UNITED CONSULTING

REPORT

For

Rockdale County Water Resources

Geotechnical Exploration
SR 138 from Hightower Elementary School to White Road NE
Conyers, Rockdale County, Georgia

Project No.: ROCKW-23-GA-07137-01
March 3, 2023

625 Holcomb Bridge Road, Norcross, GA 30071 • 770-209-0029 • unitedconsulting.com

March 3, 2023

Mr. David Cervone, P.E.
Rockdale County Water Resources
1329 Portman Dr., Suite H
Conyers, GA 30094

Via Email: David.Cervone@RockdaleCountyGA.gov

RE: Geotechnical Exploration Report
SR 138 from Hightower Elementary School to White Road NE
Conyers, Rockdale County, Georgia
Project No. ROCKW-23-GA-07137-01

Dear Mr. Cervone:

United Consulting is pleased to submit this Geotechnical Exploration Report for the SR 138 from Hightower Elementary School to White Road NE Project. The work was completed in general accordance with Proposal No. P2022.7701.01 dated October 5, 2022. This report presents the findings of the subsurface exploration and provides recommendations concerning the proposed project.

We appreciate the opportunity to assist you with this project and look forward to our continued participation. Please contact us if you have any questions or if we can be of further assistance.

Sincerely,

UNITED CONSULTING

GEORGIA REGISTERED NO. 23121 PROFESSIONAL ENGINEER MEHDI MOAZZAMI

Mehdi Moazzami, Ph.D., P.E.
Senior Geotechnical Engineer

Chris L. Roberds, P.G.
Senior Executive Vice President

MZ/MM/CLR/nj

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1.0 EXECUTIVE SUMMARY

United Consulting has completed a Geotechnical Exploration for the SR 138 from Hightower Elementary School to White Road NE Project located in Conyers, Rockdale County, Georgia. Please refer to the text of the report for a more detailed discussion of the items summarized below.

1. Fill soils were encountered to depths of 3 to 6 feet-bgs in all borings except for PT-101, PT-108, and PT-109. Below the fill soils, residual soils were present in all borings, except for PT-101, up to a depth of 20 feet-bgs. The fill soils encountered were generally free of organic material but variable in consistency. The soils at the site should generally be suitable for reuse as engineered fill with proper moisture control.

2. A thin layer (1 to 1.5 feet thick) of Partially Weathered Rock (PWR) was encountered in borings PT-101 and PT-112 starting at depths of 0 and 6.5 feet-bgs, respectively. A lens of PWR was also encountered in boring PT-104 from 3.5 to 6 feet, and in boring PT-110 from 4.5 to 6 feet.

3. Auger refusal was encountered in borings PT-100, PT-101, PT-111, and PT-112 at depths between 1.5 and 11.5 feet-bgs. Rock coring was conducted below the auger refusals depths in these borings to depths of 16.5 to 21.5 feet-bgs. We anticipate some difficult excavation associated with PWR or rock in the vicinity of these borings. Also, due to the geology of the area, depth to rock can vary significantly over short horizontal distances. As such, it is not unusual to encounter difficult excavation conditions associated with PWR or rock between and away from the boring locations.

4. Groundwater was not encountered in any of borings. This being said, the contractor should be prepared to remove groundwater or/and perched water, as needed, since groundwater levels should be anticipated to fluctuate with the change of seasons, during periods of very low or high precipitation, or due to changes in the floodplain or watershed upstream from the area.

2.0 PROJECT INFORMATION

Rockdale County Water Resources plans to install an 8-inch gravity sewer main starting in Hightower Trail Elementary School (Sta. 0+00), along SR 138 (GA Hwy 138), ending in White Road NE (Station 55+86.34).

The site plan and pipeline alignment, which were provided to us, were utilized to determine the boundaries of the Project Site and the location of the proposed geotechnical borings. The general location of the project site is shown in the Site Location Plan (Figure 1). The locations of the geotechnical borings are shown in Figure 2.

3.0 PURPOSE AND SCOPE

The purpose of this Geotechnical Exploration was to provide information and geotechnical engineering recommendations concerning subsurface conditions for the proposed water main alignment.

The scope of our geotechnical exploration included the following items:

1. A visual reconnaissance of the site from a geotechnical standpoint;
2. Laying out the proposed boring locations using a hand-held GPS unit;
3. Contacting GA811 Call Before You Dig to clear/mark underground utilities in the area, and using Private Utility Locate services to clear the boring locations;
4. Coordinating with Georgia Department of Transportation (GDOT) to obtain authorizations for borings located on the Right-of-Way (ROW), as well as coordinating with Hightower Trail Elementary School officials to obtain the Right-of-Entry to borings located in the school yard;
5. Drilling a total of fourteen (14) soil test borings with Standard Penetration Test (SPT) to assess the quality and consistency of the subsurface soils;
6. Rock coring to determine rock quality where auger refusal encountered. Rock coring was done in four (4) borings;
7. Field classification of the soil and rock samples obtained during our field-testing program for further identification and classification;
8. Performing laboratory testing consisting of eight (8) USCS tests with hydrometer and eight (8) Unconfined Compressive Strength tests on rock core specimens;
9. Analyzing the existing soil and rock conditions with respect to the proposed construction; and
10. Preparing this geotechnical exploration report to document the results of our field and laboratory testing program, engineering analysis, and to provide our findings and general recommendations.

4.0 REGIONAL GEOLOGY

Based on the Greater Atlanta Region geological map 1:24,000 (Bulletin 96, Georgia Geologic Survey), the Project Site is located in the Southern Piedmont Physiographic Province of Georgia, which is characterized by medium to high-grade metamorphic rocks and scattered igneous intrusions (USGS I-2602 Scale 1:100,000 30'x60' Quadrangle, 2003). The term metamorphic describes rocks that have been subjected to high temperature and/or pressure, usually deep within the Earth's crust. This high temperature and pressure, causing the textural and mineralogical characteristics of the original rock to be altered and can also cause certain rock types to fully melt, becoming what is known as magma. Magma is less dense than the surrounding solidified rock and tends to move upward through fractures, displacing the surrounding rock. This rock type is known as an igneous intrusion. Metamorphic rocks are predominant in this region but due to erosion and uplift, both of these rock types will eventually become exposed at the land surface. According to the geological map of Georgia, the rock types underlying the Project Site are mainly indicated as granitic gneiss, while occasionally other rocks of similar composition and origin spectrum such as hornblende gneiss, amphibolite, mica schist, and biotitic gneiss are encountered. The subsurface bedrock in this region has undergone different rates of weathering which often produces a considerable variation in depth to competent rock over short horizontal distances. Subsurface conditions usually encountered include the upper horizon soils and saprolites (residual soils which maintain the original fabric of the parent rock), and partially weathered rock. These overlay the parent crystalline rock of "massive bedrock" which occurs at depth.

Table 1 summarizes the major natural soil units (presence of greater than 10 percent of the area of interest) and their in-situ properties at the project site (along the proposed water main alignment) according to the Natural Resources Conservation Service (NRCS) Soil Survey of Newton and Rockdale Counties, Georgia. The order of appearance of soil units per location is based on their extent of presence at the project site.

Table 1 – Major Natural Soils at the Project Site

Location at Project Site	Natural Soil Unit (Symbol)	Soil Drainage	Depth to Water Table (in.)	Hydraulic Conductivity
SR 138 between Hi Roc Rd NE and White Rd NE	Wedowee sandy loam (WeD)	Well drained	> 80	Moderately high to high
	Pacolet sandy clay loam (PfC2)			
	Pacolet sandy loam (PaB)			
	Ashlar-Pacolet-Wedowee complex (AwE)	Well drained	> 80	High
Hightower Trail Elementary School Yard Section	Pacolet sandy loam (PaC)	Well drained	> 80	Moderately high to high
	Pacolet sandy loam (PaB)			

5.0 SUBSURFACE CONDITIONS

The geotechnical exploration program consisted of advancing fourteen (14) soil borings with SPTs (designated as borings PT-100 through PT-113) along the proposed sewer alignment. The borings were drilled to depths of 16.5 to 21.5 feet below ground surface (bgs). Table 2 presents a summary of information for SPT borings. The boring locations are shown on Figure 2, and boring logs are included in Appendix A-3.

This section of the report provides a general discussion of subsurface conditions encountered within the explored areas of the Project Site. More-detailed descriptions of the subsurface conditions at the individual test locations are presented on the Boring Logs. Strata breaks designated on the boring logs and subsurface profile represent approximate boundaries between soil types. The transition from one soil type to another may be gradual or occur between soil samples.

Fill soils were encountered to depths of 3 to 6 feet-bgs in all borings except for PT-101, PT-108, and PT-109. The fill soil encountered consisted of very loose to medium dense Sand with varying amounts of rock fragments, clay and silt, or stiff Silt with varying amounts of sand, clay, and rock fragments. The standard penetration test resistances (N-values) in the fill soils ranged from 4 to 24 blows per foot (bpf).

Below the fill soils, typical residual soils of the Piedmont Physiographic Province of Georgia were present in all borings, except for PT-101, up to a depth of 20 feet-bgs. The residual soils consisted of very loose to medium dense Sand with varying amounts of silt, clay, and rock fragments, or firm to very stiff Silt with varying amount of sand, clay, and rock fragments. The N-values in the residual soils generally ranged from 4 to 25 bpf. A layer of very dense residual sand soils with N-value of 63 bpf was encountered in boring PT-112 from a depth of about 3 to 7 feet below grade.

A thin layer (1 to 1.5 feet thick) of Partially Weathered Rock (PWR) was encountered in borings PT-101 and PT-112 starting at depths of 0 and 6.5 feet-bgs, respectively. A lens of PWR was encountered in boring PT-104 from 3.5 to 6 feet, and in boring PT-110 from 4.5 to 6 feet. PWR is a term for the residuum that can be penetrated by a soil drilling auger and has N-values in excess of 100 bpf. The PWRs encountered were classified as very dense Sand with varying amounts of rock fragments, silt, and clay.

Auger refusal was encountered in borings PT-100, PT-101, PT-111, and PT-112 at depths between 1.5 and 11.5 feet-bgs. Rock coring was conducted below the auger refusals in these borings to depths of 16.5 to 21.5 feet-bgs. The rock generally consisted of moderately soft to hard, competent to continuous, Granitic Gneiss with recoveries ranging from 49.2 to 96.7 percent and rock quality designation (RQD) of 48.3 to 90.4 percent. The quality and recovery of rock core samples are summarized in Table 3. Photographs of the rock cores are included in Appendix B-6.

Groundwater was not encountered in any of borings. It should be noted that groundwater levels should be anticipated to fluctuate with the change of seasons, during periods of very low or high precipitation, or due to changes in the floodplain or watershed upstream from the area.

Table 2 – Summary of SPT Borings

Boring ID	Boring Depth (feet)*	Depth to Bottom of Fill (feet)	Depth to Bottom of Residual Soils (feet)	Depth to Bottom of PWR (feet)	Depth to Auger Refusal (feet)	Groundwater Depth at the end of drilling (feet)
PT-100	21.5	6	11.5	NE	11.5	NE
PT-101	16.5	NE	NE	1.5	1.5	NE
PT-102	20	3	20	NE	NE	NE
PT-103	20	3	20	NE	NE	NE
PT-104	20	3.5	20	3.5 to 6	NE	NE
PT-105	20	3	20	NE	NE	NE
PT-106	20	3	20	NE	NE	NE
PT-107	20	3	20	NE	NE	NE
PT-108	20	NE	20	NE	NE	NE
PT-109	20	NE	20	NE	NE	NE
PT-110	20	4.5	20	4.5 to 6	NE	NE
PT-111	18	6	8	NE	8	NE
PT-112	17	3.5	6.5	7	7	NE
PT-113	20	3	20	NE	NE	NE

* Total depth includes cored length, if any.

NE: Not Encountered

Table 3 – Summary of Rock Coring at Auger Refusal Depths

Location / Run #	Depth (ft-bgs)	Recovery (%)	RQD (%)	Unconfined Compressive Strength, (UCS)	
				Sample Depth (ft)	(psi)
PT-100 / Run #1	11.5 – 21.5	95.4	90.4	14-14.5	4026.4
				19-19.5	4471.7
PT-101 / Run #1	1.5 – 6.5	87.5	76.7	3.5-4	4966.8
PT-101 / Run #2	6.5 – 11.5	83.3	73.3	8-8.5	3463.5
PT-101 / Run #3	11.5 – 16.5	90.0	80.8	13.5-14	4099.5
PT-111 / Run #1	8 – 13	61.7	51.7	9-9.5	2563.3
PT-111 / Run #2	13 – 18	96.7	66.7	14-14.5	2608.9
PT-112 / Run #1	7 – 12	78.3	75.8	11.5-12	5554.5
PT-112 / Run #2	12 – 17	49.2	48.3	-	-

6.0 LABORATORY TESTING PROGRAM

A geotechnical laboratory testing program was carried out for this Project. The geotechnical laboratory testing completed for this project included the following:

- Eight (8) Grainsize/Hydrometer Tests (ASTM D2487; ASTM D421; ASTM D422)
- Eight (8) Atterberg Limits Tests (ASTM D4318)
- Eight (8) Moisture Content Tests (ASTM D2216)
- Eight (8) Unconfined Compressive Strength of Rock Core Specimens (ASTM D2938)

A summary of the laboratory test results, and raw lab test results are included in Appendix B.

7.0 DISCUSSION AND RECOMMENDATIONS

The following recommendations are based on our understanding of the proposed construction, the data obtained in the soil test borings, a site reconnaissance, and our experience with subsurface conditions similar to those encountered at the project site.

