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LETTER OF TRANSMITTAL

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FROM: Philip Schofield, P.E.

DATE: August 17, 2026

PROJ. NO.: G24027-03

SUBJECT: Addendum No. 2
Catoosa County, GA
Three Notch Road at Boynton Drive Traffic Circle

PAGES: 40 pages to follow

PLEASE RESPOND ➔ ➔ ➔ ➔	**TO CONFIRM RECEIPT OF THIS ADDENDUM NO. 2 PLEASE SIGN AND EMAIL TO CTI** **vvisco@ctiengr.com** **Company** __________ **Signature** __________ **Title** __________ **Date** __________

ID 912510

ADDENDUM NO. 2

CONTRACT DOCUMENTS, SPECIFICATIONS, AND DRAWINGS

CATOOSA COUNTY, GEORGIA

THREE NOTCH ROAD AT BOYNTON DRIVE TRAFFIC CIRCLE

The following clarifications are for the Contract Documents and Drawings.

I. CLARIFICATIONS

A. Traffic Control Plan

The Contractor's Traffic Control Plan shall include a **minimum of two (2) portable electronic message boards.** The message boards shall be incorporated into the Contractor's traffic control operations as appropriate for advance notification of construction activities, road closures, detours, and other traffic impacts.

B. Predesign Geotechnical Report

A The **Geotechnical Report** prepared for the project is attached to this Addendum and is hereby made available to bidders for reference.

All other requirements of the Contract Documents remain unchanged.

Date: August 17, 2026

Catoosa County, Geogia
/s/ Dan Wright, County Manager

July 29, 2025

CTI Engineers, Inc.
1122 Riverfront Parkway
Chattanooga, TN 37402

ATTENTION: Mr. Zachary Robertson
zrobertson@ctiengr.com

Subject: **REPORT OF GEOTECHNICAL EXPLORATION**
Proposed Traffic Circle
Three Notch Road at Boynton Drive
Ringgold, Georgia
UES Project No. A25110.00412

Dear Mr. Robertson:

UES Professional Solutions 19, LLC (UES) is submitting the results of the geotechnical exploration performed for the subject project. The geotechnical exploration was performed in general accordance with the UES Proposal, dated June 10, 2025. The following report presents our findings and recommendations for the proposed traffic circle in Ringgold, Georgia.

UES sincerely appreciates the opportunity to serve as your geotechnical consultant. Should you have any questions regarding this report, or if we can be of any further assistance, please contact us at your convenience.

Sincerely,

UES Professional Solutions 19, LLC

GEORGIA REGISTERED No. PE049993 PROFESSIONAL 7-29-25 ENGINEER JEREMY T. HALEY

Derek K. Kilday, P.E. (TN)
V.P. – Chattanooga Area Manager

Jeremy T. Haley, P.E.
Senior Geotechnical Engineer
GA #049993

REPORT OF GEOTECHNICAL EXPLORATION

Proposed Traffic Circle

Three Notch Road at Boynton Drive
Ringgold, Georgia

UES Project No. A25110.00412

Submitted to:

CTI Engineers, Inc.
1122 Riverfront Parkway
Chattanooga, TN 37402

Submitted by:

UES
6607 Mountain View Road
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TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this geotechnical exploration was to characterize the subsurface conditions for the design and construction of the proposed new traffic circle at the intersection of Three Notch Road and Boynton Drive in Ringgold, Tennessee. This report provides recommendations for general site preparation, excavation and fill requirements, and pavement recommendations for the proposed roadway improvements.

1.2 PROJECT INFORMATION AND SITE DESCRIPTION

Project information, including a schematic layout prepared by CTI Engineers, Inc., was provided via email by Mr. Zarchary Robertson with CTI Engineers. UES understands that improvements are planned for the intersection of Three Notch Road and Boynton Drive in Ringgold, Georgia. The site is bordered by commercial development to the northwest and by residential development to the northeast, southeast, and southwest. Based on the information provided at the time of this report, we understand that the intersection is planned to be converted into a traffic circle, which will be shifted to the northeast primarily on to undisturbed soils. The majority of the proposed traffic circle and the eastern drive will be located within the residential property to the northeast of the existing intersection and is currently a relatively level grass covered yard area. The southern drive will be located within the residential property to the southeast of the existing intersection and is currently a relatively level grass and brush covered yard area. Additionally, this area sits approximately 3 to 4 feet lower than the roadways and a small creek runs parallel to Boynton Drive. We understand that the traffic circle will likely be asphalt with a concrete truck apron and a center island. Grading information was not available at time of this report, based on existing grades, we anticipate minimal cuts and fills will likely be (on the order of 5 feet or less) required to reach suitable grades.

Once final grading information and traffic loading information becomes available, UES should be allowed to review and revise the recommendations contained herein, if necessary.

1.3 SCOPE OF STUDY

This geotechnical exploration involved site reconnaissance, field drilling, laboratory testing, and engineering analysis. The following sections of this report present discussions of the field exploration, site conditions, and conclusions and recommendations. Following the text of this report, Appendix A presents figures, general notes, and test boring records. Appendix B presents the laboratory test results.

The scope of services did not include an environmental assessment for determining the presence or absence of wetlands, or hazardous or toxic materials in the soil, bedrock, surface water, subsurface water, or air, on or below, or around this site. Any statements in this report or on the boring logs regarding odors, colors, and unusual or suspicious items or conditions are strictly for informational purposes.

2.0 EXPLORATION AND TESTING PROGRAMS

2.1 FIELD EXPLORATION

The site subsurface conditions were explored with a total of five (5) soil test borings (B-1 through B-5). Three of the borings (B-2 through B-4) were performed within the alignment of the proposed traffic circle, one of the borings (B-1) was performed within the alignment of the eastern roadway, and one of the borings (B-5) was performed within the alignment of the southern roadway. Boring locations are shown on the Boring Location Plan in Figure 3 presented in Appendix A. The boring locations were located and staked in the field by UES personnel. The drilling was performed on July 3, 2025. The depths reference the ground surface elevations at the site that existed at the time of the exploration. Four of the borings (B-1 through B-4) were advanced using 2.25-inch inside diameter hollow stem augers (HSA) with a tracked Geoprobe drill rig and one of the borings (B-5) was advanced using a hand auger due to access limitations. The drill crew worked in general accordance with ASTM D6151 (HSA Drilling). Sampling of overburden soils was accomplished using the standard penetration test procedure (ASTM D1586). The borings were backfilled with soil cuttings before leaving the site. Detailed test boring records are presented in Appendix A.

In split–spoon sampling, a standard 2-inch O.D. split-spoon sampler is driven into the bottom of the boring with a 140-pound hammer falling a distance of 30 inches. The number of blows required to advance the sampler the last 12 inches of the standard 18 inches of total penetration, or the middle 12 inches of continuous sampling, is recorded as the Standard Penetration Resistance (N-value). These N-values are indicated on the boring logs at the testing depth and provide an indication of the relative density of granular materials and strength of cohesive materials.

2.2 LABORATORY TEST PROGRAM

Soil samples collected during drilling were transported to our laboratory for visual classification and laboratory testing. The following laboratory testing was performed on select samples to determine various properties of the soil:

- Atterberg Limits (ASTM D4318): Two (2) Atterberg limits tests were performed for this project. These tests help us to confirm our visual classifications according to the Unified Soil Classification System (USCS). The plastic limit and liquid limit represent the moisture content at which a cohesive soil changes from a semi-solid to a plastic state and from a plastic state to liquid state, respectively.
- Natural Moisture Content (ASTM D2216): Moisture content determinations were performed on nine (9) samples for this project. The natural moisture content is defined as the ratio of the weight of water present in the soil to the dry weight of soil.
- Standard Proctor Moisture-Density Tests (ASTM D698): One (1) standard Proctor test was performed on a collected bulk sample for this project. This test provides information concerning the relationship between moisture content, compaction effort, and density.
- California Bearing Ratio (ASTM D1883): One (1) California bearing ratio (CBR) test was performed on a collected bulk sample for this project. The CBR provides information utilized in pavement design.

The test results for the soil samples obtained during the field exploration are presented on a Laboratory Summary Sheet and individual reporting sheets, all presented in Appendix B.

3.0 SUBSURFACE CONDITIONS

3.1 GEOLOGIC CONDITIONS

The project site, and most of northwest Georgia, lies in the Appalachian Valley and Ridge Physiographic Province. The Province is characterized by elongated, northeasterly-trending ridges formed on highly resistant sandstones and shales. Between ridges, broad valleys and rolling hills are formed primarily on less resistant limestones, dolomites and shales.

