Addendum No. 1

ITB No. 20-09
8 Inch Water Line Extension – Conyers Outlots Tract 1 & 2

March 12, 2020

ITB #20-09 is hereby amended as follows:

1. Below are questions received and corresponding answers:

   A. **Question**: Will a compaction test/density test be required for back of the receiving pit prior to restoration?

      **Answer**: Yes

   B. **Question**: Near station 2+15 plans show 3.2’ of cover on page C01 will this be acceptable cover?

      **Answer**: Yes

   C. **Question**: What is the expectation of article 1.6 is spec section 01200? What Q/C will be required?

      **Answer**: Rockdale Water Resources (RWR) Inspectors will perform oversight of the Work to ensure compliance with the contract documents. Testing of the water main will be performed in conformance with the contract documents and RWR Standards and Specifications.

   D. **Question**: Will the contractor be responsible for any permits? If so what is required?

      **Answer**: No. But the selected contractor will need to provide a traffic control plan for the work within GDOT right of way. RWR is procuring the GDOT permit and will need to submit the traffic control plan to GDOT.

   E. **Question**: Section 02227 part 2 calls 8” pipe to have 16” casing with .200 wall thickness. Plans show 18” w/.25 wall thickness. Which is correct?

      **Answer**: The plans showing 18” casing w/.25” wall thickness is correct.
F. **Question:** Will the contractor be allowed to fill the new 8” water line for testing from the existing 8” water line?

   **Answer:** Yes

G. **Question:** If rock is encountered during trenching or boring will a CO for additional payment be issued?

   **Answer:** There were 2 additional borings performed by United Consulting. One is at the bore pit(20’ deep) and the other is at the receiving pit(15’ deep). Rock was not encountered in either of these borings, therefore we do not anticipate rock during the boring operation. The other borings performed by Alhberg Engineering do not indicate rock in the vicinity of the water main installation. It is expected that all excavation can be accomplished using conventional equipment. We modified the bid form to include rock excavation (pay item no 14) just in order to have it available if needed. Pay item 14 will only be used after providing notification to RWR that rock has been encountered. The Bid Item Table will be replaced with the Revised Bid Item Table included in this Addendum. We have added the Geotechnical Exploration Report by United Consulting (Dated 12/19) to this Addendum also. If rock is encountered during the boring operation a change order will be considered, but as mentioned earlier we don’t anticipate rock along the proposed water main route.

H. **Question:** The scale on drawing C-01 is half the scale it shows. Please confirm scale is 1” = 20’.

   **Answer:** Scale is 1”=20’. We are including a revised sheet C-01 with the corrected scale to replace the original C-01.

I. **Question:** Is the 8” DIP Carrier Pipe Included in the Jack and Bore Bid item #7 for payment?

   **Answer:** No. There is 334’ of 8” DIP total including the 8” carrier pipe which is reflected in pay item no. 4.

J. **Question:** Spec section 2227-9 3.08D says to close the ends of the casing with 4-inch brick walls. The typical jack and bore detail on drawing C-02 shows flexible rubber boots with stainless steel bands. Please confirm rubber boots are acceptable.

   **Answer:** Confirmed

K. **Question:** Please confirm all products shall be cast, fabricated and manufactured in the United States of America.
Answer: Confirmed

L. Question: Which class of DIP is Required? CL-350 or CL-51?

Answer: CL-350

2. All other conditions remain in full force and effect.

3. If a Bid has been submitted and anything in this Addendum causes the bidder to change the item offered or to increase or decrease the Bid price, the new price and/or changes will be inserted below:

4. All bidders under this Invitation to Bid are kindly requested to acknowledge receipt of this Addendum on page 11 of the Bid Form.

Tina Malone

Tina Malone, CPPB CPPO
Procurement Officer
Department of Finance, Purchasing Division
# BID ITEM TABLE – ITB # 19-23

**Instructions:** Type or clearly print all prices.
Any modifications to items, quantities, or units will result in rejection of the bid.
Items marked with an asterisk (*) will only be used with Project Manager’s authorization.