We recommend that United Consulting be provided with updated documents early in the preparation of final construction drawings to determine if our recommendations are still valid or should be re-evaluated and revised.

7.1 Difficult Excavation

Based on our boring data, lenses of PWR, PWR, or Rock were encountered in six (6) borings along the planned water main alignment. PWR transition was present between the residual soils and the rock in borings PT-101 and PT-112. Also, lenes of PWR as encountered in borings PT-104 and PT-110 at depth of 3.5 and 4.5 feet, respectively. Difficult excavation conditions (including blasting for trench excavations) associated with PWR and Rock will be encountered at the following locations if trench excavation extend to near or below the depths shown in Table 4.

Table 4 – Top of PWR and Auger Refusal locations at SPT borings

Boring ID	Depth of PWR (ft)	Depth to Auger Refusal (ft)	Rock Core Depth (ft)	Boring Depth (ft)
PT-100	NE	11.5	11.5 to 21.5	21.5
PT-101	0	1.5	1.5 to 16.5	16.5
PT-104	3.5 to 6	NE	NA	20
PT-110	4.5 to 6	NE	NA	20
PT-111	NE	8	8 to 18	18
PT-112	6.5	7	7 to 17	17
NE: Not Encountered NA: Not Applicable				

It is also important to note that depths to PWR and rock can vary greatly over short horizontal distances in the Piedmont geologic area, and PWR and rock could be encountered during construction at shallower depths between and outside the boring locations for this study.

PWR typically requires loosening by ripping with large dozers pulling single tooth rippers in mass excavation. The use of specialized excavation equipment (such as ram-hoes, jackhammers, or possibly blasting) is typically required for PWR excavation in confined (trench) excavations. Relatively sound, massive, rock typically requires blasting for removal in mass or trench excavation.

Excavation techniques will vary based on the weathering of the materials, fracturing, and jointing in the rock, and the overall stratigraphy of the feature. Actual field conditions usually display a gradual weathering progression with poorly defined and uneven boundaries between layers of different materials. We recommend that the following definitions for rock in earthwork excavation be included in bid documents:

1. General Excavation: Any material occupying an original volume of more than 1 cubic yard which cannot be excavated with a single-tooth ripper drawn by a crawler tractor having a minimum draw bar pull rating of not less than 80,000 lbs. usable pull (Caterpillar D-8 or larger).

2. Trench Excavation: Any material occupying an original volume of more than 1/2 cubic yard which cannot be excavated with a backhoe having a bucket curling force rated at not less than 40,000 lbs., using a rock bucket and rock teeth (John Deere 790 or larger).

Removal of rock by blasting can be very expensive. The costs of excavation vary with the type of material encountered and the quantities to be excavated. Hence, control of quantities is important. You may consider independent recording of the blasting contractors air track drilling in order to have independent verification of quantities. We will be happy to assist as requested by you with this undertaking.

7.2 Blasting Vibration and Overpressure Limits

Ground vibration and air overpressure during blasting, when required, should be kept at safe and comfortable levels. Levels need to take account of local conditions and the type of work and nearby structure that could be impacted. The limits of human perception of ground vibration are much lower than those that could cause cosmetic damage. United Consulting recommends the following maximum vibration peak particle velocity (PPV) and frequency to limit cosmetic and structural damage to nearby structures:

We recommend that when blasting is required, that a pre-blasting survey of nearby buildings and residential homes be performed prior to any blasting activities. This is recommended so pre-existing cracks, or structural damage, and general structural conditions are documented. If the PPV values provided in Table 5 are not exceeded, damage to homes due to the blasting is unlikely. In addition, blasting air overpressure should not exceed 120 to 130 dB to minimize complaints by the nearby residents. However, this levels still could cause some window vibrations. Finally, blasting of exposed rock, or rock with shallow soil cover, should be covered with blasting mats of sufficient quantity to prevent fly rock.

Table 5 – Blasting Peak Particle Velocity (PPV) and Frequency Limits (USBM)[1]

Frequency (Hz)	Peak Particle Velocity (PPV) (in/sec)
COSMETIC DAMAGE	
1 – 2.5	0.18 – 0.5
2.5 – 10	0.5
10 – 35	0.5 – 2
> 35	2
STRUCTURAL DAMAGE	
1 – 4	0.18 – 0.8
4 – 10	0.8
10 – 25	0.8 – 2
> 25	2

Notes:
1) US Bureau of Mines (USBM) suggested values.
2) Range of values provided above increase linearly in a log scale.

7.3 Caving Considerations

All excavations should be conducted in accordance with the Occupational Safety and Health Administration (OSHA) guidelines. Flattening of the excavation sidewalls and/or the use of bracing may be needed to maintain stability during construction.

7.4 Groundwater Considerations

Groundwater was not encountered in any of borings. It should be noted that groundwater levels should be anticipated to fluctuate with the change of seasons, during periods of very low or high precipitation, or due to changes in the floodplain or watershed upstream from the area. In addition, due to presence of layers of silt, the site is susceptible to formation of perched water. The contractor should be prepared to handle perched groundwater, or water collected during rainfall events. The contractor should be prepared for dewatering, and groundwater should be lowered to depths of at least 3 feet below excavation depths throughout construction.

Management of groundwater, if encountered during construction, can likely be accomplished using perimeter and interior interconnected trenches gravity drained to appropriate outfalls. Where gravity drainage may not be possible, collected water would need to be routed to sumps and pumped for discharge. However, the need for localized or more comprehensive permanent control of groundwater will need to be further evaluated based on conditions at the time of construction. The contractor should be prepared to remove perched and groundwater as needed.

7.5 Temporary Shoring

Care should be exercised during construction within or adjacent to the existing roads. For shallow open-excavation, we recommend temporary appropriate shoring to maintain stability of slope, underground utilities, and roadways. For deep excavations, construction of excavation bracing may be required to maintain stability of the surrounded area. For an excavation bracing system design, we recommend a constant earth pressure equal to $0.80K_a\gamma H$, where K_a is the coefficient of active earth pressure, γ is the unit weight of in-situ soil, and H is the depth of the excavation. Based on our experience with similar soils and field data, we recommend the following Table 6 summarizing the ultimate equivalent fluid pressures to be used in preliminary design for in-situ soils for temporary excavation bracing design.

Table 6 – Summary of Ultimate Equivalent Fluid Pressures (Excavation Bracing)

Assumed Parameters (Compacted Fill or Residual Soils)	Pressure Conditions	Co-efficient of Earth Pressures	Ultimate Equivalent Fluid Pressure
In-situ density (γ) = 110 pcf In-situ cohesion (c) = 0 psf Angle of Internal Friction (φ) = 28˚	Active (K_a)	0.36	40 psf/ft
	At-rest (K_o)	0.53	58 psf/ft
	Passive (K_p)	2.77	305 psf/ft

These ultimate equivalent fluid pressures were calculated by the Rankine Method using the assume soils parameters shown in the table. Please note that for submerged soil, the unit weight of water (62.4 pcf) needs to be subtracted from soil unit weight prior to multiplying by the coefficient of earth pressure and then added to the resulting value for each of the pressure conditions. Also, the long-term cohesion strength parameter has not been utilized in the determination of the earth pressures. Generally, for this soil type, most of the long-term cohesive strength is lost as a result of exposure and disturbance during excavation. We can design reinforced earth retaining walls, sheet pile walls or excavation bracing, if needed.

7.6 Earthwork

The onsite soils, if free of organic and other deleterious materials, should generally be suitable for reuse as engineered fill with proper moisture control. Partially weathered rock (PWR) can be used as engineered fill if it breaks up sufficiently to meet gradation requirements. PWR can also be mixed with soil to meet gradation requirements.

Due to the presence of high silt contents, some of the onsite soil may be sensitive to moisture variation. During rainy seasons, these soils will be difficult to dry. As a practical consideration during extended periods of wet weather, wet onsite soils may need to be discarded and replaced with drier soils. These soils should be placed within a narrow range of their optimum moisture content (typically within about 3 percent of optimum moisture) to achieve proper compaction. Typical restrictions on suitable fill are no organics, plasticity index less than 25, and maximum particle size of four inches, with not more than 30 percent greater than 3/4-inch. These restrictions should also be applied to imported borrow soils if needed.

Positive drainage should be maintained at all times to prevent saturation of exposed soils in case of sudden rains. Rolling the surface of disturbed soils will also improve runoff and reduce the soil moisture and construction delays. The degree of soil stability problems will also be dependent upon the precautions taken by the contractor to help protect the soils from saturation during construction.

7.7 Fill Placement

Moisture-density determinations should be performed for each soil type used to provide data necessary for quality assurance testing. The natural moisture content at the time of compaction should be within moisture content limits, which will allow the required compaction to be obtained. This is generally within three percentage points of the optimum moisture. The contractor should be prepared to increase or decrease soil water content as needed to achieve the required degrees of compaction.

The fill should be placed in thin lifts (not to exceed 8-inch loose thickness) and compacted. We recommend the fill be compacted to at least 98 percent of Standard Proctor (ASTM D 698) maximum dry density within top two feet below pavement and at least 95 percent of Standard Proctor maximum dry density elsewhere on the site. For trench backfill, walk-behind type compaction equipment is typically used for compaction, so we recommend placing fill in thin lifts not to exceed 4 inches, especially within roadways and pavement areas.

A Geotechnical Engineer on a full-time basis should observe grading operations. In-place density tests taken by that individual will assess the degree of compaction being obtained. The frequency of the testing should be determined by the Geotechnical Engineer.

8.0 LIMITATIONS

This report is for the exclusive use of **Rockdale County Water Resources** and the designers of the project described herein, and may only be applied to this specific project. If provided, our conclusions and recommendations have been prepared using generally accepted standards of Geotechnical Engineering practice in the State of Georgia. No other warranty is expressed or implied. Our firm is not responsible for conclusions, opinions or recommendations of others.

The right to rely upon this report and the data within may not be assigned without UNITED CONSULTING'S written permission.

The scope of this evaluation was limited to an evaluation of the subsurface condition with respect to the proposed development. Oil, hazardous waste, radioactivity, irritants, pollutants, molds, or other dangerous substance and conditions were not the subject of this study. Their presence and/or absence are not implied or suggested by this report, and should not be inferred.

Our conclusions and recommendations are based upon design information furnished us, data obtained from the previously described exploration and testing program and our past experience. They do not reflect variations in subsurface conditions that may exist intermediate of our borings and in unexplored areas of the site. Should such variations become apparent during construction, it will be necessary to re-evaluate our conclusions and recommendations based upon "on-site" observations of the conditions.

If the design or location of the project is changed, the recommendations contained herein must be considered invalid, unless the changes are reviewed by our firm, and our recommendations are either verified or modified in writing. When design is complete, we should be given the opportunity to review the foundation plan, grading plan, and applicable portions of the specifications to see if they are consistent with our recommendations.

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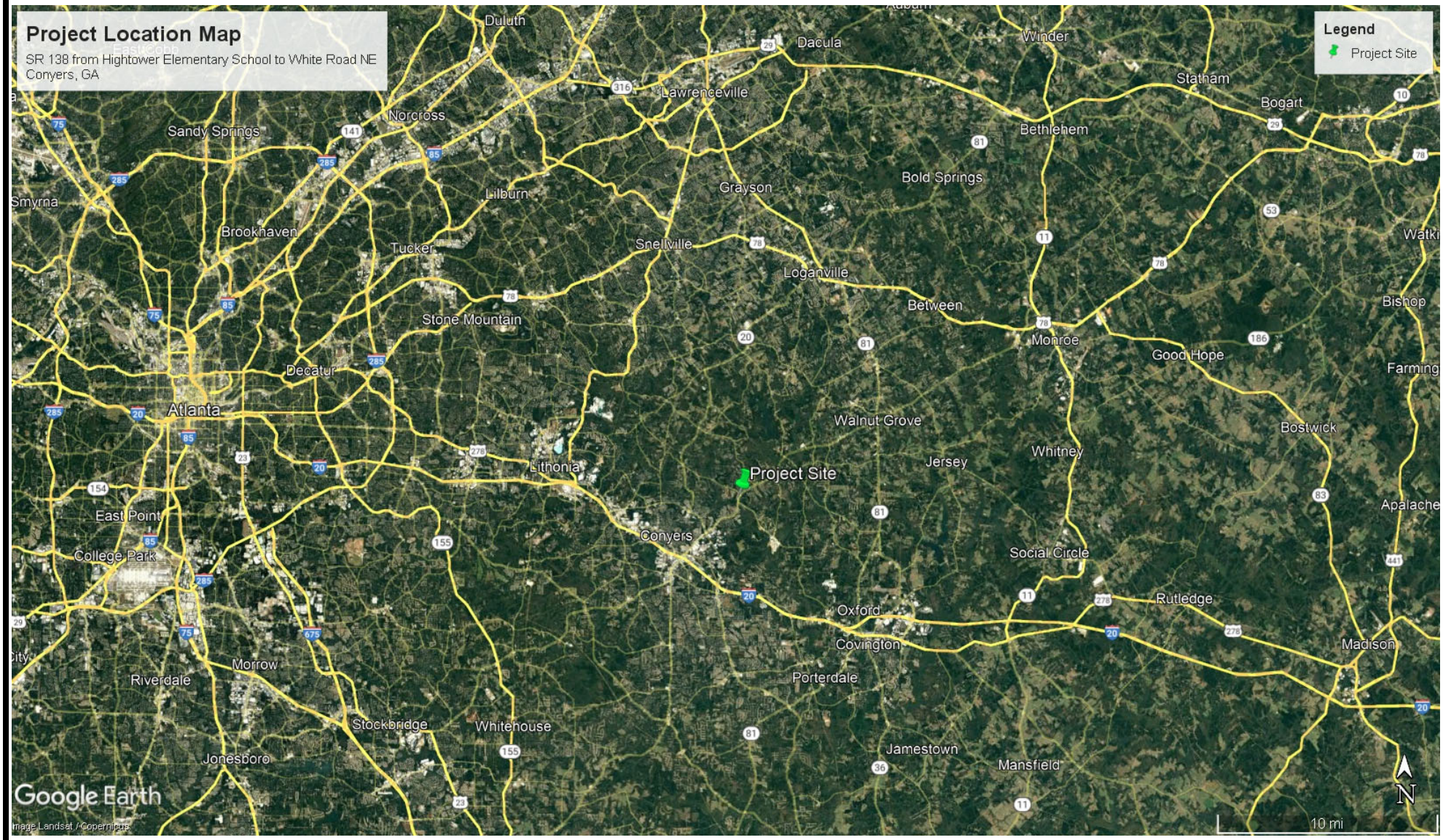