Published geologic data indicates that the project site is underlain by bedrock from the Rome Formation. The Rome Formation generally consists of variegated (red, green, and yellow) shale and siltstone with beds of gray fine-grained sandstone. The formation also contains minor beds of dolomite and limestone. The sandstone and siltstone beds weather to a shallow residual soil with many shale chips and rock fragments. The carbonate members weather more deeply and form yellow and red-brown silty clay residuum.

Since the bedrock formation at the site may contain limestone, the site 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 north Georgia, 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.

3.2 SUBSURFACE CONDITIONS

The following subsurface description is of a generalized nature to highlight the major subsurface stratification features and material characteristics. The boring logs included with this report should be reviewed for specific information at individual boring locations. The depth and thickness of the subsurface strata indicated on the boring cross-sections were generalized from and interpolated between test locations. The transition between materials will be more or less gradual than indicated and may be abrupt. Information on actual subsurface conditions exists only at the specific boring locations and is relevant to the time the exploration was performed. Variations may occur and should be expected between boring locations. The stratification lines were used for our analytical purposes and, unless specifically stated otherwise, should not be used as the basis for design or construction cost estimates.

3.2.1 Surficial Materials

A surficial layer of topsoil ranging from 6 to 8 inches in thickness was encountered in each of the five borings (B-1 through B-5). We note the surficial material thickness may vary away from the boring locations and the owner should determine a baseline surficial material thickness for construction and bidding purposes. Beneath the surficial topsoil layer, existing fill soils, alluvial soils, and residual soils were encountered to boring termination or auger refusal depths ranging from 5 to 8.9 feet.

3.2.2 Existing Fill Soils

Beneath the surficial topsoil layer in three of the five borings (B-1, B-2, and B-5), existing fill soils were encountered to approximate depths ranging from 3 to 6 feet below the ground surface. Fill is generally classified as material that has been transported and placed by man. The fill soils generally consisted of brown, dark brown, gray, and dark gray clays with varying amounts of organics and rock fragments. The N-value of the fill soils ranged from 0 to 5 blows per foot (bpf), indicating a consistency of very soft to firm. The natural moisture contents of the fill ranged from 23 to 36 percent.

3.2.3 Alluvial Soils

Beneath the existing fill soils in three of the six borings (B-1, B-2, and B-5), alluvial soils were encountered to boring termination or auger refusal depths ranging from 5 to 8.5 feet. Alluvial soils are generally classified as soils that have been transported and placed by water. The alluvial soils generally consisted of brown silty sands with varying amounts of gravel. The N-values of the alluvium ranged from 10 to 19 blows per foot (bpf), indicating a relative density of loose to medium dense. The natural moisture contents of the alluvium ranged from 15 to 19 percent.

3.2.4 Residual Soils

Beneath the surficial topsoil layer in two of the five borings (B-3 and B-4), residual soils were encountered to auger refusal depths ranging from 5.1 to 8.9 feet. Residual soils are classified as soils which have been formed in place from weathering of the underlying bedrock. The residual soils generally consisted of brown and light brown clays with varying amounts of chert fragments. The N-values of the residuum ranged from 5 blows per foot (bpf) to 50 blows per three inches of penetration (bpi), indicating a consistency of firm to very hard. The natural moisture contents of the residuum ranged from 16 to 22 percent. Atterberg limits testing on two select samples of the residuum revealed a liquid limit (LL) of 32 and 28 percent and a plasticity index (PI) of 17 and 16 percent, respectively. This soil is classified as CL (lean clay) in general accordance with the Unified Soil Classification System.

3.2.5 Subsurface Water

Subsurface water was observed in four of the five borings (B-1, B-2, B-4, and B-5) at depths ranging from 3 to 8 feet during the time of exploration. Subsurface water levels may fluctuate due to seasonal changes in precipitation amounts and the amount of water within any nearby creek. Additionally, discontinuous zones of perched water may exist within the overburden and/or at the contact with bedrock. The groundwater information presented in this report is the information that was collected at the time of our field activities. A summary of the subsurface water levels encountered in the borings is shown in Table 1 below:

Table 1 – Subsurface Water Summary

Boring No.	Subsurface Water Depth (Feet)
B-1	4.0
B-2	3.0
B-3	--
B-4	8.0
B-5	4.0

Note: Depths reference the existing ground elevations at the time of the exploration.

3.2.6 Auger Refusal Conditions

Auger refusal materials were encountered in four of the five borings (B-1 through B-4) at depths ranging from 5.1 to 8.9 feet during the field exploration. Refusal is a designation applied to any material that cannot be penetrated by the power auger. Auger refusal may indicate dense gravel or cobble layers, boulders, rock ledges or pinnacles, or the top of continuous bedrock. A summary of the auger refusal depths encountered in the borings is shown in Table 2 below:

Table 2 – Auger Refusal Summary

Boring No.	Auger Refusal Depth (Feet)
B-1	8.5
B-2	8.3
B-3	5.1
B-4	8.9

Note: Depths reference the existing ground elevations at the time of the exploration.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 SITE ASSESSMENT

The results of the field exploration indicate that the site is adaptable for the proposed improvements development; however, there are some challenges associated with the development of this site. These challenges include the existing fill soils, the firm surficial residual soils, the potentially difficult excavations, the subsurface water considerations, and the underlying karst geology. Once final grading information and traffic loading information becomes available, UES should be allowed to review and revise the recommendations contained herein, if necessary.

4.1.1 Existing Fill Soils

Existing fill was encountered in three of the five borings (B-1, B-2, and B-5) to depths ranging from 3 to 6 feet below the ground surface. We are not aware of, nor have we been provided with testing records for the fill. We anticipate that the fill was likely placed during the construction of the existing roadways or residential developments. Accordingly, there are certain risks associated with construction on these types of fill. The risk primarily consists of excessive and/or non-uniform settlement caused by extensive zones or pockets of soft, loose, or uncompacted material.

The boring data indicates the fill soils generally consisted of brown, dark brown, gray, and dark gray clays with varying amounts of organics and rock fragments. The N-value of the fill soils ranged from 0 to 5 blows per foot (bpf), indicating a consistency of very soft to firm. Typically, an engineered fill would have N-values in excess of 8 to 10 bpf and would be generally free of deleterious material. Based on our observations of the fill, the fill appears to have been subjected to only minimal compactive efforts and does contain areas of organic material.

We anticipate that portions of the existing fill may provide adequate support for any proposed pavements; however, large areas of remediation (i.e. undercut and replacement or soil-cement treatment) should be anticipated. It has been our experience that existing fill can change abruptly and may contain isolated pockets of unsuitable materials. As such, we recommend that the existing fill soils be subjected to a detailed proofroll prior to placement of new fill (in fill areas) or at final subgrade elevation (in cut areas) under the supervision of the geotechnical engineer or their qualified representative. Any areas judged to perform unsatisfactory during the proofroll should be remediated at the engineer's discretion. Remedial measures typically include undercutting and replacement with structural soil fill or dense graded aggregate.

4.1.2 Firm Surficial Residual Soils

Firm residual soils (N-values ranging from 5 to 8 bpf) were encountered beginning just beneath the surficial topsoil layer in one of the five borings (B-4) to a depth of approximately 5 feet. Depending on when the construction is performed, there is a possibility that the upper softer residual soils may need to be scarified, dried, and recompacted or undercut prior to placement of new fill over these areas or if they are at planned subgrade elevations. There is the potential of encountering softer, saturated soils between the boring locations. This is particularly true if the grading/construction is performed between November and March. Similarly to the existing fill soils, we recommend that the residual soils be subjected to a detailed proofroll prior to placement of new fill (in fill areas) or at final subgrade elevation (in cut areas) under the supervision of the geotechnical engineer or their qualified representative. Any areas judged to perform unsatisfactory during the proofroll should be remediated at the engineer's discretion. Remedial measures typically include undercutting and replacement with structural soil fill or dense graded aggregate.

4.1.3 Potentially Difficult Excavations

Auger refusal materials were encountered in four of the five borings (B-1 through B-4) at depths ranging from 5.1 to 8.9 feet below the ground surface during field exploration. A detailed grading plan was not yet available at the time of this report; however, based on the existing grades, we anticipate that the majority of the refusal materials will likely be below any planned excavations for the proposed roadway. However, refusal materials may be encountered if excavations exceed 5 feet, such as in utility excavations. If encountered, these materials may require difficult excavation techniques such as excavators with rock teeth, hoe-ramming, or blasting.