<table>
<thead>
<tr>
<th>Item #</th>
<th>Item Description</th>
<th>Approx. Quantity</th>
<th>Unit</th>
<th>Unit Price</th>
<th>Projected Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mobilization</td>
<td>1</td>
<td>LS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Erosion and Sedimentation Control</td>
<td>1</td>
<td>LS</td>
<td></td>
<td></td>
</tr>
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<td>3</td>
<td>Boring and Receiving Pit Soil Excavitation</td>
<td>400</td>
<td>CY</td>
<td></td>
<td></td>
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<tr>
<td>4</td>
<td>Furnish and Install 8&quot; Ductile Iron Pipe</td>
<td>334</td>
<td>LF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Cut &amp; Replace Asphalt Pavement</td>
<td>22</td>
<td>SY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Cut &amp; Replace Concrete Pavement</td>
<td>25</td>
<td>SY</td>
<td></td>
<td></td>
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<tr>
<td>7</td>
<td>Bore &amp; Jack 18&quot; Steel Casing (0.25 Wall)</td>
<td>67</td>
<td>LF</td>
<td></td>
<td></td>
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<tr>
<td>8</td>
<td>Furnish &amp; Install Fire Hydrant Assembly with 6&quot; Gate Valve</td>
<td>2</td>
<td>EA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Furnish and Install 8&quot;x8&quot; Tapping Sleeve with 8&quot; Valve</td>
<td>1</td>
<td>EA</td>
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</tr>
<tr>
<td>10</td>
<td>Furnish and Install 8&quot; Gate Valve</td>
<td>2</td>
<td>EA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Testing</td>
<td>1</td>
<td>EA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Furnish &amp; Install 8&quot; Plug (Restrained)</td>
<td>2</td>
<td>EA</td>
<td></td>
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<td>13</td>
<td>Traffic Control</td>
<td>1</td>
<td>EA</td>
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<tr>
<td>14*</td>
<td>Rock Excavation</td>
<td>30</td>
<td>CY</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Subtotal**

**Contingency (10% of Subtotal)**

**Total Bid Amount**

Representative’s Signature: _____________________________ Date: _____________________________
December 11, 2019

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

Via e-mail: David.Cervone@rockdalecounty.com

RE: Geotechnical Exploration Report
   SR-20 8" Dia. DIP Waterline Extension
   Conyers, Georgia
   Project Number ROCKW-19-GA-03788-01

Dear Mr. Cervone:

United Consulting is pleased to submit this Geotechnical Exploration Report for the above-referenced project. The work was completed in general accordance with the Scope of Work in Proposal No. P2019.3147.01, dated August 13, 2019 and in accordance with Preliminary Plan and Profile Sheets for the new force main dated 08/07/2019.

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

Rafael I. Ospina, P.E.
Consultant Geotechnical Engineer

Chris Roberds, P.G.
Senior Executive Vice President

KA/RIO/CLR/nj

H:Sharepoint: ROCKW-19-GA-03788-01.doc
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Table 3 – Summary of Ultimate Equivalent Fluid Pressures

FIGURES

Figure 1 – Site Location Plan
Figure 2 – Borings Location Plan

APPENDIX A

General Notes /Narrative of Drilling Operations
Exploration Procedures
SPT Boring Logs (2)

APPENDIX B

Laboratory Procedures
Soil Laboratory Test Results
1.0 EXECUTIVE SUMMARY

United Consulting has completed a Geotechnical Exploration for SR-20 8" Dia. DIP Waterline Extension Project in Conyers, Georgia, starting at Station 0+00 in the road shoulder adjacent to a wooded area between buildings 1897 and 2133 GA-20 of the Southbound lane of SR-20 highway and terminating at Sta. 3+45 in proximate vicinity of the median of the SR-20 highway, Conyers, Georgia. Please refer to the text and tables of the report for a more detailed discussion of the items summarized below.

A total of two (2) SPT soil borings (B-1 and B-2) were drilled at approximately Sta. 2+65 and 3+40. Traffic Control was carried out along the road and coordination of drilling plans was carried out with County and Georgia State Department of Transportation prior to mobilization to the site. United Consulting also contacted the Public Utility Company to clear utilities at all drilled locations.

Fill – At Boring B-1, fill was encountered from surface down to a depth of approximately 8.5 feet while at Boring B-2, fill was encountered from surface up to a depth of approximately 13 feet. The fill consisted of loose to firm Sand with varying amounts of silt, clay and trace organic matter; firm Clay with varying amounts of sand, silt and gravel as well as stiff Silt with varying amount of sand and clay. SPT N-values in the Sand ranged from 9 to 10 blows per foot (bpf) while N-values in the Silt was 10 bpf and N-values of the Clay fill was 6 bpf.

Residual - Residual soil underlying the fill was encountered in Boring B-1, at approximately 8.5 feet bgs, while the residual soil at Boring B-2 was encountered at approximately 13 feet bgs. The residual soil consisted of loose to firm silty Sand with trace clay. SPT N-values in the residual Sand ranged from 8 to 11 bpf.

Partially Weathered Rock (PWR) - PWR was not encountered in any borings. PWR is a term for the residual soil that can be penetrated with soil drilling equipment and has N-values in excess of 100 bpf.