We're here for you UNITED CONSULTING	N	Scale:	NTS	Notes	**Client:**	**Rockdale County Water Resources**
		Prepared:	MZ		**Site:**	**SR 138 from Hightower Elementary School to White Road NE Conyers, Rockdale County, GA**
		Checked:	MM			
		Project No.:	ROCKW-23-GA-07137-01		**Title:**	**Site Location Plan**

FIG. 1

We're here for you UNITED CONSULTING	N	Scale:	NTS	Notes	**Client:**	**Rockdale County Water Resources**	**FIG. 2**
		Prepared:	MZ		**Site:**	**SR 138 from Hightower Elementary School to White Road NE Conyers, Rockdale County, GA**	
		Checked:	MM				
		Project No.:	ROCKW-23-GA-07137-01		**Title:**	**Boring Location Plan**	

APPENDIX A

A-1 – Exploration Procedures (2 Pages)
A-2 – General Notes / Narrative of Drilling Operations (2 Pages)
A-3 – SPT Boring Logs (14 Logs)

EXPLORATION PROCEDURES

Fourteen (14) SPT borings were completed during this subsurface exploration. The approximate locations of the borings are shown on the Boring Location Plan (Fig. 2). The SPT borings were drilled to depths of 1.5 to 20 feet below ground surface (up to refusal or boring planned termination depths). The SPT borings were performed in general accordance with ASTM D1586. Soil samples obtained using the split spoon sampler were visually evaluated by the field geotechnical engineer/geologist and classified according to the visual-manual procedure described in ASTM D2488. A narrative of field operations is included in Appendix A-2.

The boring locations were initially determined in the field by our field geotechnical engineer/geologist using a handheld GPS unit with +/- 3 ft. horizontal accuracy. Boring locations should be considered approximate.

Rock Coring

After the auger refusal, 10 to 15 feet of rock coring were performed in each of the borings PT-100, PT-101, PT-111, and PT-112 with recoveries and rock quality designation (RQD) values shown on boring logs (Appendix A-3).

Core drilling procedures are utilized to determine the characteristics and continuity of materials below the soil drilling refusal level. The core drilling procedure is performed in general accordance with ASTM designation D 2113-70. Initially, casing is set through the overburden soils or hollow stem augers are utilized to keep the hole from collapsing. Refusal materials are then cored with a diamond-studded bit fastened to the end of a hollow core barrel. This device is rotated at high speeds and is capable of cutting the hardest rock. The cuttings are brought to the surface by circulating water. Rock core samples of the materials penetrated are protected and retained in the inner core barrel. Upon completion of the drill run, the core barrel is brought to the surface and the samples are removed and placed in partitioned boxes. The samples are then returned to our laboratory where the rock is identified and "recovery" and rock quality designation (RQD) are determined.

The ratio of the length of core obtained to the distance drilled is known as the "core recovery", expressed as a percent. The "rock quality designation" (RQD) is the ratio of recovered rock sample in sections four or more inches long to the distance drilled. This designation is generally applied only to samples of NX size or larger and to sample described as moderately hard or harder. The NX size designates a bit which obtains core samples 2-1/8 inches in diameter. The percent recovery and RQD are related to rock soundness and continuity.

An RQD ratio of 90 percent or more denotes excellent rock; 75 to 90 percent denotes good rock; 50 to 75 percent denotes fair rock; and 25 to 50 percent denotes poor rock. Hardness terms are based on the following descriptions:

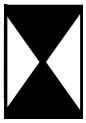
Soft:	May be broken with fingers
Moderately Soft:	May be scratched with a nail Corners and edges may be broken with fingers
Moderately Hard:	Light blow of hammer required to break sample
Hard:	Hard blow of hammer required to break sample
Very Hard:	Rock core rings when struck with hammer.

GENERAL NOTES

The soil classifications noted on the Boring Logs are visual classifications unless otherwise noted. Minor constituents of a soil sample are termed as follows:

Trace	0 - 10%
Some	11 - 35%
Suffix "y" or "ey"	36 - 49%

LEGEND



Split Spoon Sample obtained during Standard Penetration Testing

Relatively Undisturbed Shelby Tube Sample

Groundwater Level at Time of Boring Completion

Groundwater Level at 24 hours (or as noted) after Termination of Boring

w	Natural Moisture Content	
LL	Liquid Limit	
PL	Plastic Limit	Atterberg Limits
PI	Plasticity Index	
PF	Percent Fines (Percent Passing #200 Sieve)	
γ_d	Dry Unit Weight (Pounds per Cubic Foot or PCF	
γ_m	Moist or In-Situ Unit Weight (PCF)	
γ_{sat}	Saturated Unit Weight (PCF)	

BORING LOG DATA NARRATIVE OF DRILLING OPERATION

The test borings were made by mechanically advancing helical hollow stem augers into the ground. Samples were collected at regular intervals in each of the borings following established procedures for performing the Standard Penetration Test in accordance with ASTM Specification D 1586. Soil samples were obtained with a standard 1.4" I.D. x 2.0" O.D. split barrel sampler. The sampler is first seated 6" to penetrate any loose cuttings and then driven an additional foot with the blows required of a 140-pound hammer freely falling a distance of 30 inches. The number of blows required to drive the sampler the final foot is designated the "standard penetration resistance." The driving resistance, known as the "N" value, can be correlated with the relative density of granular soils and the consistency of cohesive deposits.

The following table describes soil consistency and relative densities based on standard penetration resistance values (N) determined by the Standard Penetration Test (SPT).

	"N"	Consistency	Undrained Shear Strength, S_u (ksf)
Clay and Silt	0-2	Very Soft	< 0.25
	3-4	Soft	0.25 - 0.5
	5-8	Firm	0.5 – 1
	9-15	Stiff	1 – 2
	16-30	Very Stiff	2 - 4
	Over 31	Hard	> 4

	"N"	Relative Density
Sand	0-4	Very Loose
	5-10	Loose
	11-19	Firm
	20-29	Medium Dense
	30-49	Dense
	50+	Very Dense

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BORING NUMBER PT-100

CLIENT Rockdale County Water Resources
PROJECT NAME SR 138 from Hightower Elementary School to White Road NE
PROJECT NUMBER ROCKW-23-GA-07137-01
PROJECT LOCATION Conyers, GA
DATE STARTED 2/14/2023 **DATE COMPLETED** 2/22/2023
GROUND ELEVATION N/A **HOLE SIZE** 6 inches
DRILLING CONTRACTOR Arc One Home Services
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING --- No GW Encountered
STATION N/A **LOGGED BY** FA
AT END OF DRILLING --- No GW Encountered
NOTES Hammer Effcy: 90.3% (Diedrich D-70 Turbo)
AFTER DRILLING ---

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	UCS ON ROCK (psi)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	NOTES
0			Asphalt & GAB										
			Sand - some silt, trace clay; very loose; dark brown (Fill)	SPT 1	83	2-2-2 (4)							
			Silt - some sand, trace clay; stiff; dark brown	SPT 2	100	3-4-7 (11)	1						
5			Silt - some sand, trace clay and rock fragments; firm; brown (Residual)	SPT 3	100	2-3-5 (8)	1						
			Sand - some silt, trace clay; medium dense; brown	SPT 4	100	5-4-21 (25)							
10			Hard, Light gray, Solid, Continuous, Granitic Gneiss										
								4026.4					UCS at 14' - 14.5'
15				RC 1	95 (90)								
								4471.7					UCS at 19' - 19.5'
20													

Refusal at 11.5 feet.
Boring terminated at 21.5 feet.

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BORING NUMBER PT-101

CLIENT Rockdale County Water Resources
PROJECT NAME SR 138 from Hightower Elementary School to White Road NE
PROJECT NUMBER ROCKW-23-GA-07137-01
PROJECT LOCATION Conyers, GA
DATE STARTED 2/14/2023 **DATE COMPLETED** 2/21/2023
GROUND ELEVATION N/A **HOLE SIZE** 6 inches
DRILLING CONTRACTOR Arc One Home Services
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING --- No GW Encountered
STATION N/A **LOGGED BY** FA
AT END OF DRILLING --- No GW Encountered
NOTES Hammer Effcy: 90.3% (Diedrich D-70 Turbo)
AFTER DRILLING ---

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	UCS ON ROCK (psi)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	NOTES
0			2" Topsoil	SPT 1	77	3-16-50/1"							Two offset trials on the alignment to avoid possible boulders.
			Partially Weathered Rock (PWR), sampled as Sand - some silt and rock fragments, trace clay; very dense; gray-brown										
			Hard, Light gray and white, Broken, Fairly continuous, Granitic Gneiss	RC 1	88 (77)			4966.8					UCS at 3.5' - 4'
5													
				RC 2	83 (73)			3463.5					UCS at 8' - 8.5'
10													
				RC 3	90 (81)			4099.5					UCS at 13.5' - 14'
15													

Refusal at 1.5 feet.
Boring terminated at 16.5 feet.

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BORING NUMBER PT-102

CLIENT Rockdale County Water Resources
PROJECT NAME SR 138 from Hightower Elementary School to White Road NE
PROJECT NUMBER ROCKW-23-GA-07137-01
PROJECT LOCATION Conyers, GA
DATE STARTED 2/13/2023 **DATE COMPLETED** 2/13/2023
GROUND ELEVATION N/A **HOLE SIZE** 6 inches
DRILLING CONTRACTOR Arc One Home Services
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING --- No GW Encountered
STATION N/A **LOGGED BY** FA
AT END OF DRILLING --- No GW Encountered
NOTES Hammer Effcy: 90.3% (Diedrich D-70 Turbo)
AFTER DRILLING ---

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	UCS ON ROCK (psi)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	NOTES
0			2" Topsoil Sand - some clay and silt, trace rock fragments; loose; brown (Fill) (SC)	SPT 1	89	5-4-5 (9)			13.4	39	23	16	
			Sand - trace clay and silt; loose; brown (Residual)	SPT 2	83	2-4-3 (7)							
5			- very loose	SPT 3	94	2-2-2 (4)							
			- some clay; firm	SPT 4	100	3-6-8 (14)							
10													
			Silt - some sand, trace clay; stiff; brown	SPT 5	100	4-4-5 (9)	1						
15													
			- firm; tan	SPT 6	100	3-3-4 (7)	0.75						
20			Boring terminated at 20.0 feet.										

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BORING NUMBER PT-103

CLIENT Rockdale County Water Resources
PROJECT NAME SR 138 from Hightower Elementary School to White Road NE
PROJECT NUMBER ROCKW-23-GA-07137-01
PROJECT LOCATION Conyers, GA
DATE STARTED 2/13/2023 **DATE COMPLETED** 2/13/2023
GROUND ELEVATION N/A **HOLE SIZE** 6 inches
DRILLING CONTRACTOR Arc One Home Services
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING --- No GW Encountered
STATION N/A **LOGGED BY** FA
AT END OF DRILLING --- No GW Encountered
NOTES Hammer Effcy: 90.3% (Diedrich D-70 Turbo)
AFTER DRILLING ---

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	UCS ON ROCK (psi)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	NOTES
0			2" Topsoil										
			Sand - some rock fragments, trace clay and silt; firm; brown (Fill)	SPT 1	78	4-7-9 (16)							
			Sand - some silt and clay, trace rock fragments; firm; red-brown (Residual) (SM)	SPT 2	83	3-6-9 (15)							
5				SPT 3	83	4-8-10 (18)			18.9	61	43	18	
			- loose; brown/gray	SPT 4	83	4-5-5 (10)							
10													
			- tan/gray	SPT 5	83	4-4-4 (8)							
15													
				SPT 6	100	4-4-4 (8)							
20													

Boring terminated at 20.0 feet.

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BORING NUMBER PT-104

CLIENT Rockdale County Water Resources
PROJECT NAME SR 138 from Hightower Elementary School to White Road NE
PROJECT NUMBER ROCKW-23-GA-07137-01
PROJECT LOCATION Conyers, GA
DATE STARTED 2/10/2023 **DATE COMPLETED** 2/10/2023
GROUND ELEVATION N/A **HOLE SIZE** 6 inches
DRILLING CONTRACTOR Arc One Home Services
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING --- No GW Encountered
STATION N/A **LOGGED BY** FA
AT END OF DRILLING --- No GW Encountered
NOTES Hammer Effcy: 90.3% (Diedrich D-70 Turbo)
AFTER DRILLING ---

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	UCS ON ROCK (psi)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	NOTES
0			3" Topsoil										
			Sand - some rock fragments, trace clay and silt; firm; brown (Fill)	SPT 1	83	4-6-5 (11)							
5			Partially Weathered Rock (PWR), sampled as Sand - some silt and rock fragments, trace clay; very dense; gray-brown	SPT 2	10	50/1"							
			Sand - some silt, trace clay; loose; light tan (Residual) (SM)	SPT 3	100	4-5-5 (10)							
			- firm	SPT 4	83	3-4-7 (11)							
10													
			- white-tan	SPT 5	100	5-5-6 (11)			18.1	46	41	5	
15													
				SPT 6	100	5-7-8 (15)							
20													

Boring terminated at 20.0 feet.

