*Sheet 1 of 1*

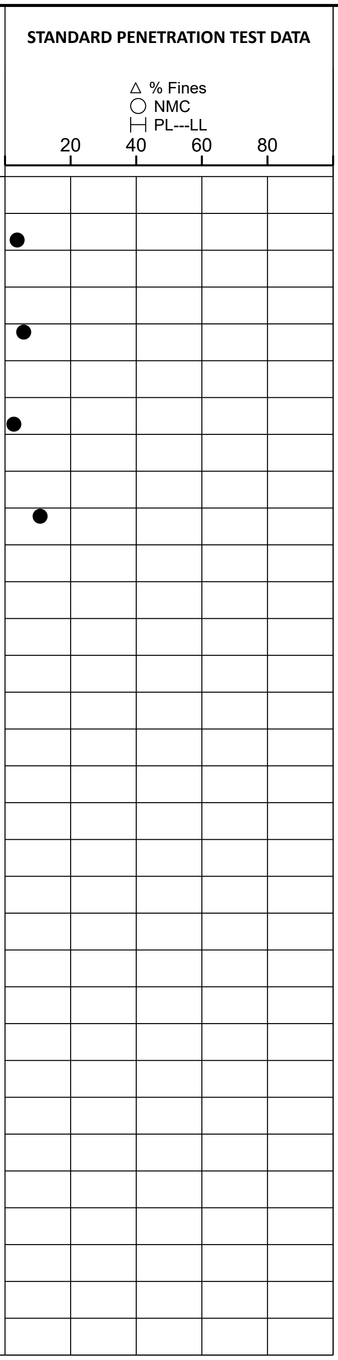
**DATE DRILLED:** 05/02/2022
**ELEVATION:**
**DRILL RIG:** Diedrich D-50
**DATUM:** NAVD88
**DRILLER:** T Bunch
**BORING DEPTH:** 10.3 ft
**HAMMER TYPE:** Automatic hammer
**CLOSURE:** Cuttings with Hole Closure Device
**DRILLING METHOD:** 3-1/4" HSA
**LOGGED BY:** David Abston
**SAMPLING METHOD:** SS

**NOTES:** Sample descriptions based on visual observation of obtained samples.

**LATITUDE:**
**LONGITUDE:**

**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Tennessee FIPS 4100 Feet

| DEPTH (feet) | NOTES | | Origin/Identifier | SAMPLE NO. (RECOVERY) | MATERIAL DESCRIPTION | BLOW COUNT DATA (SPT N-value) | ELEVATION |
|---|---|---|---|---|---|---|---|
| 0 | | 0.2 | | | TOPSOIL, 2 inches | | 0 |
| | | | Residuum | SS-01 | FAT CLAY (CH), trace sand, firm to soft, brown with tan, slightly moist to moist | 2-2-2<br>N = 4 | |
| 5 | | | | SS-02 | | 5-3-3<br>N = 6 | -5 |
| | | | | SS-03 | | 2-2-1<br>N = 3 | |
| | | 8.0 | | SS-04 | FAT CLAY (CH), little sand, stiff, red brown with dark brown, slightly moist | 3-4-7<br>N = 11 | |
| 10 | Auger refusal at 10.3 feet | 10.3 | | | Borehole terminated at 10.3 feet | | -10 |
| 15 | | | | | | | -15 |
| 20 | | | | | | | -20 |
| 25 | | | | | | | -25 |
| 30 | | | | | | | -30 |



| GROUNDWATER | | DATE | DEPTH (FT) | REMARKS |
|---|---|---|---|---|
| ATD | ▽ | 05/02/2022 | | not encountered |
| END OF DRILLING | ▼ | | | |
| AFTER DRILLING | ▼ | | | |
| AFTER DRILLING | ▼ | | | |

**GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING**
**LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),**
**AR = Auger Refusal**

**PROJECT:** David Jones Industrial Park
Anderson County, Tennessee
**S&ME Project No. 211424**

# BORING LOG: B-07

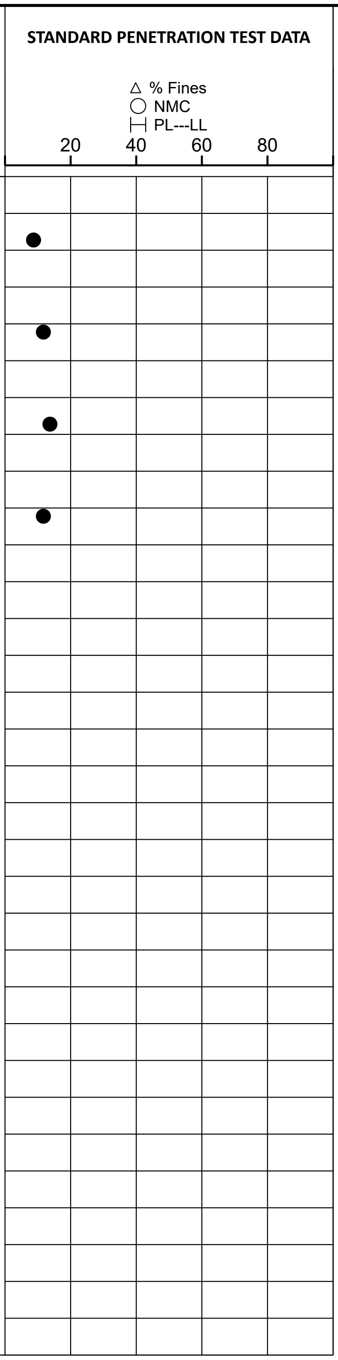
*Sheet 1 of 1*

**DATE DRILLED:** 05/03/2022
**ELEVATION:**
**DRILL RIG:** Diedrich D-50
**DATUM:** NAVD88
**DRILLER:** T Bunch
**BORING DEPTH:** 10.5 ft
**HAMMER TYPE:** Automatic hammer
**CLOSURE:** Cuttings with Hole Closure Device
**DRILLING METHOD:** 3-1/4" HSA
**LOGGED BY:** David Abston
**SAMPLING METHOD:** SS
**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Tennessee FIPS 4100 Feet

**NOTES:** Sample descriptions based on visual observation of obtained samples.

**LATITUDE:**
**LONGITUDE:**

| DEPTH (feet) | NOTES | Origin/Identifier | GRAPHIC | SAMPLE NO. (RECOVERY) | MATERIAL DESCRIPTION | BLOW COUNT DATA (SPT N-value) | ELEVATION |
|---|---|---|---|---|---|---|---|
| 0 | 0.2 | Residuum | | | TOPSOIL, 2 inches | | 0 |
| | | | | SS-01 | FAT CLAY (CH), trace sand, stiff, brown with tan, slightly moist to moist | 3-4-5<br>N = 9 | |
| | 3.8 | | | SS-02 | FAT CLAY (CH), little sand, stiff, red brown with dark brown, slightly moist | 5-5-7<br>N = 12 | |
| 5 | | | | | | | -5 |
| | 6.5 | | | SS-03 | FAT CLAY (CH), trace sand, stiff, red brown with tan, slightly moist to moist, black staining | 4-6-8<br>N = 14 | |
| | | | | SS-04 | | 5-5-7<br>N = 12 | |
| 10 | | | | | | | -10 |
| | Auger refusal at 10.5 feet 10.5 | | | | Borehole terminated at 10.5 feet | | |
| 15 | | | | | | | -15 |
| 20 | | | | | | | -20 |
| 25 | | | | | | | -25 |
| 30 | | | | | | | -30 |



| GROUNDWATER | | DATE | DEPTH (FT) | REMARKS |
|---|---|---|---|---|
| ATD | ▽ | 05/03/2022 | | not encountered |
| END OF DRILLING | ▼ | | | |
| AFTER DRILLING | ▼ | | | |
| AFTER DRILLING | ▼ | | | |

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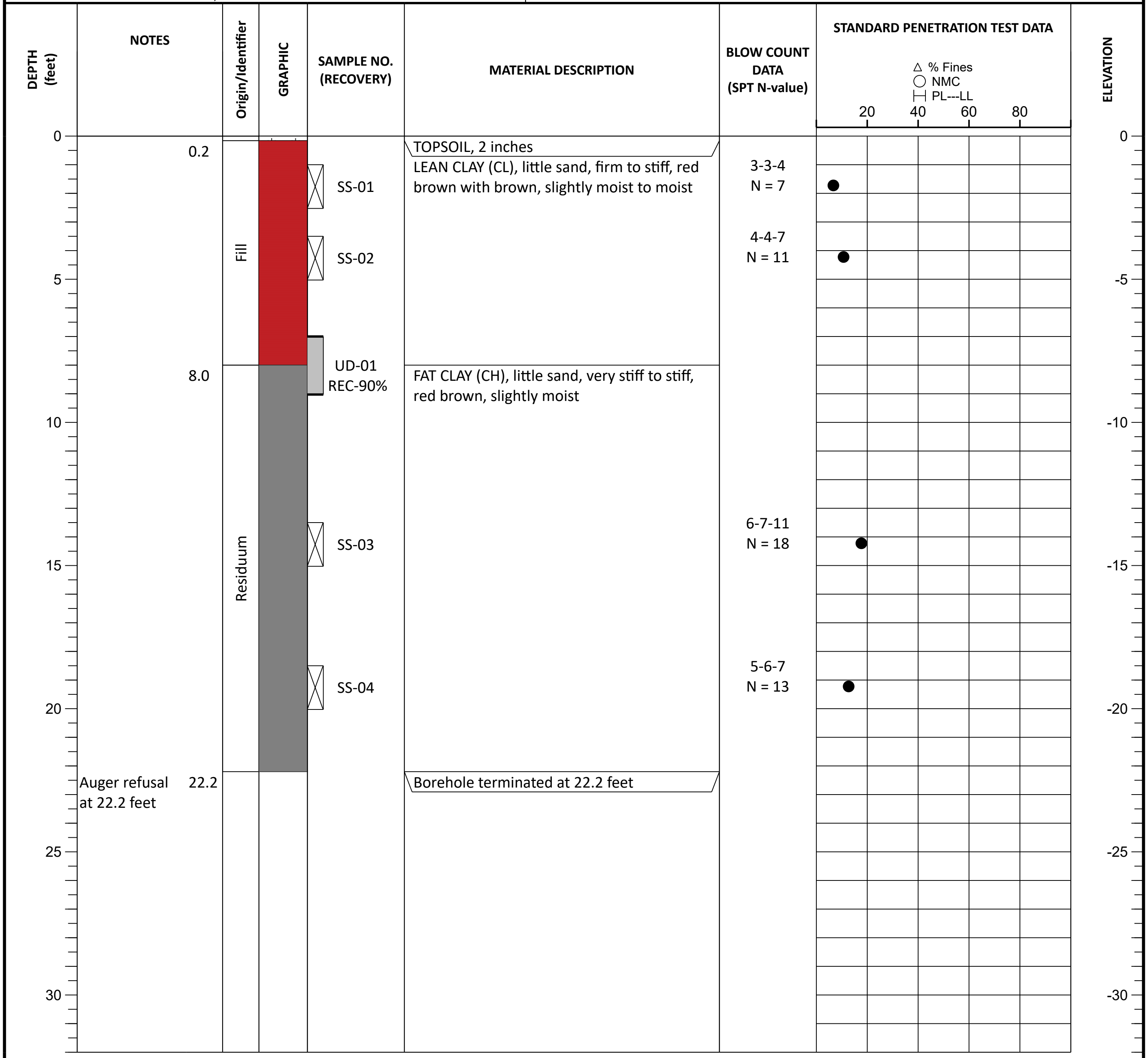
**AR = Auger Refusal**

| | | |
|---|---|---|
| **PROJECT:** | **David Jones Industrial Park**<br>**Anderson County, Tennessee**<br>**S&ME Project No. 211424** | **BORING LOG: B-08**<br>*Sheet 1 of 1* |

| | | |
|---|---|---|
| **DATE DRILLED:** 05/03/2022 | **ELEVATION:** | **NOTES:** Sample descriptions based on visual observation of obtained samples. |
| **DRILL RIG:** Diedrich D-50 | **DATUM:** NAVD88 | |
| **DRILLER:** T Bunch | **BORING DEPTH:** 22.2 ft | |
| **HAMMER TYPE:** Automatic hammer | **CLOSURE:** Cuttings with Hole Closure Device | |
| **DRILLING METHOD:** 3-1/4" HSA | **LOGGED BY:** David Abston | **LATITUDE:** **LONGITUDE:** |
| **SAMPLING METHOD:** UD, SS | **PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Tennessee FIPS 4100 Feet | |



| DEPTH (feet) | NOTES | Origin/Identifier | SAMPLE NO. (RECOVERY) | MATERIAL DESCRIPTION | BLOW COUNT DATA (SPT N-value) |
|---|---|---|---|---|---|
| 0.2 | | | | TOPSOIL, 2 inches | |
| | | Fill | SS-01 | LEAN CLAY (CL), little sand, firm to stiff, red brown with brown, slightly moist to moist | 3-3-4<br>N = 7 |
| | | Fill | SS-02 | | 4-4-7<br>N = 11 |
| | | Fill | UD-01<br>REC-90% | | |
| 8.0 | | Residuum | | FAT CLAY (CH), little sand, very stiff to stiff, red brown, slightly moist | |
| | | Residuum | SS-03 | | 6-7-11<br>N = 18 |
| | | Residuum | SS-04 | | 5-6-7<br>N = 13 |
| 22.2 | Auger refusal at 22.2 feet | | | Borehole terminated at 22.2 feet | |

| GROUNDWATER | | DATE | DEPTH (FT) | REMARKS |
|---|---|---|---|---|
| ATD | ▽ | 05/03/2022 | | not encountered |
| END OF DRILLING | ▼ | | | |
| AFTER DRILLING | ▼ | | | |
| AFTER DRILLING | ▼ | | | |

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**LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),**
**AR = Auger Refusal**

**PROJECT:**

David Jones Industrial Park
Anderson County, Tennessee
**S&ME Project No. 211424**

# BORING LOG: B-09

*Sheet 1 of 1*

**DATE DRILLED:** 05/02/2022

**ELEVATION:**

**NOTES:** Sample descriptions based on visual observation of obtained samples.

**DRILL RIG:** Diedrich D-50

**DATUM:** NAVD88

**DRILLER:** T Bunch

**BORING DEPTH:** 13.2 ft

**HAMMER TYPE:** Automatic hammer

**CLOSURE:** Cuttings with Hole Closure Device

**DRILLING METHOD:** 3-1/4" HSA

**LOGGED BY:** David Abston

**LATITUDE:**

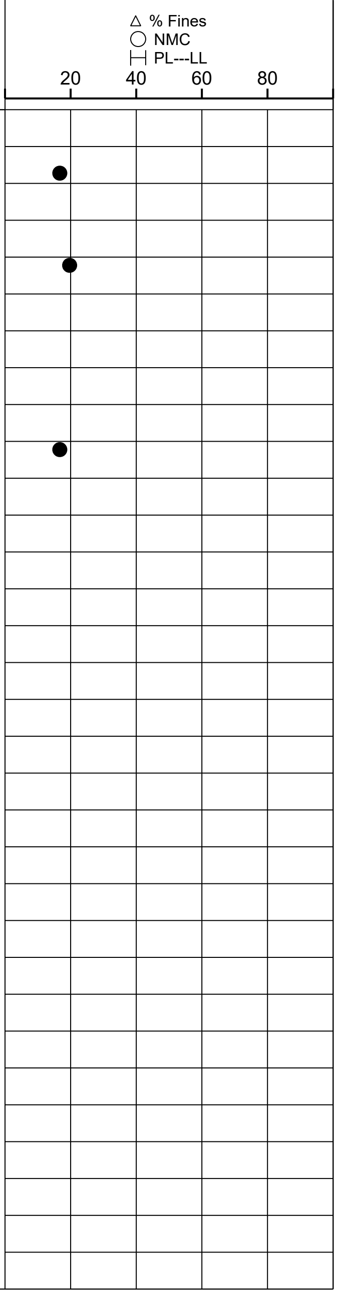
**LONGITUDE:**

**SAMPLING METHOD:** UD, SS

**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Tennessee FIPS 4100 Feet

| DEPTH (feet) | NOTES | | Origin/Identifier | GRAPHIC | SAMPLE NO. (RECOVERY) | MATERIAL DESCRIPTION | BLOW COUNT DATA (SPT N-value) | ELEVATION |
|---|---|---|---|---|---|---|---|---|
| 0 | | 0.2 | | | | TOPSOIL, 2 inches | | 0 |
| | | | Residuum | | SS-01 | FAT CLAY (CH), little sand, very stiff, red brown, slightly moist | 5-7-10<br>N = 17 | |
| | | | | | SS-02 | | 11-9-11<br>N = 20 | |
| 5 | | | | | | | | -5 |
| | | | | | UD-01<br>REC-100% | | | |
| | | | | | SS-03 | | 6-6-11<br>N = 17 | |
| 10 | | | | | | | | -10 |
| | Auger refusal at 13.2 feet | 13.2 | | | | Borehole terminated at 13.2 feet | | |
| 15 | | | | | | | | -15 |
| 20 | | | | | | | | -20 |
| 25 | | | | | | | | -25 |
| 30 | | | | | | | | -30 |