4.1.4 Subsurface Water Considerations

As discussed, subsurface water was observed in four of the five borings (B-1, B-2, B-4, and B-5) at depths ranging from 3 to 8 feet below the ground surface at the time of the exploration. It is likely groundwater will be encountered during excavation operations especially in any excavations over 3 feet in depth such as in utility excavations. Groundwater conditions will likely need to be revisited during construction. If necessary, temporary/permanent dewatering (typically consisting of gravel filled trenches draining into the storm system) can be used to help control the water.

4.1.5 Karst Geology

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. Additionally, a review of the USGS topographic map of the area did not reveal the presence of any closed depressions, which may denote past sinkhole activity, in the vicinity of the project site. Based on these findings and our experience with this formation at other sites, we consider that this site has no greater risk for sinkhole activity than other sites in the immediate vicinity of this site.

4.2 SITE PREPARATION

4.2.1 Subgrade

Gravel, topsoil, asphalt, concrete, rock fragments greater than 6 inches, unsuitable existing fill soils, and other debris should be removed from the proposed construction areas. In previously developed areas, it is often common to find buried zones of construction debris. If these materials are encountered, they should be undercut and replaced at the discretion of the geotechnical engineer.

After completion of any stripping operations and any required excavations to reach subgrade level, we recommend that the subgrade be proofrolled with a fully-loaded, tandem-axle dump truck or other pneumatic-tired construction equipment of similar weight. The geotechnical engineer or their qualified representative should observe proofrolling. Areas judged to perform unsatisfactorily should be remediated at the geotechnical engineer's discretion. As such, there is a high probability that portions of these surficial fill soils will need to be scarified, dried, and recompacted or undercut prior to placement of new fill over these areas. There is a good likelihood that the upper soils currently covering the site may require some scarifying and drying due to exposure to weather (precipitation and freeze/thaw) for an extended period of time.

4.2.2 Structural Soil Fill

Material considered suitable for use as compacted fill should be clean soil free of organics, wood, trash, and other deleterious material, containing no rock fragments greater than 6 inches in any one dimension. Preferably, borrow material to be used as structural soil fill should have a standard Proctor maximum dry density of 90 pounds per cubic foot (pcf) or greater and a plasticity index (PI) of 35 percent or less. All material being used as soil fill should be tested and confirmed by the geotechnical engineer to be in accordance with the project requirements before being placed. Based on limited laboratory testing, we anticipate the on-site residual soils are suitable for use as structural soil fill, provided that any deleterious materials are removed and any necessary moisture conditioning is performed. Standard Proctor testing on one sample of the residual soils taken from boring B-3 exhibited a maximum dry density of 107.6 pounds per cubic foot (pcf) at an optimum moisture content of 18.5 percent. Fine-grained soils are moisture sensitive and can prove difficult to place/compact during wet weather. The grading contractor should be prepared to moisture condition (including scarifying/drying) these soils as conditions warrant. Otherwise, chemical treatment (lime/soil cement) may be needed during extended periods of cooler/wet weather.

Structural fill should be placed in loose, horizontal lifts not exceeding 8 inches in thickness. Each lift should be compacted to at least 95 percent of maximum dry density per the standard Proctor method (ASTM D698) and within the range of minus 2 percent to plus 3 percent of the optimum moisture content. Additionally, we understand that Catoosa County requires that the upper 12 inches of fill be compacted to at least 98 percent of maximum dry density per the standard Proctor method. Each lift should be compacted and tested by geotechnical personnel to confirm that the contractor's method is capable of achieving the project requirements before placing any subsequent lifts. Any areas which have become soft or frozen should be removed before additional structural fill is placed. This information is summarized in Table 3 on the following page.

Table 3 – Structural Soil Fill Recommendations

Subject	Property
Maximum Dry Density	90 pcf or greater
Plasticity Index	35% or less
Maximum Particle Size	6 inches
Compaction Standard	Standard Proctor, ASTM D698
Required Compaction	95% of Maximum Dry Density
Moisture Content	-2 to +3% of the soil’s optimum moisture content
Lift Thickness	8 inches or less

4.2.3 Compacted Crushed Stone Fill

Compacted crushed stone fill should be Group 1 Aggregates in accordance with Section 815 of the Georgia Department of Transportation specifications. The crushed stone fill should be placed in loose, horizontal lifts not exceeding 10 inches in loose thickness. Each lift should be compacted to at least 98 percent of maximum dry density per the standard Proctor method (ASTM D698). Each lift should be compacted and tested by geotechnical personnel to confirm that the contractor's method is capable of achieving the project requirements before placing any subsequent lifts.

4.3 PAVEMENT DESIGN RECOMMENDATIONS

Our recommendations are based upon the assumption that the subgrade has been properly prepared as described in previous report sections and that any stone backfill to be used to meet the final subgrade meets the requirements for compacted stone fill.

All paved areas should be constructed with positive drainage to direct water off-site and to minimize surface water seeping into the pavement subgrade. The subgrade should have a minimum slope of 1 percent. In downgrade areas, the base stone should extend through the slope to allow any water entering the base stone a path to exit. For rigid pavements, water-tight seals should also be provided at formed construction and expansion joints.

4.3.1 Flexible Pavement Design

One soil sample was obtained from along the side of the roadway for use in standard Proctor compaction (ASTM D698) testing and California Bearing Ratio (CBR) testing (ASTM D1883). Specimens were remolded to an approximate compaction ratio of 98 percent at moisture contents of 2 percent below optimum, optimum, and 2 percent above optimum and subjected to laboratory-soaked California Bearing Ratio (CBR) tests (ASTM D1883) in order to develop design parameters.

The tested sample exhibited a standard Proctor maximum dry density of 107.6 pounds per cubic foot (pcf) at an optimum moisture content of 18.5 percent. The laboratory soaked CBR values for the remolded samples of the residual soils at boring B-3 ranged from approximately 4.5 to 6.8 percent. Based on these laboratory tests and our past experience with similar soils, we have utilized a CBR value of 6 percent for the design of the pavement section. We would recommend that any new structural soil fill that is placed be of a similar or greater CBR value.

No detailed traffic information was available at the time of this report; however, we have modeled the roadway as a "non-residential street" with an average daily traffic (ADT) of 10,000 or less as specified by the Catoosa County Unified Development Code. Based on the design CBR and the above-mentioned traffic information, the following pavement section would typically be recommended for this roadway:

Table 4 – Flexible Pavement Section

Recommended Thickness (Inches)	
Pavement Materials	**Roadway**
Bituminous Asphalt Surface Mix 9.5mm Super Pave GDOT & Catoosa County Specifications	1.5
Bituminous Asphalt Base Mix 19mm Super Pave GDOT & Catoosa County Specifications	2.5
Compacted Crushed Aggregate Base Group 1 Aggregate GDOT & Catoosa County Specifications	8.0
Total Flexible Pavement Thickness	12.0

The pavement subgrade and pavement materials should conform and be tested according to the Georgia Department of Transportation (GDOT) and Catoosa County Specifications.

We recommend a base stone equivalent to a Group 1 Aggregate in accordance with Section 815 of the Georgia Department of Transportation specifications. The bituminous asphalt pavement should be 9.5mm Super Pave as per Section 400 for the surface mix and 19mm Super Pave as per Section 400 for the binder mix. Compaction requirements for the crushed aggregate base and the bituminous asphalt pavement should generally follow Georgia Department of Transportation and Catoosa County specifications.

The recommended pavement thickness' presented in this report section are considered typical and minimum for the assumed parameters in the general site area. We understand that budgetary considerations sometimes warrant thinner pavement sections than those presented. However, the client, the owner, and the project designers should be aware that thinner pavement sections may result in increased maintenance costs and lower than anticipated pavement life.

