



REPORT OF GEOTECHNICAL EXPLORATION

RaceTrac Clayton

Clayton, Rabun County, Georgia

Contour Project No: G23RAC05

April 28, 2023

Prepared For:

RaceTrac Petroleum, Inc.

200 Galleria Parkway SE

Suite 900

Atlanta, Georgia 30339

April 28, 2023

RaceTrac Petroleum, Inc.
200 Galleria Parkway SE
Suite 900
Atlanta, Georgia 30339

Attn: Rowshi Craven

Reference: Report of Geotechnical Exploration
RaceTrac Clayton
Clayton, Rabun County, Georgia
Contour Project No: G23RAC05

Dear Rowshi,

Contour Engineering, LLC (Contour) has completed the geotechnical exploration for the referenced project. The following report includes a summary of the project information and the findings from our subsurface investigation and evaluation.

We appreciate the opportunity to work with you on this project and look forward to assisting you with any future projects. Should you have any questions regarding this report or if we may be of further service, please contact our office.

Sincerely,
Contour Engineering, LLC



James Sparks
Project Geologist

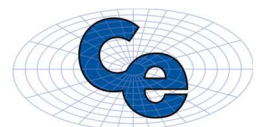


Jeffrey M. Wold, P.E.
Principal Engineer

Copies Submitted Via Email: Addressee

TABLE OF CONTENTS

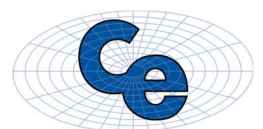
1.0	EXECUTIVE SUMMARY	1
2.0	INTRODUCTION	3
2.1	<i>Site and Project Description.....</i>	3
2.2	<i>Scope of Work</i>	3
3.0	FIELD EXPLORATION AND LABORATORY PROGRAM	5
3.1	<i>Field Exploration.....</i>	5
3.2	<i>Laboratory Program.....</i>	6
4.0	SITE AND SUBSURFACE CONDITIONS	7
4.1	<i>Area Geology.....</i>	7
4.2	<i>Subsurface Conditions</i>	7
4.3	<i>Groundwater Conditions</i>	8
5.0	EARTHWORK RECOMMENDATIONS.....	9
5.1	<i>Site Preparation.....</i>	9
5.2	<i>Excavation Conditions.....</i>	10
5.3	<i>Structural Fill</i>	11
5.4	<i>Groundwater and Drainage Considerations</i>	12
6.0	DESIGN RECOMMENDATIONS	13
6.1	<i>Foundation Support</i>	13
6.2	<i>Floor Support.....</i>	14
6.3	<i>Concrete Retaining/Below Grade Wall Design.....</i>	14
6.4	<i>General Slope Recommendations</i>	16
6.5	<i>Pavement Recommendations</i>	17
6.6	<i>Underground Storage Tanks.....</i>	18
6.7	<i>Seismic Recommendations.....</i>	18
7.0	QUALIFICATION OF RECOMMENDATIONS	20



APPENDIX

Figure 1 - Site Vicinity Map
Figure 2 - Aerial Views of Site
Figure 4 - Boring Location Plan
Subsurface Profiles (2)
Boring Log Records (19)
Soil Classification Chart
Laboratory Results

Important Information about This Geotechnical-Engineering Report



1.0 EXECUTIVE SUMMARY

Site and Project Description: The subject site is located on the western side of US Highway 441 at the intersection of Us 441 and Wal-Mart Road in Clayton, Rabun County, Georgia. The site is a previously graded lot. Based on the review of historic aerial images, it appears that the area was historically utilized for agricultural purposes. Grading activities, likely in association with nearby development, have since occurred.

According to provided topographic information, existing elevations range from about 1085 feet in the southwestern portion of the site to 1075 feet in the Northeastern portion. The site is bounded on the east side by what looks to be soils from Roadway construction along US 441, and by Stekoa Creek to the east.

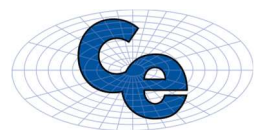
We understand that the proposed project will include the construction of a new RaceTrac Market. The proposed project will include the construction of a new 6,008 square foot market, 8-island car and light truck pump station with canopy, a 4-island over the road tractor – trailer pump station with canopies, new underground storage tanks, dumpster area, and associated drive isles. Based on the provided grading plan cut and fill will be less than 5 feet across the site, with the except for the underground storage tank areas. We were not provided with structural loading information at the time of this study. Based on previous experience we have assumed that wall and column loads will not exceed 3 kips per linear foot and 200 kips, respectively.

Subsurface Conditions: Fill materials were encountered in all borings and extended to termination depths, refusal depths (likely on obstructions in the fill) or residual soils (B-13b only). These depths ranged from approximately 3 to 25 feet below the existing ground surface in the borings performed for this study. Fill soils were described as silty sands (SM) with varying amounts of rock fragments, while residual soils were described as silty sands (SM).

Soft and Boulder Fill Soils: Fill materials with varying amounts of rock fragments and possible fill boulders were encountered in all borings and extended to a depth of approximately 3 to 25 feet below the existing ground surface in the borings performed for this study. In most cases, the fill layer was not penetrated by the soil test borings. As such, the condition and extent of the fill material below termination levels is not known.

The fill soils were described as silty sands (SM) with Standard Penetration Test (SPT) values ranging from 3 to 49 blows per foot (bpf). In borings B-08 and B-16 very loose fill soils were encountered at a depth of approximately 6 feet below the existing grade. Refusal material (possibly large boulders or other obstruction) were encountered in borings B-06, B-13 and B-13a at depths ranging from 3 to 5 feet below the existing grade.

Support of footings, floor slabs and pavements on or above existing fill soils, is discussed in this report. However, even with the recommended construction procedures, there is inherent risk for the owner that compressible fill or unsuitable material, within or buried by the fill, will not be



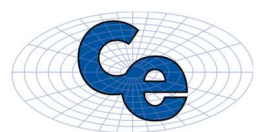
discovered. This risk of unforeseen conditions cannot be eliminated without completely removing the existing fill but can be reduced by following the recommendations of the Geotechnical Engineer.

Site Preparation: Prior to the commencement of construction, all vegetation, topsoil, and any other non-soil deleterious materials that fall within the limits of the proposed construction should be removed from the site. After the necessary clearing and stripping, areas intended to support new fill, floor slabs, foundations and pavements should be evaluated by a Geotechnical Engineer and proofrolled with a 20 to 30-ton loaded tandem-axle dump truck or other pneumatic-tired vehicle of similar size and weight. The purpose of the evaluation is to locate soft, weak, or excessively wet soils present at the time of construction.

Foundation Recommendations: If the site has been prepared in accordance with the requirements noted in the previous Earthwork Recommendations section, the proposed structure can be supported by a shallow, spread footing foundation system bearing on residual soils or structural fill extending to residual soils.

After completion of recommended site preparation, the proposed buildings may be supported on conventional shallow foundation systems. A maximum allowable net bearing pressure of 2,500 pounds per square foot may be used for the design of the shallow foundation systems bearing on residual soils and/or properly evaluated structural fill.

Seismic Recommendations: Based on the 2018 International Building Code (IBC), boring data, and the geological features of the Blue Ridge/Piedmont Physiographic Province of Georgia, it is our opinion that the subsurface conditions within the site are generally consistent with the characteristics of Seismic Site Classification “D”. The soil profile designated “Stiff Soil Profile” was selected from Chapter 20 of ASCE-7.



2.0 INTRODUCTION

2.1 Site and Project Description

The subject site is located on the western side of US Highway 441 at the intersection of Us 441 and Wal-Mart Road in Clayton, Rabun County, Georgia. The site is a previously graded lot. Based on the review of historic aerial images, it appears that the area was historically utilized for agricultural purposes. Grading activities, likely in association with nearby development, have since occurred.

According to provided topographic information, existing elevations range from about 1085 feet in the southwestern portion of the site to 1075 feet in the Northeastern portion. The site is bounded on the east side by what looks to be soils from Roadway construction along US 441, and by Stekoa Creek to the east.

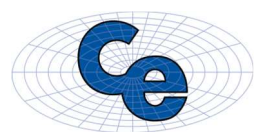
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2.2 Scope of Work

This report presents the results of our geotechnical exploration and evaluation performed for the proposed development. The purpose of this study was to perform a geotechnical exploration within the proposed area of development and provide recommendations for site design and construction.

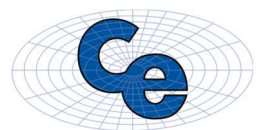
The services rendered by this firm included a site reconnaissance, drilling and sampling of sixteen (16) soil test borings with three (3) offset borings, limited laboratory testing, performing engineering analyses of obtained information, and preparation of this report. Specifically, our geotechnical report addresses the following:

- Description of existing conditions including detailed boring records, soil profiles, site maps, and a boring location plan;
- A description of the area and site geologic conditions;
- Recommendations for site preparation, excavation and grading, backfilling and compaction;
- Recommendations for subgrade preparation and slab-on-grade construction;



- Recommendations for foundation design and construction including allowable bearing pressure and settlements;
- Excavation conditions and the presence of very dense materials and the expected degree of difficulty of excavation;
- Recommendations for the installation of underground storage tanks;
- Seismic information based on the International Building Code 2018.

Note: The scope of our geotechnical services did not include any environmental assessment or exploration for the presence or absence of hazardous or toxic materials in the soil, groundwater, or surface water within or beyond the site.



3.0 FIELD EXPLORATION AND LABORATORY PROGRAM

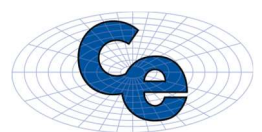
3.1 Field Exploration

The field exploration consisted of a reconnaissance and performing sixteen (16) soil test borings with three (3) offset borings within the proposed development area. Each soil test boring location was plotted on the provided site plan that was overlain onto a Google Earth Map. The coordinates of each soil test boring location were then estimated from Google Earth and located at the subject site utilizing a Trimble Global Positioning System (GPS). While the GPS device can locate points with a reasonable degree of accuracy, the precision can be affected by weather conditions, interference by external electromagnetic signals, available view of the horizon and other factors.

The soil test boring locations should be considered accurate only to the degree implied by the method of location. If locations that are more exact are desired, we recommend that a professional surveyor be engaged to locate the borings. The approximate location of each soil test boring is depicted on the Boring Location Plan included in the Appendix of this report as Figure 3.

The sampling and penetration procedures of the soil test borings were performed in general accordance with ASTM D-1586, using a power rotary drill. The standard penetration tests were accomplished by driving a standard 1-3/8" I.D. and 2" O.D. split spoon sampler with an automatic 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler a total of 18 inches, in 6-inch increments, was recorded. The Standard Penetration Test (SPT) value or "N" value is the summation of the last two 6-inch increments and is illustrated on the Boring Log Records adjacent to their corresponding depths, included in Appendix of this report. In very dense soils or weathered rock, the sample is driven a few inches rather than the 6-inch increment and the number of blows required versus the penetration depth is recorded. The penetration resistance or SPT value is used as an index to derive soil parameters from various empirical correlations.

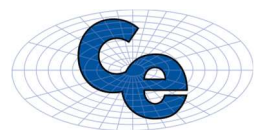
At the conclusion of our subsurface drilling, each of the boreholes was backfilled with soil cuttings and patched with asphalt prior to demobilization from the site. All recovered soil samples from our field exploration will be held in storage for a minimum of three (3) months within Contour's soil laboratory in Norcross, Georgia.



3.2 Laboratory Program

Representative portions of each recovered split-spoon sample were transported to our laboratory for further visual classification and testing. Using the Unified Soil Classification System (ASTM D-2487), the subsoil conditions are stratified and described in an illustrated form of soil profiles on the Boring Log Records included in the Appendix. In addition, the following tests were performed on representative samples:

- Atterberg Limits (ASTM D-4318)
- Natural Moisture Content (ASTM D-2216)
- Sieve Analysis (ASTM D-422)
- Standard Proctor (ASTD D-698)
- California Bearing Ratio (ASTD D-1883)



4.0 SITE AND SUBSURFACE CONDITIONS

4.1 Area Geology

The project site is in the Blue Ridge Physiographic Province of Georgia. The Blue Ridge is a region of low-to-high-grade metamorphic rocks. They consist of metamorphic rocks, either metamorphosed equivalents of sedimentary rocks or igneous rocks. Sedimentary rocks are the equivalents of Proterozoic or Paleozoic. Examples of igneous rocks are the Corbin Metagranite, Fort Mountain Gneiss, various mafic and ultramafic rocks, and the metavolcanic rocks of the Gold Belt. The Blue Ridge of Georgia is a small strip generally located in the Northeast corner of the state. The Blue Ridge extends Northeast to Virginia through the Great Smoky Mountain and Shenandoah National Parks. It includes parts of the Chattahoochee, Nantahala, Pisgah, and Cherokee National Forests.

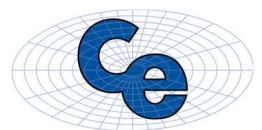
The major portion of the bedrock in the Blue Ridge is covered with a varying thickness of residual soil that has been derived by chemical decomposition and physical weathering of the underlying parent rock. The bedrock of this region is a complex crystalline formation that has been faulted and contorted by past tectonic movements. The rock has weathered to residual soils which form the mantle for the hillside and hilltops. The degree and depth of rock weathering vary extensively, depending on the local characteristics of the rock, the crack pattern, the groundwater conditions, and local surface erosion.