Auger refusal was not encountered in any boring. Auger refusal represents a depth that the boring cannot be advanced with a soil drilling auger.

Bedrock - Bedrock was not encountered at the locations bored. Regardless, it should be noted that due to high variability in soils within the Piedmont region, the possibility of encountering bedrock, outside and between drilled locations, though minimal, regardless, is still extant.

Groundwater - Groundwater was encountered at the time of drilling in Boring B-1 at a depth of 18 feet bgs.

Based on the proposed bottom of pipe elevations at approximately 827 ft-msl, the waterline is expected to be in fill and residual soil. Bedrock or PWR was not encountered in the two borings drilled at the site.
2.0 PROJECT INFORMATION

The project consists of the installation of a new 8-inch diameter Ductile Iron Pipe (DIP) Waterline Extension, starting at Station 0+00 in the road shoulder adjacent to the wooded area between buildings 1897 and 2133 GA-20 of the Southbound Lane of SR-20 highway and terminating at Sta. 3+45 in proximate vicinity of the median of the SR-20 highway, in Conyers, Georgia. Approximately 67 linear feet of the new 8" diameter DIP will be encased within an 18-inch diameter steel casing, installed from a 10"x40' bore pit extending to a 10'x10' receiving pit in the SR-20 median.

Based on the conceptual design provided by Client in Plan and Profile Sheet C-01, the invert elevation of the 18-inch casing between the lunching and receiving bore pits is at about Elevation 827 ft-msl, or about 10 to 11 feet below ground surface (bgs).

We assume horizontal and vertical survey information provided in the conceptual design is based on North American Datum (NAD) 1983 and North American Vertical Datum (NAVD) 1988, respectively.

Drilling services were subcontracted to Betts Environmental with offices in the Atlanta area. Traffic control services were subcontracted to Area Wide Protective (AWP) with headquarters located in North Canton, OH.
3.0 PURPOSE

The purpose of this geotechnical exploration was to collect data to prepare this Geotechnical Exploration report that will form the geotechnical basis of design for installation of the - 8" Dia. DIP Waterline Extension.

Project proposed structures include:

- 67 linear feet of 8-Inch diameter DIP encased in 18" diameter steel casing
- Temporary pipe jacking and receiving pits
- Numerous auxiliary appurtenances including valves, tapping sleeves and Fire Hydrant assembly
4.0 SCOPE

The scope of our geotechnical exploration included the main following items:

1. Locating and obtaining underground utility clearance for the boring locations within the limits of the geotechnical exploration.

2. Subcontracting drilling and traffic control services.

3. Drilling two (2) Standard Penetration Test (SPT) borings to assess the quality and consistency of the subsurface soils, depth to partially weathered rock (PWR) and rock, and depth to groundwater.

4. Geotechnical laboratory testing including soil classification tests.

5. Visual evaluation of the soil and rock core samples obtained during our field testing program for further identification and classification.

6. Analyzing the existing soil and rock conditions with respect to the proposed construction; and

7. Preparing this geotechnical exploration report to document the results of our field-testing and laboratory testing program.
5.0 REGIONAL AND LOCAL GEOLOGY

The project is regionally located within the Georgia Southern Piedmont Physiological Province, belonging to the Atlanta Group of late Precambrian to early Paleozoic geological age. This formation consists of "light-gray epidote-biotite-muscovite-plagioclase gneiss locally containing amphibolite (Higgins and Atkins, 1981)."

The soil profile in the region is generally characterized by three major zones, the upper most zone is composed of deep red sandy or silty clays, followed by an intermediate zone consisting of micaceous sandy silts and silty sands. The third zone is one of incomplete bedrock weathering and sandy soils that contain lenses of relatively sound rock.

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6.0 SUBSURFACE CONDITIONS

6.1 Boring Data

Two (2) Standard Penetration Test (SPT) borings (B-1 and B-2) were completed to evaluate the subsurface conditions within the proposed waterline footprint area. A summary of subsurface conditions is provided on Table 1; soil laboratory testing results are summarized in Table 2. Soil boring logs, Laboratory test procedures/result as well as exploratory notes are included in Appendices. Site Location is shown in Figure 1 (Site Location Plan) and boring locations are shown on Figure 2 (Boring Location Plan). A narrative of subsurface conditions is provided below.

**Fill** - At boring B-1, fill was encountered from surface down to a depth of approximately 8.5 feet while at boring B-2, fill was encountered from surface up to a depth of approximately 13 feet. The fill consisted of loose to firm Sand with varying amounts of silt, clay and trace organic matter; firm Clay with varying amounts of sand, silt and gravel as well as stiff Silt with varying amount of sand and clay. SPT N-values in the Sand ranged from 9 to 10 blows per foot (bpf) while N-values in the Silt was 10 bpf and N-values of the Clay fill was 6 bpf.