4.3.2 Rigid Pavement Design

If areas could possibly be subjected to heavy vehicles loads or as an alternate to the flexible pavement listed above, these areas may require the use of rigid pavement. If rigid pavement is chosen, we recommend the following rigid pavement section:

Table 5 – Rigid Pavement Section

Pavement Materials	Recommended Thickness (Inches)
4,000 psi Type I Concrete	6.0
Compacted Crushed Aggregate Base	6.0

Consideration should be given to adjusting the thickness of the compacted crushed aggregate base to match the total thickness of the adjacent asphalt areas so that the soil subgrade is at the same elevation for both the concrete and asphalt pavements. Also, consideration should be given to extending the concrete dumpster pad the full length of the garbage truck, so the all the tires of the truck are able to sit on the concrete pad while dumping the dumpster. Concrete should be reinforced with welded wire fabric or reinforcing bars to assist in controlling cracking from drying shrinkage and thermal changes. Sawed or formed control joints should be included for each 225 square feet of area or less (15 feet by 15 feet). Saw cuts should not cut through the welded wire fabric or reinforcing steel and dowels should be utilized at formed and/or cold joints.

5.0 CONSTRUCTION CONSIDERATIONS

5.1 EXCAVATIONS

Excavations should be sloped or shored in accordance with local, state, and federal regulations, including OSHA (29 CFR Part 1926) excavation trench safety standards. The contractor is usually solely responsible for site safety. This information is provided only as a service and under no circumstances should UES be assumed to be responsible for construction site safety.

As previously mentioned, auger refusal materials were encountered in four of the five borings (B-1 through B-4) at depths ranging from 5.1 to 8.9 feet below the ground surface during field exploration. A detailed grading plan was not yet available at the time of this report; however, based on the existing grades, we anticipate that the majority of the refusal materials will likely be below any planned excavations for the proposed roadway. However, this is possible if excavations exceed 5 feet, such as in utility excavations. If encountered, these materials may require difficult excavation techniques such as excavators with rock teeth, hoe-ramming, or blasting.

Additionally, subsurface water was observed in four of the five borings (B-1, B-2, B-4, and B-5) at depths ranging from 3 to 8 feet below the ground surface at the time of the exploration. It is likely groundwater will be encountered during excavation operations especially in any excavations over 3 feet in depth such as in utility excavations. Groundwater conditions will likely need to be revisited during construction. If necessary, temporary/permanent dewatering (typically consisting of gravel filled trenches draining into the storm system) can be used to help control the water.

5.2 MOISTURE SENSITIVE SOILS

The fine-grained soils encountered at this site will be sensitive to disturbances caused by construction traffic and changes in moisture content. During wet weather periods, increases in the moisture content of the soil can cause significant reduction in the soil strength and support capabilities. Construction traffic patterns should be varied to prevent the degradation of previously stable subgrade. In addition, plastic soils which become wet, may be slow to dry and thus significantly retard the progress of grading and compaction activities. We caution if site grading is performed during the wet weather season, methods such as discing and allowing the material to dry will be required to meet the required compaction recommendations. It will, therefore, be advantageous to perform earthwork and foundation construction activities during dry weather. Climate data for nearby Chickamauga, Georgia obtained from U.S. Climate Data indicate in the following table the average monthly precipitation. The average amount of precipitation does not vary much throughout the year. However, November through March is typically the difficult grading period due to the limited drying conditions that exist.

Table 6 – Average Precipitation Summary

Month	Monthly Precipitation Average (Inches)	Month	Monthly Precipitation Average (Inches)
January	5.31	July	4.40
February	5.18	August	3.66
March	5.10	September	4.22
April	3.72	October	3.31
May	4.37	November	5.01
June	4.36	December	5.17

5.3 DRAINAGE AND SURFACE WATER CONCERNS

To reduce the potential for undercut and construction induced sinkholes, water should not be allowed to collect in the utility excavations or on prepared subgrades of the construction area either during or after construction. Undercut or excavated areas should be sloped toward one corner to facilitate removal of any collected rainwater, subsurface water, or surface runoff. Positive site surface drainage should be provided to reduce infiltration of surface water around the perimeter of the construction and roadway areas. The grades should be sloped away from the roadway areas and surface drainage should be collected and discharged such that water is not permitted to infiltrate the backfill and roadway subgrade areas.

5.4 SINKHOLE CONSIDERATIONS

There is some inherent risk associated with building on any site underlain by carbonate rock. This risk can be reduced but not eliminated by preparing the site as described in this report. At this site, control of surface water during construction and over the project life will be very important to reduce the potential for sinkhole development. If a sinkhole develops, the appropriate corrective action is dependent on the size and location of the sinkhole. As described herein, UES 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 UES on a case-by-case basis.

6.0 LIMITATIONS

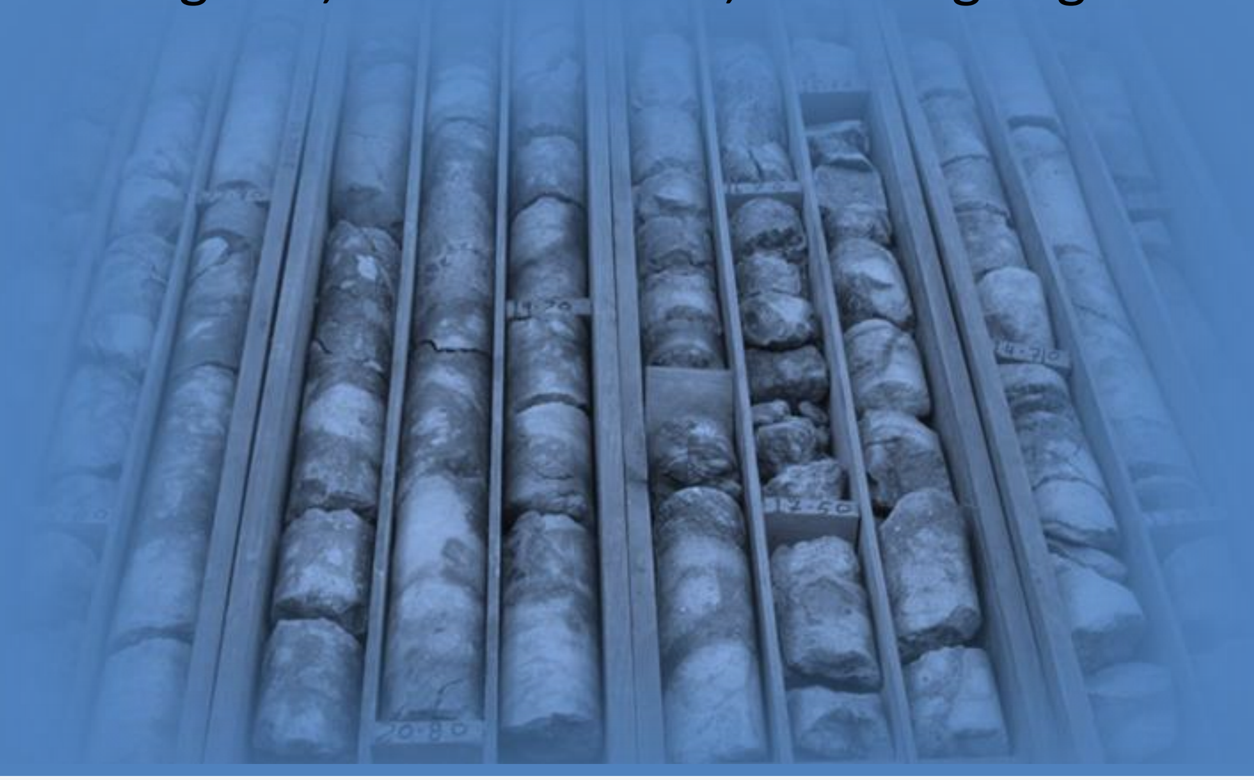
This report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. This report is for our geotechnical work only, and no environmental assessment efforts have been performed. The conclusions and recommendations contained in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