The boundary between the residual soil and the underlying bedrock is not sharply defined. Generally, a transition zone consisting of very hard soil to soft rock, appropriately classified as "partially weathered rock", is found. For engineering purposes, "partially weathered rock" is defined as any residual soils which exhibit blow counts greater than 100 blows per foot. Within the transition zone, large boulders or lenses of relatively "fresh" rock that are generally much harder than the surrounding material often exist. The irregular bedrock surface is essentially a consequence of differential weathering of the various minerals and joint patterns of the rock mass.

4.2 Subsurface Conditions

The soil test borings encountered fill materials and residual soils to termination depths ranging from about 10 to 25 feet below the existing ground surface.

Fill soils/materials, are those soils that have been placed or reworked by man in conjunction with past construction grading, underground utility installation, farming (cultivated) or other previous activity at the site. Fill can be composed of different soil types from various sources and can



contain debris from building demolition, organics, topsoil, trash, etc. The engineering properties of the fill depend primarily on its composition, density, and moisture content.

Fill materials were encountered in all borings and extended to termination depths, refusal depths (likely on obstructions in the fill) or residual soils (B-13b only). These depths ranged from approximately 3 to 25 feet below the existing ground surface in the borings performed for this study. The fill soils were described as silty sands (SM) with varying amounts of rock fragments and possibly boulders, with Standard Penetration Test (SPT) values ranging from 3 to 49 blows per foot (bpf). It is likely that the recorded SPT values were often elevated due to rock content in the fill.

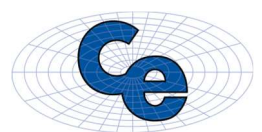
Residual soils, soils formed by in situ weathering of parent rock, were encountered beneath the fill soils in boring B-13b. These soils were described as silty sands (SM) with an SPT value of 13 bpf.

Auger refusal, any material that cannot be penetrated by power auger, were encountered in borings B-06, B-13, and B-13a at depths ranging from 3 to five feet below the existing grade. These refusal materials are anticipated to be on obstructions in the fill soil matrix. This refusal material is possibly large rock fragments or boulders.

Individual soil boring profiles are depicted on the Boring Log Records included in the Appendix. A Subsurface Profile Plate illustrating the subsurface soil is also included Appendix. Additionally, stratification lines represent the approximate boundaries between soil types. The actual transitions may be more gradual than depicted. Any elevation data on the boring logs, profiles, or in the report was interpolated from the provided topographical data.

4.3 Groundwater Conditions

During our field activities, the measurement to the depth below the existing ground surface to the groundwater table was attempted immediately after the completion of each boring. Groundwater was not encountered in any of the borings explored. Groundwater in this area will fluctuate in response to local variations of precipitation and temperature and may be different at other times and areas. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.



5.0 EARTHWORK RECOMMENDATIONS

5.1 Site Preparation

Prior to the commencement of construction, all vegetation, topsoil, and any other non-soil deleterious materials that fall within the limits of the proposed construction should be removed from the site. After the necessary clearing and stripping, areas intended to support new fill, floor slabs, foundations and pavements should be evaluated by a Geotechnical Engineer and proofrolled with a 20 to 30-ton loaded tandem-axle dump truck or other pneumatic-tired vehicle of similar size and weight. The purpose of the evaluation is to locate soft, weak, or excessively wet soils present at the time of construction.

Contour recommends careful evaluation of all subgrades prior to fill placement or building/slab construction. Proofrolling should be performed after a suitable period of dry weather to avoid degrading an otherwise acceptable subgrade and to reduce the amount of undercutting / remedial work required. Unstable materials identified should be stabilized as directed by the Geotechnical Engineer based on conditions observed during construction. Undercut and replacement and densification in-place are typical remediation methods.

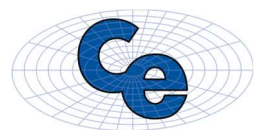
Existing Fill Material

Fill soils are those soils that have been placed or reworked by man in conjunction with past construction grading, underground utility installation, farming (cultivated) or other previous activity at the site. Fill can be composed of different soil types from various sources and can contain debris from building demolition, organics, topsoil, trash, etc. The engineering properties of the fill depend primarily on its composition, density, and moisture content.

Fill materials were encountered in all borings and extended to a depth of approximately 3 to 25 feet below the existing ground surface in the borings performed for this study. The fill soils were described as silty sand (SM) with varying amounts of rock fragments, with Standard Penetration Test (SPT) values ranging from 3 to 49 blows per foot (bpf). In most cases, the fill layer was not penetrated by the soil test borings. As such, the condition and extent of the fill material below termination levels is not known.

Support of footings, floor slabs and pavements on or above existing fill soils, is discussed in this report. However, even with the recommended construction procedures, there is inherent risk for the owner that compressible fill or unsuitable material, within or buried by the fill, will not be discovered. This risk of unforeseen conditions cannot be eliminated without completely removing the existing fill but can be reduced by following the recommendations of the Geotechnical Engineer.

If the owner elects to construct the footings, floor slabs or pavements on the existing fill, the following protocol should be followed. Initial site preparation should be performed as noted in the previously in this section. Once the planned grading has been completed, the entire area should again be proof rolled with heavy, rubber tire construction equipment, to aid in delineating areas of soft or otherwise unsuitable soil. If encountered, these materials should be remediated as directed by the Geotechnical Engineer.



Due to the inherent variability of undocumented fill soils, the areas where exiting fill soils are present will likely need some amount of remedial work. Reworking will likely consist of a combination of undercutting and replacement and in-place densification. Again, after clearing and grubbing has been performed, we recommend that all at-grade areas and areas to be filled be thoroughly proof rolled with a heavy rubber-tired piece of construction equipment prior to the placement of any new fill materials. This important step is to help characterize the condition of the existing fills that might be left in-place. Materials assessed to be unstable (exhibit pumping, rutting, etc.) should be further densified, or undercut and replaced with engineered fill (or otherwise remediated as directed by the Geotechnical Engineer).

Very Loose and Rocky Fill Soils

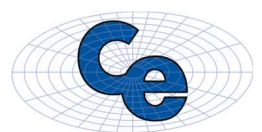
Soils described as very loose fill soils were identified in borings B-08 and B-16 at a depth of approximately 6 feet below the existing grade. . It is possible that these soils will need to be remediated during the grading process. If remediation is required, we recommend that the soil be excavated and re-compacted. Boulder laden (or other unidentified obstructions) fill soils were possibly encountered in borings B-06, B-13 and B-13a. If these areas adequately pass a proof roll and are not found to have large boulders in the top 3 feet of the fill matrix, we believe they will be able to remain in place. However, if these areas do not pass the proof roll or have boulders larger than 3 inches in the top 3 feet the fill may need to be excavated and replaced with well compacted structural fill that meet the fill criteria in Section 5.3.

As with any site that has previously placed fill soils the extent and suitability of these soils to remain in place may not be evident until the time of construction. With the evidence of organic laden materials in the tank area it is possible that other areas of organic laden fill soil may be present in unexplored areas of the site. If such areas are found during construction, we recommend that these materials be assessed and remediated as directed by the Geotechnical Engineer.

5.2 Excavation Conditions

During our field activities, auger refusal was encountered in the borings B-06, B-13 and B-13a. It may be possible that there are large boulders that cannot be excavated using conventional excavation techniques. To better understand the extent and size of the boulder fragments in the fills matrix it may be necessary to excavate test pits before or during the construction process with at minimum a Cat 318d or equivalent excavator. If these materials are found to not be removable by conventional methods chipping or blasting will most likely be required.

We present these general comments regarding our opinion of the excavation conditions for the designers' information with the understanding that they are opinions based on information from widely spaced test borings. More accurate information regarding the excavation conditions should be evaluated by contractors or other interested parties from test excavations (test pits) using equipment like that which will be used during construction. Excavation techniques will vary based on the weathering of the materials, fracturing and jointing in the rock, and the overall stratigraphy of the feature.



Depths to difficult excavation materials may vary at other locations. We note that the subsurface bedrock in this region has undergone differing rates of weathering, which often produces a considerable variation in depth to competent rock over short horizontal distances. It is also not unusual for lenses and boulders of hard rock and zones of partially weathered rock to be present within the soil mantle above the general bedrock level. Excavation difficulty should be expected to increase with depth.

5.3 Structural Fill

All structural fill should be free of organic materials debris, and particles larger than about 4 inches in the top 5 feet and moisture conditioned to maintain a moisture content within three percentage points above and below the optimum moisture contents as determined by the Standard Proctor tests (ASTM D-698).

All structural fill to be used on site should be evaluated and approved by the Geotechnical Engineer. The following guidelines are recommended:

- Maximum dry density (MDD) of at least 95 pounds per cubic foot (pcf) (ASTM D-698)
- Liquid limit (LL) not exceeding 40 percent
- Plastic index (PI) not exceeding 20 percent

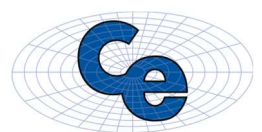
Placement and Compaction Requirements

Structural fill should be placed in thin loose lifts not exceeding 8 inches in thickness and tested by a soil technician to evaluate the compaction percentage. We recommend that the following minimum level of compaction be achieved:

- Building Areas - Compact the fill to a minimum of 98 % of the soil's MDD. In cut areas, the subgrade should be proofrolled and if found unstable, it should be scarified and re-compacted to the same criteria.
- Pavement Areas - Compact the upper 18 inches of subgrade in fill areas and the upper 12 inches in cut areas to a minimum of 98 % of the soil's MDD and a minimum of 95 % of the soil's MDD value below this level.
- Utility Trenches - Compact the upper 18 inches of the subgrade to a minimum of 98 % of the soil's MDD and a minimum of 95 % of the soil's MDD below this level.

Suitability of On-Site Soils

Most of the existing fill material encountered on-site appears to be re-useable as structural fill on site if it meets the requirements above. However, if fine-grained soils are present, they will be moisture sensitive and can prove difficult to place/compact during wet weather. The grading contractor should be prepared to moisture condition (including scarifying/drying) these soils as



conditions warrant. When possible, it is often prudent to schedule grading activities for the warmer/dryer seasons.

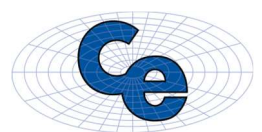
We do not anticipate that these materials will be removed from the site in association with the proposed development. As such, it is anticipated that the material generated from utility excavations, etc. will be used to backfill excavations. Proper monitoring and testing of backfill should be performed for all site grading/ backfilling activities. Some select blending of soils may be necessary as work proceeds.

Additional laboratory tests including Standard Proctors (ASTM D-698), sieve analysis (ASTM D-6913) and Atterberg Limits Tests (ASTM D-4318) will be required during construction on the proposed fill soils to compare their characteristics to the specified criteria.

5.4 Groundwater and Drainage Considerations

No groundwater was encountered in any of the borings explored. However, the contractor should implement dewatering techniques to maintain groundwater levels a minimum of 2 feet below working subgrades if groundwater is encountered. The contractor should establish groundwater levels at the time of construction. Groundwater levels in this area will fluctuate in response to local variations of precipitation and temperature and may be different at other times and areas.

Site drainage should be planned and maintained to promote drainage away from all improvements during and after construction. Moreover, permanent site drainage should be established to prevent subgrade soils beneath pavements and slabs from becoming saturated and to minimize potential distress. Surface drainage should be directed away from proposed building structures. All roof drains should be tied directly to a storm sewer by closed pipes. Landscape irrigation should also be minimized to reduce future maintenance problems. Additionally, maximum practical grades should be utilized to reduce the likelihood of ponding water on or adjacent to flatworks. Care should be taken to properly seal and maintain all flatwork that abuts building structures to minimize the intrusion of water.



6.0 DESIGN RECOMMENDATIONS

6.1 Foundation Support

If the site has been prepared in accordance with the requirements noted in the previous Earthwork Recommendations section, the proposed structure can be supported by a shallow, spread footing foundation system bearing on residual soils or structural fill extending to residual soils.

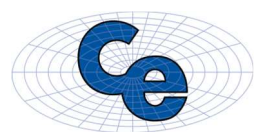
Shallow foundations may be supported on existing fill soils provided the site has been prepared in accordance with the requirements noted in the previous Earthwork Recommendations section. However, even with the recommended construction procedures, there is inherent risk for the owner that compressible fill or unsuitable material, within or buried by the fill, will not be discovered. This risk of unforeseen conditions cannot be eliminated without completely removing the existing fill but can be reduced by following the recommendations contained in this report.

Based on boring data, assumed loading conditions, and after the completion of recommended site preparation, the proposed buildings may be supported on a conventional shallow foundation system. A maximum allowable net bearing pressure of 2,500 pounds per square foot may be used for the design of the shallow foundation systems bearing on residual soils and/or properly evaluated structural fill. Any soft areas or organic laden materials encountered should be remediated under the direction of the Geotechnical Engineer (often undercut and replaced with structural fill or crushed stone).

To reduce the possibility of shear failure, wall bearing and column foundations should be designed with a minimum width of 18 and 24 inches, respectively. For frost protection, exterior wall bearing and column foundations should be designed with a minimum embedment depth of 18 inches, while interior foundations should be designed with a minimum embedment depth of 12 inches. The embedment depth should be measured from the base of the foundation to lowest adjacent outside grade.

Bottoms of foundation excavations should be evaluated by a Geotechnical Engineer prior to placement of reinforcing steel and concrete to evaluate if adequate bearing materials are present and that all debris, mud, and loose, frozen or water-softened soils are removed. Where footings will bear on existing fills, they should be thoroughly evaluated at the time of excavation with hand auger borings and Dynamic Cone Penetrometer (DCP) tests to evaluate if the encountered materials are sufficient to support the design bearing pressure.