**Residual Soil** - Residual soil underlying the fill was encountered in boring B-1 at approximately 8.5 feet below ground surface (ft-bgs), while the residual soil at boring B-2 was encountered at approximately 13 ft-bgs The residual soil consisted of loose to firm silty Sand with trace clay. SPT N-values in the residual Sand ranged from 8 to 11 bpf.

**Partially Weathered Rock (PWR)** - PWR was not encountered in any borings. PWR is a term for the residual soil that can be penetrated with soil drilling equipment and has N-values in excess of 100 bpf.

**Auger refusal** - Auger refusal was not encountered in any boring. Auger refusal represents a depth that the boring cannot be advanced with a soil drilling auger.

**Bedrock** - Bedrock was not encountered at the locations bored. Regardless, it should be noted that due to high variability in soils within the piedmont region, the possibility of encountering bedrock, outside and between drilled location, though minimal, regardless, is still extant.

**Groundwater** - Groundwater was encountered at the time of drilling boring B-1 at depth of 18 feet bgs. bgs.

After drilling completion, boreholes were generally plugged and backfilled with compacted soil cuttings.
Table 1: Summary of Subsurface Conditions

<table>
<thead>
<tr>
<th>Boring No.</th>
<th>Station No.</th>
<th>Elevation</th>
<th>Fill Depth (ft)</th>
<th>Depth to PWR (ft)</th>
<th>Depth to Rock (ft)</th>
<th>Depth to Groundwater (ft)</th>
<th>Depth to Bottom of Pipe (ft)</th>
<th>Boring Termination Depth (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-1</td>
<td>2+65</td>
<td>837</td>
<td>8.5</td>
<td>NE</td>
<td>NE</td>
<td>18</td>
<td>11</td>
<td>20</td>
</tr>
<tr>
<td>B-2</td>
<td>3+40</td>
<td>838</td>
<td>13</td>
<td>NE</td>
<td>NE</td>
<td>NE</td>
<td>13</td>
<td>15</td>
</tr>
</tbody>
</table>

Notes
NE - Not Encountered
AR - Auger Refusal

For a more detailed description of the subsurface conditions encountered, please refer to the boring logs in The Appendix.

6.2 Laboratory Test Data

Geotechnical laboratory testing was performed on select soil samples. The soil laboratory testing consisted of the following tests:

- 2 Grain Size
- 2 Atterberg Limits
- 2 Natural Moisture Contents

The soil testing results are included in Appendix C and summarized in Table 2 below.

Table 2: Soil Laboratory Tests Summary

<table>
<thead>
<tr>
<th>Boring</th>
<th>Depth (feet)</th>
<th>Natural Moisture (%)</th>
<th>Plastic Limit (%)</th>
<th>Liquid Limit (%)</th>
<th>Plasticity Index (%)</th>
<th>USCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-1</td>
<td>8.5-10</td>
<td>27.1</td>
<td>NP</td>
<td>NV</td>
<td>NP</td>
<td>SM</td>
</tr>
<tr>
<td>B-2</td>
<td>8.5-10</td>
<td>25.0</td>
<td>45</td>
<td>65</td>
<td>20</td>
<td>SM</td>
</tr>
</tbody>
</table>

Notes: NP = Non Plastic; NV = No Value
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 Trench Excavation

Partially Weathered Rock (PWR) or Rock were not encountered in the borings, thus difficult excavation is not expected for this project.

It is important to note that depths to PWR and rock can vary 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. If rock excavation by blasting is required, 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 Trenchless Installation Excavation

Based on our boring data the new jack and bore casing and pipe carrier installation will be within fill or residual soils. PWR/Rock or auger refusal was not encountered at the two borings completed for the project.

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 encountered in Boring B-1 at 18 ft-bgs at the time of drilling, and was not encountered in Boring B-2 (>15 ft-bgs). Hence groundwater is not expected to present an issue during construction. However, the contractor should regardless be prepared to handle groundwater during trenching and tunneling shaft construction because it is possible that perched water levels could develop at shallower depths at the site and groundwater levels are also subject to seasonal fluctuation. The contractor should be prepared for dewatering, and groundwater should be lowered to depths of at least 3 feet below excavation depths throughout construction if encountered.

Management of groundwater 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.