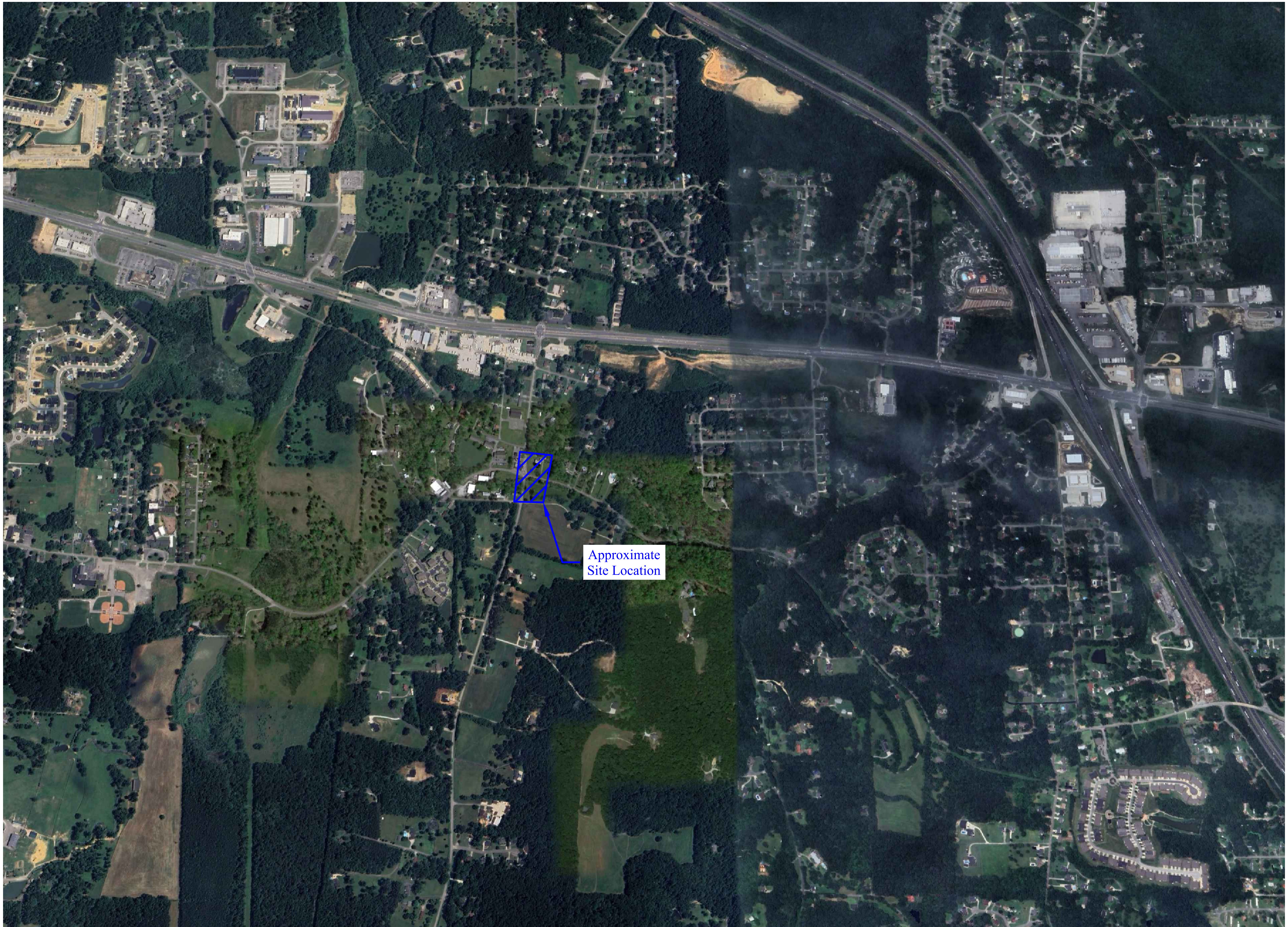
The analyses and recommendations submitted herein are based, in part, upon the data obtained from the exploration. The nature and extent of variations between the borings will not become evident until construction. We recommend that UES be retained to observe the project construction in the field. UES cannot accept responsibility for conditions which deviate from those described in this report if not retained to perform construction observation and testing. If variations appear evident, then we will re-evaluate the recommendations of this report. In the event that any changes in the nature, design, or location of the project are planned, the conclusions and recommendations contained in this report will not be considered valid unless the changes are reviewed, and conclusions modified or verified in writing. Also, if the scope of the project should change significantly from that described herein, these recommendations may have to be re-evaluated.

APPENDICES

APPENDIX A

Figures, General Notes, & Boring Logs





NOTES:
1.) BASE MAP PROVIDED BY GOOGLE EARTH PRO (04/18/22).

SITE VICINITY MAP

Three Notch Road Traffic Circle

Ringgold, Georgia

DRAWN BY:	LM
APPROVED BY:	JTH
SCALE:	NTS
JOB NO.:	A25110.00412
DATE:	7/15/2025

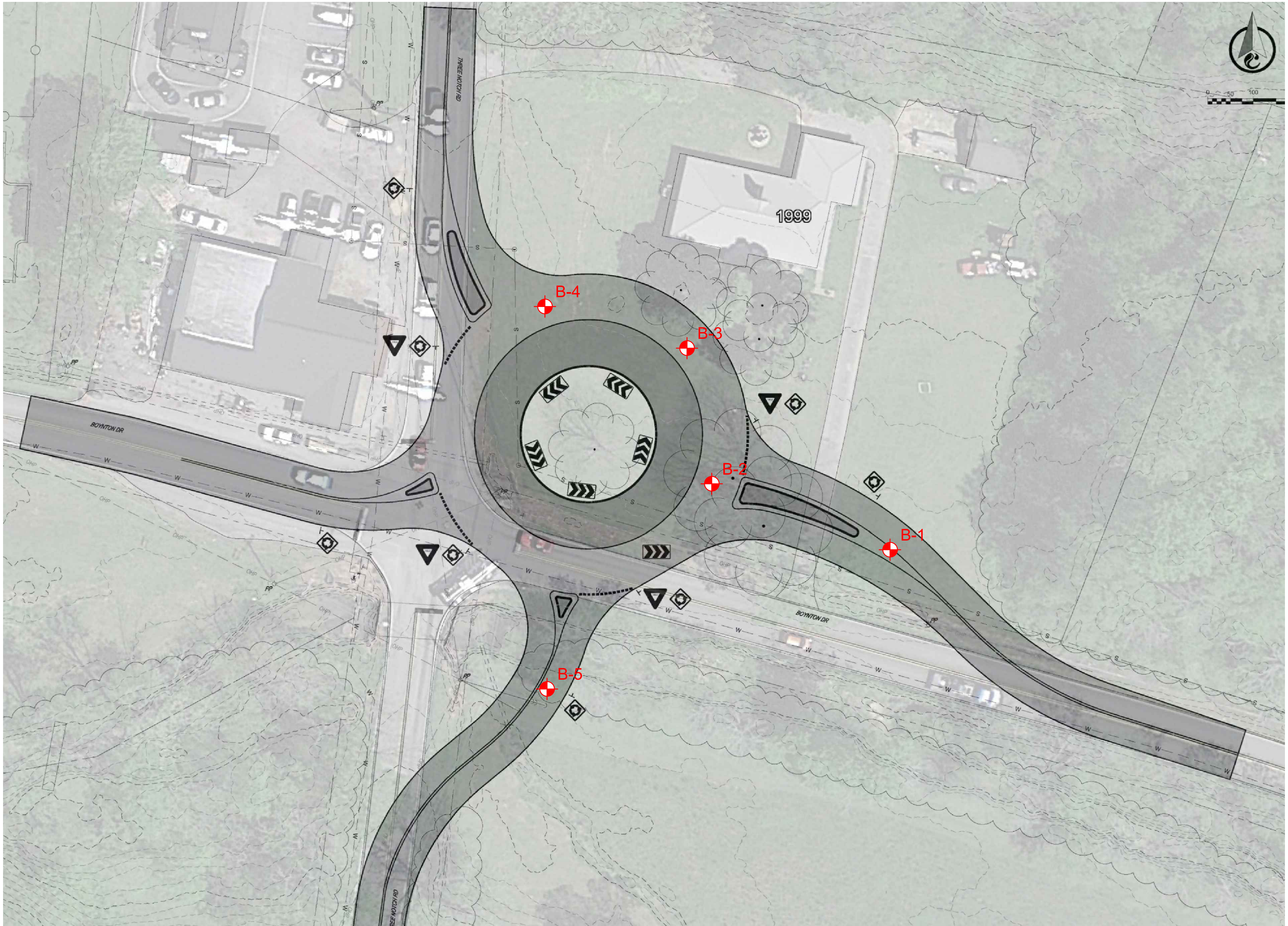
FIGURE 1

NOTES:
1.) BASE MAP PROVIDED BY USGS TOPOGRAPHIC MAP (1969) - EAST RIDGE QUADRANGLE (TN-GA).