Some amount of remediation of bearing materials should be anticipated. If unsuitable bearing soils are encountered at the base of the planned footing excavation, the excavation should be extended deeper to suitable soils, and the footings could bear directly on these soils at the lower level or on lean concrete backfill placed in the excavations (or otherwise remediated as directed by the Geotechnical Engineer).



Foundation excavations should be concreted as soon as practical after they are excavated. Water should not be allowed to pond in any excavation. If an excavation is left open for an extended period, a thin mat of lean concrete should be placed over the bottom to minimize damage to the bearing surface from weather or construction activities. Foundation concrete should not be placed on frozen or saturated subgrades.

Upon completion of the recommendations and using the assumed structural loading, we anticipate total settlement of 1-inch or less and differential settlement of approximately half of the total settlement. Careful field control will contribute substantially to minimizing potential settlements.

6.2 Floor Support

After completion of the site preparation and evaluation recommendations (Section 5.0), the building floor slab may be directly supported on residual soils or structural fill. Provided the slab subgrade is prepared in accordance with our recommendations, a subgrade modulus reaction (K) of 90 pounds per cubic inch (pci, pounds per square inch per inch of deflection) may be used for slab design for slab loads of less than 100 psf. If a higher subgrade modulus is desired, 6 inches of well-compacted GAB can be placed under the slab on grade to achieve a K of 120 pci.

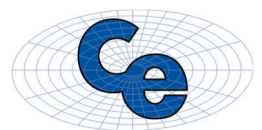
Expansion and contraction joints should be used to isolate all floor slabs from the load bearing walls and/or isolated columns. This will allow for possible differential movement and diminish the potential of cracking the floor slabs.

6.3 Concrete Retaining/Below Grade Wall Design

Any below grade or on-site concrete below grade walls will be subjected to lateral earth pressures. Walls that are relatively rigid or fixed at the top and bottom may be subjected to “at-rest” earth pressures. Walls that are allowed to have sufficient movement and not fixed at the top will be subjected to “active” pressures.

The following lateral earth pressure parameters are recommended for design in residual soils or structural fill for walls such as one-level basement walls, retaining/loading dock walls or cast-in-place site retaining walls less than 15 feet in height :

Earth Pressure Coefficient	Earth Pressure Value	Equivalent Fluid Density (pcf)
At-Rest (K_0)	0.53	63.6
Active (K_A)	0.36	43.2
Passive (K_P)	2.77	-

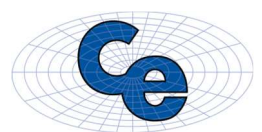


These values assume that the wall has horizontal backfill and no surcharge loads such as from adjacent structures. A moist unit weight of 120 pounds cubic foot and a sliding coefficient of 0.53 may be used in the *ultimate design value* of retaining walls. Typically, a factor of safety of 1.5 is used for active earth pressure and 2.0 for passive earth pressure.

The recommended equivalent fluid pressures assume that constantly functioning drainage systems are installed between walls and soil backfill to prevent the accidental buildup of hydrostatic pressures and lateral stresses in excess of those stated. If a functioning drainage system is not installed, then lateral earth pressures should be estimated using the buoyant weight of the soil (approximately 58 pcf). Hydrostatic pressures calculated with the unit weight of water (62.4 pcf) should be added to these earth pressures to obtain the total stresses for design.

The surcharge and lateral loads from tractors and other heavy equipment operating within 10 feet of below grade walls should be added to the lateral loads cited in this section of the report. If foundations or other surcharge loadings are located a short distance outside below grade walls, they may also exert appreciable additional lateral pressures that must be considered.

The retaining wall/below grade wall recommendations listed above should not be correlated with soil parameters for use in Segmental Retaining Wall/MSE Wall design. In the event that Retaining Walls are constructed as MSE Walls, we recommend that design soil parameters be established through appropriate laboratory testing by the wall designer.



6.4 General Slope Recommendations

Temporary Slope Recommendations

Temporary slopes not exceeding 10 feet in height for confined areas and constructed in the residual soils (virgin soils) or structural fill, should be configured no steeper than 1.5(H):1.0(V) provided no water is observed seeping from the sides of the excavation. These temporary slopes should be regularly monitored for signs of movement or unsafe conditions. Temporary slopes below the groundwater table will require shoring / bracing. Additionally, construction excavation should comply with OSHA Guidelines outlined in the Code of Federal Regulations Federal Register Volume 54, Number 209 (October 1989) "Construction Standards for Excavation, 29CFR Part 1926, Subpart P." Also, the contractor should have a designated "qualified engineer" as defined by OSHA on-site during the excavation to observe the slopes for signs of possible failure.

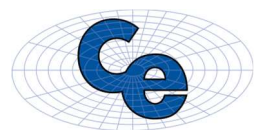
Proper management of groundwater seepage and surface water runoff around the excavations will also contribute to the stability of temporary slopes. Material removed from excavations should *not* be stockpiled within a distance of twenty (20) feet from the crest of temporary excavations. Furthermore, positive drainage should also be maintained with ditches or channels at the top and bottom of the slope. It is also very important to always keep these drainage channels free of dirt, debris and vegetation.

Permanent Slope Recommendation

Permanent slopes less than 20 feet in height and constructed in residual soils or structural fill that are placed in accordance with the recommendations outlined in this report should be constructed no steeper than 2(H):1(V). For slopes greater than 20 feet, the slopes may require to be constructed at a 2.5(H):1(V) configuration and/or include a 10-foot bench at mid-height of the slope. Therefore, slopes greater than 20 feet in height will require a slope stability analysis.

To prevent erosion and saturation of the slopes, we recommend that a trench drain/diversion ditch be constructed adjacent to and along the top of the embankment (sloping toward the trench drain) to ensure that water drains away from the slope. Depending on site conditions, a toe drain or French drain may also be constructed at the toe of cut slopes to collect water seepage. A protective cover of grass or other vegetation should be established on the slopes as soon as possible for erosion protection.

Buildings should have a minimum setback of 10 feet from the slope shoulders. A minimum setback of 5 feet is recommended for the pavement curbs.



6.5 Pavement Recommendations

Contour understands that the following pavement thicknesses are standard RaceTrac Petroleum, Inc. sections and typical for the subject project:

RIGID PAVEMENT DESIGN	(Minimum Thickness)	
	Standard Duty (Inches)	Heavy Duty (Inches)
Portland Cement Concrete	6	8
Graded Aggregate Base	6	6

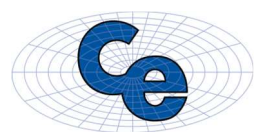
Traffic information was not provided during the preparation of this report. We have assumed up to 100 trucks per day and 20-year design life for the heavy-duty section. Based on this assumption, at minimum, we anticipate the standard sections above to be adequate. Revision to these pavement thicknesses should be performed if traffic loading will be different than assumed.

The site should be prepared in accordance with the requirements noted in the previous Earthwork Recommendations section. We recommend that a proofroll be performed with a fully-loaded tandem axle dump truck to evaluate if there is any unsuitable material located throughout the proposed site. Any areas that deflect excessively under proofrolling should be undercut and/or otherwise remediated as recommended by the Geotechnical Engineer. Remediation may include undercutting and replacement with compacted structural fill, or installation of geogrid with the use of additional well compacted GAB.

The compaction, quality and gradation of the GAB crushed stone base will directly affect the quality and life of the pavement section. Consequently, we recommend a minimum compaction of 98 percent of the maximum dry density for the GAB crushed stone material as determined by either the modified Proctor compaction test (ASTM D 1557, Method D) or the Modified AASHTO (T-180).

A soil engineering technician working under the direction of a Geotechnical Engineer should observe placement and compaction of the base course material and perform density tests to evaluate if the material has been placed in accordance with our recommendations.

The materials recommended for the pavement design are referenced to the Georgia Department of Transportation (GDOT) Standard Specifications for Testing Manual. The concrete pavement should have the minimum thickness listed above. The pavement should be designed with proper air-entrainment and have maximum joint spacing as recommended by ACI 330. The concrete pavement should have a minimum 28-day compressive strength of 4,000 pounds per inch (psi) with a modulus rupture of 630 psi. Placing the crushed stone base course beneath the concrete pavement will help to prevent the pumping of the soil fines through the construction joints.



The joints should be sealed as soon as possible (in accordance with sealant manufacturer's instructions and ACI requirements) to minimize infiltration of water into the soil. In addition, the quality and life of the pavement is also contingent upon periodic inspection and maintenance. Over time, cracks may form within the pavement. The cracks should be filled or patched in order to prevent water infiltration into the underlying base material and soil subgrade.

Contour recommends that positive drainage should be maintained to prevent the ponding of water. We also recommend that measures be taken to contain water from irrigation system to within landscape islands. Water infiltration into the underlying soil subgrade will reduce the soil's bearing capacity and result in pavement failure.

6.6 Underground Storage Tanks

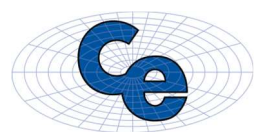
It is assumed the tanks will have a maximum embedment depth of 20 feet below the finished elevation of the pavement section. Based on the borings, we do anticipate that temporary dewatering systems will be required at this depth. If the groundwater migrates into the tank pit during construction dewatering measures will be required to lower water levels to two feet below construction grade.

When the fluid level within the fuel tank structure is maintained at or above the surrounding groundwater level, no net buoyancy will occur. However, when these structures are drained for maintenance or as fluid levels fluctuate within the tanks, a positive means of uplift protection may be necessary, depending on the future groundwater levels. Hydrostatic uplift forces can be resisted in several ways including:

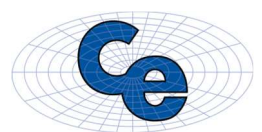
- Addition of dead weight to the structure.
- Mobilizing the dead weight of the soil surrounding the structure through extension of footings outside the perimeter of the structure.
- Use of a permanent gravity or mechanical dewatering system that is operated only when the structure is to be drained.

6.7 Seismic Recommendations

Part of the International Building Code (IBC) procedure to evaluate seismic forces requires the evaluation of the Seismic Site Class, which categorizes the site based upon the characteristics of the subsurface profile within the upper 100 feet of the ground surface. To define the Seismic Site Class for this project, we have interpreted the results of our soil test borings drilled within the project site and estimated appropriate soil properties below the base of the test borings to a depth of 100 feet, as permitted by the IBC.



Based on the 2018 International Building Code (IBC), boring data, and the geological features of the Blue Ridge/Piedmont Physiographic Province of Georgia, it is our opinion that the subsurface conditions within the site are generally consistent with the characteristics of Seismic Site Classification “D”. The soil profile designated “Stiff Soil Profile” was selected from Chapter 20 of ASCE-7.



7.0 QUALIFICATION OF RECOMMENDATIONS

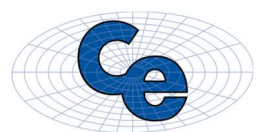
This report has been prepared based on currently accepted geotechnical engineering principles and practices in the local area for the specific application of this project.

The analyses and recommendations presented in this report are based upon preliminary information and our understanding of the Site and the data obtained from our field exploration. If there are any revisions to the plans for this project, we should be permitted to determine if the recommendations must be modified. The nature and extent of variations between borings will not be evident until the course of construction. If such variations become evident, it may be necessary to submit supplementary recommendations.

Regardless of the thoroughness of a geotechnical study, there is always a possibility that subsurface conditions will be different from those at the boring locations; that conditions will not be as anticipated by the designers or contractors; or that the construction process will alter soil conditions. Therefore, the Geotechnical Engineer's representative should observe and confirm that the conditions indicated by the geotechnical exploration actually exist.

Once final design plans and specifications are complete, and loading criterion for each building has been determined, we recommend that Contour Engineering, LLC be provided the opportunity to review the final design and specifications in order that earthwork and foundation recommendations are properly interpreted and implemented.

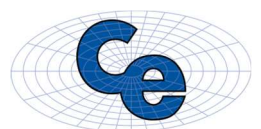
This report and all of the contents herein are issued exclusively for use by RaceTrac, Inc. No other person or entity may rely on this report without written authorization from Contour Engineering, LLC. Any use, reliance on, or decisions to be made based on this report by a third party are the responsibilities of such third parties.