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BORING NUMBER PT-105

CLIENT Rockdale County Water Resources
PROJECT NAME SR 138 from Hightower Elementary School to White Road NE
PROJECT NUMBER ROCKW-23-GA-07137-01
PROJECT LOCATION Conyers, GA
DATE STARTED 2/10/2023 **DATE COMPLETED** 2/10/2023
GROUND ELEVATION N/A **HOLE SIZE** 6 inches
DRILLING CONTRACTOR Arc One Home Services
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING --- No GW Encountered
STATION N/A **LOGGED BY** FA
AT END OF DRILLING --- No GW Encountered
NOTES Hammer Effcy: 90.3% (Diedrich D-70 Turbo)
AFTER DRILLING ---

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	UCS ON ROCK (psi)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	NOTES
0			3" Topsoil										
			Silt - sandy, some rock fragments, trace clay; stiff; gray/brown (Fill)	SPT 1	100	8-6-9 (15)	1						
			Silt - sandy, some clay and rock fragments; stiff; orange-brown (Residual) (MH)	SPT 2	89	9-6-6 (12)	1.5						
5				SPT 3	78	4-6-6 (12)	1.25						
				SPT 4	89	3-4-5 (9)	1.25		24.2	58	45	13	
10			- white/tan										
				SPT 5	94	6-6-8 (14)	1.25						
15			- very stiff										
				SPT 6	100	6-8-8 (16)	2.5						
20			Boring terminated at 20.0 feet.										

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BORING NUMBER PT-106

CLIENT Rockdale County Water Resources
PROJECT NAME SR 138 from Hightower Elementary School to White Road NE
PROJECT NUMBER ROCKW-23-GA-07137-01
PROJECT LOCATION Conyers, GA
DATE STARTED 2/22/2023 **DATE COMPLETED** 2/22/2023
GROUND ELEVATION N/A **HOLE SIZE** 6 inches
DRILLING CONTRACTOR Arc One Home Services
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING --- No GW Encountered
STATION N/A **LOGGED BY** FA
AT END OF DRILLING --- No GW Encountered
NOTES Hammer Effcy: 90.3% (Diedrich D-70 Turbo)
AFTER DRILLING ---

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	UCS ON ROCK (psi)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	NOTES
0			3" Topsoil Sand - some silt, trace clay; firm; brown (Fill)	SPT 1	89	4-6-7 (13)							Offset boring 10 feet to the north of the original location.
5			Sand - some silt, trace clay and rock fragments; firm; orange-brown (Residual)	SPT 2	94	9-8-9 (17)							
			- some clay; medium dense	SPT 3	100	5-6-14 (20)							
10			- clayey; firm	SPT 4	83	5-5-8 (13)							
15				SPT 5	100	8-9-10 (19)							
20			- loose	SPT 6	100	5-5-5 (10)							

Boring terminated at 20.0 feet.

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BORING NUMBER PT-107

CLIENT Rockdale County Water Resources
PROJECT NAME SR 138 from Hightower Elementary School to White Road NE
PROJECT NUMBER ROCKW-23-GA-07137-01
PROJECT LOCATION Conyers, GA
DATE STARTED 2/13/2023 **DATE COMPLETED** 2/13/2023
GROUND ELEVATION N/A **HOLE SIZE** 6 inches
DRILLING CONTRACTOR Arc One Home Services
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING --- No GW Encountered
STATION N/A **LOGGED BY** FA
AT END OF DRILLING --- No GW Encountered
NOTES Hammer Effcy: 90.3% (Diedrich D-70 Turbo)
AFTER DRILLING ---

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	UCS ON ROCK (psi)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	NOTES
0			4" Topsoil										
			Sand - silty, trace clay and rock fragments; loose; brown (Fill)	SPT 1	100	4-3-5 (8)							
			Sand - some silt, clay and rock fragments; loose; red-brown (Residual) (SM)	SPT 2	67	3-3-3 (6)							
5				SPT 3	89	3-3-4 (7)							
				SPT 4	100	3-3-4 (7)			21.7	49	34	15	
10			- brown										
				SPT 5	83	2-2-5 (7)							
15			- tan/gray										
				SPT 6	83	3-5-5 (10)							
20			Boring terminated at 20.0 feet.										

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BORING NUMBER PT-108

CLIENT Rockdale County Water Resources
PROJECT NAME SR 138 from Hightower Elementary School to White Road NE
PROJECT NUMBER ROCKW-23-GA-07137-01
PROJECT LOCATION Conyers, GA
DATE STARTED 2/13/2023 **DATE COMPLETED** 2/13/2023
GROUND ELEVATION N/A **HOLE SIZE** 6 inches
DRILLING CONTRACTOR Arc One Home Services
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING --- No GW Encountered
STATION N/A **LOGGED BY** FA
AT END OF DRILLING --- No GW Encountered
NOTES Hammer Effcy: 90.3% (Diedrich D-70 Turbo)
AFTER DRILLING ---

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	UCS ON ROCK (psi)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	NOTES
0			3" Topsoil										
			Sand - trace silt, clay and rock fragments; firm; gray/brown (Residual) (SM)	SPT 1	67	10-9-8 (17)							
			- some silt; medium dense; tan/brown	SPT 2	83	4-6-18 (24)							
5			- trace silt; firm	SPT 3	78	9-6-9 (15)							
			- some silt and clay; red-brown	SPT 4	56	6-4-7 (11)							
10													
			- trace rock fragments; medium dense; light brown	SPT 5	83	6-8-16 (24)			10.6	NP	NP	NP	
15													
			- firm	SPT 6	100	5-7-7 (14)							
20													

Boring terminated at 20.0 feet.

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BORING NUMBER PT-109

CLIENT Rockdale County Water Resources
PROJECT NAME SR 138 from Hightower Elementary School to White Road NE
PROJECT NUMBER ROCKW-23-GA-07137-01
PROJECT LOCATION Conyers, GA
DATE STARTED 2/13/2023 **DATE COMPLETED** 2/13/2023
GROUND ELEVATION N/A **HOLE SIZE** 6 inches
DRILLING CONTRACTOR Arc One Home Services
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING --- No GW Encountered
STATION N/A **LOGGED BY** FA
AT END OF DRILLING --- No GW Encountered
NOTES Hammer Effcy: 90.3% (Diedrich D-70 Turbo)
AFTER DRILLING ---

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	UCS ON ROCK (psi)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	NOTES
0			Asphalt & GAB										
			Sand - trace silt, clay and rock fragments; medium dense; brown (Residual)	SPT 1	100	5-8-15 (23)							
			- brown/gray	SPT 2	67	7-10-11 (21)							
5			- firm; gray/white	SPT 3	56	15-5-6 (11)							
			- some rock fragments; loose; gray/brown	SPT 4	67	6-4-5 (9)							
10													
			- medium dense	SPT 5	83	14-10-10 (20)							
15													
			- some silt; firm	SPT 6	56	6-9-7 (16)							
20			Boring terminated at 20.0 feet.										

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BORING NUMBER PT-110

CLIENT Rockdale County Water Resources
PROJECT NAME SR 138 from Hightower Elementary School to White Road NE
PROJECT NUMBER ROCKW-23-GA-07137-01
PROJECT LOCATION Conyers, GA
DATE STARTED 2/13/2023 **DATE COMPLETED** 2/13/2023
GROUND ELEVATION N/A **HOLE SIZE** 6 inches
DRILLING CONTRACTOR Arc One Home Services
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING --- No GW Encountered
STATION N/A **LOGGED BY** FA
AT END OF DRILLING --- No GW Encountered
NOTES Hammer Effcy: 90.3% (Diedrich D-70 Turbo)
AFTER DRILLING ---

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	UCS ON ROCK (psi)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	NOTES
0			3" Topsoil Sand - gravelly, some silt, trace clay; medium dense; brown (Fill)	SPT 1	56	4-12-12 (24)							Offset to the west of the original location due to presence of shallow boulders.
				SPT 2	88	5-6-50/4"							
5			Partially Weathered Rock (PWR), sampled as Sand - some silt and rock fragments, trace clay; very dense; orange-brown										
			Sand - some silt and rock fragments, trace clay; firm; gray (Residual) (SM)	SPT 3	56	7-8-7 (15)			7.6	NP	NP	NP	
			- trace rock fragments; loose	SPT 4	56	3-3-6 (9)							
10													
			- firm	SPT 5	100	3-7-7 (14)							
15													
			- some clay; loose; brown	SPT 6	78	9-3-2 (5)							
20													

Boring terminated at 20.0 feet.

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BORING NUMBER PT-111

CLIENT Rockdale County Water Resources
PROJECT NAME SR 138 from Hightower Elementary School to White Road NE
PROJECT NUMBER ROCKW-23-GA-07137-01
PROJECT LOCATION Conyers, GA
DATE STARTED 2/10/2023 **DATE COMPLETED** 2/20/2023
GROUND ELEVATION N/A **HOLE SIZE** 6 inches
DRILLING CONTRACTOR Arc One Home Services
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING --- No GW Encountered
STATION N/A **LOGGED BY** FA
AT END OF DRILLING --- No GW Encountered
NOTES Hammer Effcy: 90.3% (Diedrich D-70 Turbo)
AFTER DRILLING ---

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	UCS ON ROCK (psi)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	NOTES
0			4" Topsoil										
			Sand - some silt and clay, trace rock fragments; firm; orange-brown (Fill) (SC)	SPT 1	67	5-6-7 (13)							Two offset trials to 10 feet to the south and west of the original location due to presence of boulders.
			- loose; orange	SPT 2	83	2-3-4 (7)			19.9	43	25	18	
5			Sand - some silt, clay and rock fragments; firm; brown (Residual)	SPT 3	100	3-7-11 (18)							
			Moderately hard, Gray, Fractured with stains, Competent, Granitic Gneiss	RC 1	62 (52)			2563.3					UCS at 9' - 9.5'
10													
			- Moderately soft to moderately hard	RC 2	97 (67)			2608.9					UCS at 14' - 14.5'
15													

Refusal at 8.0 feet.
Boring terminated at 18.0 feet.

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BORING NUMBER PT-112

CLIENT Rockdale County Water Resources
PROJECT NAME SR 138 from Hightower Elementary School to White Road NE
PROJECT NUMBER ROCKW-23-GA-07137-01
PROJECT LOCATION Conyers, GA
DATE STARTED 2/10/2023 **DATE COMPLETED** 2/21/2023
GROUND ELEVATION N/A **HOLE SIZE** 6 inches
DRILLING CONTRACTOR Arc One Home Services
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING --- No GW Encountered
STATION N/A **LOGGED BY** FA
AT END OF DRILLING --- No GW Encountered
NOTES Hammer Effcy: 90.3% (Diedrich D-70 Turbo)
AFTER DRILLING ---

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	UCS ON ROCK (psi)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	NOTES
0			Asphalt & GAB										
			Sand - some silt, trace clay; firm; brown (Fill)	SPT 1	83	7-7-9 (16)							Offset boring to 10 feet to the west of the original location due to presence of boulders.
5			Sand - some silt, clay and rock fragments; very dense; brown/tan (Residual)	SPT 2	83	31-38-25 (63)							
				SPT 3	60	14-50/4"							
			Partially Weathered Rock (PWR), sampled as Sand - some silt and rock fragments, trace clay; very dense; tan										
			Hard, Light gray and white, Solid, Fairly continuous, Granitic Gneiss	RC 1	78 (76)								
10								5554.5					UCS at 11.5' - 12'
			- Competent, Broken										
				RC 2	49 (48)								
15													

Refusal at 7.0 feet.
Boring terminated at 17.0 feet.

United Consulting Group
625 Holcomb Bridge Road
Norcross, Georgia 30071
Telephone: (770) 209-0029
Fax: (770) 582-2800

BORING NUMBER PT-113

CLIENT Rockdale County Water Resources
PROJECT NAME SR 138 from Hightower Elementary School to White Road NE
PROJECT NUMBER ROCKW-23-GA-07137-01
PROJECT LOCATION Conyers, GA
DATE STARTED 2/10/2023 **DATE COMPLETED** 2/10/2023
GROUND ELEVATION N/A **HOLE SIZE** 6 inches
DRILLING CONTRACTOR ARC One Home Services
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING --- No GW Encountered
STATION N/A **LOGGED BY** FA
AT END OF DRILLING --- No GW Encountered
NOTES Hammer Effcy: 90.3% (Diedrich D-70 Turbo)
AFTER DRILLING ---

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	UCS ON ROCK (psi)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	NOTES
0			4" Topsoil										
			Sand - trace silt and clay; firm; brown (Fill)	SPT 1	89	12-7-8 (15)							
			Sand - silty, trace rock fragments and clay; loose; tan (Residual)	SPT 2	100	4-4-5 (9)							
5													
			Silt - some sand, trace clay; firm; brown/tan	SPT 3	100	3-3-5 (8)	1						
			- sandy; stiff	SPT 4	67	3-5-5 (10)	1						
10													
			- tan/white	SPT 5	100	5-6-6 (12)	1.5						
15													
			- trace sand	SPT 6	100	5-6-6 (12)	1.5						
20													

Boring terminated at 20.0 feet.