**STANDARD PENETRATION TEST DATA**



| GROUNDWATER | | DATE | DEPTH (FT) | REMARKS |
|---|---|---|---|---|
| ATD | | 05/02/2022 | | not encountered |
| END OF DRILLING | | | | |
| AFTER DRILLING | | | | |
| AFTER DRILLING | | | | |

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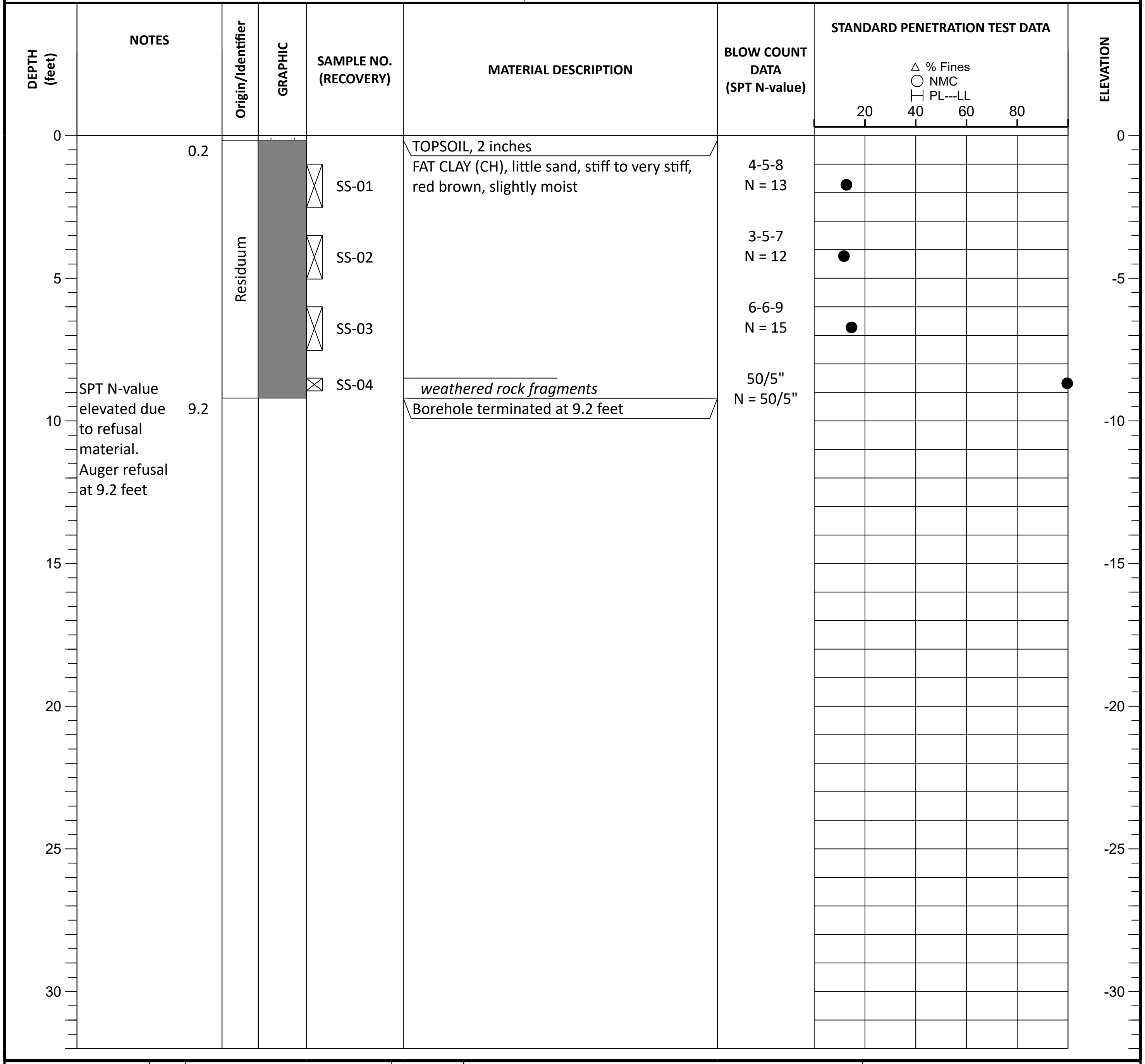
**AR = Auger Refusal**

**PROJECT:** David Jones Industrial Park
Anderson County, Tennessee
S&ME Project No. 211424

# BORING LOG: B-10

*Sheet 1 of 1*

**DATE DRILLED:** 05/02/2022
**DRILL RIG:** Diedrich D-50
**DRILLER:** T Bunch
**HAMMER TYPE:** Automatic hammer
**DRILLING METHOD:** 3-1/4" HSA
**SAMPLING METHOD:** SS
**ELEVATION:**
**DATUM:** NAVD88
**BORING DEPTH:** 9.2 ft
**CLOSURE:** Cuttings with Hole Closure Device
**LOGGED BY:** David Abston
**NOTES:** Sample descriptions based on visual observation of obtained samples.
**LATITUDE:**
**LONGITUDE:**
**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Tennessee FIPS 4100 Feet



| DEPTH (feet) | NOTES | Origin/Identifier | SAMPLE NO. (RECOVERY) | MATERIAL DESCRIPTION | BLOW COUNT DATA (SPT N-value) |
|---|---|---|---|---|---|
| 0 | | | | TOPSOIL, 2 inches | |
| 0.2 | 0.2 | Residuum | SS-01 | FAT CLAY (CH), little sand, stiff to very stiff, red brown, slightly moist | 4-5-8<br>N = 13 |
| | | | SS-02 | | 3-5-7<br>N = 12 |
| | | | SS-03 | | 6-6-9<br>N = 15 |
| | SPT N-value elevated due to refusal material. Auger refusal at 9.2 feet | | SS-04 | *weathered rock fragments* | 50/5"<br>N = 50/5" |
| 9.2 | 9.2 | | | Borehole terminated at 9.2 feet | |

| GROUNDWATER | | DATE | DEPTH (FT) | REMARKS |
|---|---|---|---|---|
| ATD | ▽ | 05/02/2022 | | not encountered |
| END OF DRILLING | ▼ | | | |
| AFTER DRILLING | ▼ | | | |
| AFTER DRILLING | ▼ | | | |

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**AR = Auger Refusal**

**PROJECT:** David Jones Industrial Park
Anderson County, Tennessee
**S&ME Project No. 211424**

# BORING LOG: B-11

*Sheet 1 of 1*

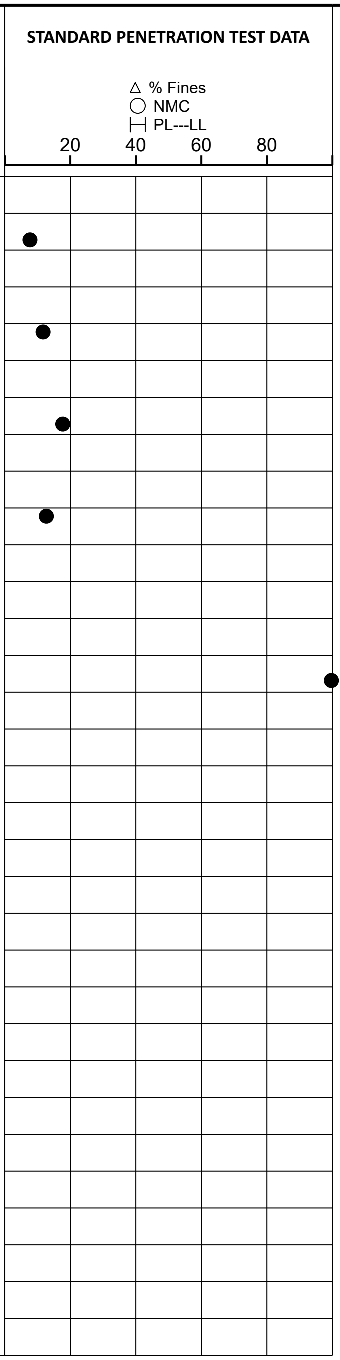
| | |
|---|---|
| **DATE DRILLED:** 05/03/2022 | **ELEVATION:** |
| **DRILL RIG:** Diedrich D-50 | **DATUM:** NAVD88 |
| **DRILLER:** T Bunch | **BORING DEPTH:** 14.0 ft |
| **HAMMER TYPE:** Automatic hammer | **CLOSURE:** Cuttings with Hole Closure Device |
| **DRILLING METHOD:** 3-1/4" HSA | **LOGGED BY:** David Abston |
| **SAMPLING METHOD:** SS | **PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Tennessee FIPS 4100 Feet |

**NOTES:** Sample descriptions based on visual observation of obtained samples.

**LATITUDE:**

**LONGITUDE:**

| DEPTH (feet) | NOTES | Origin/Identifier | SAMPLE NO. (RECOVERY) | MATERIAL DESCRIPTION | BLOW COUNT DATA (SPT N-value) |
|---|---|---|---|---|---|
| 0.2 | | | | TOPSOIL, 2 inches | |
| 2.0 | | Residuum | SS-01 | FAT CLAY (CH), trace sand, firm, brown, moist | 4-3-5<br>N = 8 |
| | | | SS-02 | FAT CLAY (CH), little sand, stiff to very stiff, red brown, slightly moist | 4-5-7<br>N = 12 |
| | | | SS-03 | | 6-8-10<br>N = 18 |
| | | | SS-04 | | 5-6-7<br>N = 13 |
| | SPT N-value elevated due to refusal material. | | SS-05 | | 50/5"<br>N = 50/5" |
| 14.0 | Auger refusal at 14.0 feet | | | Borehole terminated at 14.0 feet | |



| GROUNDWATER | | DATE | DEPTH (FT) | REMARKS |
|---|---|---|---|---|
| ATD | ▽ | 05/03/2022 | | not encountered |
| END OF DRILLING | ▼ | | | |
| AFTER DRILLING | ▼ | | | |
| AFTER DRILLING | ▼ | | | |

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**AR = Auger Refusal**

**PROJECT:**

David Jones Industrial Park
Anderson County, Tennessee
**S&ME Project No. 211424**

# BORING LOG: B-12

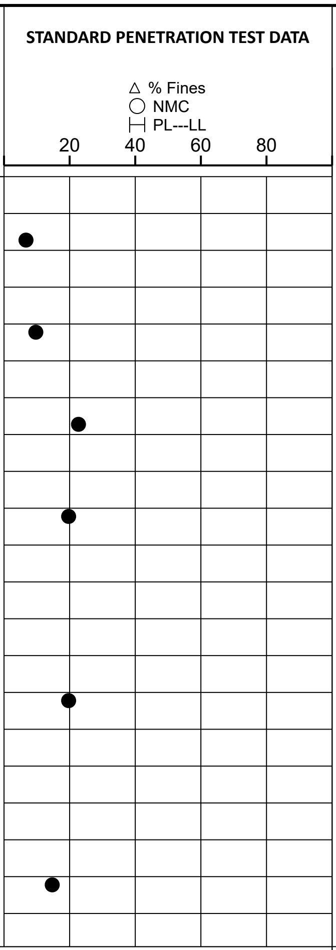
*Sheet 1 of 1*

| | |
|---|---|
| **DATE DRILLED:** 05/04/2022 | **ELEVATION:** |
| **DRILL RIG:** Diedrich D-50 | **DATUM:** NAVD88 |
| **DRILLER:** T Bunch | **BORING DEPTH:** 30.9 ft |
| **HAMMER TYPE:** Automatic hammer | **CLOSURE:** Cuttings with Hole Closure Device |
| **DRILLING METHOD:** 3-1/4" HSA, NQ | **LOGGED BY:** David Abston |
| **SAMPLING METHOD:** SS, CORE | **PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Tennessee FIPS 4100 Feet |

**NOTES:** Sample descriptions based on visual observation of obtained samples.

**LATITUDE:** **LONGITUDE:**

| DEPTH (feet) | NOTES | Origin/Identifier | SAMPLE NO. (RECOVERY) | MATERIAL DESCRIPTION | BLOW COUNT DATA (SPT N-value) | ELEVATION |
|---|---|---|---|---|---|---|
| 0 | 0.2 | Residuum | | TOPSOIL, 2 inches | | 0 |
| | | | SS-01 | FAT CLAY (CH), little sand, firm to very stiff, red brown, slightly moist | 3-3-4<br>N = 7 | |
| 5 | | | SS-02 | | 4-4-6<br>N = 10 | -5 |
| | | | SS-03 | | 7-10-13<br>N = 23 | |
| 10 | | | SS-04 | | 6-7-13<br>N = 20 | -10 |
| 15 | | | SS-05 | | 7-8-12<br>N = 20 | -15 |
| 20 | | | SS-06 | | 6-6-9<br>N = 15 | -20 |
| | Auger refusal at 20.9 feet | 20.9 | Run-01<br>REC-74%<br>RQD-11% | LIMESTONE AND DOLOMITE, blue gray and gray, thinly interbedded, fair quality, fine grained, close jointed, 10°, slightly weathered, very hard | | |
| | | 23.6 | | Open void | | |
| 25 | | 24.0 | Run-02<br>REC-100%<br>RQD-68% | LIMESTONE AND DOLOMITE, blue gray and gray, thinly interbedded, fair quality, fine grained, close jointed, 10°, slightly weathered, very hard | | -25 |
| 30 | | 31.0 | Run-03<br>REC-65%<br>RQD-65% | Borehole terminated at 30.9 feet | | -30 |



| GROUNDWATER | | DATE | DEPTH (FT) | REMARKS |
|---|---|---|---|---|
| ATD | ▽ | 05/04/2022 | | not encountered |
| END OF DRILLING | ▼ | | | |
| AFTER DRILLING | ▼ | | | |
| AFTER DRILLING | ▼ | | | |