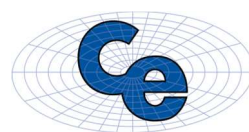


APPENDIX

Figure 1 - Site Vicinity Map
Figure 2 - Aerial Views of Site
Figure 4 - Boring Location Plan
Subsurface Profiles (2)
Boring Log Records (19)
Soil Classification Chart
Laboratory Results

Important Information about This Geotechnical-Engineering Report





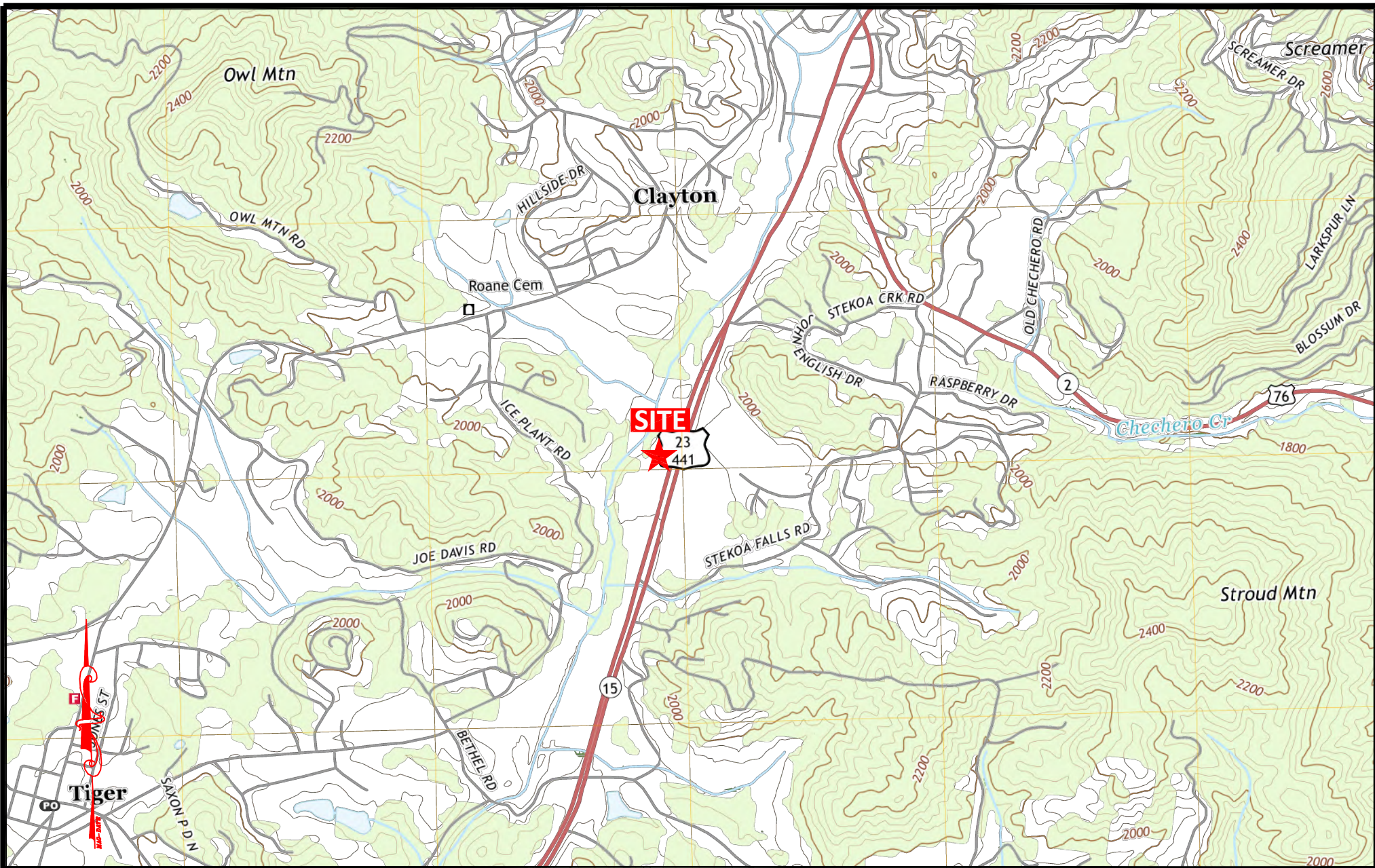


FIGURE 1: SITE VICINITY MAP

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Engineering
Sciences
Company

LEGEND

Source: USGS Topographic Map -
Tiger, GA 2020

Scale: Not to Scale

PROJECT

RaceTrac Clayton

RaceTrac Inc.

Clayton, Rabun County, Georgia

Project No.: G23RAC05



FIGURE 2: AERIAL VIEW

LEGEND

Source: GoogleEarth.com

Scale: Not to Scale

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Engineering
Sciences
Company

PROJECT
RaceTrac Clayton
RaceTrac, Inc.
Clayton, Rabun County, Georgia
Project No.: G23RAC05

NOTE:
This subsurface profile is provided for graphical representation of the boring logs only. Actual horizontal and vertical stratigraphy may be more gradual than indicated on this subsurface profile.

B-01 — Boring Number

1886 — Surface Elevation

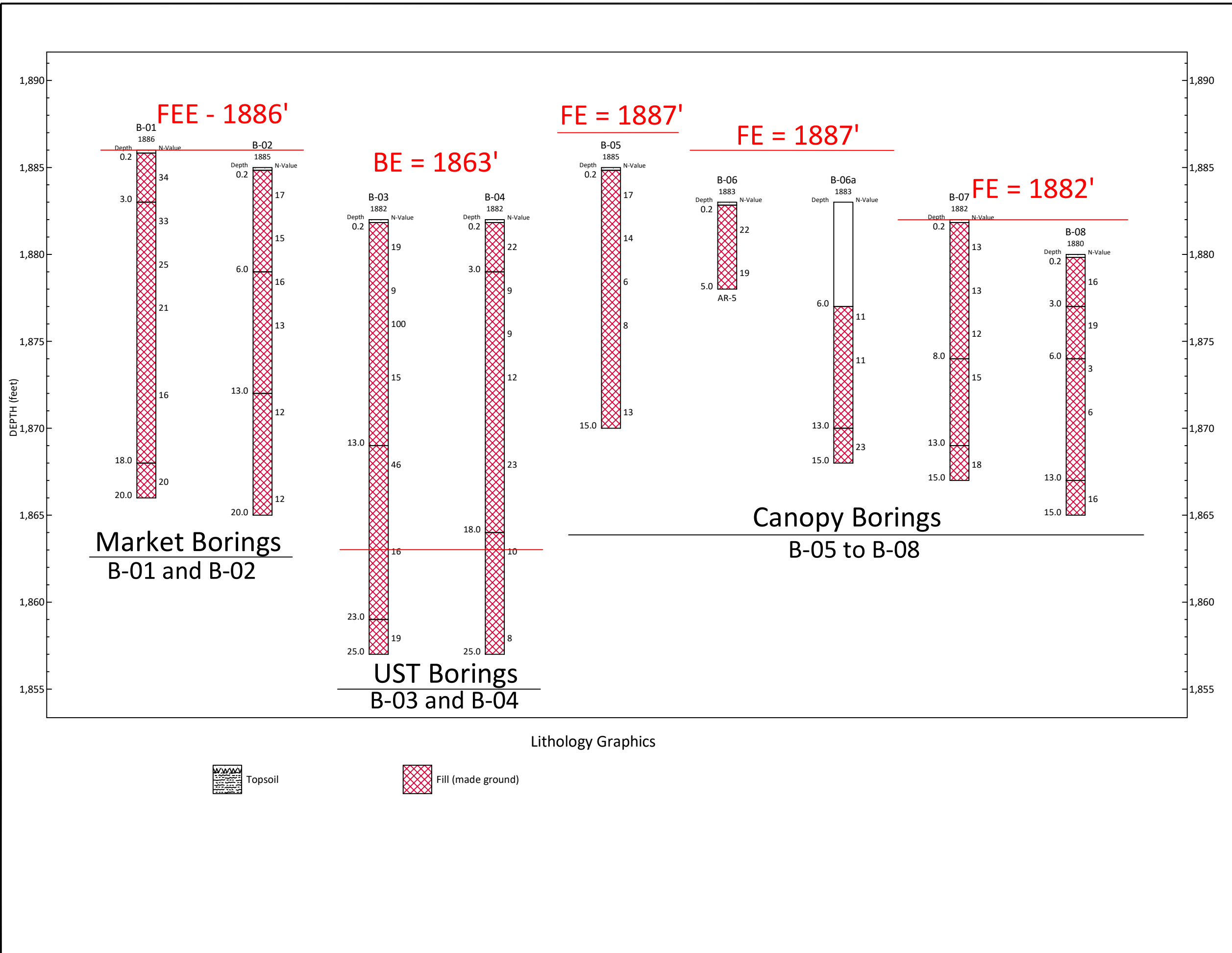
Borehole Lithology

N (Blows Per Ft.)

AR = Auger Refusal

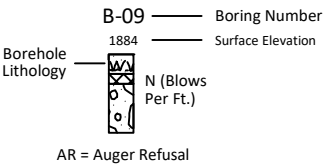
NOTE:
This subsurface profile is provided for graphical representation of the boring logs only. Actual horizontal and vertical stratigraphy may be more gradual than indicated on this subsurface profile.

Clayton, Georgia



GENERALIZED
SUB-SURFACE
PROFILE

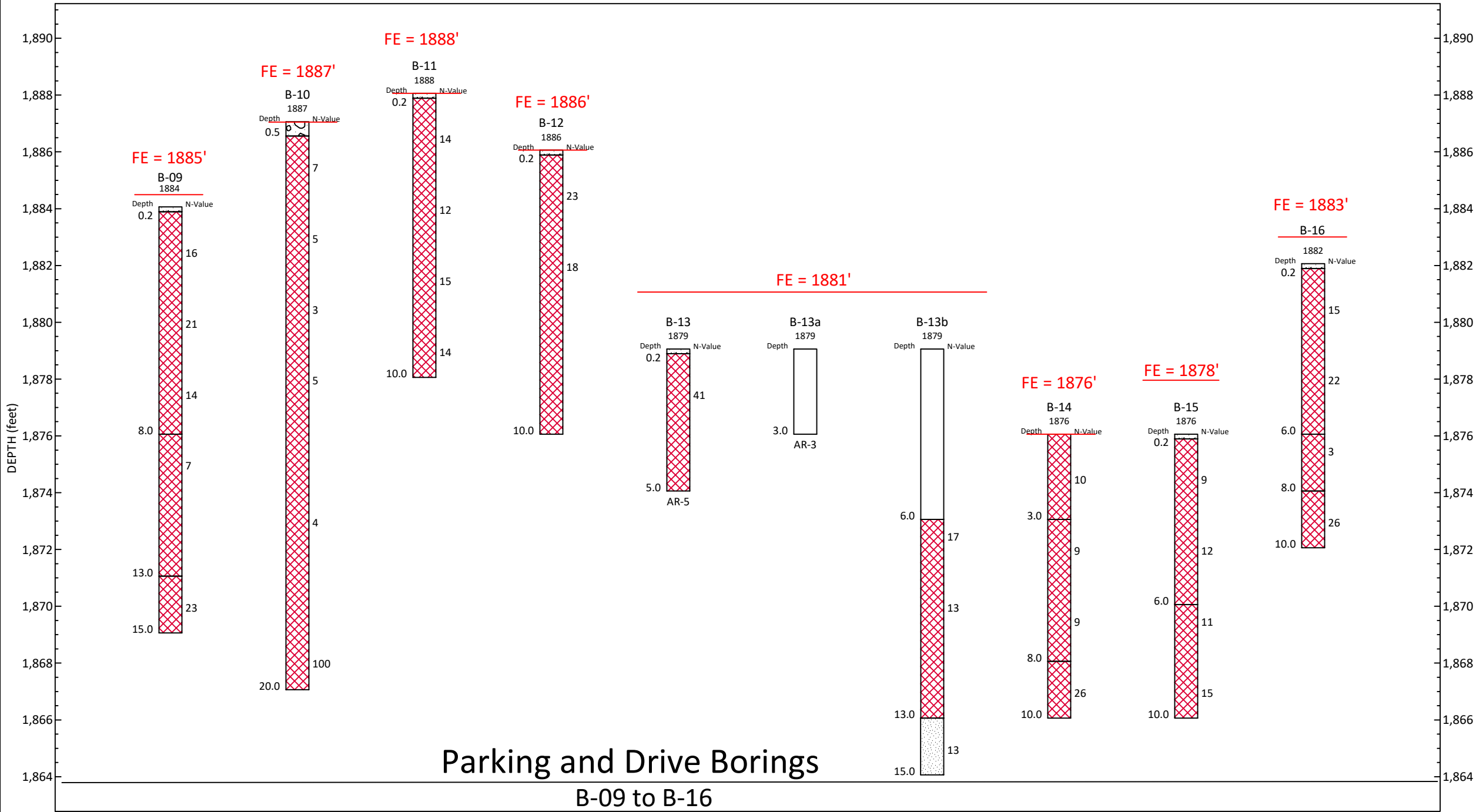
Explanation:



NOTE:
This subsurface profile is provided for graphical representation of the boring logs only. Actual horizontal and vertical stratigraphy may be more gradual than indicated on this subsurface profile.
Vertical Scale: AS SHOWN
Horizontal Scale: NOT TO SCALE

RaceTrac Clayton

Clayton, Georgia



Lithology Graphics



Topsoil



Fill (made ground)



Graded Aggregate Base



USCS Silty Sand

PROJECT: RaceTrac Clayton
US Highway 441
Clayton, Georgia

BORING DESIGNATION: **B-01**
SECTION: TOWNSHIP:

SHEET: **1 of 1**
RANGE:

CLIENT: RaceTrac, Inc.

G.S. ELEVATION (ft): 1886.0

DATE STARTED: 4/6/23

LOCATION: See BLP

WATER TABLE (ft): NE

DATE FINISHED: 4/6/23

REMARKS: Deidrich D50 Turbo Automatic Hammer Rig, NE = Not Encountered

DATE OF READING: 4/6/2023

DRILLED BY: Dodd

TYPE OF SAMPLING: HSA, SPT

DEPTH (FT.)	ELEV (FT.)	S A M P L E	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	S Y M B O L	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	POCKET PEN. (tsf)
										LL	PI		
0							TOPSOIL: Approximately 2 inches						
1885			7-20-14	34			FILL: Dense, brown, silty SAND (SM) with rock fragments SPT values elevated due to possible rock fragments in fill matrix						
5			5-18-15	33			Dense to medium dense, gray brown, silty SAND (SM) with rock fragments SPT values elevated due to possible rock fragments in fill matrix						
1880			18-12-13	25									
10			10-10-11	21									
1875													
15			8-8-8	16									
1870													
20			10-10-10	20			Medium dense, red brown, silty SAND (SM)						
							Boring terminated at 20.0 ft.						