APPENDIX B

B-1 – Laboratory Testing Procedures (2 Pages)
B-2 – Summary of Laboratory Test Results (1 Page)
B-3 – Particle Size Distribution Report (8 Sheets)
B-4 – Liquid and Plastic Limit Tests and Moisture Content Report (1 Sheet)
B-5 – Rock Unconfined Compressive Strength Tests Report (1 Page)
B-6 – Rock Core Samples Photographs (5 Pages)

LABORATORY TESTING PROCEDURES

Moisture Content

The moisture content was determined for selected soil samples obtained in the split-barrel sampler. A representative portion of each sample was weighed and then placed in an oven and dried at 110 degrees Centigrade for at least 15 to 16 hours. After removal from the oven, the soil was again weighed. The weight of the moisture lost during drying thus was determined. From this data, the moisture content of the sample was then calculated as the weight of moisture divided by dry weight of soil, expressed as a percentage. This test was conducted according to ASTM D 2216.

Moisture content is a useful index of a soil's compressibility. If the soil is to be used as fill, the moisture content may be compared to the range of water contents for which proper compaction may be achieved. The moisture content results are indicated on the boring logs attached and on the Summary of USCS Tests.

Unified Soil Classification System (USCS)

Soils to be classified as per Unified Soil Classification System (USCS) are generally required to perform grain size analysis (particle size distribution), liquid limit and plasticity index tests when precise classification is required. After performing the required tests, the classification was generally performed in accordance with ASTM D 2487.

Grain Size (Sieve) Analysis with or without Hydrometer

Grain Size Analysis tests were performed to determine the particle size distribution of selected samples tested. The grain size distribution of soils coarser than a number 200 sieve was determined by passing the samples through a standard set of nested sieves. Materials finer than the number 200 sieve was suspended in water and the grain size distribution computed from the time rate of settlement of the different size particles (hydrometer test). Air-dried soil is passed through a #200 sieve, and 50 grams of this soil is then soaked in sodium hexametaphosphate agent for a minimum of 8 hours. Soil is then put in a graduated cylinder with a hydrometer. Readings are taken at specified times. A graph of grain size distribution is then drawn from data. These procedures were performed in accordance with the specifications and were similar to those described by ASTM D 421 and D 422. The data obtained are summarized on the enclosed Summary of USCS Test Data.

Liquid and Plastic Limits (Atterberg Limits)

Liquid Limit and Plastic Limit tests aid in the classification of the soils and provide an indication of the soil behavior with moisture change. The Plasticity Index is calculated by subtracting the Plastic Limit (PL) from the Liquid Limit (LL). The Liquid Limit is the moisture content at which the soil will flow as a heavy viscous fluid and is the upper limit of the plastic range, as determined in accordance with ASTM D 4318. The Plastic Limit is the moisture content at which the soil begins to lose its plasticity, as determined in accordance with ASTM D 4318. The Liquidity Index is the ratio of the difference between the in-place moisture and the plastic limit to the Plasticity Limit. The data obtained are summarized on the enclosed Summary of USCS Test Data.

Unconfined Compressive Strength - Rock

The Unconfined Compressive Strength (UCS) of rock cores is evaluated in general accordance with the American Society of Testing and Materials (ASTM) procedure D2938. This method addresses protocols for preparation of the sample, performance of the UCS test, and acquiring and reporting data.

The test specimens tested are cylindrical in shape, with approximate length to diameter ratio of 2, and had a diameter of 2.5 inches. The ends of the specimens are cut parallel to each other and at right angles. The end surfaces are flat and capped with a capping compound to assure a smooth surface.

Once the testing specimens are capped, they were placed on the base plate of the loading frame and raised by turning the loading frame switch to up until the samples are securely held between the top and bottom plates. The load is then applied continuously and without shock. The strain rate is approximately 0.05 in/min. The maximum load sustained by the specimens is recorded. The compressive strength of each specimen is calculated from the maximum compressive load on the specimen and the initial computed cross-sectional area.

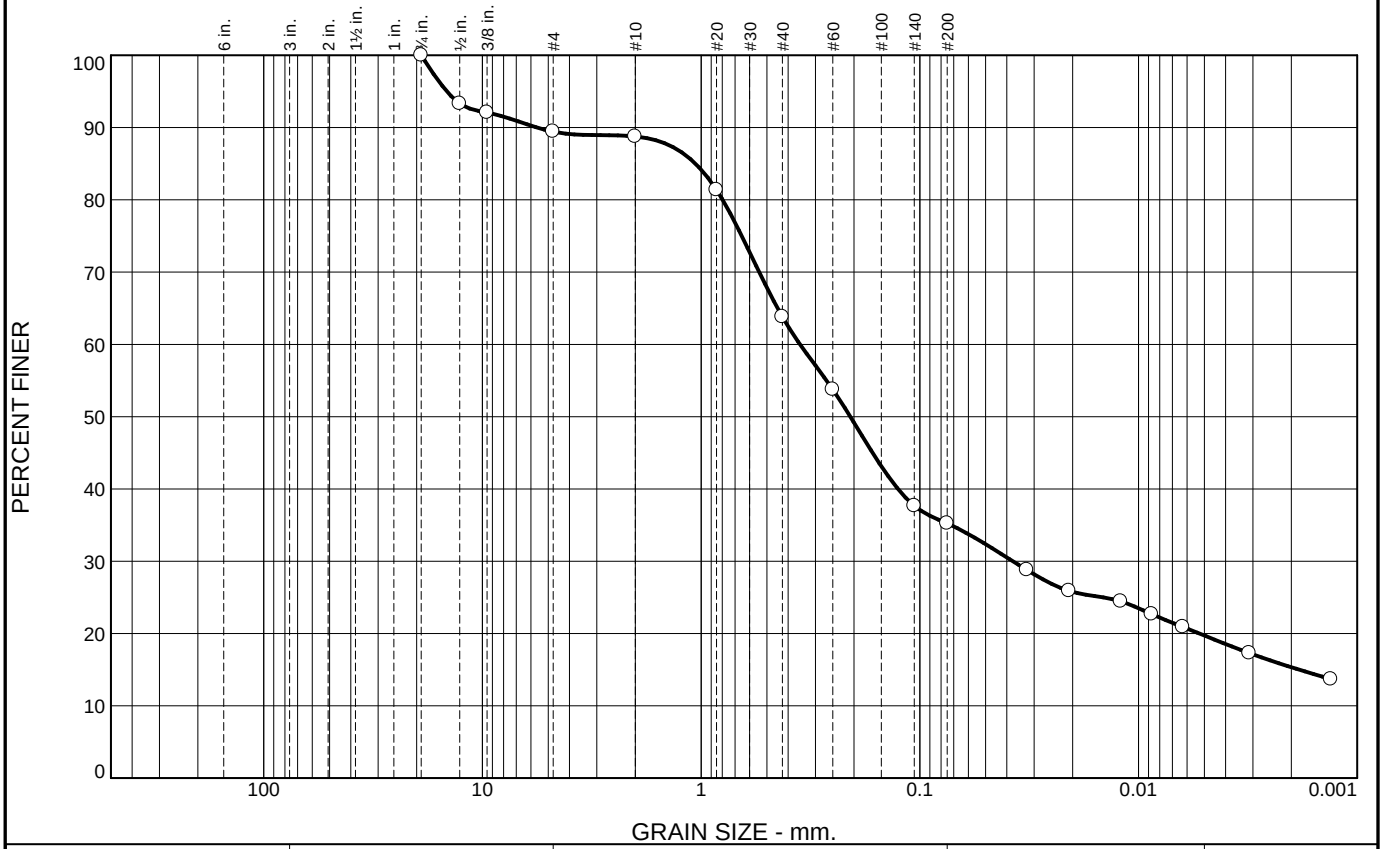
SR 138 from Hightower Elementary School to White Road NE
SUMMARY OF SOIL DATA

Sample Identification	Sample Type	Sample Depth (ft.)	Soil Classification (USCS)	MC %	Atterberg Limits				Grain Size Distribution			Compaction		Gs	Unit Weight		Permeability (cm/sec)	Additional Tests Conducted (See Notes)
Borehole Number					L.L.	P.L.	P.I.	L.I.	% Finer No. 4 Sieve	% Finer No. 200 Sieve	% Finer .005 mm	Maximum Dry Density (lb/cuft)	Optimum Moisture %		Moisture %	Dry (lb/cuft)		
PT-102	Bag	0-1.5	SC	13.4	39	23	16	-0.6	89.4	35.2	19.7	-	-	-	-	-	-	-
PT-103	Bag	6-7.5	SM	18.9	61	43	18	-1.3	99.7	46.3	31.4	-	-	-	-	-	-	-
PT-104	Bag	13.5-15	SM	18.1	46	41	5	-4.6	100.0	33.6	5.6	-	-	-	-	-	-	-
PT-105	Bag	8.5-10	MH	24.2	58	45	13	-1.6	100.0	53.7	11.5	-	-	-	-	-	-	-
PT-107	Bag	8.5-10	SM	21.7	49	34	15	-0.8	100.0	40.4	26.6	-	-	-	-	-	-	-
PT-108	Bag	13.5-15	SM	10.6	NV	NP	NP	NV	98.2	23.0	11.2	-	-	-	-	-	-	-
PT-110	Bag	6-7.5	SM	7.6	NV	NP	NP	NV	71.8	16.9	4.3	-	-	-	-	-	-	-
PT-111	Bag	3.5-5	SC	19.9	43	25	18	-0.3	99.9	46.6	21.6	-	-	-	-	-	-	-

ABBREVIATIONS:
LIQUID LIMIT (LL)
PLASTIC LIMIT (PL)
PLASTICITY INDEX (PI)
LIQUIDITY INDEX (LI
SPECIFIC GRAVITY (Gs)
MOISTURE CONTENT (MC)
NP - NO PLASTICITY
NV - NO VALUE
UNDISTURBED SAMPLE (UD)

NOTES:
T = TRIAXIAL TEST
U = UNCONFINED COMPRESSION TEST
C = CONSOLIDATION TEST
DS = DIRECT SHEAR TEST
O = ORGANIC CONTENT
P = pH
R = Resistivity
Vc = Volume /shrinkage change
Cl = Chloride
S = Sulfate / Sulfide
Rx = Redox Potential

Particle Size Distribution Report



% +3"	% Gravel	% Sand	% Silt	% Clay
0.0	10.6	54.2	15.5	19.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75	100.0		
0.5	93.3		
0.375	92.1		
#4	89.4		
#10	88.8		
#20	81.4		
#40	63.8		
#60	53.8		
#140	37.7		
#200	35.2		

* (no specification provided)

Material Description

Sand, some clay and silt, trace gravel, brown

Atterberg Limits

PL= 23 LL= 39 PI= 16

Coefficients

D_{90}= 5.6210 D_{85}= 1.0614 D_{60}= 0.3529
D_{50}= 0.2079 D_{30}= 0.0375 D_{15}= 0.0018
D_{10}= C_u= C_c=

Classification

USCS= SC AASHTO= A-2-6(1)

Remarks

Sample Number: PT-102 **Depth:** 0-1.5'

Date: 2/17/23

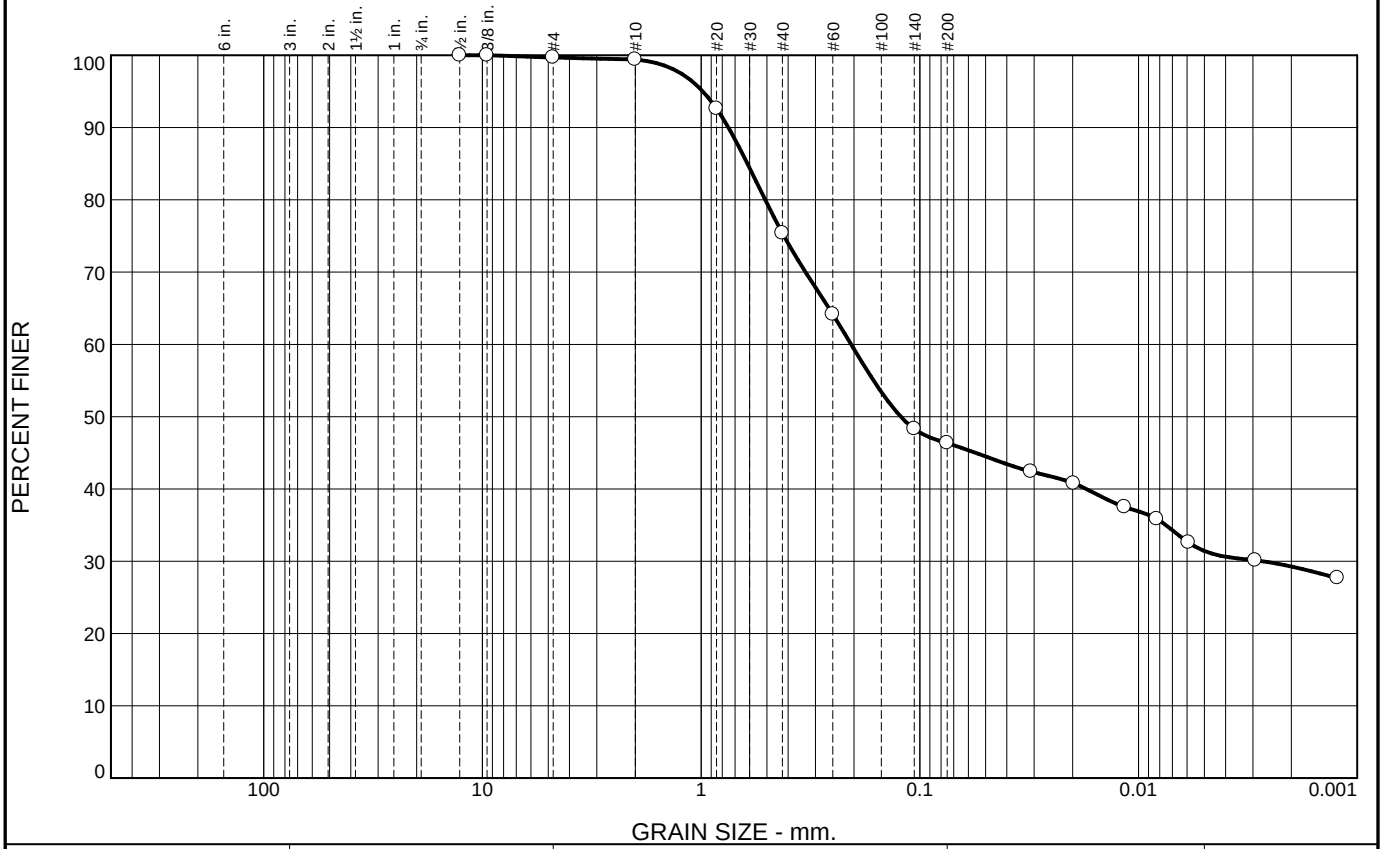
United Consulting

Norcross, Georgia

Client: Rockdale County Water Resources
Project: SR 138 From Hightower Elementary to White Road NE