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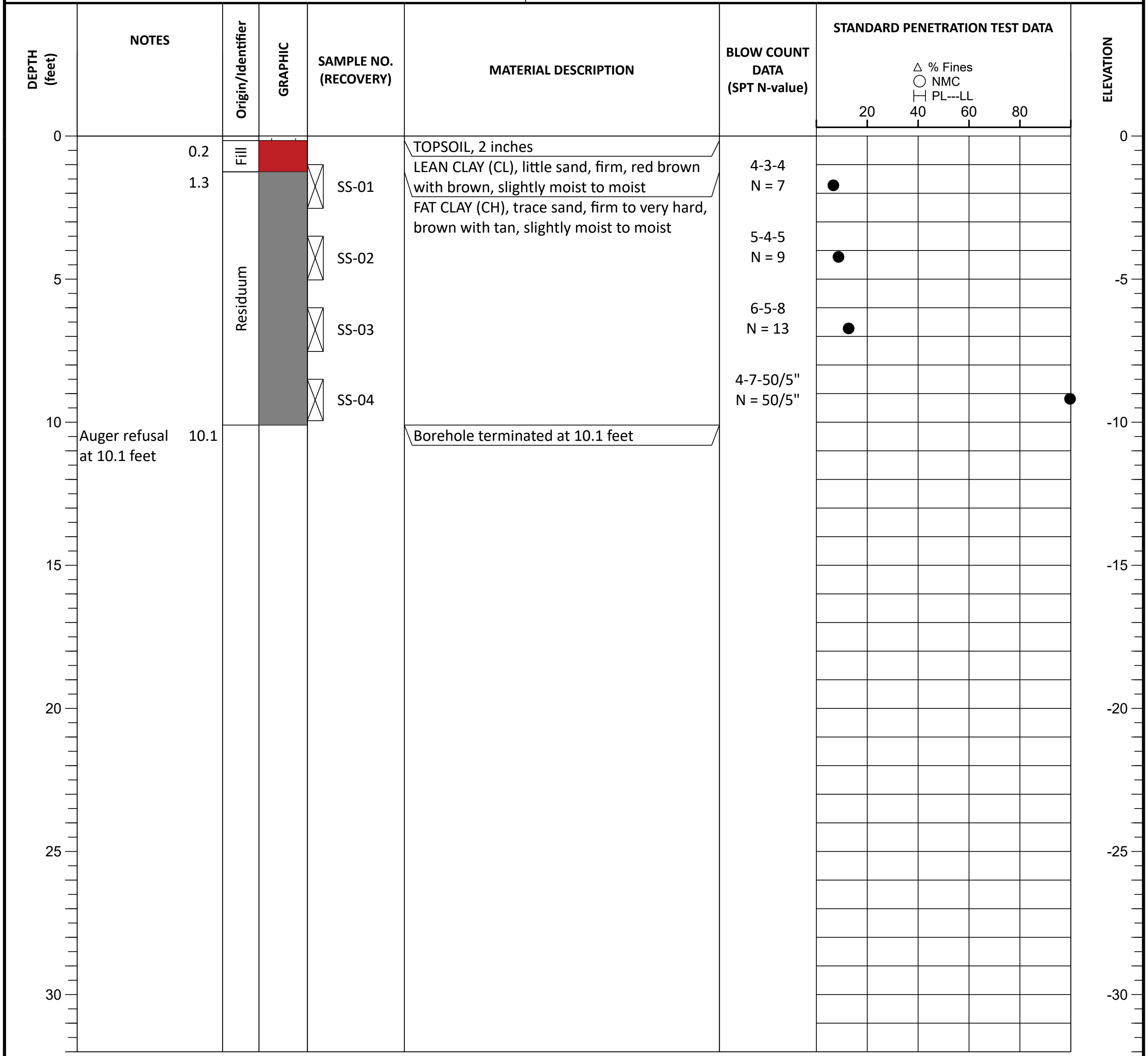
**AR = Auger Refusal**

**PROJECT:** David Jones Industrial Park
Anderson County, Tennessee
**S&ME Project No. 211424**

# BORING LOG: B-13

*Sheet 1 of 1*

| | | |
|---|---|---|
| **DATE DRILLED:** 05/02/2022 | **ELEVATION:** | **NOTES:** Sample descriptions based on visual observation of obtained samples. |
| **DRILL RIG:** Diedrich D-50 | **DATUM:** NAVD88 | |
| **DRILLER:** T Bunch | **BORING DEPTH:** 10.1 ft | |
| **HAMMER TYPE:** Automatic hammer | **CLOSURE:** Cuttings with Hole Closure Device | |
| **DRILLING METHOD:** 3-1/4" HSA | **LOGGED BY:** David Abston | **LATITUDE:** **LONGITUDE:** |
| **SAMPLING METHOD:** SS | **PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Tennessee FIPS 4100 Feet | |



| NOTES | Depth | SAMPLE NO. (RECOVERY) | MATERIAL DESCRIPTION | BLOW COUNT DATA (SPT N-value) |
|---|---|---|---|---|
| | 0.2 | | TOPSOIL, 2 inches | |
| | 1.3 | SS-01 | LEAN CLAY (CL), little sand, firm, red brown with brown, slightly moist to moist | 4-3-4<br>N = 7 |
| | | SS-02 | FAT CLAY (CH), trace sand, firm to very hard, brown with tan, slightly moist to moist | 5-4-5<br>N = 9 |
| | | SS-03 | | 6-5-8<br>N = 13 |
| | | SS-04 | | 4-7-50/5"<br>N = 50/5" |
| Auger refusal at 10.1 feet | 10.1 | | Borehole terminated at 10.1 feet | |

| GROUNDWATER | | DATE | DEPTH (FT) | REMARKS |
|---|---|---|---|---|
| ATD | ▽ | 05/02/2022 | | not encountered |
| END OF DRILLING | ▼ | | | |
| AFTER DRILLING | ▼ | | | |
| AFTER DRILLING | ▼ | | | |

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**AR = Auger Refusal**

| | |
|---|---|
| **PROJECT:** | David Jones Industrial Park<br>Anderson County, Tennessee<br>**S&ME Project No. 211424** |

# BORING LOG: B-14

*Sheet 1 of 1*

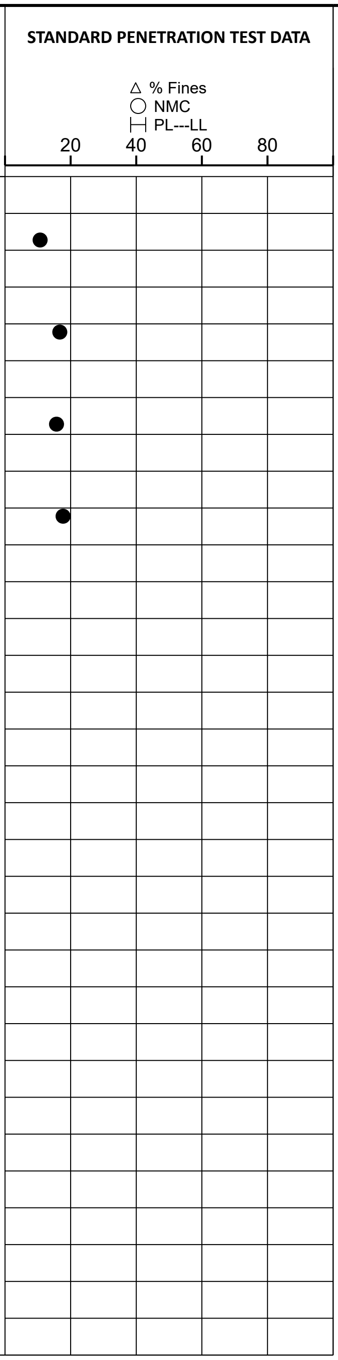
| | |
|---|---|
| **DATE DRILLED:** 05/03/2022 | **ELEVATION:** |
| **DRILL RIG:** Diedrich D-50 | **DATUM:** NAVD88 |
| **DRILLER:** T Bunch | **BORING DEPTH:** 12.4 ft |
| **HAMMER TYPE:** Automatic hammer | **CLOSURE:** Cuttings with Hole Closure Device |
| **DRILLING METHOD:** 3-1/4" HSA | **LOGGED BY:** David Abston |
| **SAMPLING METHOD:** SS | **PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Tennessee FIPS 4100 Feet |

**NOTES:** Sample descriptions based on visual observation of obtained samples.

**LATITUDE:**

**LONGITUDE:**

| DEPTH (feet) | NOTES | Origin/Identifier | SAMPLE NO. (RECOVERY) | MATERIAL DESCRIPTION | BLOW COUNT DATA (SPT N-value) | ELEVATION |
|---|---|---|---|---|---|---|
| 0 | 0.2 | Residuum | | TOPSOIL, 2 inches | | 0 |
| | | | SS-01 | FAT CLAY (CH), little sand and gravel, stiff to very stiff, red brown, slightly moist | 3-5-6<br>N = 11 | |
| | | | SS-02 | | 6-7-10<br>N = 17 | |
| 5 | | | | | | -5 |
| | | | SS-03 | | 4-6-10<br>N = 16 | |
| | 7.0 | | | FAT CLAY (CH), trace sand, very stiff, brown with tan, slightly moist to moist | | |
| | | | SS-04 | | 4-5-13<br>N = 18 | |
| 10 | | | | | | -10 |
| | Auger refusal at 12.4 feet 12.4 | | | Borehole terminated at 12.4 feet | | |
| 15 | | | | | | -15 |
| 20 | | | | | | -20 |
| 25 | | | | | | -25 |
| 30 | | | | | | -30 |



| GROUNDWATER | | DATE | DEPTH (FT) | REMARKS |
|---|---|---|---|---|
| ATD | ▽ | 05/03/2022 | | not encountered |
| END OF DRILLING | ▼ | | | |
| AFTER DRILLING | ▼ | | | |
| AFTER DRILLING | ▼ | | | |

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**AR = Auger Refusal**

**PROJECT:** David Jones Industrial Park
Anderson County, Tennessee
S&ME Project No. 211424

# BORING LOG: B-15

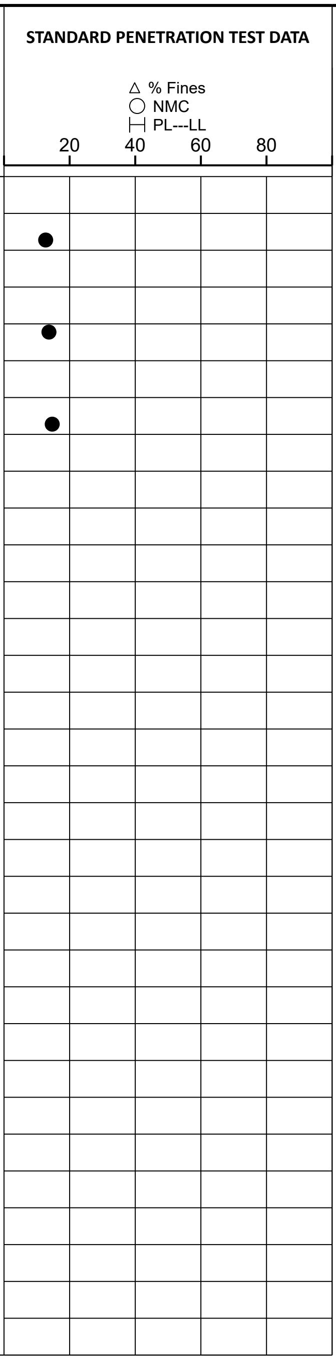
*Sheet 1 of 1*

| | |
|---|---|
| **DATE DRILLED:** 05/04/2022 | **ELEVATION:** |
| **DRILL RIG:** Diedrich D-50 | **DATUM:** NAVD88 |
| **DRILLER:** T Bunch | **BORING DEPTH:** 13.2 ft |
| **HAMMER TYPE:** Automatic hammer | **CLOSURE:** Cuttings with Hole Closure Device |
| **DRILLING METHOD:** 3-1/4" HSA | **LOGGED BY:** David Abston |
| **SAMPLING METHOD:** SS, UD | **PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Tennessee FIPS 4100 Feet |

**NOTES:** Sample descriptions based on visual observation of obtained samples.

**LATITUDE:**
**LONGITUDE:**

| DEPTH (feet) | NOTES | Origin/Identifier | SAMPLE NO. (RECOVERY) | MATERIAL DESCRIPTION | BLOW COUNT DATA (SPT N-value) | ELEVATION |
|---|---|---|---|---|---|---|
| 0.2 | | | | TOPSOIL, 2 inches | | |
| | | Residuum | SS-01 | FAT CLAY (CH), trace sand and gravel, stiff, red brown, slightly moist | 4-5-8<br>N = 13 | |
| | | | SS-02 | | 5-6-8<br>N = 14 | |
| | | | SS-03 | | 4-6-9<br>N = 15 | |
| | | | UD-01<br>REC-100% | | | |
| 13.2 | Auger refusal at 13.2 feet | | | Borehole terminated at 13.2 feet | | |



| GROUNDWATER | | DATE | DEPTH (FT) | REMARKS |
|---|---|---|---|---|
| ATD | ▽ | 05/04/2022 | | not encountered |
| END OF DRILLING | ▼ | | | |
| AFTER DRILLING | ▼ | | | |
| AFTER DRILLING | ▼ | | | |

**GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING**
**LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),**
**AR = Auger Refusal**

**PROJECT:**

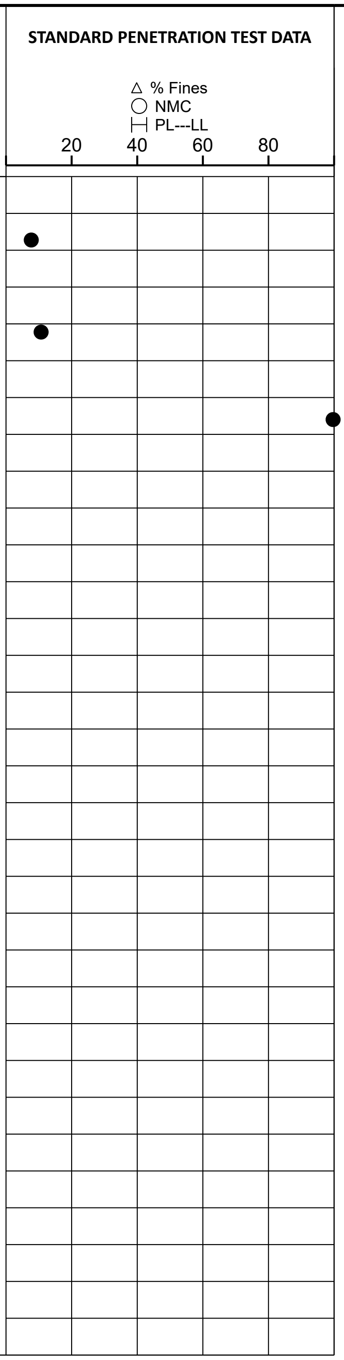
David Jones Industrial Park
Anderson County, Tennessee
**S&ME Project No. 211424**