PROJECT: RaceTrac Clayton
US Highway 441
Clayton, Georgia

BORING DESIGNATION: **B-02**
SECTION: TOWNSHIP:

SHEET: **1 of 1**
RANGE:

CLIENT: RaceTrac, Inc.

G.S. ELEVATION (ft): 1885.0

DATE STARTED: 4/6/23

LOCATION: See BLP

WATER TABLE (ft): NE

DATE FINISHED: 4/6/23

REMARKS: Deidrich D50 Turbo Automatic Hammer Rig, NE = Not Encountered

DATE OF READING: 4/6/2023

DRILLED BY: Dodd

TYPE OF SAMPLING: HSA, SPT

DEPTH (FT.)	ELEV (FT.)	S A M P L E	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	S Y M B O L	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	POCKET PEN. (tsf)
										LL	PI		
0							TOPSOIL: Approximately 2 inches						
			9-9-8	17			FILL: Medium dense, gray brown, silty SAND (SM) with rock fragments						
5	1880		9-8-7	15									
			8-8-8	16			Medium dense, red brown, silty SAND (SM)						
10	1875		6-7-6	13									
15	1870		5-5-7	12			Medium dense, brown, silty SAND (SM) with rock fragments						
20	1865		5-5-7	12			Boring terminated at 20.0 ft.						

PROJECT: RaceTrac Clayton
US Highway 441
Clayton, Georgia

BORING DESIGNATION: **B-03**
SECTION: TOWNSHIP:

SHEET: **1 of 1**
RANGE:

CLIENT: RaceTrac, Inc.

G.S. ELEVATION (ft): 1882.0

DATE STARTED: 4/6/23

LOCATION: See BLP

WATER TABLE (ft): NE

DATE FINISHED: 4/6/23

REMARKS: Deidrich D50 Turbo Automatic Hammer Rig, NE = Not Encountered

DATE OF READING: 4/6/2023

DRILLED BY: Dodd

TYPE OF SAMPLING: HSA, SPT

DEPTH (FT.)	ELEV (FT.)	S A M P L E	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	S Y M B O L	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	POCKET PEN. (tsf)
										LL	PI		
0							TOPSOIL: Approximately 2 inches						
	1880	X	4-8-11	19			FILL: Medium dense, brown, silty SAND (SM) with rock fragments						
5		X	3-4-5	9									
	1875	X	50/4"	100									
10		X	8-8-7	15									
	1870	X											
15		X	22-26-20	46			Dense to medium dense, brown, silty SAND (SM) with rock fragments						
	1865	X					SPT values elevated due to possible rock fragments in fill matrix						
20		X	4-5-11	16									
	1860	X											
25		X	8-9-10	19			Medium dense, brown, silty SAND (SM) with rock fragments						
							Boring terminated at 25.0 ft.						

PROJECT: RaceTrac Clayton
US Highway 441
Clayton, Georgia

BORING DESIGNATION: **B-04**
SECTION: TOWNSHIP:

SHEET: **1 of 1**
RANGE:

CLIENT: RaceTrac, Inc.

G.S. ELEVATION (ft): 1882.0

DATE STARTED: 4/6/23

LOCATION: See BLP

WATER TABLE (ft): NE

DATE FINISHED: 4/6/23

REMARKS: Deidrich D50 Turbo Automatic Hammer Rig, NE = Not Encountered

DATE OF READING: 4/6/2023

DRILLED BY: Dodd

TYPE OF SAMPLING: HSA, SPT

DEPTH (FT.)	ELEV (FT.)	S A M P L E	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	S Y M B O L	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	POCKET PEN. (tsf)
										LL	PI		
0							TOPSOIL: Approximately 2 inches						
	1880	X	5-16-6	22			FILL: Medium dense, brown, silty SAND (SM) with rock fragments						
5		X	5-4-5	9			Loose to medium dense, gray brown, silty SAND (SM) with rock fragments						
	1875	X	4-4-5	9									
10		X	7-6-6	12									
	1870	X											
15		X	6-8-15	23									
	1865	X											
20		X	4-7-3	10			Loose, brown, silty SAND (SM) with rock fragments						
	1860	X											
25		X	2-4-4	8			Boring terminated at 25.0 ft.						

PROJECT: RaceTrac Clayton
US Highway 441
Clayton, Georgia

BORING DESIGNATION: **B-05**
SECTION: TOWNSHIP:

SHEET: **1 of 1**
RANGE:

CLIENT: RaceTrac, Inc.

G.S. ELEVATION (ft): 1885.0

DATE STARTED: 4/6/23

LOCATION: See BLP

WATER TABLE (ft): NE

DATE FINISHED: 4/6/23

REMARKS: Deidrich D50 Turbo Automatic Hammer Rig, NE = Not Encountered

DATE OF READING: 4/6/2023

DRILLED BY: Dodd

TYPE OF SAMPLING: HSA, SPT

DEPTH (FT.)	ELEV (FT.)	S A M P L E	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	S Y M B O L	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	POCKET PEN. (tsf)
										LL	PI		
0							TOPSOIL: Approximately 2 inches						
			8-8-9	17			FILL: Medium dense and loose, brown, silty SAND (SM) with rock fragments						
5	1880		7-7-7	14									
			5-4-2	6									
10	1875		4-6-2	8									
15	1870		6-5-8	13			Boring terminated at 15.0 ft.						

BORING LOG

PROJECT NO.: G23RAC05

REPORT NO.:

PROJECT: RaceTrac Clayton
US Highway 441
Clayton, Georgia

BORING DESIGNATION: **B-06**
SECTION: TOWNSHIP:

SHEET: **1 of 1**
RANGE:

CLIENT: RaceTrac, Inc.

G.S. ELEVATION (ft): 1883.0

DATE STARTED: 4/6/23

LOCATION: See BLP

WATER TABLE (ft): NE

DATE FINISHED: 4/6/23

REMARKS: Deidrich D50 Turbo Automatic Hammer Rig, NE = Not Encountered

DATE OF READING: 4/6/2023

DRILLED BY: Dodd

TYPE OF SAMPLING: HSA, SPT

DEPTH (FT.)	ELEV (FT.)	S A M P L E	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	S Y M B O L	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	POCKET PEN. (tsf)
										LL	PI		
0							TOPSOIL: Approximately 2 inches Medium dense, gray brown, silty SAND (SM) with rock fragments						
	1880		9-11-11	22									
5			5-8-11	19			Auger refusal at 5.0 ft.						

PROJECT: RaceTrac Clayton
US Highway 441
Clayton, Georgia

BORING DESIGNATION: **B-06a**
SECTION: TOWNSHIP:

SHEET: **1 of 1**
RANGE:

CLIENT: RaceTrac, Inc.

G.S. ELEVATION (ft): 1883.0

DATE STARTED: 4/6/23

LOCATION: See BLP

WATER TABLE (ft): NE

DATE FINISHED: 4/6/23

REMARKS: Deidrich D50 Turbo Automatic Hammer Rig, NE = Not Encountered

DATE OF READING: 4/6/2023

DRILLED BY: Dodd

TYPE OF SAMPLING: HSA, SPT

DEPTH (FT.)	ELEV (FT.)	S A M P L E	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	S Y M B O L	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	POCKET PEN. (tsf)
										LL	PI		
0							Offset half way between borings B-5 and B-6 Auger to 6 feet						
1880													
5													
			4-4-7	11			FILL: Medium dense, brown, silty SAND (SM) with rock fragments						
1875													
10			5-5-6	11									
1870							Medium dense, gray brown, silty SAND (SM) with rock fragments						
15			5-11-12	23			Boring terminated at 15.0 ft.						

BORING LOG

PROJECT NO.: G23RAC05

REPORT NO.:

PROJECT: RaceTrac Clayton
US Highway 441
Clayton, Georgia

BORING DESIGNATION: **B-07**
SECTION: TOWNSHIP:

SHEET: **1 of 1**
RANGE:

CLIENT: RaceTrac, Inc.

G.S. ELEVATION (ft): 1882.0

DATE STARTED: 4/6/23

LOCATION: See BLP

WATER TABLE (ft): NE

DATE FINISHED: 4/6/23

REMARKS: Deidrich D50 Turbo Automatic Hammer Rig, NE = Not Encountered

DATE OF READING: 4/6/2023

DRILLED BY: Dodd

TYPE OF SAMPLING: HSA, SPT

DEPTH (FT.)	ELEV (FT.)	S A M P L E	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	S Y M B O L	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	POCKET PEN. (tsf)
										LL	PI		
0							TOPSOIL: Approximately 2 inches						
	1880	X	6-7-6	13			FILL: Medium dense, brown, silty SAND (SM) with rock fragments						
5		X	8-5-8	13									
	1875	X	5-6-6	12									
		X					Medium dense, gray brown, silty SAND (SM) with rock fragments						
10		X	5-6-9	15									
	1870	X											
		X					Medium dense, brown, silty SAND (SM) with rock fragments						
15		X	7-9-9	18									
							Boring terminated at 15.0 ft.						

BORING LOG

PROJECT NO.: G23RAC05

REPORT NO.:

PROJECT: RaceTrac Clayton
US Highway 441
Clayton, Georgia

BORING DESIGNATION: **B-08**
SECTION: TOWNSHIP:

SHEET: **1 of 1**
RANGE:

CLIENT: RaceTrac, Inc.

G.S. ELEVATION (ft): 1880.0

DATE STARTED: 4/6/23

LOCATION: See BLP

WATER TABLE (ft): NE

DATE FINISHED: 4/6/23

REMARKS: Deidrich D50 Turbo Automatic Hammer Rig, NE = Not Encountered

DATE OF READING: 4/6/2023

DRILLED BY: Dodd

TYPE OF SAMPLING: HSA, SPT

DEPTH (FT.)	ELEV (FT.)	S A M P L E	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	S Y M B O L	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	POCKET PEN. (tsf)
										LL	PI		
0							TOPSOIL: Approximately 2 inches						
			4-8-8	16			FILL: Medium dense, gray brown, silty SAND (SM) with rock fragments						
							Medium dense, brown, silty SAND (SM) with rock fragments						
5	1875		4-10-9	19									
			3-1-2	3			Very loose to loose, brown, silty SAND (SM)						
10	1870		5-5-1	6									
							Medium dense, brown, silty SAND (SM) with rock fragments						
15	1865		2-3-13	16			Boring terminated at 15.0 ft.						

PROJECT: RaceTrac Clayton
US Highway 441
Clayton, Georgia

BORING DESIGNATION: **B-09**
SECTION: TOWNSHIP:

SHEET: **1 of 1**
RANGE:

CLIENT: RaceTrac, Inc.

G.S. ELEVATION (ft): 1884.0

DATE STARTED: 4/6/23

LOCATION: See BLP

WATER TABLE (ft): NE

DATE FINISHED: 4/6/23

REMARKS: Deidrich D50 Turbo Automatic Hammer Rig, NE = Not Encountered

DATE OF READING: 4/6/2023

DRILLED BY: Dodd

TYPE OF SAMPLING: HSA, SPT

DEPTH (FT.)	ELEV (FT.)	S A M P L E	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	S Y M B O L	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	POCKET PEN. (tsf)
										LL	PI		
0							TOPSOIL: Approximately 2 inches						
			6-7-9	16			FILL: Medium dense, brown, silty SAND (SM) with rock fragments						
1880													
5			10-11-10	21									
			6-7-7	14									
1875							Loose, red brown, silty SAND (SM)						
10			3-3-4	7									
1870							Medium dense, brown, silty SAND (SM) with rock fragments						
15			10-13-10	23			Boring terminated at 15.0 ft.						

PROJECT: RaceTrac Clayton
US Highway 441
Clayton, Georgia

BORING DESIGNATION: **B-10**
SECTION: TOWNSHIP:

SHEET: **1 of 1**
RANGE:

CLIENT: RaceTrac, Inc.

G.S. ELEVATION (ft): 1887.0

DATE STARTED: 4/6/23

LOCATION: See BLP

WATER TABLE (ft): NE

DATE FINISHED: 4/6/23

REMARKS: Deidrich D50 Turbo Automatic Hammer Rig, NE = Not Encountered

DATE OF READING: 4/6/2023

DRILLED BY: Dodd

TYPE OF SAMPLING: HSA, SPT

DEPTH (FT.)	ELEV (FT.)	S A M P L E	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	S Y M B O L	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	POCKET PEN. (tsf)
										LL	PI		
0							GRADED AGGREGATE BASE: Approximately 6 inches						
	1885	X	4-3-4	7			FILL: Loose, brown, silty SAND (SM) with rock fragments						
5		X	3-2-3	5									
	1880	X	2-2-1	3									
10		X	2-3-2	5									
	1875												
15		X	3-2-2	4									
	1870												
20		X	2-2-50/5"				SPT values elevated due to possible rock fragments in fill matrix						
							Boring terminated at 20.0 ft.						

PROJECT: RaceTrac Clayton
US Highway 441
Clayton, Georgia

BORING DESIGNATION: **B-11**
SECTION: TOWNSHIP:

SHEET: **1 of 1**
RANGE:

CLIENT: RaceTrac, Inc.

G.S. ELEVATION (ft): 1888.0

DATE STARTED: 4/6/23

LOCATION: See BLP

WATER TABLE (ft): NE

DATE FINISHED: 4/6/23

REMARKS: Deidrich D50 Turbo Automatic Hammer Rig, NE = Not Encountered

DATE OF READING: 4/6/2023

DRILLED BY: Dodd

TYPE OF SAMPLING: HSA, SPT

DEPTH (FT.)	ELEV (FT.)	S A M P L E	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	S Y M B O L	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	POCKET PEN. (tsf)
										LL	PI		
0							TOPSOIL: Approximately 2 inches FILL: Medium dense, brown, silty SAND (SM) with rock fragments						
	1885	X	5-8-6	14									
5		X	5-5-7	12									
	1880	X	5-13-2	15									
10		X	13-6-8	14			Boring terminated at 10.0 ft.						