Project No: ROCKW23GA0713701 **Figure**

Particle Size Distribution Report



% +3"	% Gravel	% Sand	% Silt	% Clay
0.0	0.3	53.4	14.9	31.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.5	100.0		
0.375	100.0		
#4	99.7		
#10	99.4		
#20	92.6		
#40	75.4		
#60	64.2		
#140	48.3		
#200	46.3		

* (no specification provided)

Material Description

Sand, some clay and silt, trace gravel, red brown

Atterberg Limits

PL= 43 LL= 61 PI= 18

Coefficients

D_{90}= 0.7505 D_{85}= 0.6138 D_{60}= 0.2060
D_{50}= 0.1222 D_{30}= 0.0027 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-7-5(6)

Remarks

Sample Number: PT 103 **Depth:** 6-7.5'

Date: 2/17/23

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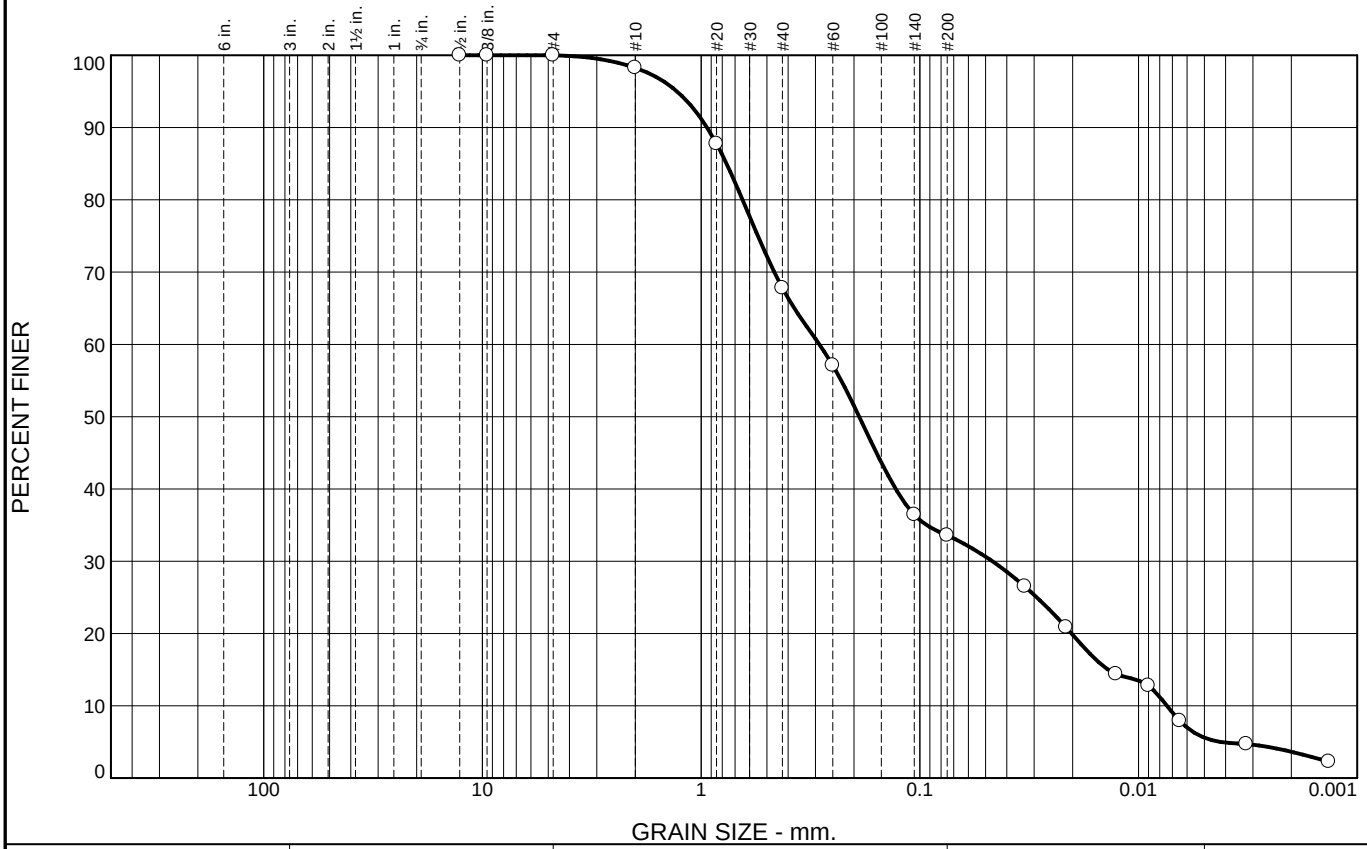
Norcross, Georgia

Client: Rockdale County Water Resources
Project: SR 138 From Hightower Elementary to White Road NE

Project No: ROCKW23GA0713701 **Figure**

Particle Size Distribution Report



% +3"	% Gravel	% Sand	% Silt	% Clay
0.0	0.0	66.4	28.0	5.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.5	100.0		
0.375	100.0		
#4	100.0		
#10	98.3		
#20	87.7		
#40	67.8		
#60	57.1		
#140	36.4		
#200	33.6		

* (no specification provided)

Material Description

Sand, some silt, trace clay, light tan

Atterberg Limits

PL= 41 LL= 46 PI= 5

Coefficients

D_{90}= 0.9394 D_{85}= 0.7655 D_{60}= 0.2880
D_{50}= 0.1894 D_{30}= 0.0466 D_{15}= 0.0138
D_{10}= 0.0074 C_u= 38.89 C_c= 1.02

Classification

USCS= SM AASHTO= A-2-5(0)

Remarks

Sample Number: PT 104 **Depth:** 13.5-15'

Date: 2/17/23

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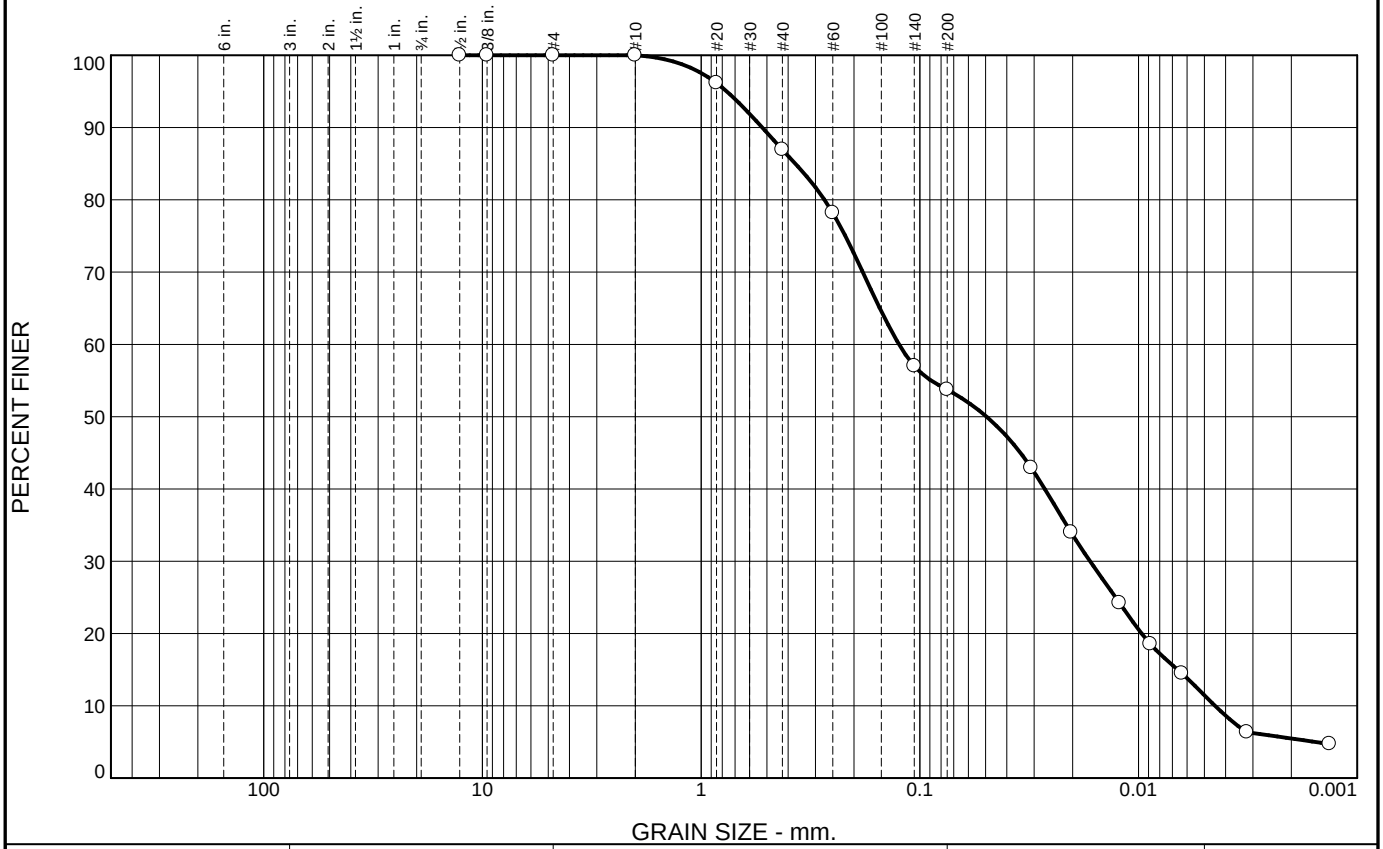
Norcross, Georgia

Client: Rockdale County Water Resources
Project: SR 138 From Hightower Elementary to White Road NE

Project No: ROCKW23GA0713701 **Figure**

Particle Size Distribution Report



% +3"	% Gravel	% Sand	% Silt	% Clay
0.0	0.0	46.3	42.2	11.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.5	100.0		
0.375	100.0		
#4	100.0		
#10	100.0		
#20	96.2		
#40	86.9		
#60	78.2		
#140	57.0		
#200	53.7		

* (no specification provided)

Material Description

Silt-sandy, some clay, orange

Atterberg Limits

PL= 45 LL= 58 PI= 13

Coefficients

D_{90}= 0.5254 D_{85}= 0.3709 D_{60}= 0.1245
D_{50}= 0.0495 D_{30}= 0.0167 D_{15}= 0.0066
D_{10}= 0.0045 C_u= 27.89 C_c= 0.50

Classification

USCS= MH AASHTO= A-7-5(7)

Remarks

Sample Number: PT 105 **Depth:** 8.5-10'