# BORING LOG: B-16

*Sheet 1 of 1*

| | | | |
|---|---|---|---|
| **DATE DRILLED:** 05/03/2022 | **ELEVATION:** | **NOTES:** Sample descriptions based on visual observation of obtained samples. | |
| **DRILL RIG:** Diedrich D-50 | **DATUM:** NAVD88 | | |
| **DRILLER:** T Bunch | **BORING DEPTH:** 7.5 ft | | |
| **HAMMER TYPE:** Automatic hammer | **CLOSURE:** Cuttings with Hole Closure Device | | |
| **DRILLING METHOD:** 3-1/4" HSA | **LOGGED BY:** David Abston | **LATITUDE:** | **LONGITUDE:** |
| **SAMPLING METHOD:** SS | **PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Tennessee FIPS 4100 Feet | | |

| DEPTH (feet) | NOTES | Origin/Identifier | GRAPHIC | SAMPLE NO. (RECOVERY) | MATERIAL DESCRIPTION | BLOW COUNT DATA (SPT N-value) | ELEVATION |
|---|---|---|---|---|---|---|---|
| 0 | 0.2 | | | | TOPSOIL, 2 inches | | 0 |
| | | Residuum | ▨ | SS-01 | FAT CLAY (CH), little sand, stiff, orange brown and tan, slightly moist | 5-3-5<br>N = 8 | |
| 5 | | | | SS-02 | | 4-5-6<br>N = 11 | -5 |
| | SPT N-value elevated due to refusal material<br>Auger refusal at 7.5 feet | | | SS-03 | *weathered rock fragments* | 9-10-50/3"<br>N = 50/3" | |
| | 7.5 | | | | Borehole terminated at 7.5 feet | | |
| 10 | | | | | | | -10 |
| 15 | | | | | | | -15 |
| 20 | | | | | | | -20 |
| 25 | | | | | | | -25 |
| 30 | | | | | | | -30 |



| GROUNDWATER | | DATE | DEPTH (FT) | REMARKS |
|---|---|---|---|---|
| ATD | ▽ | 05/04/2022 | | not encountered |
| END OF DRILLING | ▼ | | | |
| AFTER DRILLING | ▼ | | | |
| AFTER DRILLING | ▼ | | | |

**GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING**
**LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),**
**AR = Auger Refusal**

**PROJECT:** David Jones Industrial Park
Anderson County, Tennessee
S&ME Project No. 211424

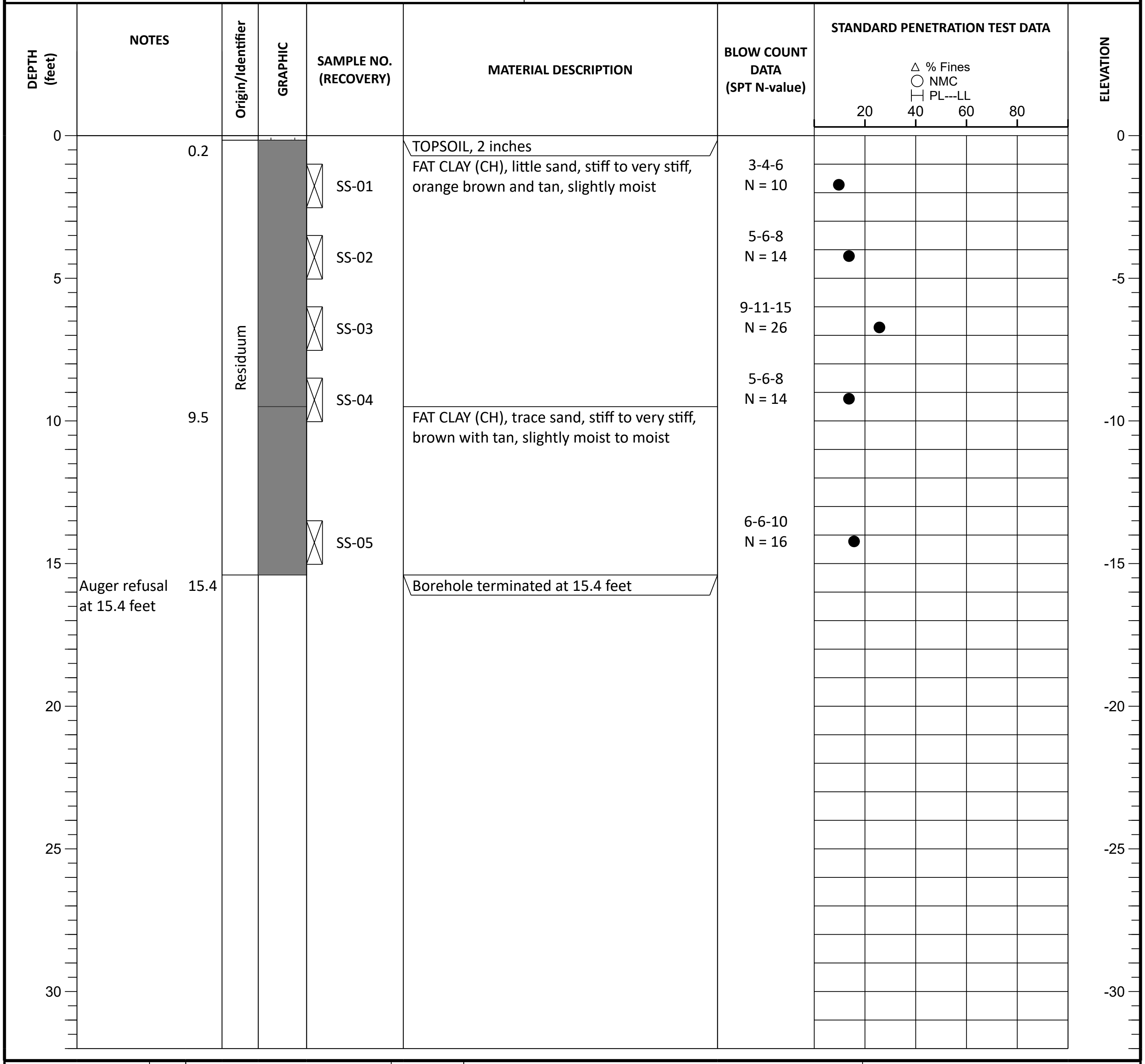
# BORING LOG: B-17

*Sheet 1 of 1*

**DATE DRILLED:** 05/02/2022
**ELEVATION:**
**DRILL RIG:** Diedrich D-50
**DATUM:** NAVD88
**DRILLER:** T Bunch
**BORING DEPTH:** 15.4 ft
**HAMMER TYPE:** Automatic hammer
**CLOSURE:** Cuttings with Hole Closure Device
**DRILLING METHOD:** 3-1/4" HSA
**LOGGED BY:** David Abston
**SAMPLING METHOD:** SS
**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Tennessee FIPS 4100 Feet

**NOTES:** Sample descriptions based on visual observation of obtained samples.

**LATITUDE:**
**LONGITUDE:**



| DEPTH (feet) | NOTES | Origin/Identifier | SAMPLE NO. (RECOVERY) | MATERIAL DESCRIPTION | BLOW COUNT DATA (SPT N-value) |
|---|---|---|---|---|---|
| 0.2 | | Residuum | | TOPSOIL, 2 inches | |
| | | | SS-01 | FAT CLAY (CH), little sand, stiff to very stiff, orange brown and tan, slightly moist | 3-4-6<br>N = 10 |
| | | | SS-02 | | 5-6-8<br>N = 14 |
| | | | SS-03 | | 9-11-15<br>N = 26 |
| | | | SS-04 | | 5-6-8<br>N = 14 |
| 9.5 | | | | FAT CLAY (CH), trace sand, stiff to very stiff, brown with tan, slightly moist to moist | |
| | | | SS-05 | | 6-6-10<br>N = 16 |
| 15.4 | Auger refusal at 15.4 feet | | | Borehole terminated at 15.4 feet | |

| GROUNDWATER | | DATE | DEPTH (FT) | REMARKS |
|---|---|---|---|---|
| ATD | ▽ | 05/02/2022 | | not encountered |
| END OF DRILLING | ▼ | | | |
| AFTER DRILLING | ▼ | | | |
| AFTER DRILLING | ▼ | | | |

**GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING**
**LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal**

**PROJECT:** David Jones Industrial Park
Anderson County, Tennessee
**S&ME Project No. 211424**

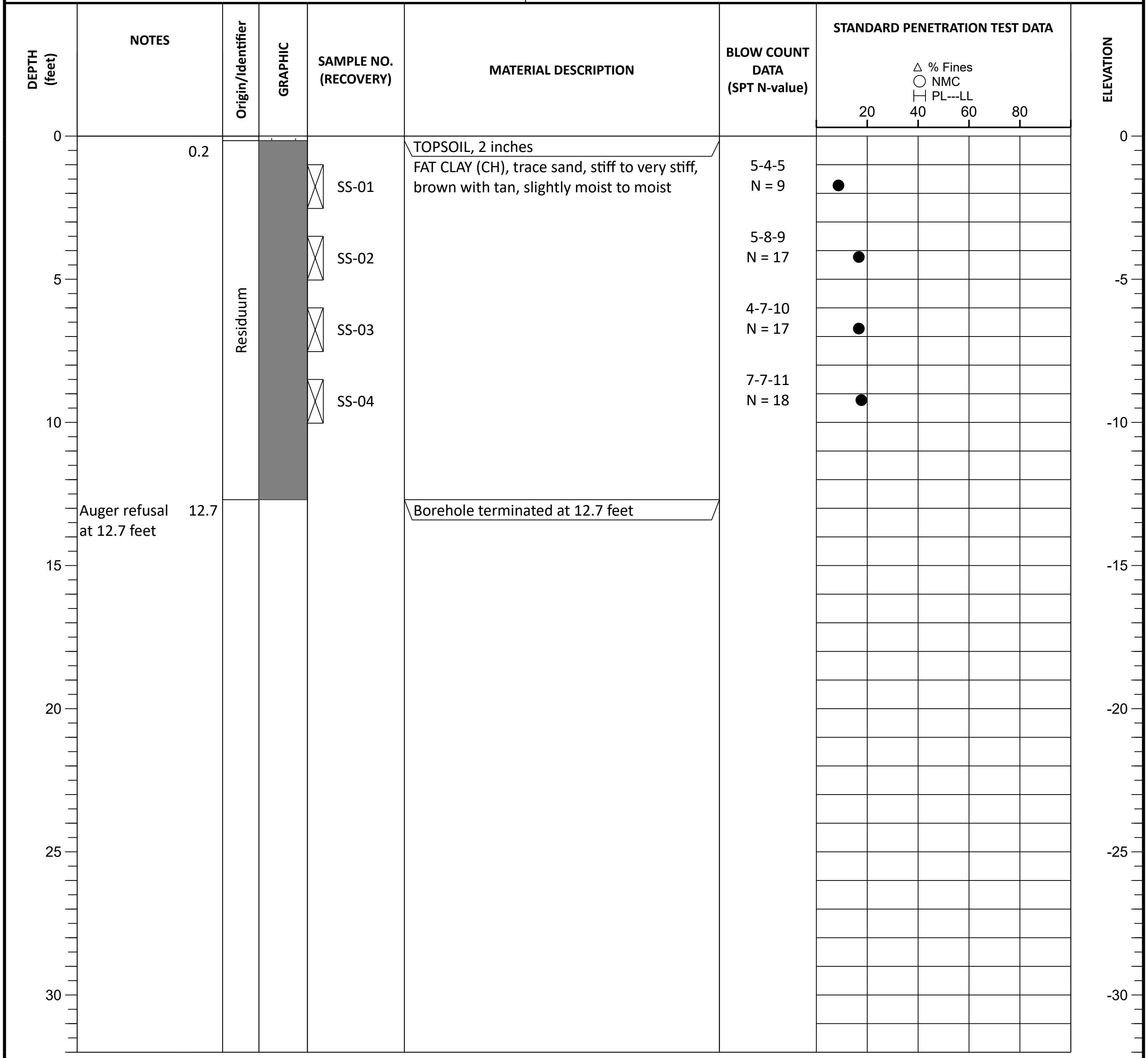
## BORING LOG: B-18

*Sheet 1 of 1*

**DATE DRILLED:** 05/03/2022
**ELEVATION:**
**DRILL RIG:** Diedrich D-50
**DATUM:** NAVD88
**DRILLER:** T Bunch
**BORING DEPTH:** 12.7 ft
**HAMMER TYPE:** Automatic hammer
**CLOSURE:** Cuttings with Hole Closure Device
**DRILLING METHOD:** 3-1/4" HSA
**LOGGED BY:** David Abston
**SAMPLING METHOD:** SS
**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Tennessee FIPS 4100 Feet

**NOTES:** Sample descriptions based on visual observation of obtained samples.

**LATITUDE:**
**LONGITUDE:**



| NOTES | Origin/Identifier | GRAPHIC | SAMPLE NO. (RECOVERY) | MATERIAL DESCRIPTION | BLOW COUNT DATA (SPT N-value) |
|---|---|---|---|---|---|
| 0.2 | | | | TOPSOIL, 2 inches | |
| | Residuum | | SS-01 | FAT CLAY (CH), trace sand, stiff to very stiff, brown with tan, slightly moist to moist | 5-4-5<br>N = 9 |
| | | | SS-02 | | 5-8-9<br>N = 17 |
| | | | SS-03 | | 4-7-10<br>N = 17 |
| | | | SS-04 | | 7-7-11<br>N = 18 |
| Auger refusal at 12.7 feet 12.7 | | | | Borehole terminated at 12.7 feet | |

| GROUNDWATER | | DATE | DEPTH (FT) | REMARKS |
|---|---|---|---|---|
| ATD | ▽ | 05/03/2022 | | not encountered |
| END OF DRILLING | ▼ | | | |
| AFTER DRILLING | ▼ | | | |
| AFTER DRILLING | ▼ | | | |

**GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING**
**LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),**
**AR = Auger Refusal**

**PROJECT:** David Jones Industrial Park
Anderson County, Tennessee
**S&ME Project No. 211424**

# BORING LOG: B-19

*Sheet 1 of 1*

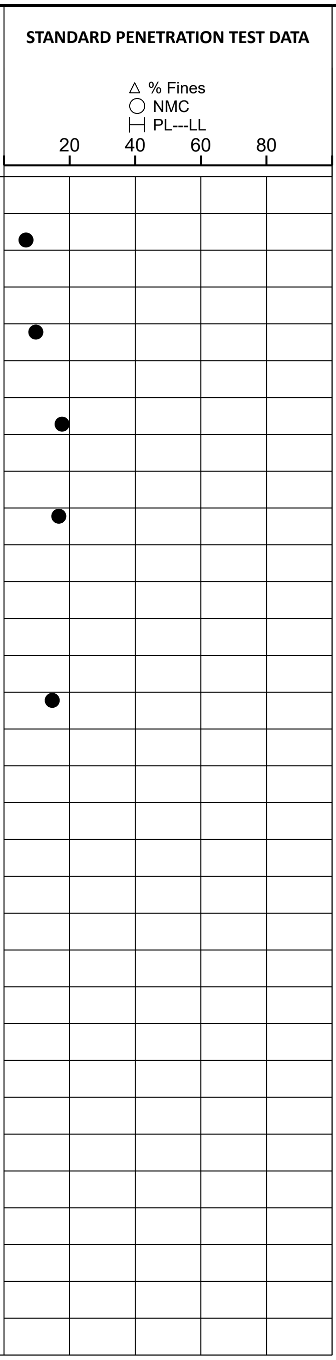
| | |
|---|---|
| **DATE DRILLED:** 05/02/2022 | **ELEVATION:** |
| **DRILL RIG:** Diedrich D-50 | **DATUM:** NAVD88 |
| **DRILLER:** T Bunch | **BORING DEPTH:** 15.4 ft |
| **HAMMER TYPE:** Automatic hammer | **CLOSURE:** Cuttings with Hole Closure Device |
| **DRILLING METHOD:** 3-1/4" HSA | **LOGGED BY:** David Abston |
| **SAMPLING METHOD:** SS | **PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Tennessee FIPS 4100 Feet |