BORING LOG

PROJECT NO.: G23RAC05

REPORT NO.:

PROJECT: RaceTrac Clayton
US Highway 441
Clayton, Georgia

BORING DESIGNATION: **B-12**
SECTION: TOWNSHIP:

SHEET: **1 of 1**
RANGE:

CLIENT: RaceTrac, Inc.

G.S. ELEVATION (ft): 1886.0

DATE STARTED: 4/6/23

LOCATION: See BLP

WATER TABLE (ft): NE

DATE FINISHED: 4/6/23

REMARKS: Deidrich D50 Turbo Automatic Hammer Rig, NE = Not Encountered

DATE OF READING: 4/6/2023

DRILLED BY: Dodd

TYPE OF SAMPLING: HSA, SPT

DEPTH (FT.)	ELEV (FT.)	S A M P L E	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	S Y M B O L	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	POCKET PEN. (tsf)
										LL	PI		
0							TOPSOIL: Approximately 2 inches						
	1885	X					FILL: Medium dense, brown, silty						
		X	12-12-11	23			SAND (SM) with rock fragments						
		X											
5		X	13-9-9	18									
	1880	X	17-50/3"				SPT values elevated due to possible						
		X	50/1"				rock fragments in fill matrix						
10							Boring terminated at 10.0 ft.						

BORING LOG

PROJECT NO.: G23RAC05

REPORT NO.:

PROJECT: RaceTrac Clayton
US Highway 441
Clayton, Georgia

BORING DESIGNATION: **B-13**
SECTION: TOWNSHIP:

SHEET: **1 of 1**
RANGE:

CLIENT: RaceTrac, Inc.

G.S. ELEVATION (ft): 1879.0

DATE STARTED: 4/6/23

LOCATION: See BLP

WATER TABLE (ft): NE

DATE FINISHED: 4/6/23

REMARKS: Deidrich D50 Turbo Automatic Hammer Rig, NE = Not Encountered

DATE OF READING: 4/6/2023

DRILLED BY: Dodd

TYPE OF SAMPLING: HSA, SPT

DEPTH (FT.)	ELEV (FT.)	S A M P L E	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	S Y M B O L	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	POCKET PEN. (tsf)
										LL	PI		
0							TOPSOIL: Approximately 2 inches FILL: Dense, brown, silty SAND (SM) with large rock fragments SPT values elevated due to possible rock fragments in fill matrix						
1875			20-20-21	41									
5			13-15-50/3"				Auger refusal at 5.0 ft.						

BORING LOG

PROJECT NO.: G23RAC05

REPORT NO.:

PROJECT: RaceTrac Clayton
US Highway 441
Clayton, Georgia

BORING DESIGNATION: **B-13a** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: RaceTrac, Inc.

G.S. ELEVATION (ft): 1879.0 DATE STARTED: 4/6/23

LOCATION: See BLP

WATER TABLE (ft): NE DATE FINISHED: 4/6/23

REMARKS: Deidrich D50 Turbo Automatic Hammer Rig, NE = Not Encountered

DATE OF READING: 4/6/2023 DRILLED BY: Dodd

TYPE OF SAMPLING: HSA, SPT

DEPTH (FT.)	ELEV (FT.)	S A M P L E	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	S Y M B O L	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	POCKET PEN. (tsf)
										LL	PI		
0							Offset 10 feet west						
							Refusal in fill at 3 feet						
							Auger refusal at 3.0 ft.						

PROJECT: RaceTrac Clayton
US Highway 441
Clayton, Georgia

BORING DESIGNATION: **B-13b**
SECTION: TOWNSHIP:

SHEET: **1 of 1**
RANGE:

CLIENT: RaceTrac, Inc.

G.S. ELEVATION (ft): 1879.0

DATE STARTED: 4/6/23

LOCATION: See BLP

WATER TABLE (ft): NE

DATE FINISHED: 4/6/23

REMARKS: Deidrich D50 Turbo Automatic Hammer Rig, NE = Not Encountered

DATE OF READING: 4/6/2023

DRILLED BY: Dodd

TYPE OF SAMPLING: HSA, SPT

DEPTH (FT.)	ELEV (FT.)	S A M P L E	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	S Y M B O L	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	POCKET PEN. (tsf)
										LL	PI		
0							Offset 10 feet east of B-13 Auger to 6 feet						
1875													
5													
			34-9-8	17			FILL: Medium dense, gray brown, silty SAND (SM) with rock fragments						
1870													
10			5-7-6	13									
1865							RESIDUUM: Medium dense, reddish purple with gray, silty SAND (SM)						
15			5-7-6	13			Boring terminated at 15.0 ft.						

PROJECT: RaceTrac Clayton
US Highway 441
Clayton, Georgia

BORING DESIGNATION: **B-14**
SECTION: TOWNSHIP:

SHEET: **1 of 1**
RANGE:

CLIENT: RaceTrac, Inc.

G.S. ELEVATION (ft): 1876.0

DATE STARTED: 4/6/23

LOCATION: See BLP

WATER TABLE (ft): NE

DATE FINISHED: 4/6/23

REMARKS: Deidrich D50 Turbo Automatic Hammer Rig, NE = Not Encountered

DATE OF READING: 4/6/2023

DRILLED BY: Dodd

TYPE OF SAMPLING: HSA, SPT

DEPTH (FT.)	ELEV (FT.)	S A M P L E	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	S Y M B O L	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	POCKET PEN. (tsf)
										LL	PI		
0							FILL: Loose, brown, silty SAND (SM)						
1875			5-5-5	10			Loose, gray brown, silty SAND (SM)						
5			3-5-4	9									
1870			4-4-5	9			FILL: Medium dense, brown, silty SAND (SM) with rock fragments						
10			8-12-14	26			Boring terminated at 10.0 ft.						

PROJECT: RaceTrac Clayton
US Highway 441
Clayton, Georgia

BORING DESIGNATION: **B-15**
SECTION: TOWNSHIP:

SHEET: **1 of 1**
RANGE:

CLIENT: RaceTrac, Inc.

G.S. ELEVATION (ft): 1876.0

DATE STARTED: 4/6/23

LOCATION: See BLP

WATER TABLE (ft): NE

DATE FINISHED: 4/6/23

REMARKS: Deidrich D50 Turbo Automatic Hammer Rig, NE = Not Encountered

DATE OF READING: 4/6/2023

DRILLED BY: Dodd

TYPE OF SAMPLING: HSA, SPT

DEPTH (FT.)	ELEV (FT.)	S A M P L E	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	S Y M B O L	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	POCKET PEN. (tsf)
										LL	PI		
0							TOPSOIL: Approximately 2 inches						
1875			3-4-5	9			FILL: Loose to medium dense, red brown, silty SAND (SM)						
5			4-5-7	12									
1870			4-4-7	11			Medium dense, brown, silty SAND (SM) with rock fragments						
10			4-7-8	15			Boring terminated at 10.0 ft.						

PROJECT: RaceTrac Clayton
US Highway 441
Clayton, Georgia

BORING DESIGNATION: **B-16**
SECTION: TOWNSHIP:

SHEET: **1 of 1**
RANGE:

CLIENT: RaceTrac, Inc.

G.S. ELEVATION (ft): 1882.0

DATE STARTED: 4/6/23

LOCATION: See BLP

WATER TABLE (ft): NE

DATE FINISHED: 4/6/23

REMARKS: Deidrich D50 Turbo Automatic Hammer Rig, NE = Not Encountered

DATE OF READING: 4/6/2023

DRILLED BY: Dodd

TYPE OF SAMPLING: HSA, SPT

DEPTH (FT.)	ELEV (FT.)	S A M P L E	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	S Y M B O L	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	POCKET PEN. (tsf)
										LL	PI		
0							TOPSOIL: Approximately 2 inches						
	1880	X	5-7-8	15			FILL: Medium dense, brown, silty SAND (SM) with rock fragments						
5		X	5-8-14	22									
	1875	X	2-1-2	3			Very loose, red brown, silty SAND (SM)						
		X					Medium dense, red brown, silty SAND (SM)						
10		X	2-4-22	26			Boring terminated at 10.0 ft.						

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS	
			GRAPH	LETTER		
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES	
		(LITTLE OR NO FINES)		GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES	
		GRAVELS WITH FINES		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES	
		(APPRECIABLE AMOUNT OF FINES)		GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES	
	SAND AND SANDY SOILS	CLEAN SANDS		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	
		(LITTLE OR NO FINES)		SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES	
		SANDS WITH FINES		SM	SILTY SANDS, SAND - SILT MIXTURES	
		(APPRECIABLE AMOUNT OF FINES)		SC	CLAYEY SANDS, SAND - CLAY MIXTURES	
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY	
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS	
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS	
				CH	INORGANIC CLAYS OF HIGH PLASTICITY	
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS	
	HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

COMPACTION TEST REPORT

Curve No.: B-1

Project No.: G23RAC05

Date: 3-30-23

Project: RaceTrac Clayton

Client: RaceTrac Petroleum, Inc.

Location: Boring B-1

Sample Number: 20684

Remarks:

MATERIAL DESCRIPTION

Description: Brown silty SAND (SM), trace mica

Classifications -

USCS: SM

AASHTO: A-2-4(0)