USGS TOPOGRAPHIC MAP
Three Notch Road Traffic Circle
Ringgold, Georgia

DRAWN BY:	LM
APPROVED BY:	JTH
SCALE:	NTS
JOB NO.:	A25110.00412
DATE:	7/15/2025

FIGURE 2



NOTES:
1.) BORING LOCATIONS ARE SHOWN IN GENERAL ARRANGMENT ONLY.
2.) DO NOT USE BORING LOCATIONS FOR DETERMINATIONS OF DISTANCES OR QUANTITIES.
3.) BASE MAP PROVIDED BY CTIENGINEERS.
LOCATION OF SOIL TEST BORING

BORING LOCATION PLAN
Three Notch Road Traffic Circle
Ringgold, Georgia

DRAWN BY:	LM
APPROVED BY:	JTH
SCALE:	NTS
JOB NO.:	A25110.00412
DATE:	7/15/2025

UES™

FIGURE 3

GENERAL NOTES

FINE AND COARSE GRAINED SOIL PROPERTIES

PARTICLE SIZE

BOULDERS:	GREATER THAN 300 mm
COBBLES:	75 mm to 300 mm
GRAVEL:	4.74 mm to 75 mm
COARSE SAND:	2 mm to 4.74 mm
MEDIUM SAND:	0.425 mm to 2 mm
FINE SAND:	0.075 mm to 0.425 mm
SILTS & CLAYS:	LESS THAN 0.075 mm

COARSE GRAINED SOILS (SANDS & GRAVELS)

N-VALUE	RELATIVE DENSITY
0 - 4	VERY LOOSE
5 - 10	LOOSE
11 - 30	MEDIUM DENSE
31 - 50	DENSE
OVER 50	VERY DENSE

FINE GRAINED SOILS (SILTS & CLAYS)

N-VALUE	CONSISTENCY	Qu, PSF
0 - 2	VERY SOFT	0 - 500
3 - 4	SOFT	500 - 1000
5 - 8	FIRM	1000 - 2000
9 - 15	STIFF	2000 - 4000
16 - 30	VERY STIFF	4000 - 8000
OVER 31	HARD	8000 +

STANDARD PENETRATION TEST (ASTM D1586)

THE STANDARD PENETRATION TEST AS DEFINED BY ASTM D1586 IS A METHOD TO OBTAIN A DISTURBED SOIL SAMPLE FOR EXAMINATION AND TESTING AND TO OBTAIN RELATIVE DENSITY AND CONSISTENCY INFORMATON. THE 1.4 INCH I.D./2.0 INCH O.D. SAMPLER IS DRIVEN 3-SIX INCH INCREMENTS WITH A 140 LB. HAMMER FALLING 30 INCHES. THE BLOW COUNTS REQUIRED TO DRIVE THE SAMPLER THE FINAL 2 INCREMENTS ARE ADDED TOGETHER AND DESIGNATED THE N-VALUE. AT TIMES, THE SAMPLER CAN NOT BE DRIVEN THE FULL 18 INCHES. THE FOLLOWING REPRESENTS OUR INTERPRETATION OF THE STANDARD PENETRATION TEST WITH VARIATIONS.

BLOWS/FOOT (N-VALUE)	DESCRIPTION
25	25 BLOWS DROVE SAMPLER 12" AFTER INITIAL 6" SEATING
75/10"	75 BLOWS DROVE SAMPLER 10" AFTER INITIAL 6" SEATING
50/PR	PENETRATION REFUSAL OF SAMPLER AFTER INITIAL 6" SEATING

SAMPLING SYMBOLS

ST:	UNDISTURBED SAMPLE
SS:	SPLIT SPOON SAMPLE
CORE:	ROCK CORE SAMPLE
AU:	AUGER OR BAG SAMPLE

SOIL PROPERTY SYMBOLS

N:	STANDARD PENETRATION, BPF
M:	MOISTURE CONTENT %
LL:	LIQUID LIMIT %
PI:	PLASTICITY INDEX %
Qp:	POCKET PENETROMETER VALUE, TSF
Qu:	UNCONFINED COMPRESSIVE STRENGTH, TSF
DUW:	DRY UNIT WEIGHT, PCF

ROCK PROPERTIES

ROCK QUALITY DESIGNATION (RQD)

PERCENT	QUALITY
90 TO 100	EXCELLENT
75 TO 90	GOOD
50 TO 75	FAIR
25 TO 50	POOR
0 TO 25	VERY POOR

ROCK HARDNESS

VERY SOFT:	ROCK DISINTEGRATES OR EASILY COMPRESSES TO TOUCH: CAN BE HARD TO VERY HARD SOIL.
SOFT:	ROCK IS COHERANT BUT BREAKS EASILY TO THUMB PRESSURE AT SHARP EDGES AND CRUMBLES WITH FIRM HAND PRESSURE.
MODERATELY HARD:	SMALL PIECES CAN BE BROKEN OFF ALONG SHARP EDGES BY CONSIDERABLE HARD THUMB PRESSURE: CAN BE BROKEN BY LIGHT HAMMER BLOWS.
HARD:	ROCK CAN NOT BE BROKEN BY THUMB PRESSURE, BUT CAN BE BROKEN BY MODERATE HAMMER BLOWS.
VERY HARD:	ROCK CAN BE BROKEN BY HEAVY HAMMER BLOWS.

UES TM

SOIL BORING NUMBER: B-1

PROJECT NAME Three Notch Road Traffic Circle
PROJECT NUMBER A25110.00412
GROUND ELEVATION N/A **PROPOSED ELEVATION** N/A
PROJECT LOCATION Ringgold, Georgia
DATE DRILLED 07/03/2025
LATITUDE / LONGITUDE 34.925673, -85.171772
DRILLING CONTRACTOR Tri-State Drilling
DRILLING METHOD Hollow Stem Auger
GROUNDWATER: AT TIME OF DRILLING 4'
24 HOURS N/A
FINAL BORING DEPTH 8.5'

Depth (ft)	Elevation (ft)	Sample Graphic	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	Samples: Blow Counts (N/Refusal)	Lab: Moisture Content (%)	Lab: Liquid Limit	Lab: Plastic Limit	Lab: Plasticity Index
						TOPSOIL - 8 inches					
			SS	1		**LEAN CLAY** (CL) - with rock fragments and organics - brown and dark brown - very soft - moist to very moist (**FILL**)	x-x-x (0)				
			SS	2		**SILTY SAND** (SM) - with gravel - brown - medium dense - very moist to wet (**ALLUVIUM**)	3-5-7 (12)	15			
5											
			SS	3			1-6-9 (15)	19			

Auger refusal at 8.5'

Notes:

SOIL BORING NUMBER: B-2

PROJECT NAME Three Notch Road Traffic Circle
PROJECT NUMBER A25110.00412
GROUND ELEVATION N/A **PROPOSED ELEVATION** N/A
PROJECT LOCATION Ringgold, Georgia
DATE DRILLED 07/03/2025
LATITUDE / LONGITUDE 34.925750, -85.172033
DRILLING CONTRACTOR Tri-State Drilling
DRILLING METHOD Hollow Stem Auger
GROUNDWATER: AT TIME OF DRILLING 3'
24 HOURS N/A
FINAL BORING DEPTH 8.3'

Depth (ft)	Elevation (ft)	Sample Graphic	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	Samples: Blow Counts (N/Refusal)	Lab: Moisture Content (%)	Lab: Liquid Limit	Lab: Plastic Limit	Lab: Plasticity Index
						TOPSOIL - 6 inches					
			SS	1		**LEAN CLAY** (CL) - with rock fragments and organics - brown and dark brown - very soft - moist to very moist (**FILL**)	1-1-1 (2)	23			
			SS	2		**FAT CLAY** (CH) - with trace rock fragments and organics - gray and dark gray - firm - very moist (**FILL**)	1-1-4 (5)	36			
5											
			SS	3		**SILTY SAND** (SM) - with gravel - brown - medium dense - very moist to wet (**ALLUVIUM**)	10-12-7 (19)	19			

Auger refusal at 8.3'

Notes:

SOIL BORING NUMBER: B-3

PROJECT NAME Three Notch Road Traffic Circle
PROJECT NUMBER A25110.00412
GROUND ELEVATION N/A **PROPOSED ELEVATION** N/A
PROJECT LOCATION Ringgold, Georgia
DATE DRILLED 07/03/2025
LATITUDE / LONGITUDE 34.925912, -85.172072
DRILLING CONTRACTOR Tri-State Drilling
DRILLING METHOD Hollow Stem Auger
GROUNDWATER: AT TIME OF DRILLING Dry
24 HOURS N/A
FINAL BORING DEPTH 5.1'

Depth (ft)	Elevation (ft)	Sample Graphic	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	Samples: Blow Counts (N/Refusal)	Lab: Moisture Content (%)	Lab: Liquid Limit	Lab: Plastic Limit	Lab: Plasticity Index
						TOPSOIL - 8 inches					
			SS	1		**LEAN CLAY** (CL) - with chert fragments - brown and light brown - very stiff to very hard - moist (**RESIDUUM**)	3-4-13 (17)	20	32	15	17
			SS	2			20-50/3" (50/3")	22			
5											

Auger refusal at 5.1'

Notes: Auger refusal was encountered at 4.9 feet. Boring was offset and re-drilled.