**NOTES:** Sample descriptions based on visual observation of obtained samples.

**LATITUDE:**

**LONGITUDE:**

| DEPTH (feet) | NOTES | Origin/Identifier | SAMPLE NO. (RECOVERY) | MATERIAL DESCRIPTION | BLOW COUNT DATA (SPT N-value) | ELEVATION |
|---|---|---|---|---|---|---|
| 0 | 0.2 | | | TOPSOIL, 2 inches | | 0 |
| | | Residuum | SS-01 | FAT CLAY (CH), little sand, firm to stiff, orange brown and tan, slightly moist | 4-3-4<br>N = 7 | |
| 5 | | Residuum | SS-02 | | 3-4-6<br>N = 10 | -5 |
| | 6.0 | Residuum | SS-03 | FAT CLAY (CH), with weathered rock fragments, little sand, very stiff to stiff, orange brown and tan, slightly moist | 6-7-11<br>N = 18 | |
| 10 | | Residuum | SS-04 | | 9-7-10<br>N = 17 | -10 |
| 15 | | Residuum | SS-05 | | 6-6-9<br>N = 15 | -15 |
| | Auger refusal at 15.4 feet 15.4 | | | Borehole terminated at 15.4 feet | | |
| 20 | | | | | | -20 |
| 25 | | | | | | -25 |
| 30 | | | | | | -30 |

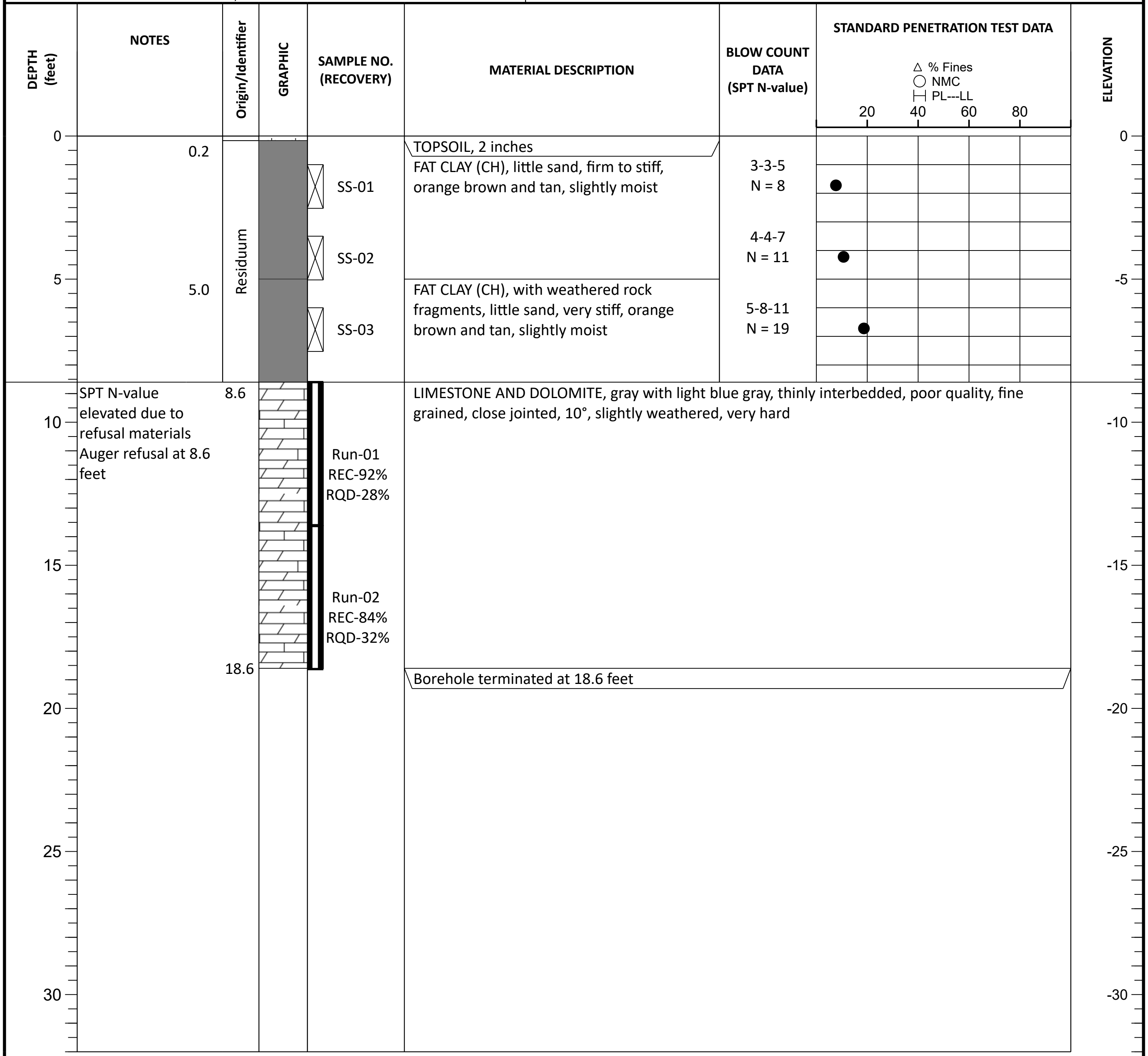


| GROUNDWATER | | DATE | DEPTH (FT) | REMARKS |
|---|---|---|---|---|
| ATD | ▽ | 05/04/2022 | | not encountered |
| END OF DRILLING | ▼ | | | |
| AFTER DRILLING | ▼ | | | |
| AFTER DRILLING | ▼ | | | |

**GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING**
**LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),**
**AR = Auger Refusal**

| | | |
|---|---|---|
| **PROJECT:** | David Jones Industrial Park<br>Anderson County, Tennessee<br>S&ME Project No. 211424 | **BORING LOG: B-20**<br>*Sheet 1 of 1* |

| | | |
|---|---|---|
| **DATE DRILLED:** 05/09/2022 | **ELEVATION:** | **NOTES:** Sample descriptions based on visual observation of obtained samples. |
| **DRILL RIG:** Diedrich D-50 | **DATUM:** NAVD88 | |
| **DRILLER:** T Bunch | **BORING DEPTH:** 18.6 ft | |
| **HAMMER TYPE:** Automatic hammer | **CLOSURE:** Cuttings with Hole Closure Device | |
| **DRILLING METHOD:** 3-1/4" HSA, NQ | **LOGGED BY:** David Abston | **LATITUDE:** **LONGITUDE:** |
| **SAMPLING METHOD:** CORE, SS | **PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Tennessee FIPS 4100 Feet | |



| DEPTH (feet) | NOTES | Origin/Identifier | SAMPLE NO. (RECOVERY) | MATERIAL DESCRIPTION | BLOW COUNT DATA (SPT N-value) |
|---|---|---|---|---|---|
| 0.2 | | | | TOPSOIL, 2 inches | |
| | | Residuum | SS-01 | FAT CLAY (CH), little sand, firm to stiff, orange brown and tan, slightly moist | 3-3-5<br>N = 8 |
| | | | SS-02 | | 4-4-7<br>N = 11 |
| 5.0 | | | SS-03 | FAT CLAY (CH), with weathered rock fragments, little sand, very stiff, orange brown and tan, slightly moist | 5-8-11<br>N = 19 |
| 8.6 | SPT N-value elevated due to refusal materials<br>Auger refusal at 8.6 feet | | Run-01<br>REC-92%<br>RQD-28% | LIMESTONE AND DOLOMITE, gray with light blue gray, thinly interbedded, poor quality, fine grained, close jointed, 10°, slightly weathered, very hard | |
| | | | Run-02<br>REC-84%<br>RQD-32% | | |
| 18.6 | | | | Borehole terminated at 18.6 feet | |

| GROUNDWATER | | DATE | DEPTH (FT) | REMARKS |
|---|---|---|---|---|
| ATD | ▽ | 05/09/2022 | | not encountered |
| END OF DRILLING | ▼ | | | |
| AFTER DRILLING | ▼ | | | |
| AFTER DRILLING | ▼ | | | |

**GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING**
**LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),**
**AR = Auger Refusal**

# TEST BORING LOG LEGEND

## FINE AND COARSE GRAINED SOIL INFORMATION

### COARSE GRAINED SOILS
(SANDS AND GRAVELS)

| N | Relative Density |
|---|---|
| 0-4 | Very Loose |
| 5-10 | Loose |
| 11-30 | Medium Dense |
| 31-50 | Dense |
| Over 50 | Very Dense |

### FINE GRAINED SOILS
(CLAYS AND SILTS)

| N | Consistency | PPV, tsf |
|---|---|---|
| 0-2 | Very Soft | 0.0-0.25 |
| 3-4 | Soft | 0.25-0.5 |
| 5-8 | Firm | 0.5-1.0 |
| 9-15 | Stiff | 1.0-2.0 |
| 16-30 | Very Stiff | 2.0-4.0 |
| Over 30 | Hard | 4.0+ |

### PARTICLE SIZE

| | |
|---|---|
| **Boulders** | Greater than 300 mm (12”) |
| **Cobbles** | 75 mm—300 mm (3-12”) |
| **Gravel** | 4.75 mm—75 mm (3/16-3”) |
| **Coarse Sand** | 2 mm—4.74 mm |
| **Medium Sand** | .425 mm—2 mm |
| **Fine Sand** | 0.075 mm—0.425 mm |
| **Silts and Clays** | Less than 0.075 mm |

The STANDARD PENETRATION TEST as defined by ASTM D 1586 is a method to obtain a disturbed soil sample for examination and testing and to obtain relative density and consistency information. A standard 1.4-inch I.D. / 2.0-inch O.D. split barrel sampler is driven three 6-inch increments with a 140 lb. hammer falling 30 inches. The hammer can either be of a trip, free-fall design, or actuated by a rope and cathead. The blow counts required to drive the sampler the final two 6-inch increments are added together and designated the N-value defined in the above tables.

## ROCK PROPERTIES

### RQD

| Percent RQD | Quality |
|---|---|
| 0-25 | Very Poor |
| 25-50 | Poor |
| 50-75 | Fair |
| 75-90 | Good |
| 90-100 | Excellent |

### ROCK HARDNESS

| | |
|---|---|
| **Very Hard** | Rock can be broken by heavy hammer blows. |
| **Hard** | Rock cannot be broken by thumb pressure, but can be broken by moderate hammer blows. |
| **Moderately Hard** | Small pieces can be broken off along sharp edges by considerable thumb pressure; can be broken with light hammer blows. |
| **Soft** | Rock is coherent but breaks very easily with thumb pressure at sharp edges and crumbles with firm hand pressure. |
| **Very Soft** | Rock disintegrates or easily compresses when touched; can be hard to very hard soil. |

## KEY

| | |
|---|---|
| ■ | **Undisturbed Sample** |
| ☒ | **Standard Penetration Test Sample** |
| ▯ | **Rock Core Sample** |

| Core Diameter (I.D.) | Inches |
|---|---|
| **BQ** | 1-7/16 |
| **NQ** | 1-7/8 |
| **HQ** | 2-1/2 |

RQD=
(Rock Quality Designation)

$$\text{RQD} = \frac{\text{Sum of 4” and Longer Rock Pieces Recovered}}{\text{Length of Core Run}} \times 100$$

REC=
(Recovery)

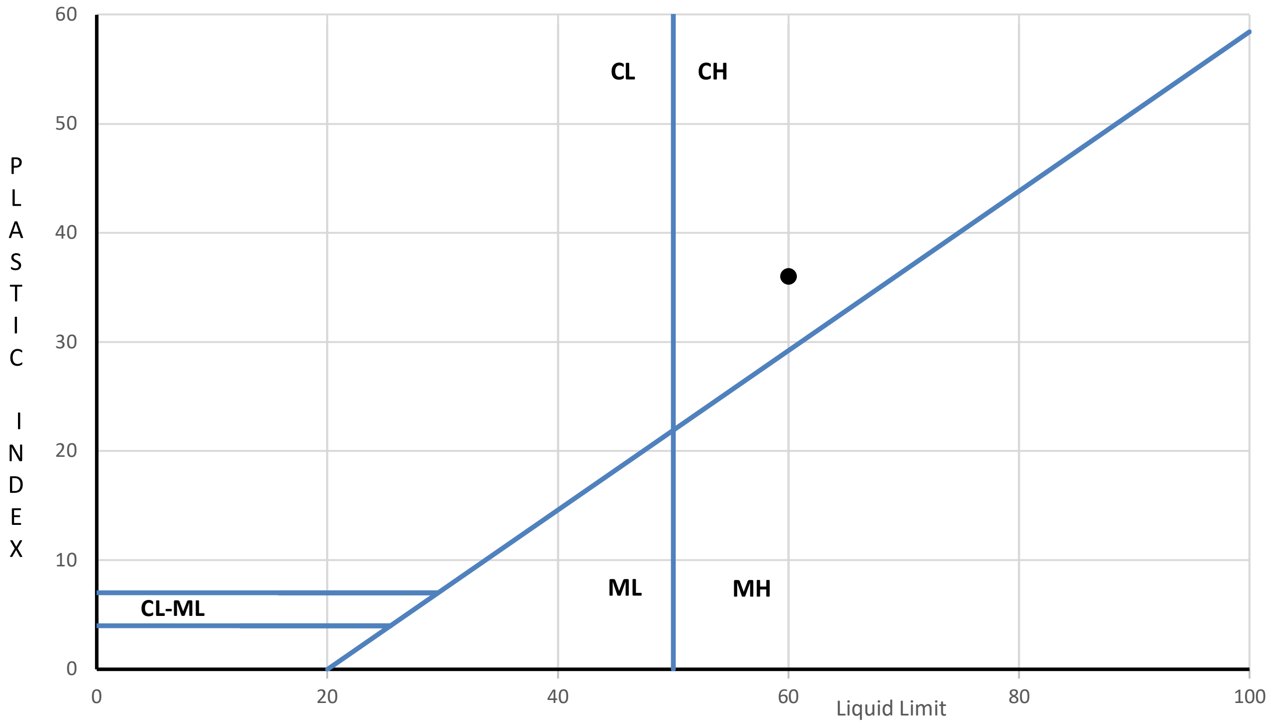
$$\text{REC} = \frac{\text{Length of Rock Core Recovered}}{\text{Length of Core Run}} \times 100$$

### SOIL PROPERTY SYMBOLS

| | |
|---|---|
| **N** | Standard Penetration, BPF |
| **NMC** | Natural Moisture Content, % |
| **LL** | Liquid Limit, % |
| **PL** | Plastic Limit, % |
| **PI** | Plasticity Index, % |
| **PPV** | Pocket Penetrometer Value, TSF |
| **Qu** | Unconfined Compressive Strength, TSF |
| **Yd** | Dry Unit Weight, PCF |
| **F** | Fines Content |

| | | |
|---|---|---|
| ▽ | **At Time of Drilling (ATD)** | Groundwater observation made anytime during the drilling process. Depending on time of reading and drilling methodologies, this value may be influenced by the drilling process. |
| ⧩ | **End of Drilling** | Groundwater measurement soon after all drilling processes are complete, and the borehole is at final depth. Drilling fluids, if introduced during drilling, may influence this measurement. |
| ▼ | **After Drilling** | Groundwater measurements made in a borehole hours to days after drilling is complete. Depending on subsurface conditions, elapsed time, drilling process, etc. this observation may reflect a stabilized level. |