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 such those in at the proposed tunneling shafts, construction of excavation bracing may be required to maintain stability of the surrounded areas/roads. For an excavation bracing system design, we recommend a constant earth pressure equal to 0.80K_aγH, 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 summarizing the ultimate equivalent fluid pressures to be used in preliminary design for in-situ soils for temporary excavation bracing design.

Table 3: Summary of Ultimate Equivalent Fluid Pressures (Excavation Bracing/Shafts)

<table>
<thead>
<tr>
<th>Pressure Conditions</th>
<th>Coefficient of Earth Pressures</th>
<th>Ultimate Equivalent Fluid Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active (K_a)</td>
<td>0.35</td>
<td>38 psf/ft</td>
</tr>
<tr>
<td>At-rest (K_o)</td>
<td>0.53</td>
<td>58 psf/ft</td>
</tr>
<tr>
<td>Passive (K_p)</td>
<td>2.8</td>
<td>308 psf/ft</td>
</tr>
</tbody>
</table>

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

We’re here for you.
These ultimate equivalent fluid pressures were calculated by the Rankine method using an estimated in-situ soil unit weight of 110 pcf, an average in-situ angle of internal friction of 28 degrees, and zero effective cohesion. 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. PWR is not present at the borings, however if encountered, 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 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.

Moisture-density determinations should be performed for each soil type used, to provide data necessary for quality assurance testing. Soil moisture contents at the time of compaction should be adjusted so that they are within moisture content limits that will allow the required compaction to be obtained.

7.7 Slopes

All slopes should be protected from erosion during construction and provided with appropriate permanent vegetation or other cover after construction. Slopes should be protected from concentrated run-off flow by means of berms and drainage ditches to direct runoff around slopes or through concrete channels. Appropriate vegetative cover should consist of fast growing grasses that will rapidly create a dense root mat over the entire slope. Landscaping consisting of isolated shrubs and pine straw will not provide adequate slope protection.

All temporary slopes and open excavations should be performed in accordance with applicable OSHA guidelines for trench safety.
7.8 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 and at least 95 percent of Standard Proctor maximum dry density elsewhere on the site. For trench backfilling, lift thickness should not exceed 4 inches, as walk behind compactors are typically used to compact soils within trenches, specially within 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. Our work has been completed using generally accepted standards of Geotechnical Engineering practice in the State of Georgia. No other warranty is expressed or implied.

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

The scope of work was limited to collecting subsurface information for the preparation of geotechnical investigation report for design of the SR-20 8-inch DIP Water Main Extension Project in Rockdale County, Georgia.

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 to 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 our firm reviews the changes 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 confirm that they are consistent with the intent of our recommendations.

UNITED CONSULTING
APPENDIX A

General Notes / Narrative of Drilling Operations
Exploration Procedures
SPT Boring Logs (2)
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:

<table>
<thead>
<tr>
<th>Trace</th>
<th>0 - 10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some</td>
<td>11 - 35%</td>
</tr>
<tr>
<td>Suffix &quot;y&quot; or &quot;ey&quot;</td>
<td>36 - 49%</td>
</tr>
</tbody>
</table>

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)
\( \gamma_d \) Dry Unit Weight (Pounds per Cubic Foot or PCF)
\( \gamma_m \) Moist or In-Situ Unit Weight (PCF)
\( \gamma_{sat} \) 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).

<table>
<thead>
<tr>
<th>Clay and Silt</th>
<th>&quot;N&quot;</th>
<th>Consistency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0-2</td>
<td>Very Soft</td>
</tr>
<tr>
<td></td>
<td>3-4</td>
<td>Soft</td>
</tr>
<tr>
<td></td>
<td>5-8</td>
<td>Firm</td>
</tr>
<tr>
<td></td>
<td>9-15</td>
<td>Stiff</td>
</tr>
<tr>
<td></td>
<td>16-30</td>
<td>Very Stiff</td>
</tr>
<tr>
<td></td>
<td>Over 31</td>
<td>Hard</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sand</th>
<th>&quot;N&quot;</th>
<th>Relative Density</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0-4</td>
<td>Very Loose</td>
</tr>
<tr>
<td></td>
<td>5-10</td>
<td>Loose</td>
</tr>
<tr>
<td></td>
<td>11-19</td>
<td>Firm</td>
</tr>
<tr>
<td></td>
<td>20-29</td>
<td>Medium Dense</td>
</tr>
<tr>
<td></td>
<td>30-49</td>
<td>Dense</td>
</tr>
<tr>
<td></td>
<td>50+</td>
<td>Very Dense</td>
</tr>
</tbody>
</table>
EXPLORATION PROCEDURES

The drilling operations were based on typical subsurface soil conditions across the Greater Atlanta area. Two (2) SPT borings (designated B-1 and B-2) were performed at the approximate locations indicated on the attached Boring Location Plan (Figure 2). The SPT borings were performed in general accordance with ASTM D 1586. The rock core borings, if completed, were performed in general accordance with ASTM D2113. Soil samples obtained during testing were visually evaluated by the Project Engineer and classified according to the visual-manual procedure described in ASTM D 2488. A narrative of field operations is included in The Appendix.