SOIL BORING NUMBER: B-4

PROJECT NAME Three Notch Road Traffic Circle
PROJECT NUMBER A25110.00412
GROUND ELEVATION N/A **PROPOSED ELEVATION** N/A
PROJECT LOCATION Ringgold, Georgia
DATE DRILLED 07/03/2025
LATITUDE / LONGITUDE 34.925961, -85.172281
DRILLING CONTRACTOR Tri-State Drilling
DRILLING METHOD Hollow Stem Auger
GROUNDWATER: AT TIME OF DRILLING 8'
24 HOURS N/A
FINAL BORING DEPTH 8.9'

Depth (ft)	Elevation (ft)	Sample Graphic	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	Samples: Blow Counts (N/Refusal)	Lab: Moisture Content (%)	Lab: Liquid Limit	Lab: Plastic Limit	Lab: Plasticity Index
						TOPSOIL - 6 inches					
			SS	1		**LEAN CLAY** (CL) - with chert fragments - brown and light brown - firm to stiff - moist (**RESIDUUM**)	3-3-4 (7)	16	28	12	16
			SS	2			1-2-3 (5)				
5											
			SS	3			2-4-5 (9)	21			

Auger refusal at 8.9'

Notes:

SOIL BORING NUMBER: B-5

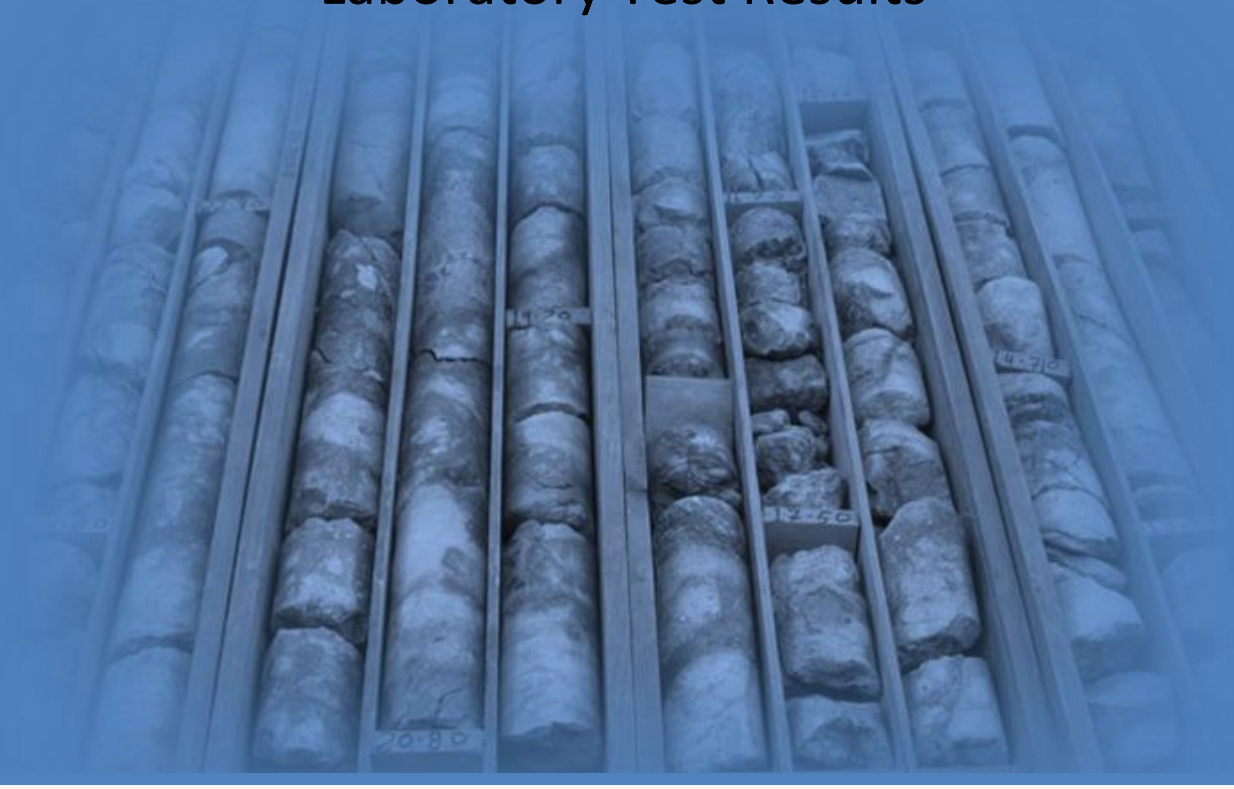
PROJECT NAME Three Notch Road Traffic Circle
PROJECT NUMBER A25110.00412
GROUND ELEVATION N/A **PROPOSED ELEVATION** N/A
PROJECT LOCATION Ringgold, Georgia
DATE DRILLED 07/03/2025
LATITUDE / LONGITUDE 34.925500, -85.172272
DRILLING CONTRACTOR Tri-State Drilling
DRILLING METHOD Hand Auger
GROUNDWATER: AT TIME OF DRILLING 4'
24 HOURS N/A
FINAL BORING DEPTH 5'

Depth (ft)	Elevation (ft)	Sample Graphic	Sample Type	Sample Number	Graphic Log	MATERIAL DESCRIPTION	Samples: Blow Counts (N/Refusal)	Lab: Moisture Content (%)	Lab: Liquid Limit	Lab: Plastic Limit	Lab: Plasticity Index
						TOPSOIL - 6 inches					
			Hand	1		**LEAN CLAY** (CL) - with trace rock fragments - brown and dark brown - soft - moist to very moist (**FILL**)	2-3-3 (3)				
			Hand	2			4-5-4 (4)				
			Hand	3		**SILTY SAND** (SM) - with gravel - brown - loose - very moist (**ALLUVIUM**)	9-10-12 (10)				
5						Boring terminated at 5'					

Notes:

APPENDIX B

Laboratory Test Results



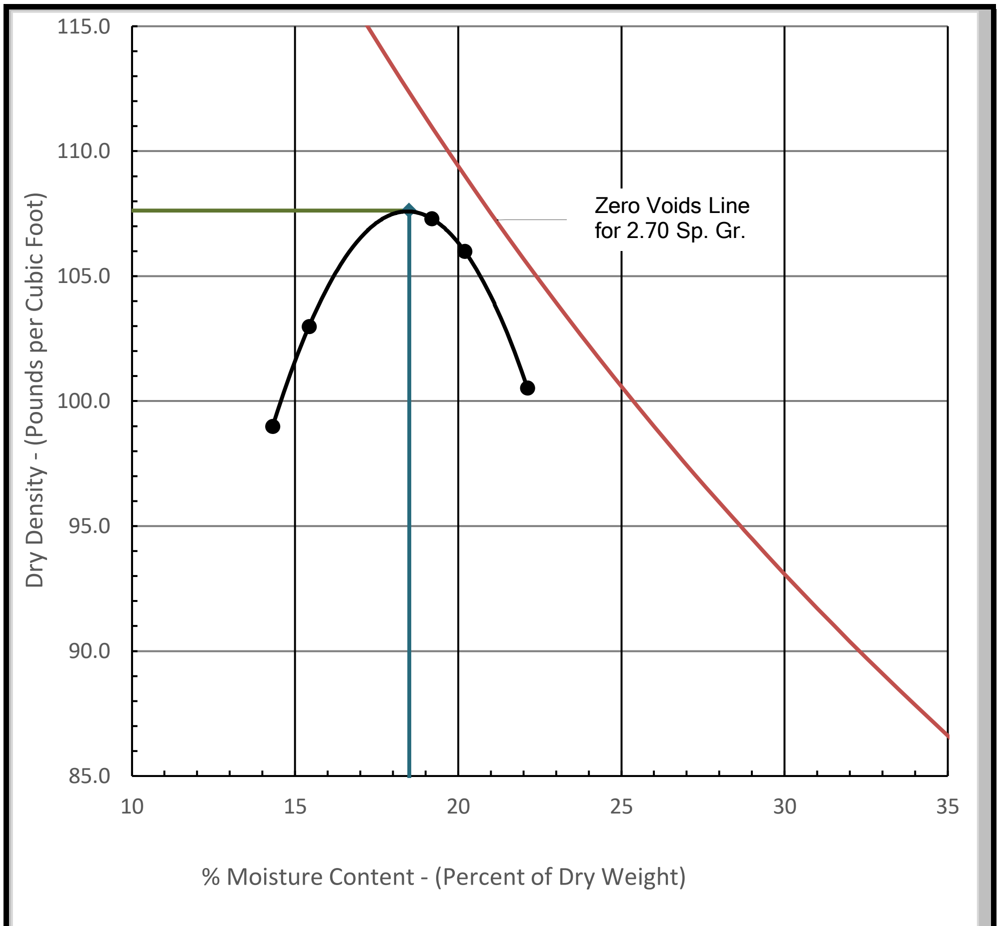
LABORATORY SUMMARY SHEET

Boring Number	Sample Number	Depth (feet)	Natural Moisture Content	Atterberg Limits			Soil Type
				LL	PL	PI	
B-1	1	1.0-2.5	-				
	2	3.5-5.0	15.0%				
	3	6.0-7.5	18.5%				
B-2	1	1.0-2.5	23.0%				
	2	3.5-5.0	36.1%				
	3	6.0-7.5	19.0%				
B-3	1	1.0-2.5	20.2%	32	15	17	CL
	2	3.5-5.0	22.1%				
B-4	1	1.0-2.5	15.5%	28	12	16	CL
	2	3.5-5.0	-				
	3	6.0-7.5	21.3%				

LABORATORY COMPACTION OF SOILS
ASTM D 698 Method B

UES Project Name:	Three Notch Road Traffic Circle		
UES Project Number:	A25110.00412	Report Date:	July 16, 2025
UES Log #:	N/A	Date Received:	July 8, 2025

Sample Location:	Boring B-3
Sample Depth:	1' - 5'
Sample Description:	Light Brown Clay with Chert



Max. Dry Density (pcf)
107.6
Optimum Moisture (%)
18.5

As Received W%	20.2
Rammer Type	Manual
Prep Method	Dry

ASTM D4718
Percent Oversize Material
TNP < 5%
OS Bulk Specific Gravity
TNP
Oversize Corrected Data Corrected MDD (pcf)
TNP
Corrected Opt Moisture %
TNP

LL / PL / PI - Data By:		ASTM D4318	
Liquid Limit	32	Plasticity Index	17
Plastic Limit	15	Soil Type	CL

SOIL SPECIFIC GRAVITY BY ASTM D854
ASSUMED 2.70

NOTES

UES Professional Solutions 19, LLC - 6607 Mountain View Road, Suite 139, Ooltewah, Tennessee 37363 - Phone: (423) 614-6471 Fax: (423) 614-6479

CALIFORNIA BEARING RATIO
ASTM D1883

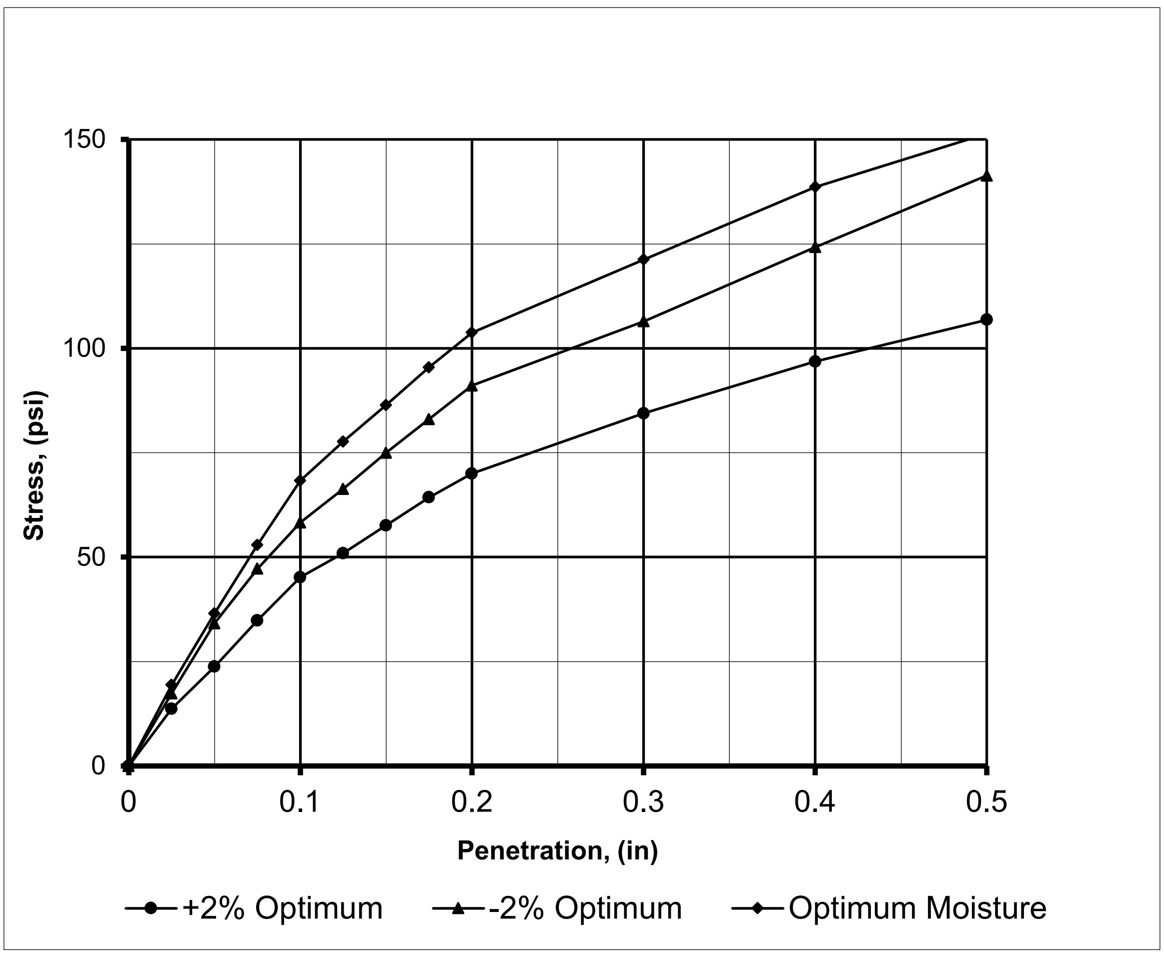
Job Name: Three Notch Road Traffic Circle

Job No: A25110.00412

Sample No: Boring B-3 (1 to 5 feet)

Sample Description: Light Brown Clay with Chert

	+2% Optimum Moisture Content			Optimum Moisture Content			-2% Optimum Moisture Content	
Wet Density	126.4	pcf	Wet Density	124.9	pcf	Wet Density	123.4	pcf
Dry Density	105.0	pcf	Dry Density	105.6	pcf	Dry Density	105.8	pcf
Water Content	20.3%		Water Content	18.2%		Water Content	16.7%	
Compaction	97.6%		Compaction	98.2%		Compaction	98.3%	
Swell	-0.15%		Swell	0.31%		Swell	0.48%	
CBR @ .1"	**4.5**		**CBR @ .1"**	**6.8**		**CBR @ .1"**	**5.8**	
CBR @ .2"	**4.7**		**CBR @ .2"**	**6.9**		**CBR @ .2"**	**6.1**	



CALIFORNIA BEARING RATIO
ASTM D1883

Job Name: Three Notch Road Traffic Circle

Job No: A25110.00412

Sample No: Boring B-3 (1 to 5 feet)

Sample Description: Light Brown Clay with Chert

	+2% Optimum Moisture Content	Optimum Moisture Content	-2% Optimum Moisture Content
Wet Density	126.4 pcf	124.9 pcf	123.4 pcf
Water Content	20.3%	18.2%	16.7%
Dry Density	**105.0**	**105.6**	**105.8**
% Compaction	**97.6%**	**98.2%**	**98.3%**
CBR @ .1"	**4.5**	**6.8**	**5.8**