Nat. Moist. = 17.3 %

Sp.G. =

Liquid Limit = NV

Plasticity Index = NP

%<No.10 = 92.7 %

%<No.40 = 46.5 %

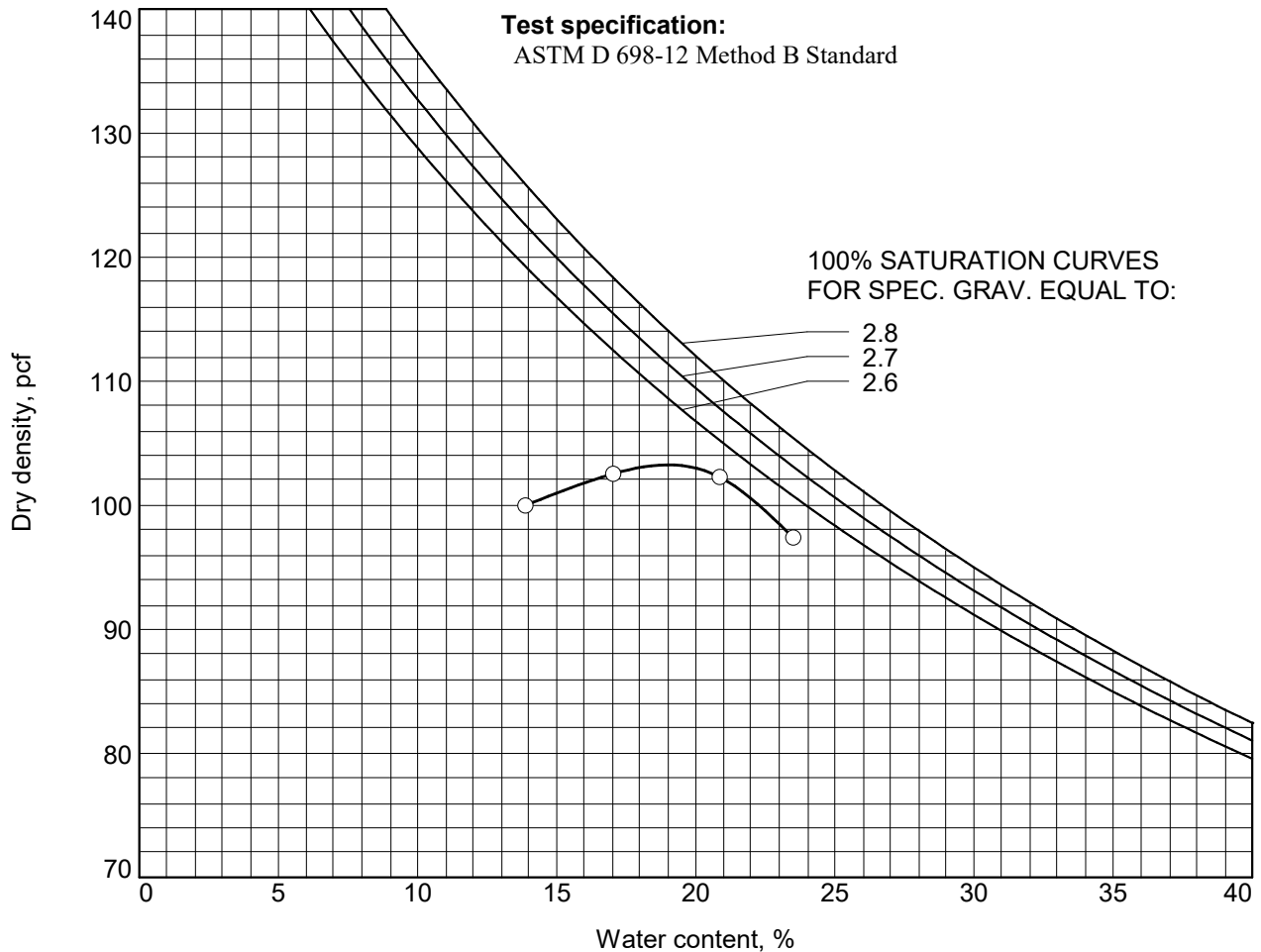
%<No.60 = 40.7 %

%<No.200 = 33.1 %

TEST RESULTS

Maximum dry density = 103.3 pcf

Optimum moisture = 19.0 %



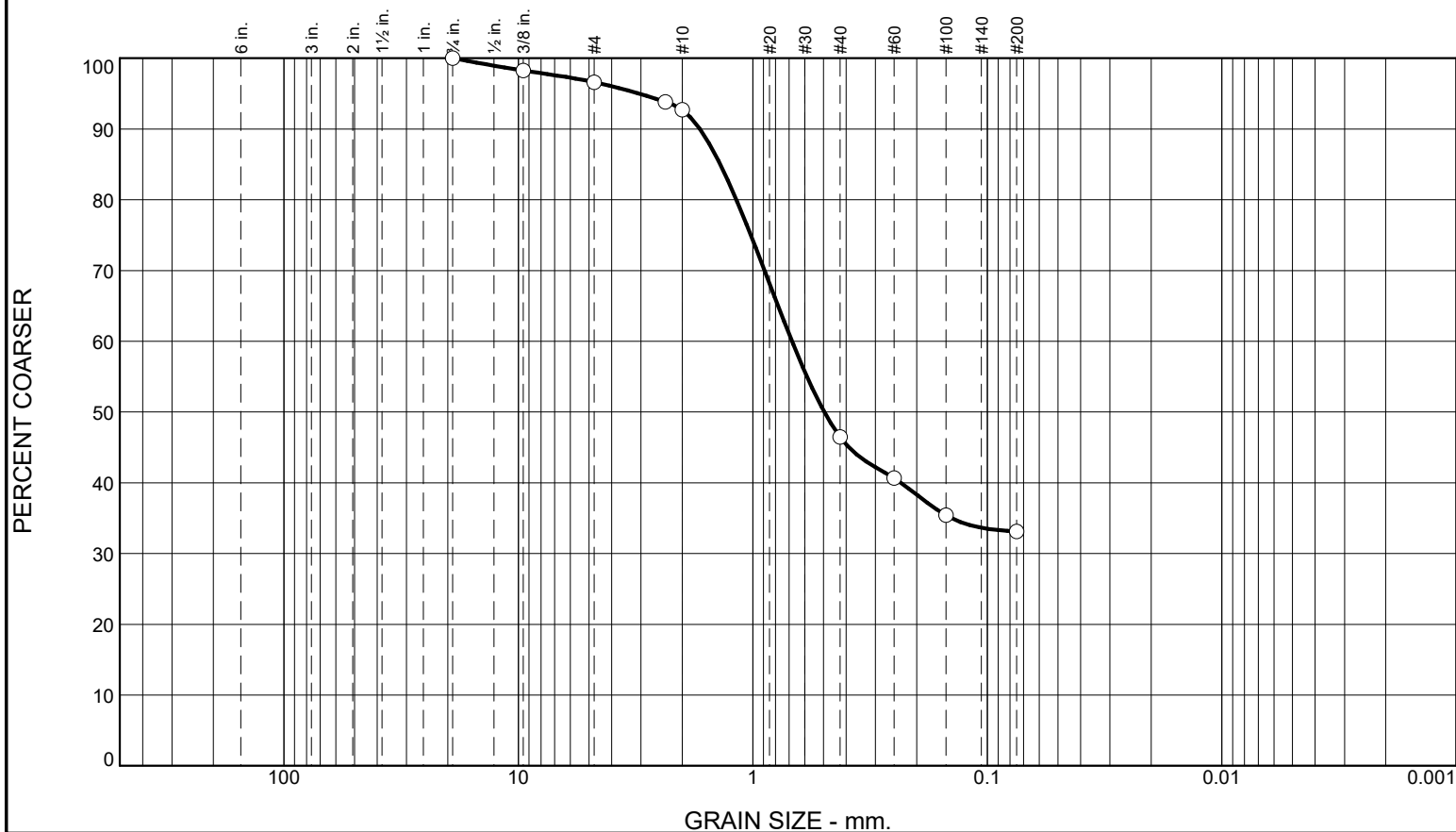
Figure

Contour Engineering, LLC

Tested By: Ray Boyd

Checked By: Chris LeBeau

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.4	3.9	46.2	13.4	33.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.375	98.3		
#4	96.6		
#8	93.8		
#10	92.7		
#40	46.5		
#60	40.7		
#100	35.4		
#200	33.1		

* (no specification provided)

Material Description
Brown silty SAND (SM), trace mica

Atterberg Limits
 PL= NP LL= NV PI= NP

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

Remarks

Location: Boring B-1
Sample Number: 20684

Date: 3-30-23



Client: RaceTrac Petroleum, Inc.

Project: RaceTrac Clayton

Project No: G23RAC05

Figure

Tested By: Ray Boyd

Checked By: Chris LeBeau

COMPACTION TEST REPORT

Curve No.: B-5

Project No.: G23RAC05

Date: 3-30-23

Project: RaceTrac Clayton

Client: RaceTrac Petroleum, Inc.

Location: Boring B-5

Sample Number: 20685

Remarks:

MATERIAL DESCRIPTION

Description: Brown silty SAND (SM)

Classifications -

USCS: SM

AASHTO: A-2-4(0)

Nat. Moist. = 18.3 %

Sp.G. =

Liquid Limit = NV

Plasticity Index = NP

%<No.10 = 91.5 %

%<No.40 = 69.1 %

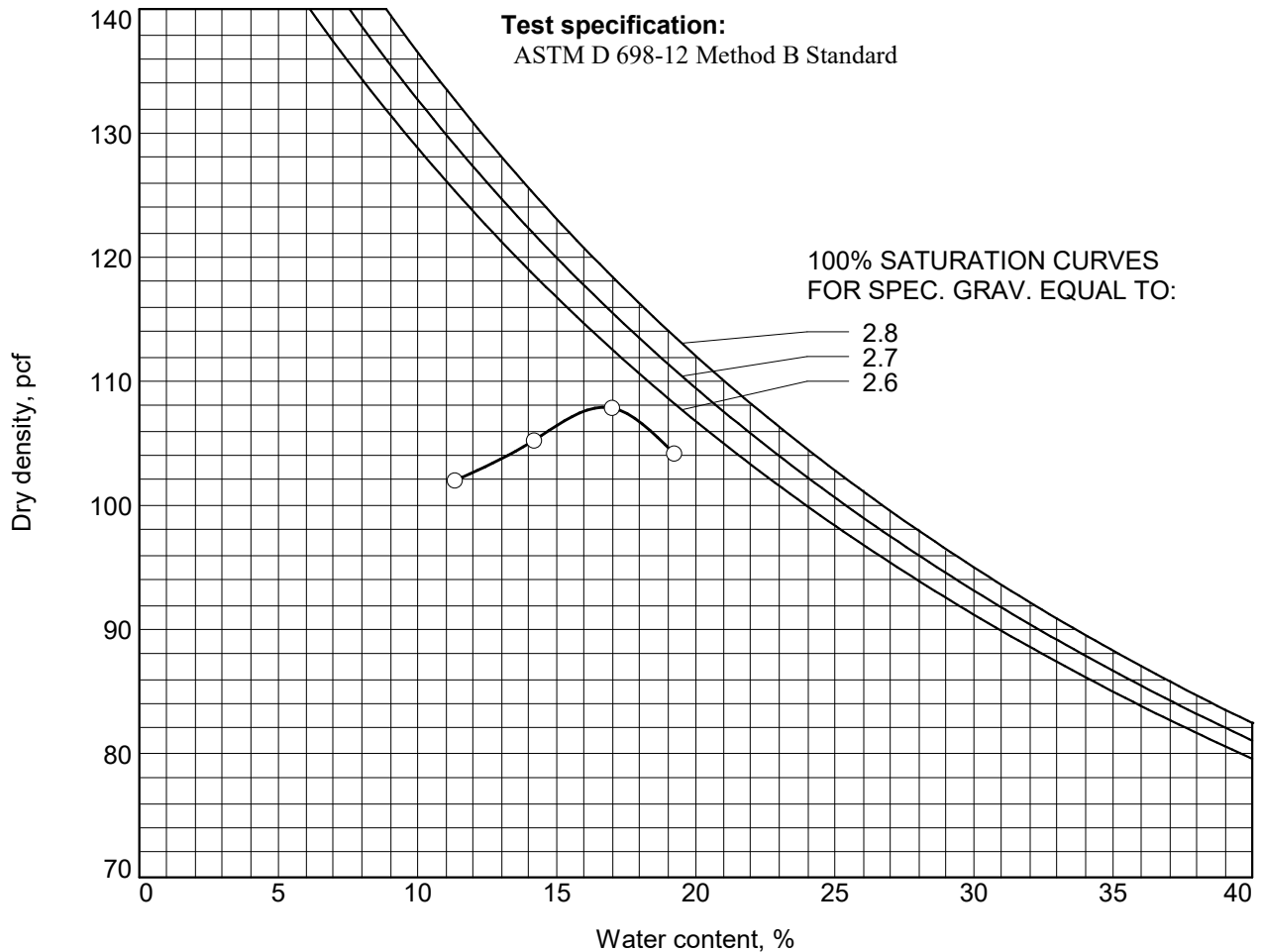
%<No.60 = 57.3 %

%<No.200 = 29.1 %

TEST RESULTS

Maximum dry density = 107.9 pcf

Optimum moisture = 16.7 %



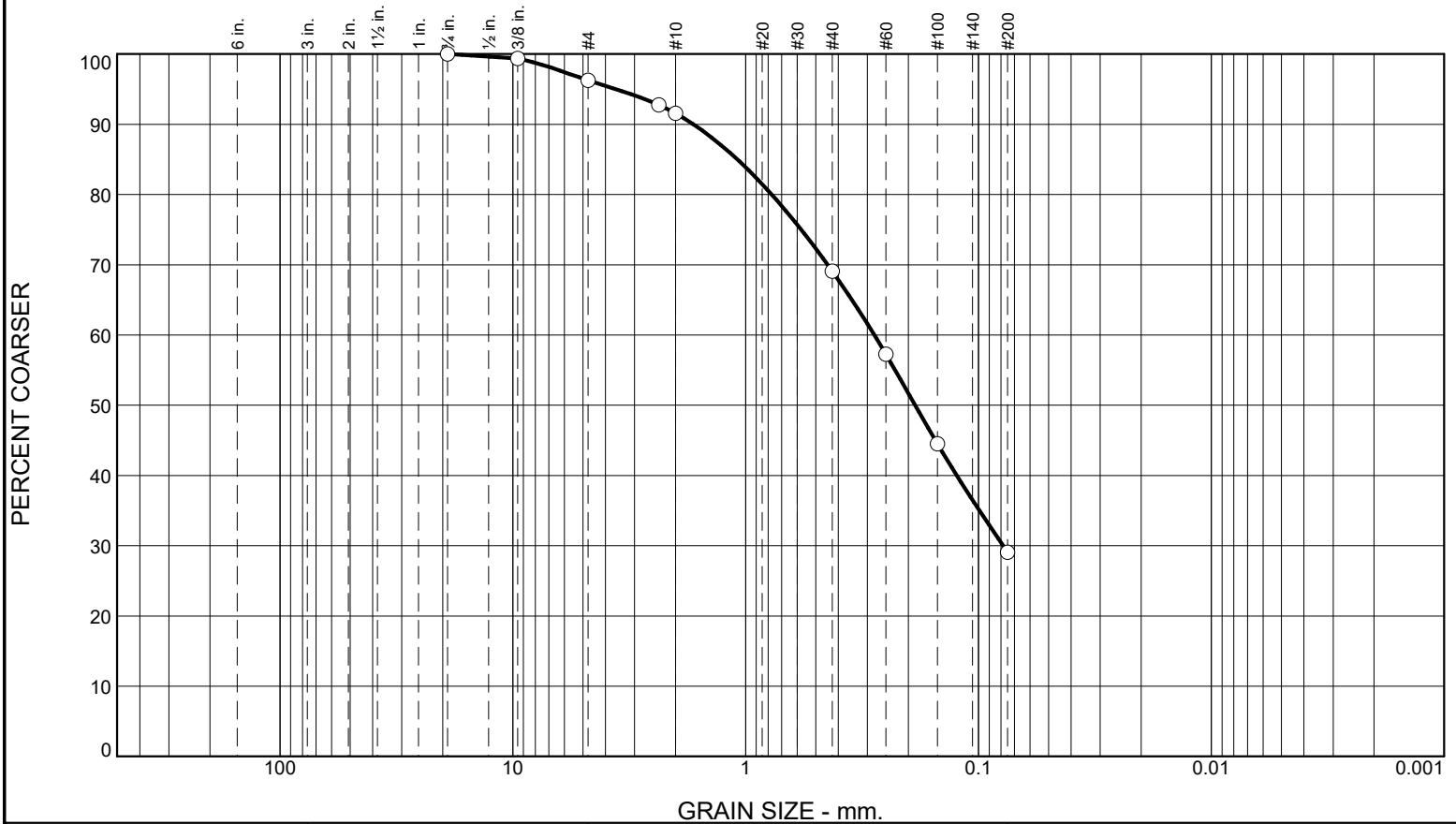
Figure

Contour Engineering, LLC

Tested By: Ray Boyd

Checked By: Chris LeBeau

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.7	4.8	22.4	40.0	29.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.375	99.4		
#4	96.3		
#8	92.8		
#10	91.5		
#40	69.1		
#60	57.3		
#100	44.5		
#200	29.1		

* (no specification provided)

Material Description
 Brown silty SAND (SM)

PL= NP **Atterberg Limits** LL= NV PI= NP
 USCS= SM **Classification** AASHTO= A-2-4(0)

Remarks

Location: Boring B-5
Sample Number: 20685

Date: 3-30-23



Client: RaceTrac Petroleum, Inc.