The boring locations were marked by United Consulting based on Geotechnical Exploration Work Plan approved by Client. Some of the boring locations where field adjusted from the original staked locations by United Consulting Engineers due to offsets required due to shallow auger refusals on boulders or existing underground utilities, so the locations shown on Figure 2 should be considered approximate. The elevations shown on the test logs were obtained from elevations provided in the Plan and Profile Project provided by Rockdale County Department of Water Resources.

A CME 75 drill rig was utilized to perform the SPT drills. The first stage of drilling consisted of advancing hollow stem augers and the second stage consisted of introducing split spoon sampler into the hollow stem at desired/target depths in order to obtain hammer blow counts as well as to retrieve soil samples for visual and laboratory testing. Once the blow count is obtained, the hollow stem is further advanced and the process repeated until boring termination.
**BORING LOG**

**CONTRACTED WITH:** Rockdale County Water Resources  
**PROJECT NAME:** SR-20 8" Dia DIP Waterline Extension  
**DATE:** 10/28/19  
**JOB NO.:** ROCKW-19-GA-03788  
**DRILLER:** Betts Environmental  
**RIG:** CME75  
**LOGGED BY:** KoleA

<table>
<thead>
<tr>
<th>USCS ELEV.</th>
<th>DESCRIPTION</th>
<th>DEPTH FEET</th>
<th>SAMPLES</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>835</td>
<td>2&quot; topsoil</td>
<td>0</td>
<td>1 4.4-5 9 10</td>
<td>Automatic Hammer Energy Transfer Ratio = 72.88%</td>
</tr>
<tr>
<td>830</td>
<td>Sand- trace clay and silt; loose; red-brown (Fill)(SC)</td>
<td>5 6-5-5 10 16</td>
<td>Bottom of Pipe LL = NV, PL = NP, PI = NP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Silt- sandy, trace clay; stiff; tan-brown (ML)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>825</td>
<td>Sand- some silt, trace clay; firm; tan (Residual)(SM)</td>
<td>10 4-5-6 11 16 27.1</td>
<td>Groundwater encountered at 18 feet at time of drill</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- loose</td>
<td>15</td>
<td>4 4-3-5 8 16</td>
<td></td>
</tr>
<tr>
<td>820</td>
<td>- firm</td>
<td>20</td>
<td>5 4-5-6 11 14</td>
<td></td>
</tr>
<tr>
<td>815</td>
<td>BORING TERMINATED AT 20 FEET</td>
<td>25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>810</td>
<td></td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>805</td>
<td></td>
<td>36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>800</td>
<td></td>
<td>40</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Boring Log

**Contracted With:** Rockdale County Water Resources  
**Project Name:** SR-20 8" Dia DIP Waterline Extension  
**Date:** 10/28/19  
**Driller:** Betts Environmental  
**Rig:** CME75  
**Logged By:** KoleA

<table>
<thead>
<tr>
<th>USCS</th>
<th>ELEV.</th>
<th>Description</th>
<th>Depth Feet</th>
<th>Samples</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2&quot; topsoil</td>
<td>0</td>
<td>Sand- silty, trace vegetation ; firm; brown (Fill)(SM)</td>
<td>1</td>
<td>5-5-5</td>
<td>10 10</td>
</tr>
<tr>
<td>Clay - some sand, trace silt and gravel; firm; brown (CL)</td>
<td>835</td>
<td>2</td>
<td>8-3-3</td>
<td>6 6</td>
<td></td>
</tr>
<tr>
<td>Sand - some silt and clay; firm; orange brown (SM)</td>
<td>830</td>
<td>10</td>
<td>5-4-6</td>
<td>10 10 25</td>
<td></td>
</tr>
<tr>
<td>Sand - silty, trace clay; firm; gray-red (Residual) (SM)</td>
<td>825</td>
<td>15</td>
<td>5-4-6</td>
<td>10 19</td>
<td></td>
</tr>
<tr>
<td><strong>BORING TERMINATED AT 15 FEET</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>820</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>815</td>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>810</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>805</td>
<td>35</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>800</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**  
Automatic Hammer Energy Transfer Ratio = 72.88%  
Vegetation from median grass  
Bottom of Pipe LL = 85, PL = 45, PI = 20  
LL = Liquid Limit  
PL = Plastic Limit  
PI = Plasticity Index
APPENDIX B