Date: 2/17/23

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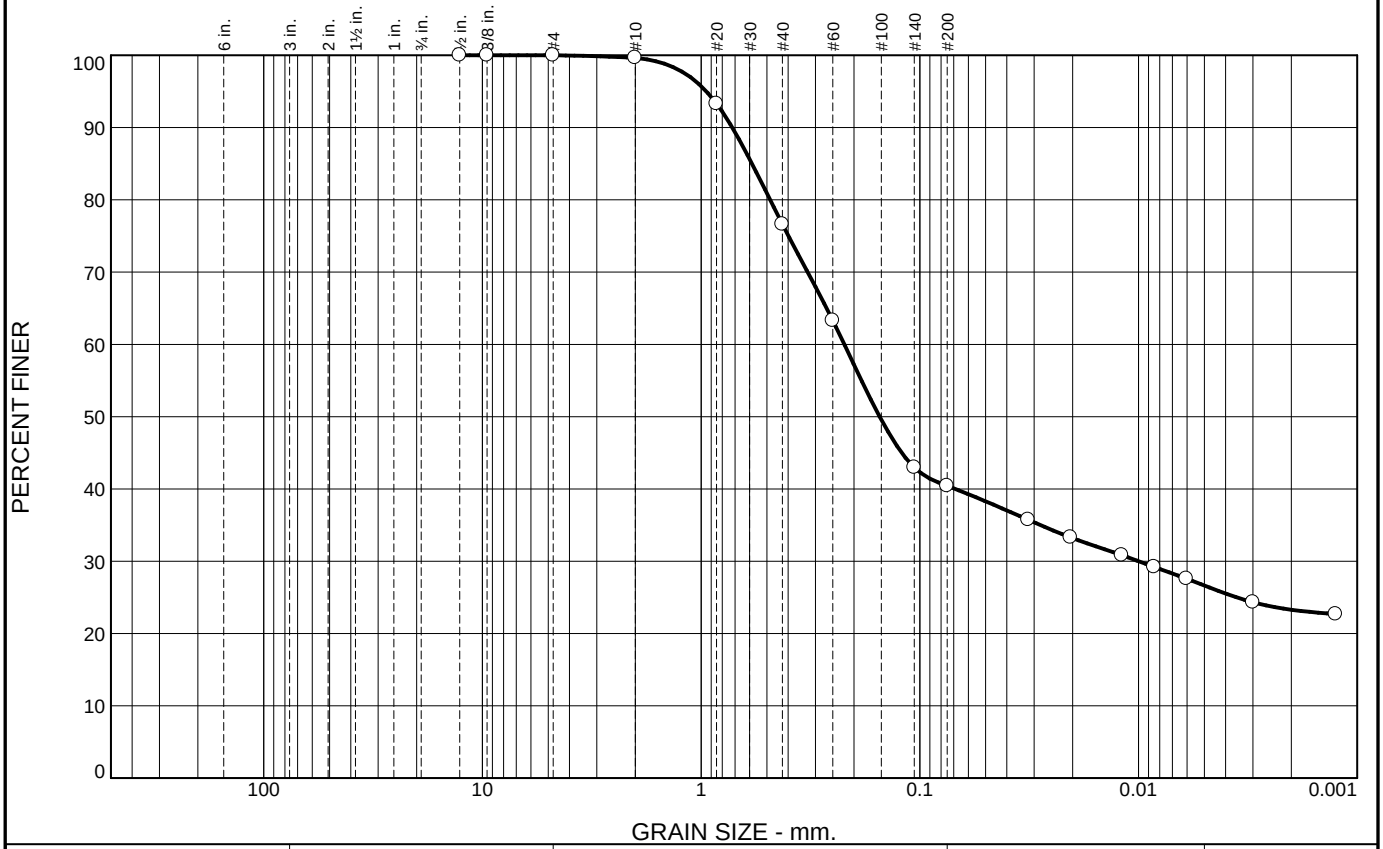
Norcross, Georgia

Client: Rockdale County Water Resources

Project: SR 138 From Hightower Elementary to White Road NE

Project No: ROCKW23GA0713701 **Figure**

Particle Size Distribution Report



% +3"	% Gravel	% Sand	% Silt	% Clay
0.0	0.0	59.6	13.8	26.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.5	100.0		
0.375	100.0		
#4	100.0		
#10	99.7		
#20	93.3		
#40	76.6		
#60	63.3		
#140	43.0		
#200	40.4		

* (no specification provided)

Material Description

Sand, some clay and silt, red brown

Atterberg Limits

PL= 34 LL= 49 PI= 15

Coefficients

D_{90}= 0.7204 D_{85}= 0.5854 D_{60}= 0.2214
D_{50}= 0.1526 D_{30}= 0.0100 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-7-5(2)

Remarks

Sample Number: PT 107 **Depth:** 8.5-10'

Date: 2/17/23

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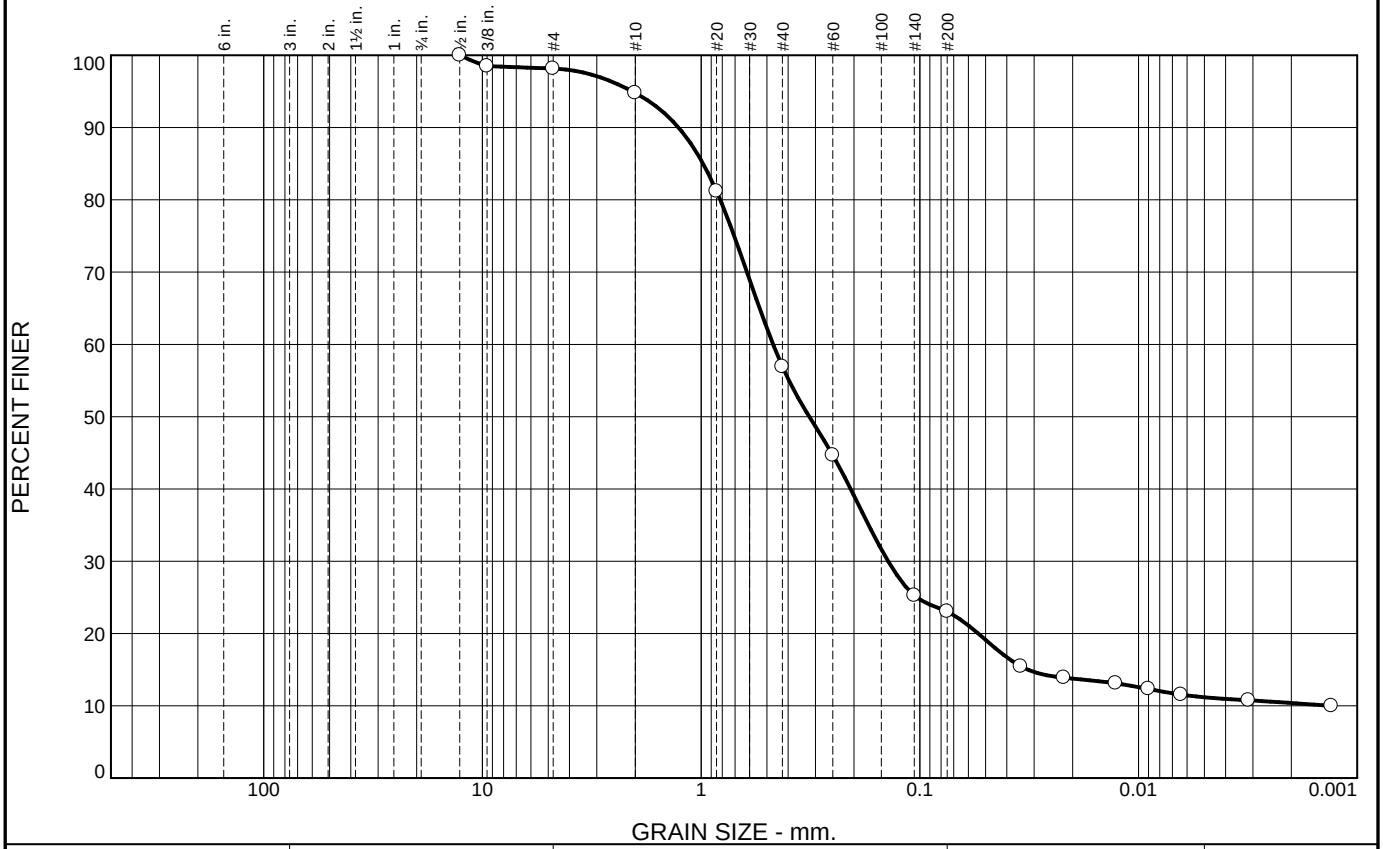
Norcross, Georgia

Client: Rockdale County Water Resources
Project: SR 138 From Hightower Elementary to White Road NE

Project No: ROCKW23GA0713701 **Figure**

Particle Size Distribution Report



% +3"	% Gravel	% Sand	% Silt	% Clay
0.0	1.8	75.2	11.8	11.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.5	100.0		
0.375	98.5		
#4	98.2		
#10	94.8		
#20	81.2		
#40	56.9		
#60	44.7		
#140	25.3		
#200	23.0		

* (no specification provided)

Material Description

Sand, some clay and silt, trace gravel, light brown

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 1.2682 D_{85}= 0.9795 D_{60}= 0.4687
D_{50}= 0.3201 D_{30}= 0.1396 D_{15}= 0.0321
D_{10}= 0.0013 C_u= 354.55 C_c= 31.44

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Sample Number: PT 108 **Depth:** 13.5-15'

Date: 2/17/23

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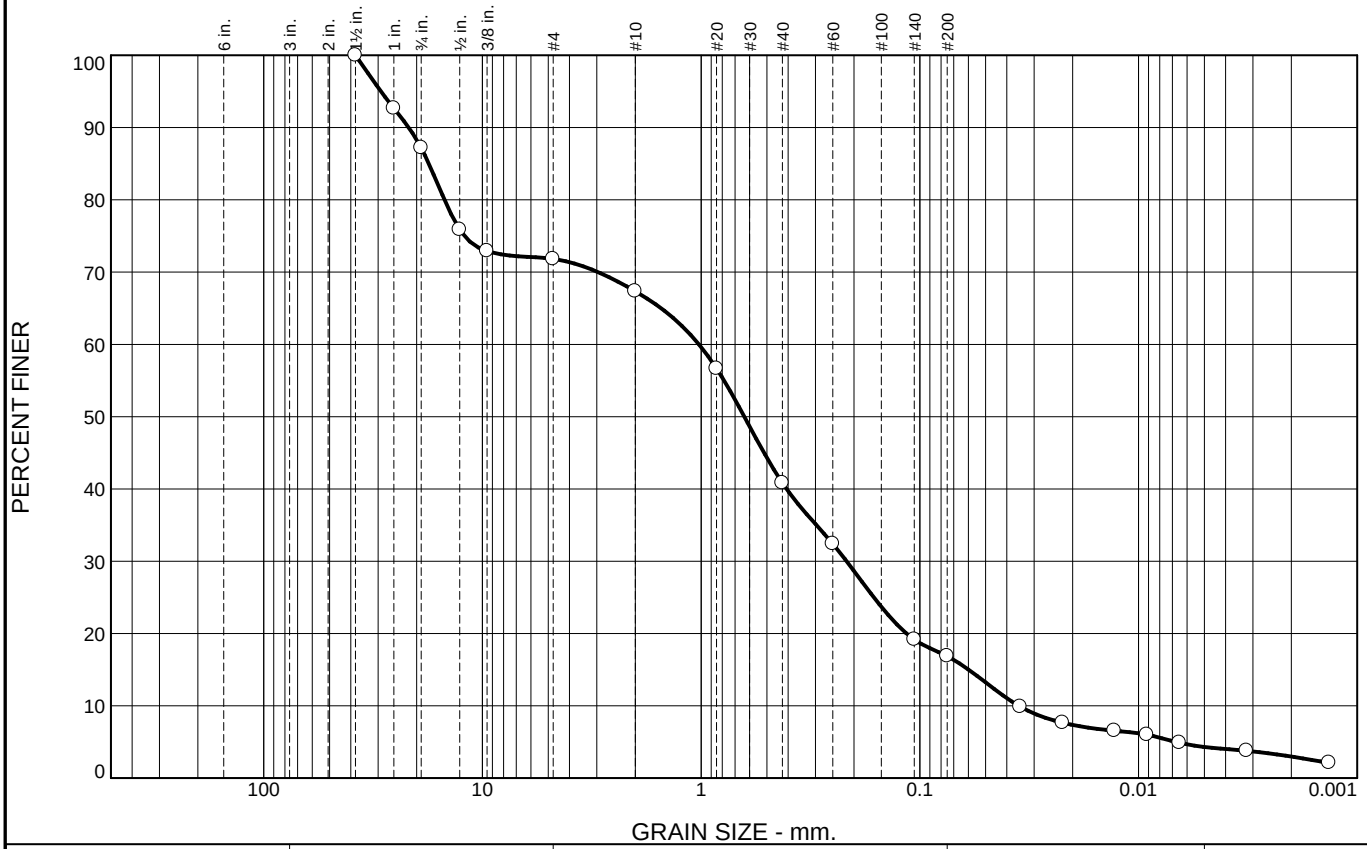
Norcross, Georgia

Client: Rockdale County Water Resources
Project: SR 138 From Hightower Elementary to White Road NE

Project No: ROCKW23GA0713701 **Figure**

Particle Size Distribution Report



% +3"	% Gravel	% Sand	% Silt	% Clay
0.0	28.2	54.9	12.6	4.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	92.6		
0.75	87.2		
0.5	75.9		
0.375	72.9		
#4	71.8		
#10	67.3		
#20	56.7		
#40	40.8		
#60	32.4		
#140	19.2		
#200	16.9		

* (no specification provided)

Material Description

Sand, some gravel and silt, trace clay, grey

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 21.7289 D_{85}= 17.5745 D_{60}= 1.0233
D_{50}= 0.6345 D_{30}= 0.2162 D_{15}= 0.0598
D_{10}= 0.0352 C_u= 29.03 C_c= 1.30

Classification

USCS= SM AASHTO= A-1-b

Remarks

Sample Number: PT 110 **Depth:** 6-7.5'