# Appendix III – Laboratory Test Results

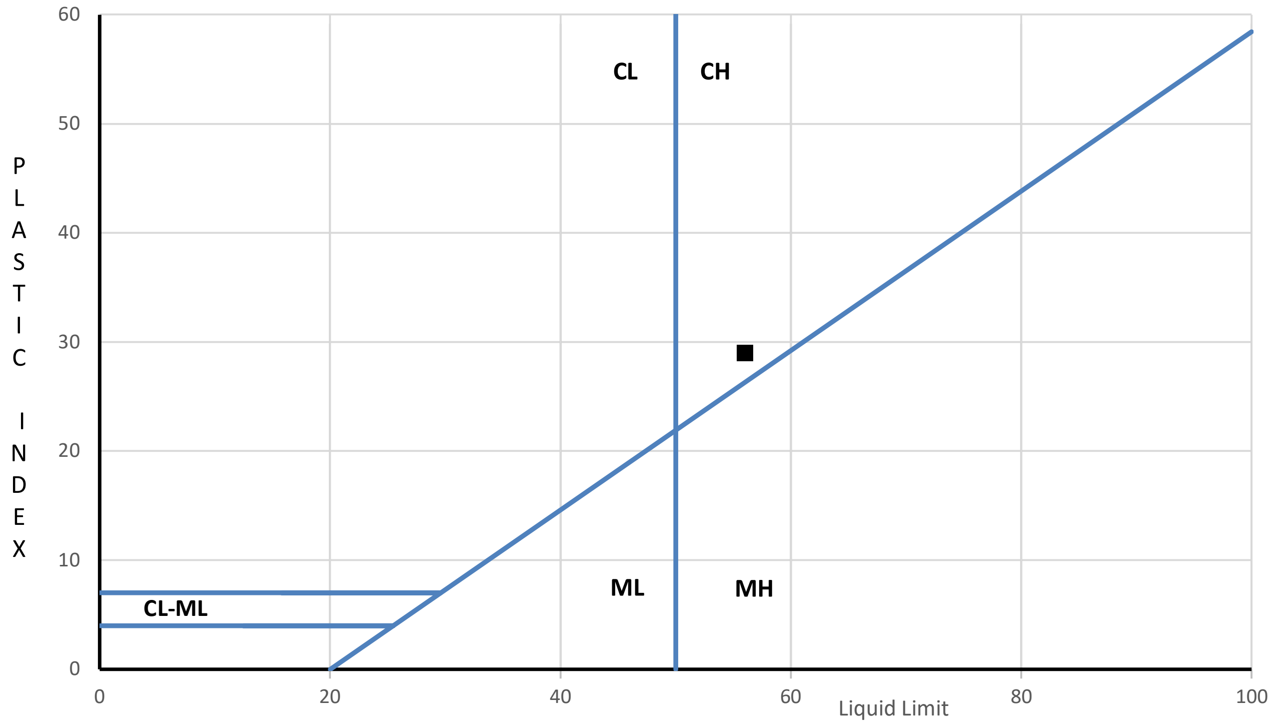


| Specimen Identification | | | | MC | LL | PL | PI | Fines | Classification (symbol is based on minus 40 material only when no grain size information is present.) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | ID | No. | Top Depth | | | | | | Symbol | Name |
| | B-01 | SS-01 | 1 | 26.9 | | | | | | |
| | B-01 | SS-02 | 3.5 | 28.0 | | | | | | |
| | B-02 | SS-01 | 1 | 34.2 | | | | | | |
| ● | B-02 | SS-02 | 3.5 | 25.8 | 60 | 24 | 36 | 95.2 | | FAT CLAY |
| | B-02 | SS-03 | 6 | 33.1 | | | | | | |
| | B-04 | SS-01 | 1 | 32.7 | | | | | | |
| | B-04 | SS-02 | 3.5 | 23.9 | | | | | | |
| | B-04 | SS-03 | 6 | 23.0 | | | | | | |
| | B-04 | SS-04 | 8.5 | 22.6 | | | | | | |
| | B-06 | SS-01 | 1 | 26.1 | | | | | | |
| | B-06 | SS-02 | 3.5 | 31.9 | | | | | | |
| | B-06 | SS-03 | 6 | 30.1 | | | | | | |
| | B-06 | SS-04 | 8.5 | 28.7 | | | | | | |
| | B-07 | SS-01 | 1 | 29.4 | | | | | | |
| | B-07 | SS-02 | 3.5 | 32.1 | | | | | | |
| | B-07 | SS-03 | 6 | 26.8 | | | | | | |
| | B-07 | SS-04 | 8.5 | 31.8 | | | | | | |
| | B-09 | SS-01 | 1 | 37.5 | | | | | | |
| | B-09 | SS-02 | 3.5 | 31.0 | | | | | | |
| | B-09 | SS-03 | 8.5 | 26.0 | | | | | | |

# INDEX TEST RESULTS

| | |
|---|---|
| Project Name | David Jones Industrial Park |
| Project Number | 211424 |

| Approved by | Date |
|---|---|
| | 5/24/2022 13:51 |

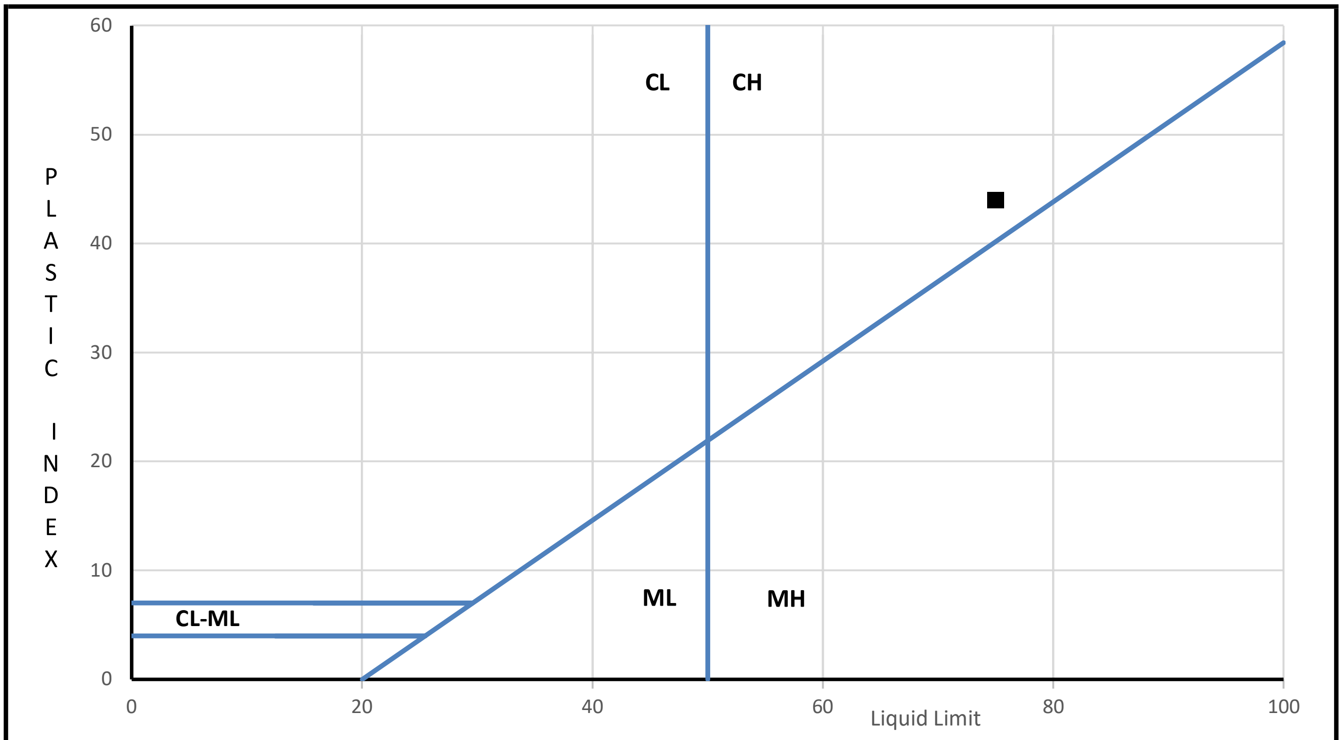


| Specimen Identification | | | | MC | LL | PL | PI | Fines | Classification (symbol is based on minus 40 material only when no grain size information is present.) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | ID | No. | Top Depth | | | | | | Symbol | Name |
| ■ | **B-09** | **UD-01** | **5** | | **56** | **27** | **29** | **91.9** | | **FAT CLAY** |
| | **B-10** | **SS-01** | **1** | **34.8** | | | | | | |
| | **B-10** | **SS-02** | **3.5** | **33.0** | | | | | | |
| | **B-10** | **SS-03** | **6** | **32.0** | | | | | | |
| | **B-10** | **SS-04** | **8.5** | **33.4** | | | | | | |
| | **B-12** | **SS-01** | **1** | **36.2** | | | | | | |
| | **B-12** | **SS-02** | **3.5** | **25.7** | | | | | | |
| | **B-12** | **SS-03** | **6** | **31.0** | | | | | | |
| | **B-12** | **SS-04** | **8.5** | **33.1** | | | | | | |
| | **B-12** | **SS-05** | **13.5** | **27.0** | | | | | | |
| | **B-12** | **SS-06** | **18.5** | **30.1** | | | | | | |
| | **B-13** | **SS-01** | **1** | **24.4** | | | | | | |
| | **B-13** | **SS-02** | **3.5** | **31.7** | | | | | | |
| | **B-13** | **SS-03** | **6** | **32.7** | | | | | | |
| | **B-13** | **SS-04** | **8.5** | **32.0** | | | | | | |
| | **B-14** | **SS-02** | **3.5** | **32.6** | | | | | | |
| | **B-14** | **SS-04** | **8.5** | **30.3** | | | | | | |
| | **B-15** | **SS-01** | **1** | **22.8** | | | | | | |
| | **B-15** | **SS-02** | **3.5** | **25.4** | | | | | | |
| | **B-15** | **SS-03** | **6** | **28.5** | | | | | | |

# INDEX TEST RESULTS

| | |
|---|---|
| Project Name | David Jones Industrial Park |
| Project Number | 211424 |

| Approved by | Date |
|---|---|
| | 5/24/2022 14:06 |



| Specimen Identification | | | | MC | LL | PL | PI | Fines | Classification (symbol is based on minus 40 material only when no grain size information is present.) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | ID | No. | Top Depth | | | | | | Symbol | Name |
| ■ | B-15 | UD-01 | 7.5 | | 75 | 31 | 44 | 96.7 | | FAT CLAY |
| | B-16 | SS-01 | 1 | 31.0 | | | | | | |
| | B-16 | SS-02 | 3.5 | 27.8 | | | | | | |
| | B-16 | SS-03 | 6 | 32.3 | | | | | | |
| | B-18 | SS-01 | 1 | 26.3 | | | | | | |
| | B-18 | SS-02 | 3.5 | 29.2 | | | | | | |
| | B-18 | SS-03 | 6 | 28.2 | | | | | | |
| | B-18 | SS-04 | 8.5 | 28.2 | | | | | | |
| | B-20 | SS-01 | 1 | 35.9 | | | | | | |
| | B-20 | SS-02 | 3.5 | 28.1 | | | | | | |
| | B-20 | SS-03 | 6 | 32.6 | | | | | | |
| | | | | | | | | | | |
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| | | | | | | | | | | |

# INDEX TEST RESULTS

| | |
|---|---|
| Project Name | David Jones Industrial Park |
| Project Number | 211424 |

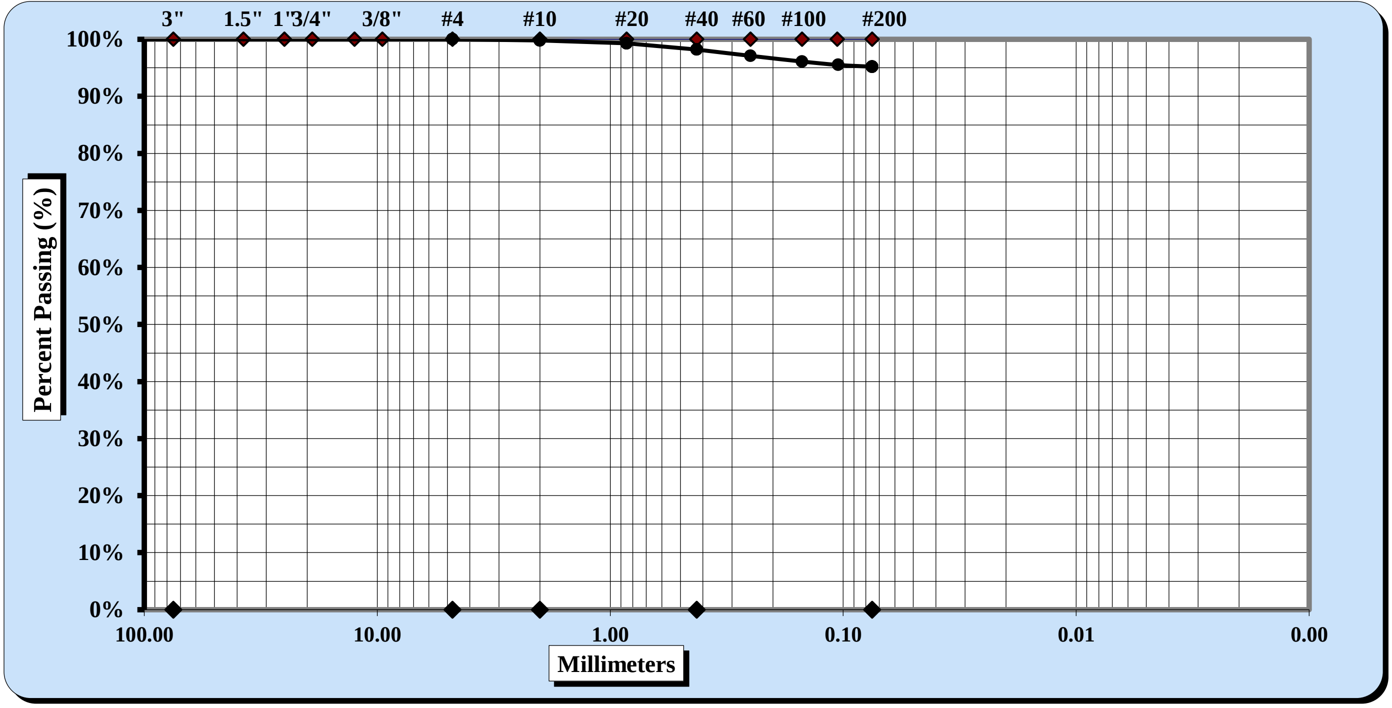
| Approved by | Date |
|---|---|
| | 5/24/2022 14:13 |

# ASTM D6913: Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

| | |
|---|---|
| Report Number | **KNOX_22000368** |
| Report Date | **5/24/2022** |
| Test Date | **5/20/2022** |
| Sample Date | **5/3/2022** |

| | |
|---|---|
| Project Number | 211424 |
| Project Name | David Jones Industrial Park |
| Client Name | Anderson County Economic Development Association |
| Client Address | |

| | | | |
|---|---|---|---|
| KeyLAB ID | KNOX202205123 | Sample Type | SS |
| Location ID | B-02 | Sample Top Depth | 3.5 |
| Sample Reference | SS-02 | Sample Base Depth | 5 |
| Description | FAT CLAY (CH), tannish brown | Method | ASTM D6913 Method B |
| Classification | FAT CLAY | | |



ASTM PARTICLE SIZE DEFINITIONS

| | | | |
|---|---|---|---|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Medium Sand | < 2.00 mm and > 0.425 mm (#40) |
| Gravel | < 75 mm and > 4.75 mm (#4) | Fine Sand | < 0.425 mm and > 0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | Silt & Clay | < 0.075 |

| | | | | | |
|---|---|---|---|---|---|
| Maximum Particle Size | **0.85 mm** | Coarse Sand | 0.2 | Fine Sand | 3.0 |
| Gravel | 0.0 | Medium Sand | 1.6 | Silt & Clay | 95.2 |
| Liquid Limit | 60 | Plastic Limit | 24 | Plastic Index | 36 |