Laboratory Procedures
Soil Laboratory Test Results
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 is 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 sieves were 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 #200 sieve, and 50 grams of this soil is soaked in s/c 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 is then drawn from data. These tests 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.
## LIQUID AND PLASTIC LIMITS TEST REPORT

Dashed line indicates the approximate upper limit boundary for natural soils

### SOIL DATA

<table>
<thead>
<tr>
<th>SOURCE</th>
<th>SAMPLE NO.</th>
<th>DEPTH (ft)</th>
<th>NATURAL WATER CONTENT (%)</th>
<th>PLASTIC LIMIT (%)</th>
<th>LIQUID LIMIT (%)</th>
<th>PLASTICITY INDEX (%)</th>
<th>USCS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B-1</td>
<td>8.5-10.0</td>
<td>27.1</td>
<td>NP</td>
<td>NV</td>
<td>NP</td>
<td>SM</td>
</tr>
<tr>
<td></td>
<td>B-2</td>
<td>8.5-10.0</td>
<td>25.0</td>
<td>45</td>
<td>65</td>
<td>20</td>
<td>SM</td>
</tr>
</tbody>
</table>

Client: Rockdale County Water Resources  
Project: SR 20 1910 GA20 Water Line Extension  
Project No.: ROCKW19GA0378801  
Figure
Particle Size Distribution Report

<table>
<thead>
<tr>
<th>SIZE</th>
<th>PERCENT FINER</th>
<th>SPEC. PERCENT</th>
<th>PASS? (X=NO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>#4</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#10</td>
<td>99.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#20</td>
<td>91.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#40</td>
<td>68.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#60</td>
<td>45.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#140</td>
<td>25.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#200</td>
<td>23.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Material Description
Sand, some silt, trace clay, tan

Atterberg Limits
PL= NP  
LL= NV  
PI= NP

Coefficients
D_60= 0.8001  
D_50= 0.6692  
D_30= 0.1428  
D_10= 0.0102  
C_u= 34.58  
C_c= 5.68

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

Remarks

Location: SA-3  
Sample Number: B-1  
Depth: 8.5-10.0 ft  
Date: 11/20/2019

United Consulting  
Noricross, Georgia

Client: Rockdale County Water Resources  
Project: SR 20 1910 GA20 Water Line Extension  
Project No: ROCKW19GA0378801  
Figure
Particle Size Distribution Report