Date: 2/17/23

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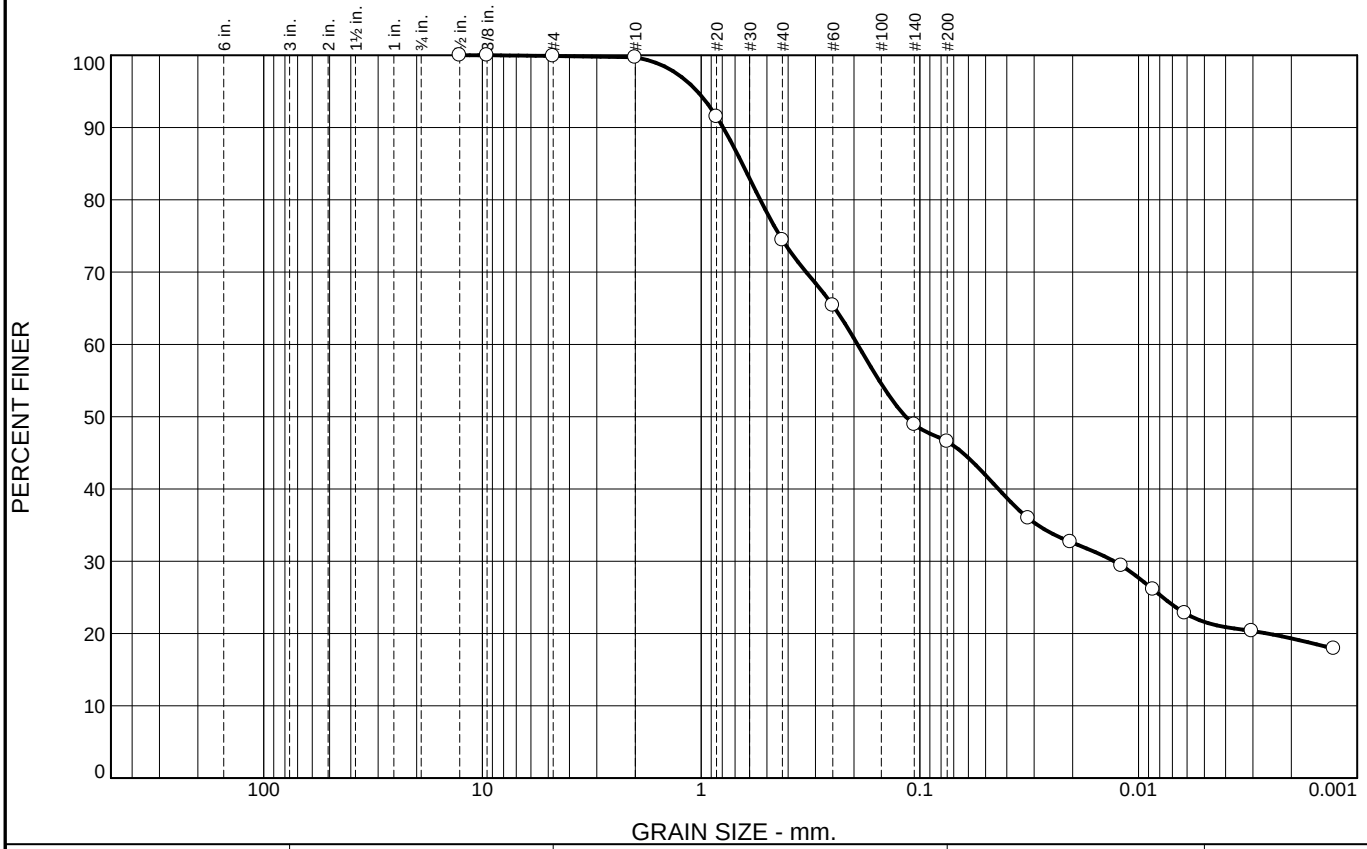
Client: Rockdale County Water Resources

Project: SR 138 From Hightower Elementary to White Road NE

Project No: ROCKW23GA0713701 **Figure**

Particle Size Distribution Report



% +3"	% Gravel	% Sand	% Silt	% Clay
0.0	0.1	53.3	25.0	21.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.5	100.0		
0.375	100.0		
#4	99.9		
#10	99.7		
#20	91.5		
#40	74.5		
#60	65.4		
#140	48.9		
#200	46.6		

* (no specification provided)

Material Description

Sand, some silt and clay, trace gravel, orange

Atterberg Limits

PL= 25 LL= 43 PI= 18

Coefficients

D_{90}= 0.7932 D_{85}= 0.6484 D_{60}= 0.1927
D_{50}= 0.1161 D_{30}= 0.0129 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SC AASHTO= A-7-6(5)

Remarks

Sample Number: PT 111 **Depth:** 3.5-5'

Date: 2/17/23

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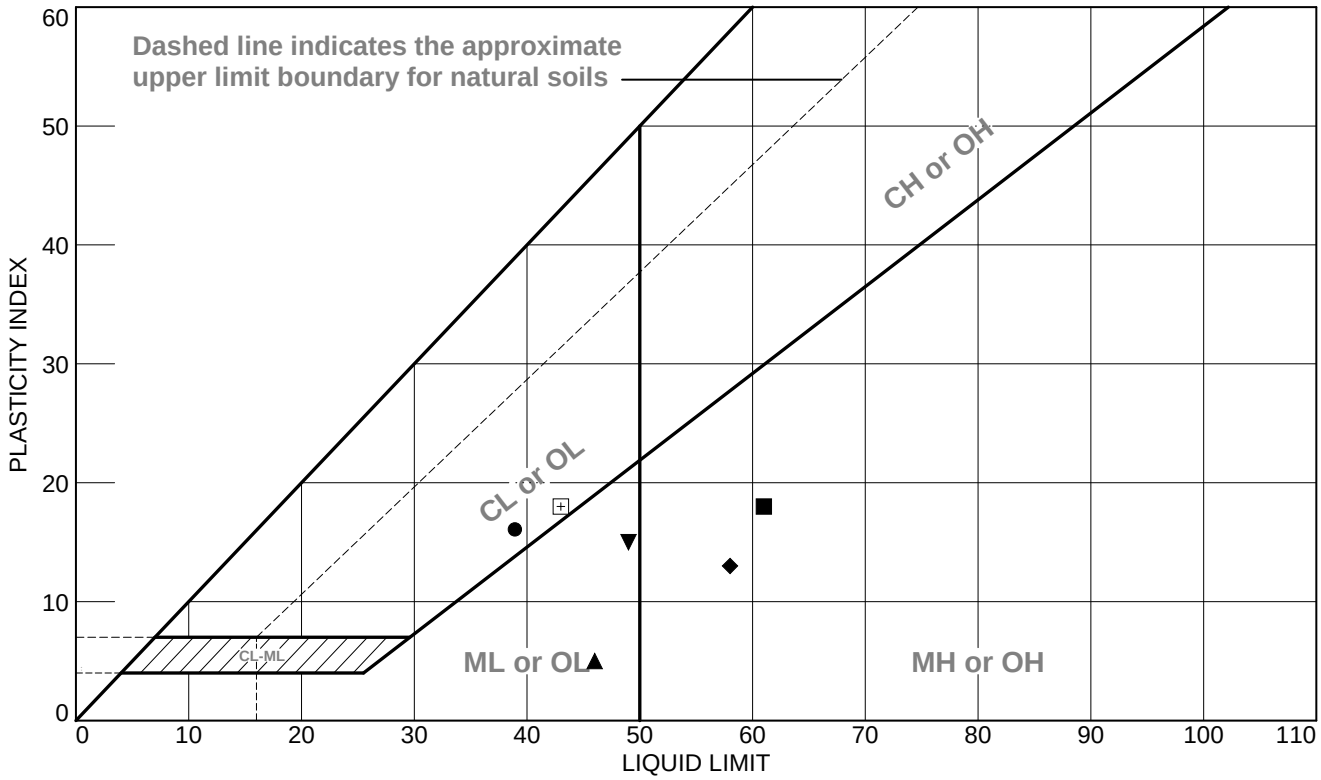
Client: Rockdale County Water Resources
Project: SR 138 From Hightower Elementary to White Road NE

Project No: ROCKW23GA0713701 **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●		PT-102	0-1.5'	13.4	23	39	16	SC
■		PT 103	6-7.5'	18.9	43	61	18	SM
▲		PT 104	13.5-15'	18.1	41	46	5	SM
◆		PT 105	8.5-10'	24.2	45	58	13	MH
▼		PT 107	8.5-10'	21.7	34	49	15	SM
✱		PT 108	13.5-15'	10.6	NP	NV	NP	SM
⊕		PT 110	6-7.5'	7.6	NP	NV	NP	SM
⊞		PT 111	3.5-5'	19.9	25	43	18	SC

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Norcross, Georgia

Client: Rockdale County Water Resources

Project: SR 138 From Hightower Elementary to White Road NE

Project No.: ROCKW23GA0713701 **Figure**

We're here for you
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UNITED CONSULTING
625 Holcomb Bridge Road, Norcross, GA 30071
Tel. 770/209-0029 FAX 770/582-2900

UNCONFINED COMPRESSION TEST OF ROCK

ASTM D2938 / AASHTO T226 / UC SOP L9

Title: SR 138 from Hightower Elementary School to White Road NE

Project No.: ROCKW-23-GA-07137-01

Sample No.	Location	Run #	Depth (ft)	Diameter (in)	Height (in)	Maximum Load (lb)	Cross sectional area (in^2)	Correction factor	Unconfined compressive strength (psi)	Test date	Tested by
1	PT-100	1	14' - 14.5'	1.836	4.012	10660	2.65	1.00	4026.4	3/3/2023	Mehdi M.
2	PT-100	1	19' - 19.5'	1.850	3.965	12020	2.69	1.00	4471.7	3/3/2023	Mehdi M.
3	PT-101	1	3.5' - 4'	1.843	4.145	13250	2.67	1.00	4966.8	3/3/2023	Mehdi M.
4	PT-101	2	8' - 8.5'	1.850	4.080	9310	2.69	1.00	3463.5	3/3/2023	Mehdi M.
5	PT-101	3	13.5' - 14'	1.845	4.095	10960	2.67	1.00	4099.5	3/3/2023	Mehdi M.
6	PT-111	1	9' - 9.5'	1.854	3.932	6920	2.70	1.00	2563.3	3/3/2023	Mehdi M.
7	PT-111	2	14' - 14.5'	1.847	4.114	6990	2.68	1.00	2608.9	3/3/2023	Mehdi M.
8	PT-112	1	11.5' - 12'	1.845	4.073	14850	2.67	1.00	5554.5	3/3/2023	Mehdi M.

SR 138 from Hightower Elementary School to White Road NE

Conyers, GA

ROCKW-23-GA-07137-01

PT-100

Core Run 1: 11.5' – 21.5'

REC = 95.4%

RQD = 90.4%

11.5 ft.

UCS at 14'-14.5'

UCS at 19'-19.5'

21.5 ft.

SR 138 from Hightower Elementary School to *White Road NE*

Conyers, GA

ROCKW-23-GA-07137-01

PT-101

Core Run 1: 1.5’ – 6.5’

REC = 87.5%

RQD = 76.7%

Core Run 2: 6.5’ – 11.5’

REC = 83.3%

RQD = 73.3%

1.5 ft.

UCS at 3.5'-4'

6.5 ft.

UCS at 8'-8.5'

11.5 ft.

SR 138 from Hightower Elementary School to White Road NE

Conyers, GA

ROCKW-23-GA-07137-01

PT-101

Core Run 3: 11.5' – 16.5'

REC = 90%

RQD = 80.8%

11.5 ft.

UCS at 13.5'-14'

16.5 ft.

SR 138 from Hightower Elementary School to White Road NE

Conyers, GA

ROCKW-23-GA-07137-01

PT-111

Core Run 1: 8′ – 13′

REC = 61.7%

RQD = 51.7%

Core Run 2: 13′ – 18′

REC = 96.7%

RQD = 66.7%

8 ft.

UCS at 9'-9.5'

13 ft.

UCS at 14'-14.5'

18 ft.

SR 138 from Hightower Elementary School to White Road NE

Conyers, GA

ROCKW-23-GA-07137-01

PT-112

Core Run 1: 7′ – 12′

REC = 78.3%

RQD = 75.8%

Core Run 2: 12′ – 17′

REC = 49.2%

RQD = 48.3%

7 ft.

UCS at 11.5'-12'

12 ft.

17 ft.

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a civil engineer may not fulfill the needs of a constructor — a construction contractor — or even another civil engineer. Because each geotechnical- engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. No one except you should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply this report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical-engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

Geotechnical Engineers Base Each Report on a Unique Set of Project-Specific Factors

Geotechnical engineers consider many unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk-management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical-engineering report that was:

- not prepared for you;
- not prepared for your project;
- not prepared for the specific site explored; or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical-engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical-engineering report is based on conditions that existed at the time the geotechnical engineer performed the study. *Do not rely on a geotechnical-engineering report whose adequacy may have been affected by*: the passage of time; man-made events, such as construction on or adjacent to the site; or natural events, such as floods, droughts, earthquakes, or groundwater fluctuations. *Contact the geotechnical engineer before applying this report to determine if it is still reliable.* A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ — sometimes significantly — from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide geotechnical-construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are Not Final

Do not overrely on the confirmation-dependent recommendations included in your report. *Confirmation-dependent recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations *only* by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's confirmation-dependent recommendations if that engineer does not perform the geotechnical-construction observation required to confirm the recommendations' applicability.*

A Geotechnical-Engineering Report Is Subject to Misinterpretation

Other design-team members' misinterpretation of geotechnical-engineering reports has resulted in costly

problems. Confront that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Constructors can also misinterpret a geotechnical-engineering report. Confront that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing geotechnical construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical-engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make constructors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give constructors the complete geotechnical-engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise constructors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure constructors have sufficient time* to perform additional study. Only then might you be in a position to give constructors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and constructors fail to recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Environmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform an *environmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold-prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, many mold- prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical- engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; *none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.*

Rely, on Your GBC-Member Geotechnical Engineer for Additional Assistance

Membership in the Geotechnical Business Council of the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you GBC-Member geotechnical engineer for more information.

GEOTECHNICAL BUSINESS COUNCIL
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