Description of Sand & Gravel Particles: Rounded ☒ Angular ☐

Hard & Durable ☒ Soft ☐ Weathered & Friable ☐

*References / Comments / Deviations:*

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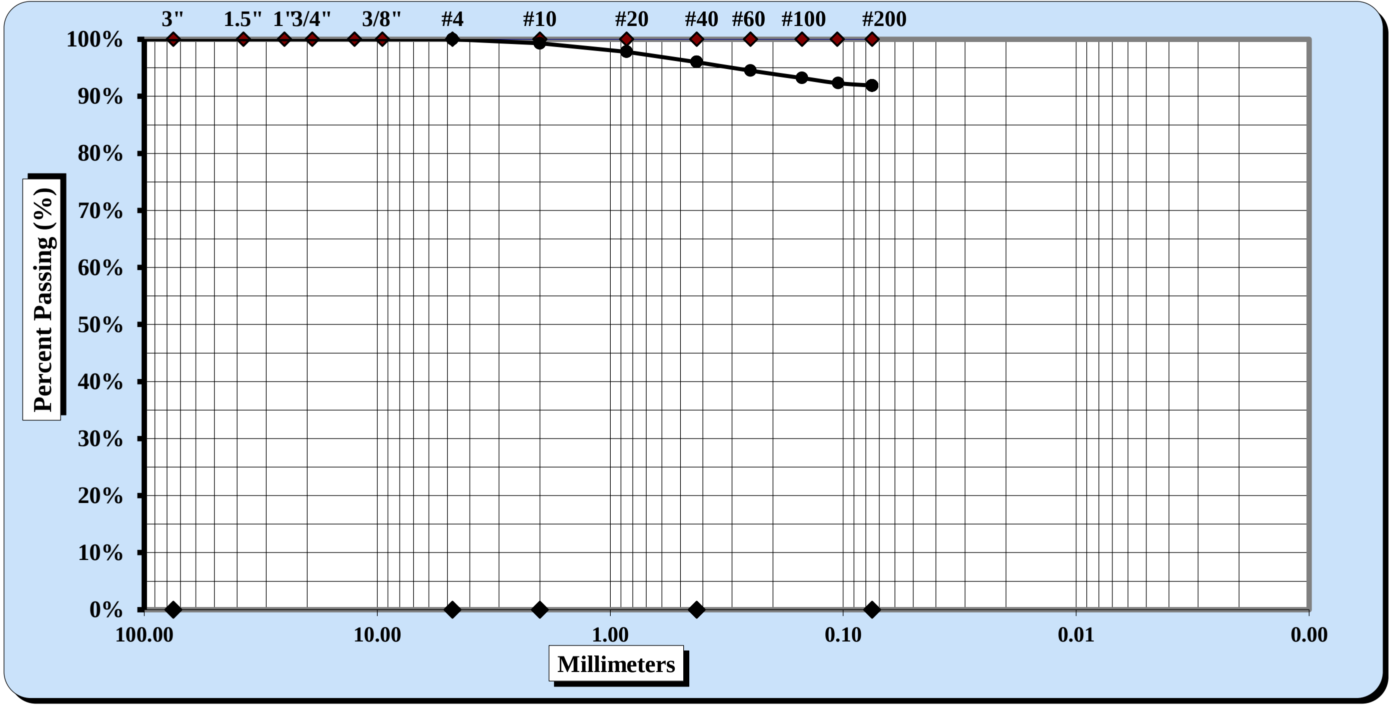
| | | |
|---|---|---|
| KGonzalez | vigoe | |
| *Tested by* | *Approved by* | *Signature* |
| *Knoxville* | *1413 Topside Road, Louisville, TN 37777* | |

# ASTM D6913: Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

| | |
|---|---|
| Report Number | **KNOX_22000369** |
| Report Date | **5/24/2022** |
| Test Date | **5/20/2022** |
| Sample Date | **5/2/2022** |

| | |
|---|---|
| Project Number | 211424 |
| Project Name | David Jones Industrial Park |
| Client Name | Anderson County Economic Development Association |
| Client Address | |

| | | | |
|---|---|---|---|
| KeyLAB ID | KNOX2022051220 | Sample Type | UD |
| Location ID | B-09 | Sample Top Depth | 5 |
| Sample Reference | UD-01 | Sample Base Depth | 7 |
| Description | FAT CLAY (CH), red with tan | Method | ASTM D6913 Method B |
| Classification | FAT CLAY | | |



ASTM PARTICLE SIZE DEFINITIONS

| | | | |
|---|---|---|---|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Medium Sand | < 2.00 mm and > 0.425 mm (#40) |
| Gravel | < 75 mm and > 4.75 mm (#4) | Fine Sand | < 0.425 mm and > 0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | Silt & Clay | < 0.075 |

| | | | | | |
|---|---|---|---|---|---|
| Maximum Particle Size | **2 mm** | Coarse Sand | 0.7 | Fine Sand | 4.1 |
| Gravel | 0.0 | Medium Sand | 3.3 | Silt & Clay | 91.9 |
| Liquid Limit | 56 | Plastic Limit | 27 | Plastic Index | 29 |

Description of Sand & Gravel Particles: Rounded ☐ Angular ☒

Hard & Durable ☒ Soft ☐ Weathered & Friable ☐

*References / Comments / Deviations:*

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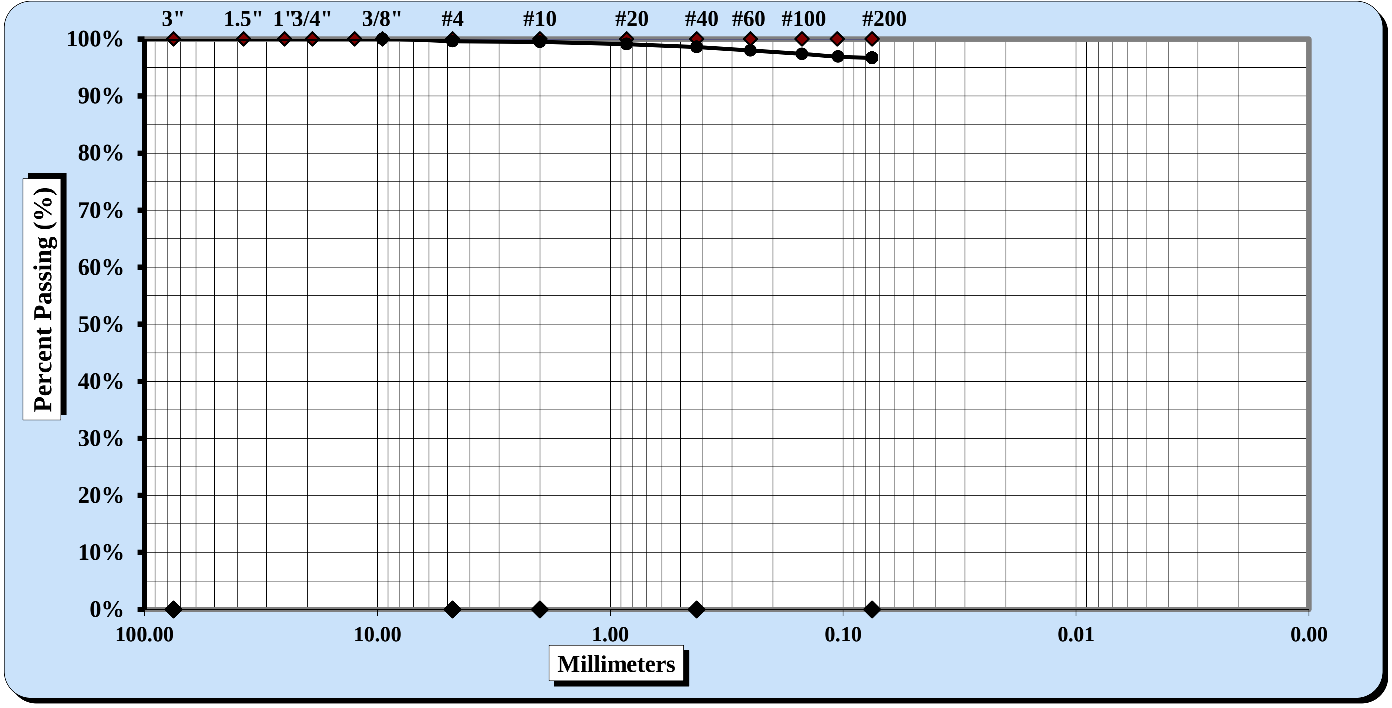
| | | |
|---|---|---|
| KGonzalez | vigoe | |
| *Tested by* | *Approved by* | *Signature* |
| *Knoxville* | *1413 Topside Road, Louisville, TN 37777* | |

# ASTM D6913: Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

| | |
|---|---|
| Report Number | **KNOX_22000370** |
| Report Date | **5/24/2022** |
| Test Date | **5/20/2022** |
| Sample Date | **5/4/2022** |

| | | | |
|---|---|---|---|
| Project Number | 211424 | | |
| Project Name | David Jones Industrial Park | | |
| Client Name | Anderson County Economic Development Association | | |
| Client Address | | | |
| KeyLAB ID | KNOX2022051240 | Sample Type | UD |
| Location ID | B-15 | Sample Top Depth | 7.5 |
| Sample Reference | UD-01 | Sample Base Depth | 9.5 |
| Description | FAT CLAY (CH), light brown | Method | ASTM D6913 Method B |
| Classification | FAT CLAY | | |



## ASTM PARTICLE SIZE DEFINITIONS

| | | | |
|---|---|---|---|
| Cobbles | < 300 mm (12") and > 75 mm (3") | Medium Sand | < 2.00 mm and > 0.425 mm (#40) |
| Gravel | < 75 mm and > 4.75 mm (#4) | Fine Sand | < 0.425 mm and > 0.075 mm |
| Coarse Sand | < 4.75 mm and >2.00 mm (#10) | Silt & Clay | < 0.075 |

| | | | | | |
|---|---|---|---|---|---|
| Maximum Particle Size | **0.85 mm** | Coarse Sand | 0.1 | Fine Sand | 1.9 |
| Gravel | 0.4 | Medium Sand | 0.9 | Silt & Clay | 96.7 |
| Liquid Limit | 75 | Plastic Limit | 31 | Plastic Index | 44 |

Description of Sand & Gravel Particles: Rounded ☐ Angular ☒

Hard & Durable ☒ Soft ☐ Weathered & Friable ☐

*References / Comments / Deviations:*

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| | | |
|---|---|---|
| KGonzalez | vigoe | |
| *Tested by* | *Approved by* | *Signature* |
| *Knoxville* | *1413 Topside Road, Louisville, TN 37777* | |

Form No. TR-D2166-01
Revision No. : 1
Revision Date: 08/16/17

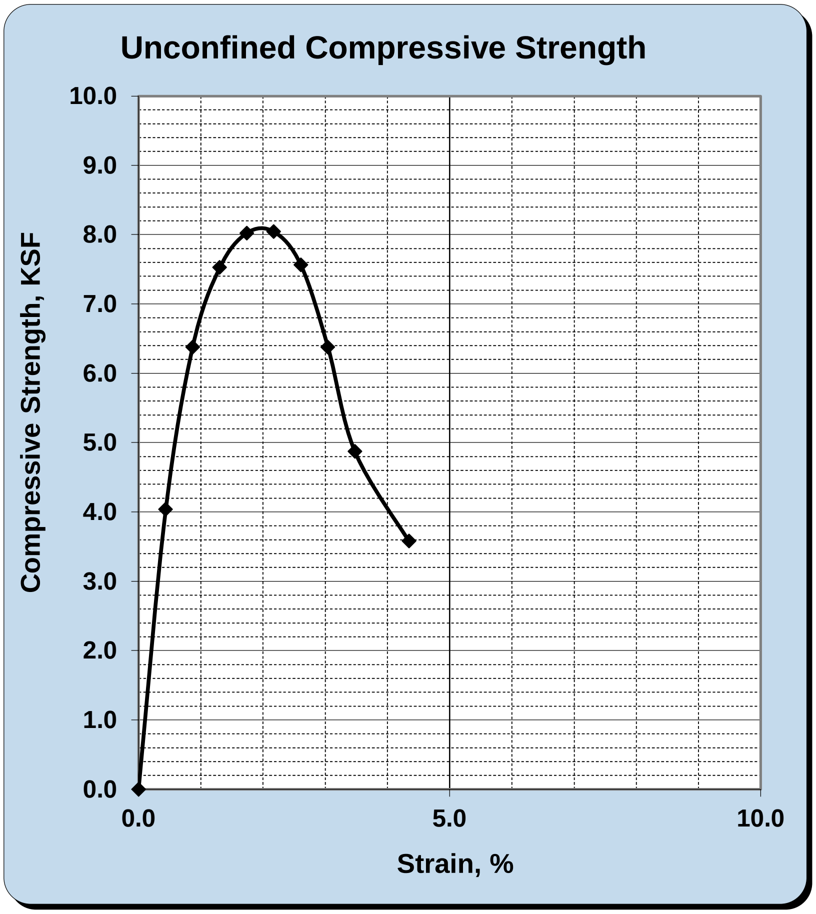
# UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS

ASTM D2166

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

| | | | |
|---|---|---|---|
| Project No.: | 211424 | Report Date: | 5/27/2022 |
| Project Name: | David Jones Industrial Park | Test Date(s): | 5/18/2022 |
| Client Name: | ACEDA | | |
| Client Address: | 245 North Main Street Suite 200, Clinton, TN | | |

Boring No.: B-09 Sample No. UD-01 Sample Date: 5/2/2022 - 5/9/2022
Location: Borings Depth: 5-7
Sample Description: Reddish brown with tan clay



**Failed Specimen**

Type of Sample: Intact
Source of Moisture Sample: Test Specimen

Initial Dry Unit Weight: 96.7 pcf
Initial Water Content: 27.4%
Height to Diameter Ratio: 2.0
Unconfined Compressive Strength, $q_u$: **8.042** KSF
Rate of Strain (%/min.): 0.87
Undrained Shear Strength, $s_u$: **4.021** KSF
Strain at Failure: 2.0

*References / Comments / Deviations:*

ASTM D2166

| | | | |
|---|---|---|---|
| Victoria Igoe | | Engineering Technician | 5/27/2022 |
| *Technical Responsibility* | *Signature* | *Position* | *Date* |

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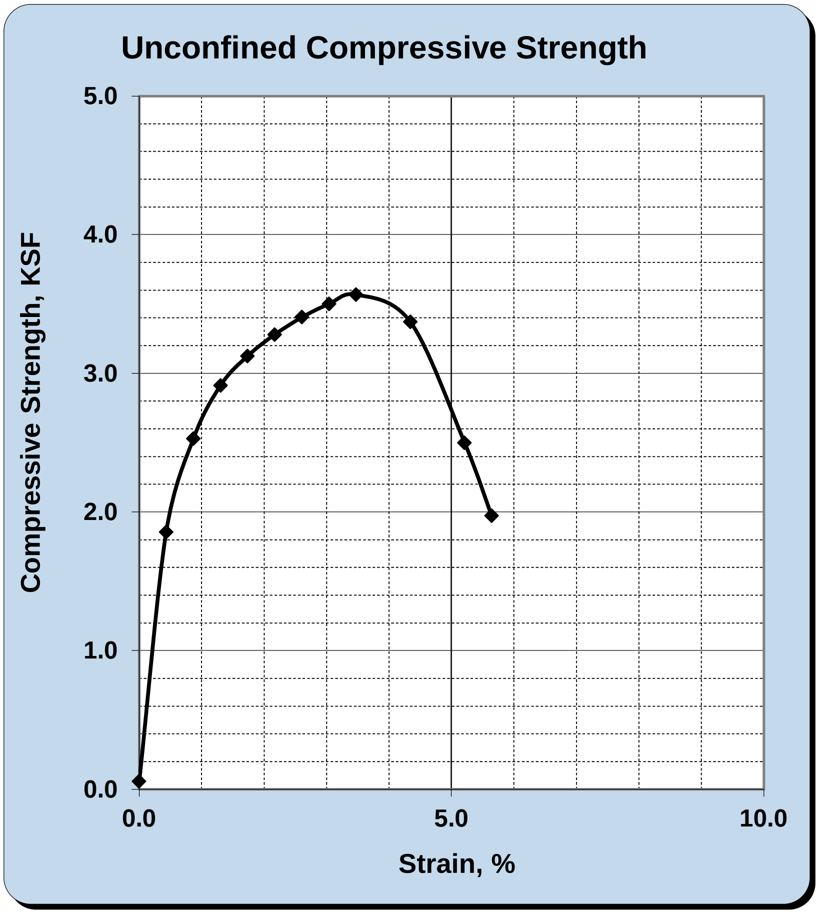
Form No. TR-D2166-01
Revision No. : 1
Revision Date: 08/16/17

# UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS

ASTM D2166

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

Project No.: 211424
Report Date: 5/27/2022
Project Name: David Jones Industrial Park
Test Date(s): 5/18/2022
Client Name: ACEDA
Client Address: 245 North Main Street Suite 200, Clinton, TN
Boring No.: B-15
Sample No. UD-01
Sample Date: 5/2/2022 - 5/9/2022
Location: Borings
Depth: 5-7
Sample Description: Brown clay



**Failed Specimen**

Type of Sample: Intact
Source of Moisture Sample: Test Specimen

Initial Dry Unit Weight: 91.6 pcf
Initial Water Content: 31.5%
Height to Diameter Ratio: 2.0
Unconfined Compressive Strength, $q_u$: **3.568** KSF
Rate of Strain (%/min.): 0.87
Undrained Shear Strength, $s_u$: **1.784** KSF
Strain at Failure: 3.5

*References / Comments / Deviations:*

ASTM D2166

Victoria Igoe
*Technical Responsibility*

*Signature*

Engineering Technician
*Position*

5/27/2022
*Date*

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Form No. TR-D698-2
Revision No. : 1
Revision Date: 07/25/17

# MOISTURE - DENSITY REPORT

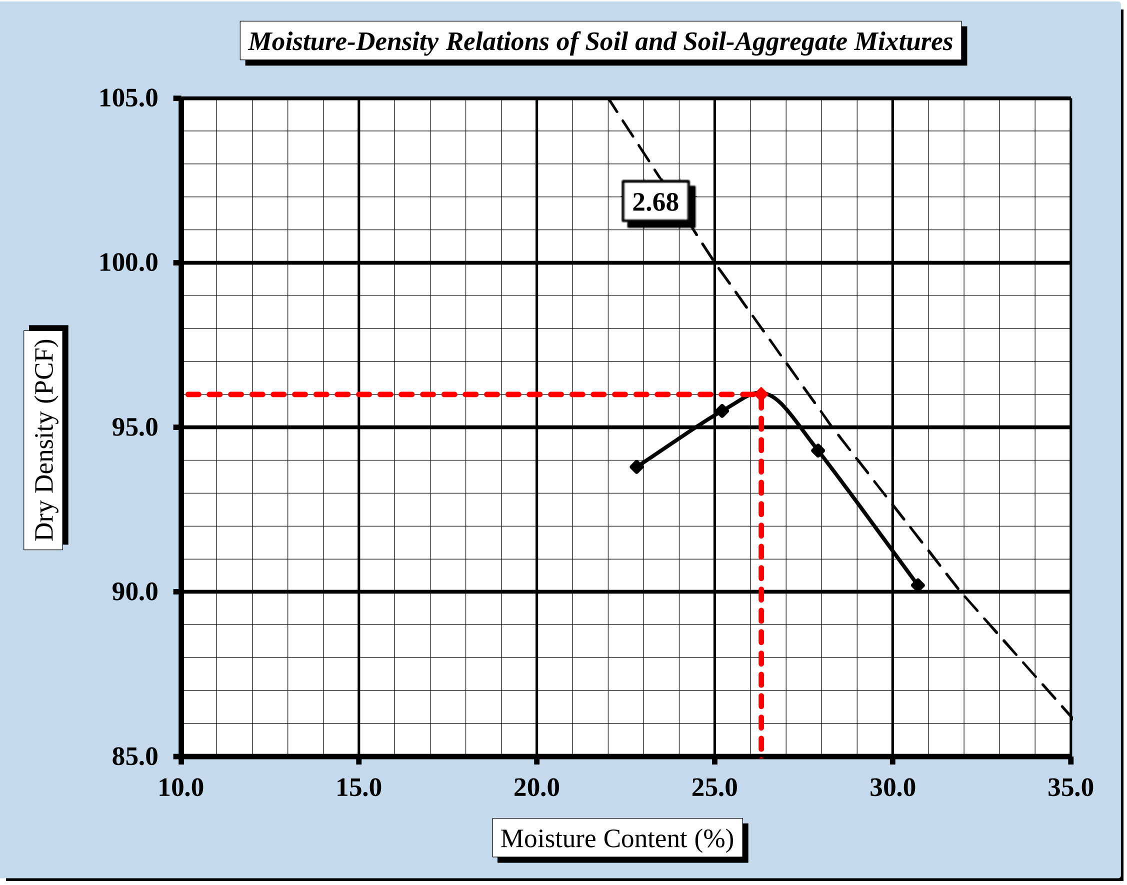
*Quality Assurance*

S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

| | | | | | |
|---|---|---|---|---|---|
| S&ME Project #: | 211424 | *Log #:* | *43-3617* | Report Date: | 5/27/2022 |
| Project Name: | David Jones Industrial Park | | | Test Date(s): | 5/18/2022 |
| Client Name: | ACEDA | | | | |
| Client Address: | 245 North Main Street Suite 200, Clinton, TN | | | | |
| Boring #: | B-2 | Sample: | Bulk 1 | Sample Date: | 5/2/2022 - 5/9/2022 |
| Location: | Borings | | | Depth: | 1 - 7.9 ft |
| Sample Description: | Brown clay | | | | |

**Maximum Dry Density** **96.0** **PCF.** **Optimum Moisture Content** **26.3%**

***ASTM D 698 - - Method B***



***Soil Properties***

| | |
|---|---|
| *Natural Moisture Content* | 27.1% |

*% Passing*

| | |
|---|---|
| *3/8"* | 100% |

*Oversize Fraction*

| | |
|---|---|
| *Bulk S.G.* | |
| *%Absorption* | |
| *% Oversize* | N/A |
| ***MDD*** | |
| ***Opt. MC*** | |

Moisture-Density Curve Displayed: Fine Fraction ☒ Corrected for Oversize Fraction (ASTM D 4718) ☐
Sieve Size used to separate the Oversize Fraction: #4 Sieve ☐ 3/8 inch Sieve ☒ 3/4 inch Sieve ☐
Mechanical Rammer ☐ Manual Rammer ☒ Moist Preparation ☐ Dry Preparation ☒

*References / Comments / Deviations:* The specific gravity value of the zero air-voids line is assumed.
ASTM D698, D2216

| | | | |
|---|---|---|---|
| Victoria Igoe | Victoria Igoe | Engineering Technician | 5/27/2022 |
| *Technical Responsibility* | *Signature* | *Position* | *Date* |

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Form No. TR-D698-2
Revision No. : 1
Revision Date: 07/25/17

# MOISTURE - DENSITY REPORT

*Quality Assurance*

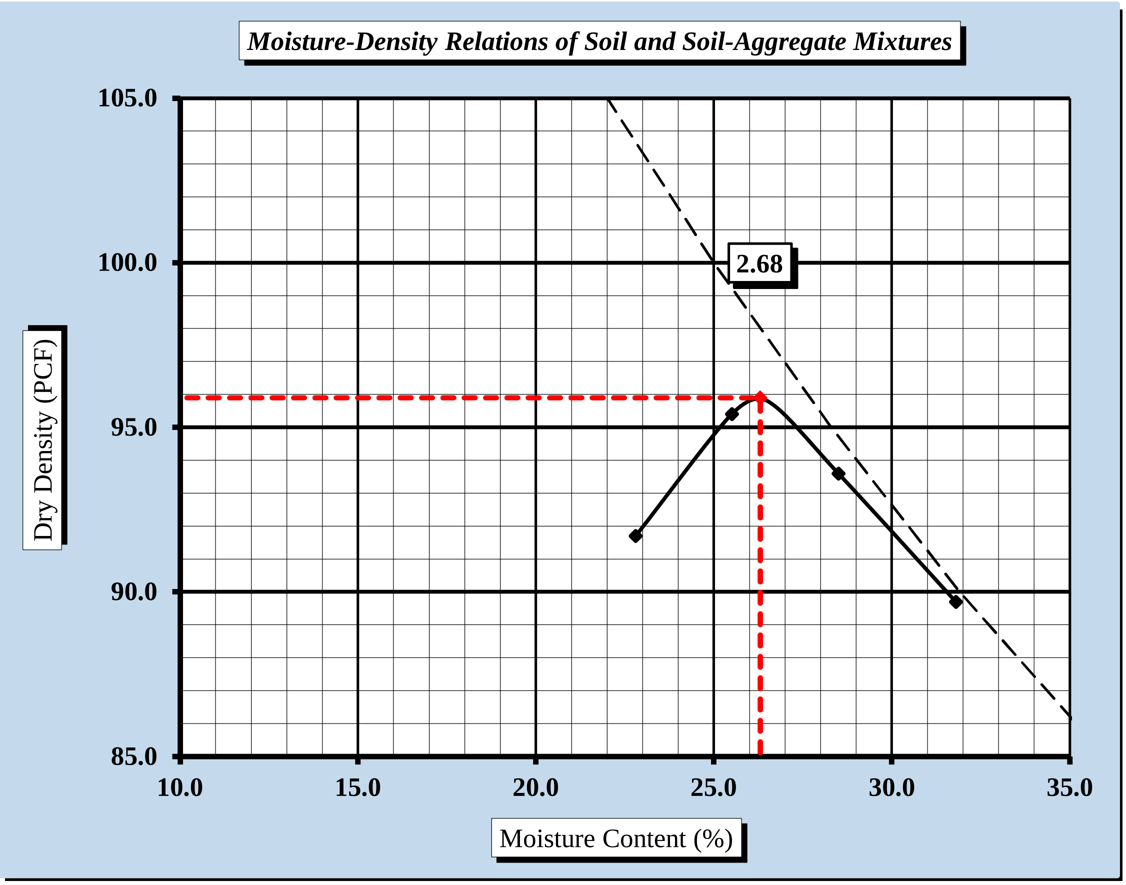
S&ME, Inc. - Knoxville: 1413 Topside Road, Louisville, TN 37777

| | | | | | |
|---|---|---|---|---|---|
| S&ME Project #: | 211424 | *Log #:* | *43-3617* | Report Date: | 5/27/2022 |
| Project Name: | David Jones Industrial Park | | | Test Date(s): | 5/18/2022 |
| Client Name: | ACEDA | | | | |
| Client Address: | 245 North Main Street Suite 200, Clinton, TN | | | | |
| Boring #: | B-16 | Sample: | Bulk 1 | Sample Date: | 5/2/2022 - 5/9/2022 |
| Location: | Borings | | | Depth: | 1 - 7.5 ft |

Sample Description: Reddish brown clay

**Maximum Dry Density 95.9 PCF.** **Optimum Moisture Content 26.3%**

***ASTM D 698 - - Method B***



***Soil Properties***

| | |
|---|---|
| *Natural Moisture Content* | 35.8% |

*% Passing*

| | |
|---|---|
| *3/8"* | 99% |

*Oversize Fraction*

| | |
|---|---|
| *Bulk S.G.* | |
| *%Absorption* | |
| *% Oversize* | N/A |
| ***MDD*** | |
| ***Opt. MC*** | |

Moisture-Density Curve Displayed: Fine Fraction ☒ Corrected for Oversize Fraction (ASTM D 4718) ☐
Sieve Size used to separate the Oversize Fraction: #4 Sieve ☐ 3/8 inch Sieve ☒ 3/4 inch Sieve ☐
Mechanical Rammer ☐ Manual Rammer ☒ Moist Preparation ☐ Dry Preparation ☒

*References / Comments / Deviations:* The specific gravity value of the zero air-voids line is assumed.
ASTM D698, D2216

| | | | |
|---|---|---|---|
| Victoria Igoe | Victoria Igoe | Engineering Technician | 5/27/2022 |
| *Technical Responsibility* | *Signature* | *Position* | *Date* |

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BUILT FOR VERSATILITY

# Important Information About Your Geotechnical Engineering Report

*Variations in subsurface conditions can be a principal cause of construction delays, cost overruns and claims. The following information is provided to assist you in understanding and managing the risk of these variations.*

## Geotechnical Findings Are Professional Opinions

Geotechnical engineers cannot specify material properties as other design engineers do. Geotechnical material properties have a far broader range on a given site than any manufactured construction material, and some geotechnical material properties may change over time because of exposure to air and water, or human activity.

Site exploration identifies subsurface conditions at the time of exploration and only at the points where subsurface tests are performed or samples obtained. Geotechnical engineers review field and laboratory data and then apply their judgment to render professional opinions about site subsurface conditions. Their recommendations rely upon these professional opinions. Variations in the vertical and lateral extent of subsurface materials may be encountered during construction that significantly impact construction schedules, methods and material volumes. While higher levels of subsurface exploration can mitigate the risk of encountering unanticipated subsurface conditions, no level of subsurface exploration can eliminate this risk.

## Scope of Geotechnical Services

Professional geotechnical engineering judgment is required to develop a geotechnical exploration scope to obtain information necessary to support design and construction. A number of unique project factors are considered in developing the scope of geotechnical services, such as the exploration objective; the location, type, size and weight of the proposed structure; proposed site grades and improvements; the construction schedule and sequence; and the site geology.

Geotechnical engineers apply their experience with construction methods, subsurface conditions and exploration methods to develop the exploration scope. The scope of each exploration is unique based on available project and site information. Incomplete project information or constraints on the scope of exploration increases the risk of variations in subsurface conditions not being identified and addressed in the geotechnical report.

**Services Are Performed for Specific Projects** Because the scope of each geotechnical exploration is unique, each geotechnical report is unique. Subsurface conditions are explored and recommendations are made for a specific project. Subsurface information and recommendations may not be adequate for other uses. Changes in a proposed structure location, foundation loads, grades, schedule, etc. may require additional geotechnical exploration, analyses, and consultation. The geotechnical engineer should be consulted to determine if additional services are required in response to changes in proposed construction, location, loads, grades, schedule, etc.

## Geo-Environmental Issues

The equipment, techniques, and personnel used to perform a geo-environmental study differ significantly from those used for a geotechnical exploration. Indications of environmental contamination may be encountered incidental to performance of a geotechnical exploration but go unrecognized. Determination of the presence, type or extent of environmental contamination is beyond the scope of a geotechnical exploration.

## Geotechnical Recommendations Are Not Final

Recommendations are developed based on the geotechnical engineer's understanding of the proposed construction and professional opinion of site subsurface conditions. Observations and tests must be performed during construction to confirm subsurface conditions exposed by construction excavations are consistent with those assumed in development of recommendations. It is advisable to retain the geotechnical engineer that performed the exploration and developed the geotechnical recommendations to conduct tests and observations during construction. This may reduce the risk that variations in subsurface conditions will not be addressed as recommended in the geotechnical report.

PLATE 15

*Portion obtained with permission from "Important Information About Your Geotechnical Engineering Report", ASFE, 2004*