<table>
<thead>
<tr>
<th>GRAIN SIZE - mm.</th>
<th>% Finer</th>
<th>% Gravel</th>
<th>% Sand</th>
<th>% Silt</th>
<th>% Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 in.</td>
<td>0.2</td>
<td>0.2</td>
<td>99.8</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>1 in.</td>
<td>0.4</td>
<td>0.4</td>
<td>99.6</td>
<td>0.4</td>
<td>0.2</td>
</tr>
<tr>
<td>3/4 in.</td>
<td>0.6</td>
<td>0.6</td>
<td>99.4</td>
<td>0.6</td>
<td>0.2</td>
</tr>
<tr>
<td>1/2 in.</td>
<td>0.8</td>
<td>0.8</td>
<td>99.2</td>
<td>0.8</td>
<td>0.2</td>
</tr>
<tr>
<td>1/4 in.</td>
<td>1.0</td>
<td>1.0</td>
<td>99.0</td>
<td>1.0</td>
<td>0.0</td>
</tr>
<tr>
<td>3/8 in.</td>
<td>1.2</td>
<td>1.2</td>
<td>98.8</td>
<td>1.2</td>
<td>0.0</td>
</tr>
<tr>
<td>3/16 in.</td>
<td>1.4</td>
<td>1.4</td>
<td>98.6</td>
<td>1.4</td>
<td>0.0</td>
</tr>
<tr>
<td>1/8 in.</td>
<td>1.6</td>
<td>1.6</td>
<td>98.4</td>
<td>1.6</td>
<td>0.0</td>
</tr>
<tr>
<td>1/16 in.</td>
<td>1.8</td>
<td>1.8</td>
<td>98.2</td>
<td>1.8</td>
<td>0.0</td>
</tr>
<tr>
<td>3/32 in.</td>
<td>2.0</td>
<td>2.0</td>
<td>98.0</td>
<td>2.0</td>
<td>0.0</td>
</tr>
<tr>
<td>1/32 in.</td>
<td>2.2</td>
<td>2.2</td>
<td>97.8</td>
<td>2.2</td>
<td>0.0</td>
</tr>
<tr>
<td>1/64 in.</td>
<td>2.4</td>
<td>2.4</td>
<td>97.6</td>
<td>2.4</td>
<td>0.0</td>
</tr>
<tr>
<td>1/128 in.</td>
<td>2.6</td>
<td>2.6</td>
<td>97.4</td>
<td>2.6</td>
<td>0.0</td>
</tr>
<tr>
<td>1/256 in.</td>
<td>2.8</td>
<td>2.8</td>
<td>97.2</td>
<td>2.8</td>
<td>0.0</td>
</tr>
<tr>
<td>1/512 in.</td>
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<td>3.0</td>
<td>97.0</td>
<td>3.0</td>
<td>0.0</td>
</tr>
<tr>
<td>1/1024 in.</td>
<td>3.2</td>
<td>3.2</td>
<td>96.8</td>
<td>3.2</td>
<td>0.0</td>
</tr>
<tr>
<td>1/2048 in.</td>
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<td>3.4</td>
<td>96.6</td>
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</tr>
<tr>
<td>1/4096 in.</td>
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<td>3.6</td>
<td>96.4</td>
<td>3.6</td>
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</tr>
<tr>
<td>1/8192 in.</td>
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<td>3.8</td>
<td>96.2</td>
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<td>1/16384 in.</td>
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<td>4.0</td>
<td>96.0</td>
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<td>0.0</td>
</tr>
<tr>
<td>1/32768 in.</td>
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<td>4.2</td>
<td>95.8</td>
<td>4.2</td>
<td>0.0</td>
</tr>
<tr>
<td>1/65536 in.</td>
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<td>4.4</td>
<td>95.6</td>
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<td>0.0</td>
</tr>
<tr>
<td>1/131072 in.</td>
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<td>4.6</td>
<td>95.4</td>
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<td>0.0</td>
</tr>
<tr>
<td>1/262144 in.</td>
<td>4.8</td>
<td>4.8</td>
<td>95.2</td>
<td>4.8</td>
<td>0.0</td>
</tr>
<tr>
<td>1/524288 in.</td>
<td>5.0</td>
<td>5.0</td>
<td>95.0</td>
<td>5.0</td>
<td>0.0</td>
</tr>
<tr>
<td>1/1048576 in.</td>
<td>5.2</td>
<td>5.2</td>
<td>94.8</td>
<td>5.2</td>
<td>0.0</td>
</tr>
<tr>
<td>1/2097152 in.</td>
<td>5.4</td>
<td>5.4</td>
<td>94.6</td>
<td>5.4</td>
<td>0.0</td>
</tr>
<tr>
<td>1/4194304 in.</td>
<td>5.6</td>
<td>5.6</td>
<td>94.4</td>
<td>5.6</td>
<td>0.0</td>
</tr>
<tr>
<td>1/8388608 in.</td>
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<td>5.8</td>
<td>94.2</td>
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</tr>
<tr>
<td>1/16777216 in.</td>
<td>6.0</td>
<td>6.0</td>
<td>94.0</td>
<td>6.0</td>
<td>0.0</td>
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<tr>
<td>1/33554432 in.</td>
<td>6.2</td>
<td>6.2</td>
<td>93.8</td>
<td>6.2</td>
<td>0.0</td>
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<tr>
<td>1/67108864 in.</td>
<td>6.4</td>
<td>6.4</td>
<td>93.6</td>
<td>6.4</td>
<td>0.0</td>
</tr>
<tr>
<td>1/134217728 in.</td>
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<td>6.6</td>
<td>93.4</td>
<td>6.6</td>
<td>0.0</td>
</tr>
<tr>
<td>1/268435456 in.</td>
<td>6.8</td>
<td>6.8</td>
<td>93.2</td>
<td>6.8</td>
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<tr>
<td>1/536870912 in.</td>
<td>7.0</td>
<td>7.0</td>
<td>93.0</td>
<td>7.0</td>
<td>0.0</td>
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<tr>
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Material Description
Sand, some silt and clay, orange brown

Atterberg Limits
PL= 45  LL= 65  PI= 20

Coefficients
D90= 0.8525  D85= 0.7123  D60= 0.3072
D50= 0.2012  D30= 0.0256  D15= 0.0030
C_u= 5  C_c= 3

Classification
AASHTO= A-7-5(2)

Remarks

Location: SA-3  Sample Number: B-2  Depth: 8.5-10.0 ft  Date: 11/20/2019

United Consulting  Client: Rockdale County Water Resources
Norcross, Georgia  Project: SR 20 1910 GA20 Water Line Extension

Project No: ROCKW19GA0378801  Figure
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 where 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 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.