Project: RaceTrac Clayton

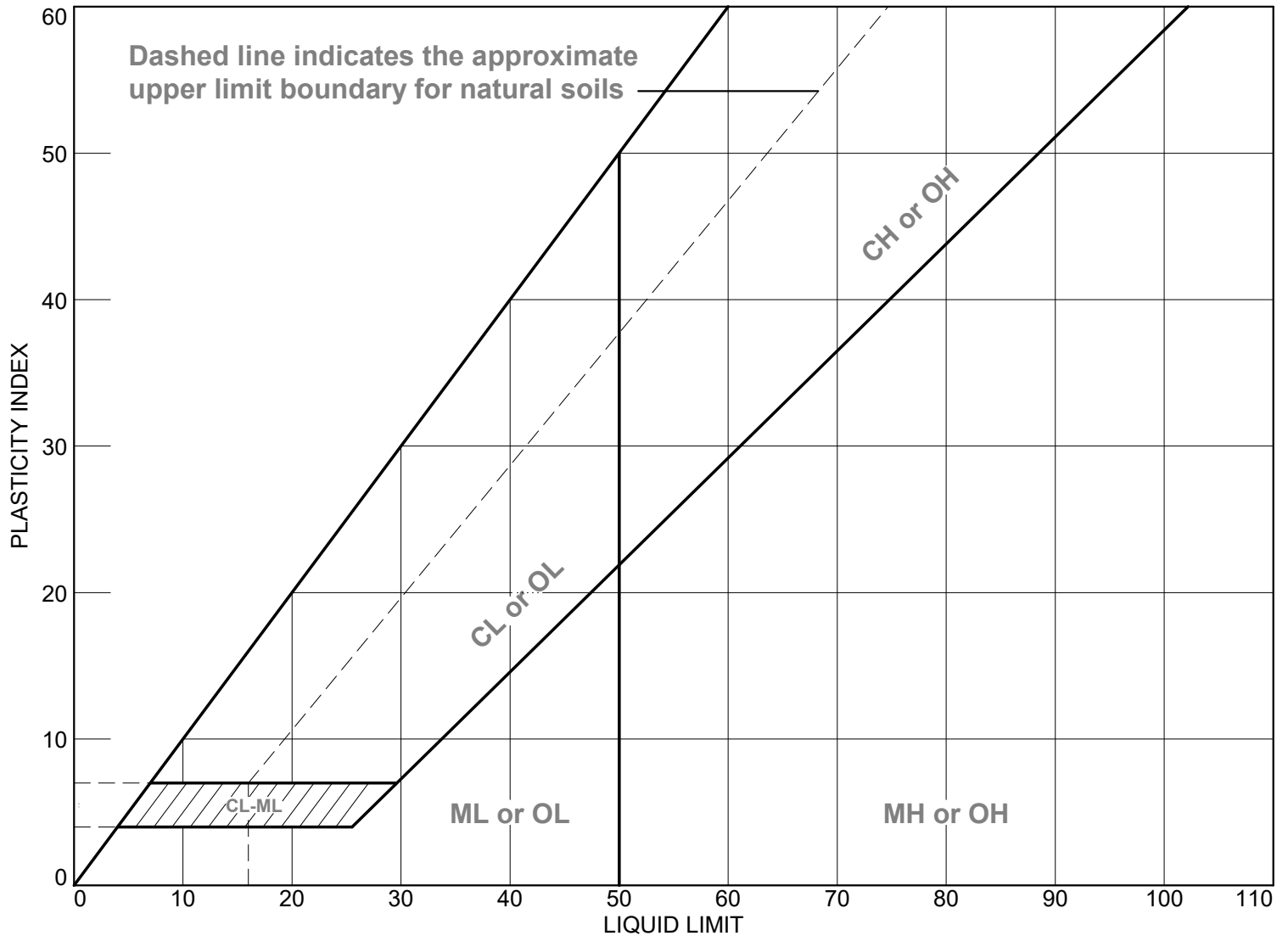
Project No: G23RAC05

Figure

Tested By: Ray Boyd

Checked By: Chris LeBeau

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

SYMBOL	SOURCE	BORING NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●		B-1		17.3	NP	NV	NP	SM
■		B-5		18.3	NP	NV	NP	SM
▲		B-11, B-12		15.8	NP	NV	NP	SM



Client: RaceTrac Petroleum, Inc.

Project: RaceTrac Clayton

Project No.: G23RAC05

Figure

CALIFORNIA BEARING RATIO

ASTM D-1883

RaceTrac Clayton

Clayton, GA

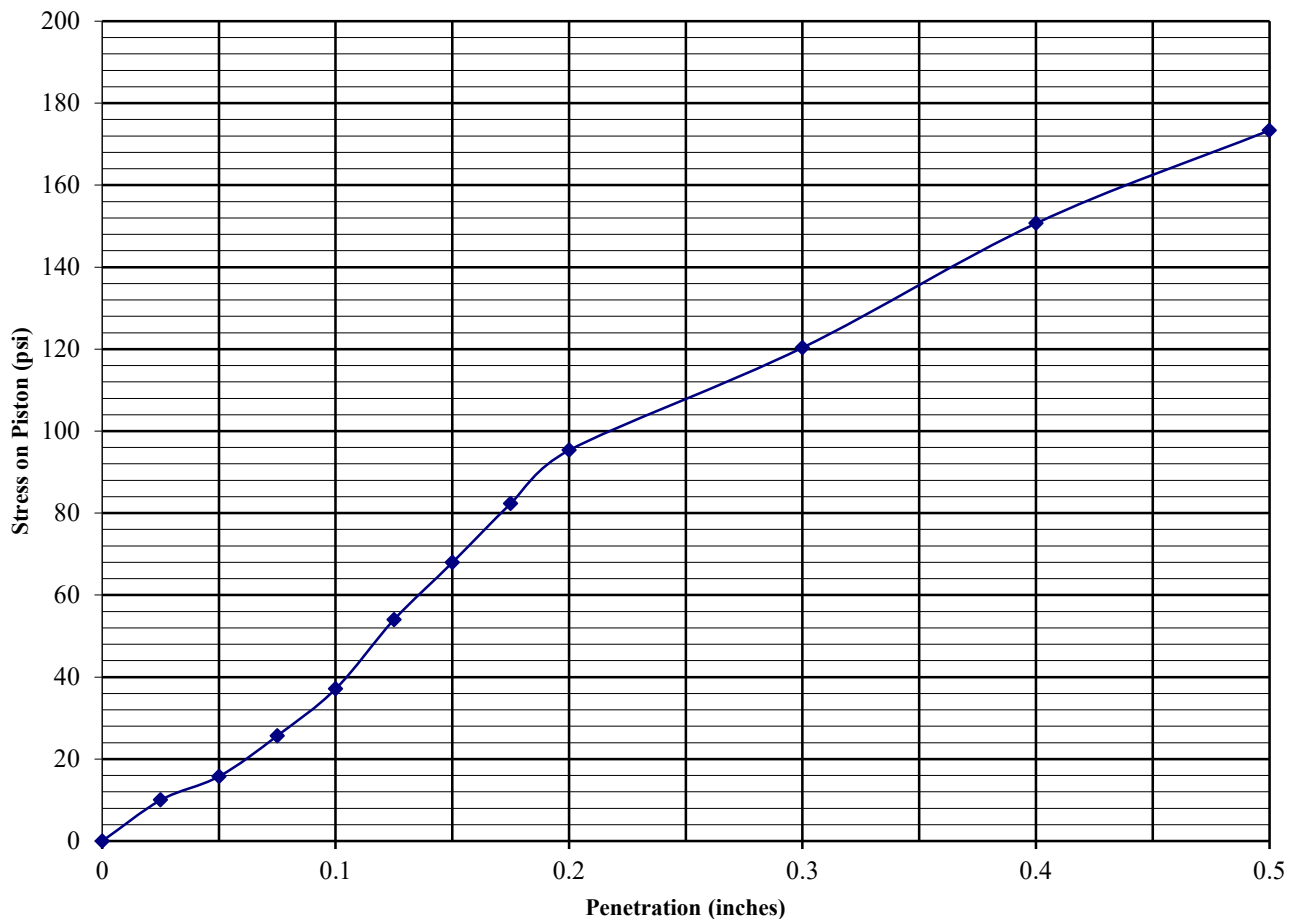
G23RAC05

Sampled No.: 20686

Sample Description: Brown orange silty SAND (SM), trace mica

Date: 4/12/2023

Surcharge Load	10
Condition of Sample	Soaked
Dry Density Before Soaking (pcf)	104.7
Moisture Content Before Soaking (%)	17.2
Dry Density After Soaking (pcf)	102.7
Moisture Content After Soaking (%)	23.7
Swell (in)	0.020
Bearing Ratio as tested at 0.100	3.7
Bearing Ratio as tested at 0.200	6.4



COMPACTION TEST REPORT

Curve No.: B-11, B-12

Project No.: G23RAC05

Date: 3-30-23

Project: RaceTrac Clayton

Client: RaceTrac Petroleum, Inc.

Location: Composite B-11 & B-12

Sample Number: 20686

Remarks:

MATERIAL DESCRIPTION

Description: Brown orange silty SAND (SM), trace mica

Classifications -

USCS: SM

AASHTO: A-2-4(0)

Nat. Moist. = 15.8 %

Sp.G. =

Liquid Limit = NV

Plasticity Index = NP

%<No.10 = 86.5 %

%<No.40 = 66.1 %

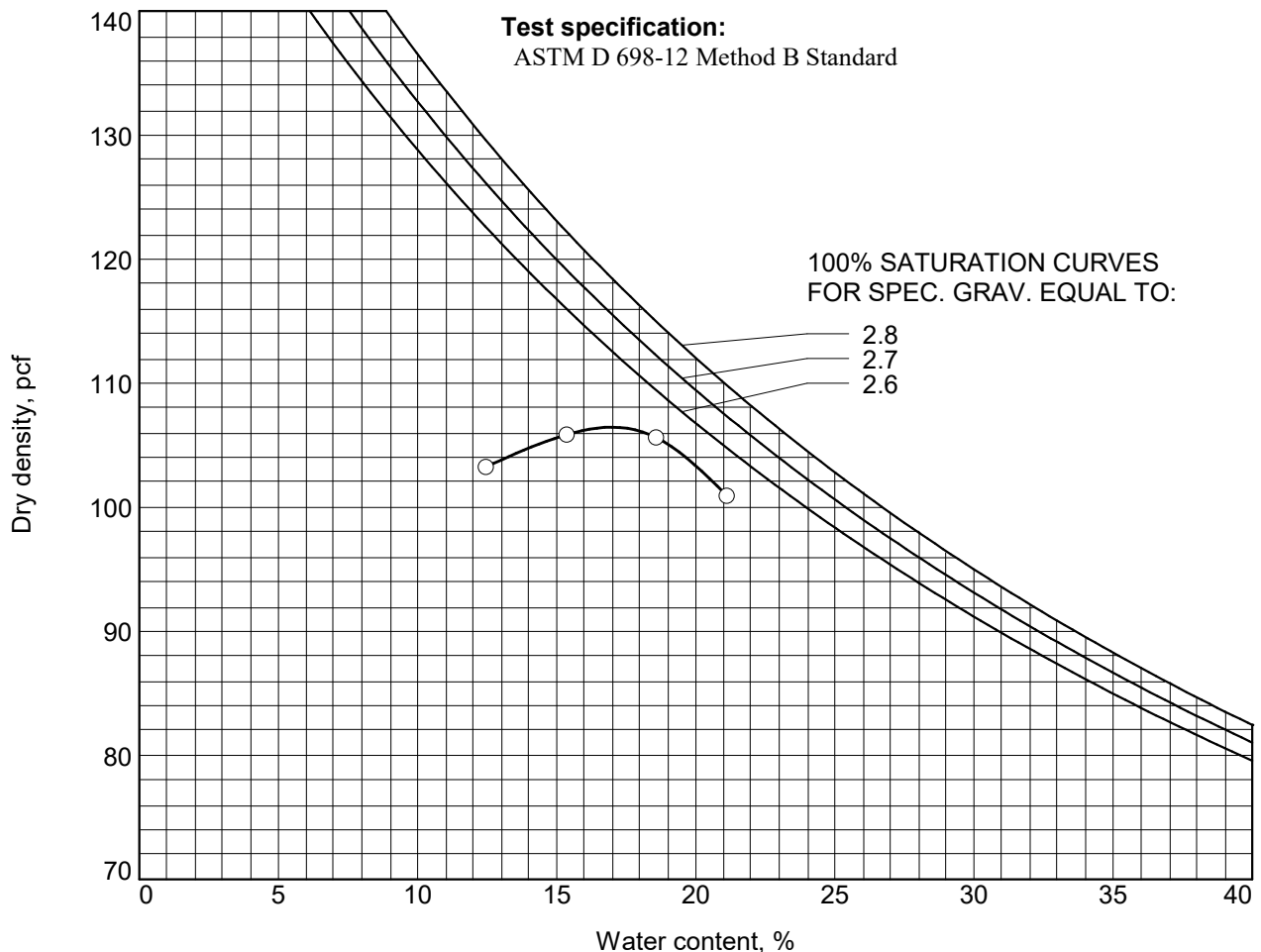
%<No.60 = 55.2 %

%<No.200 = 29.0 %

TEST RESULTS

Maximum dry density = 106.5 pcf

Optimum moisture = 17.0 %



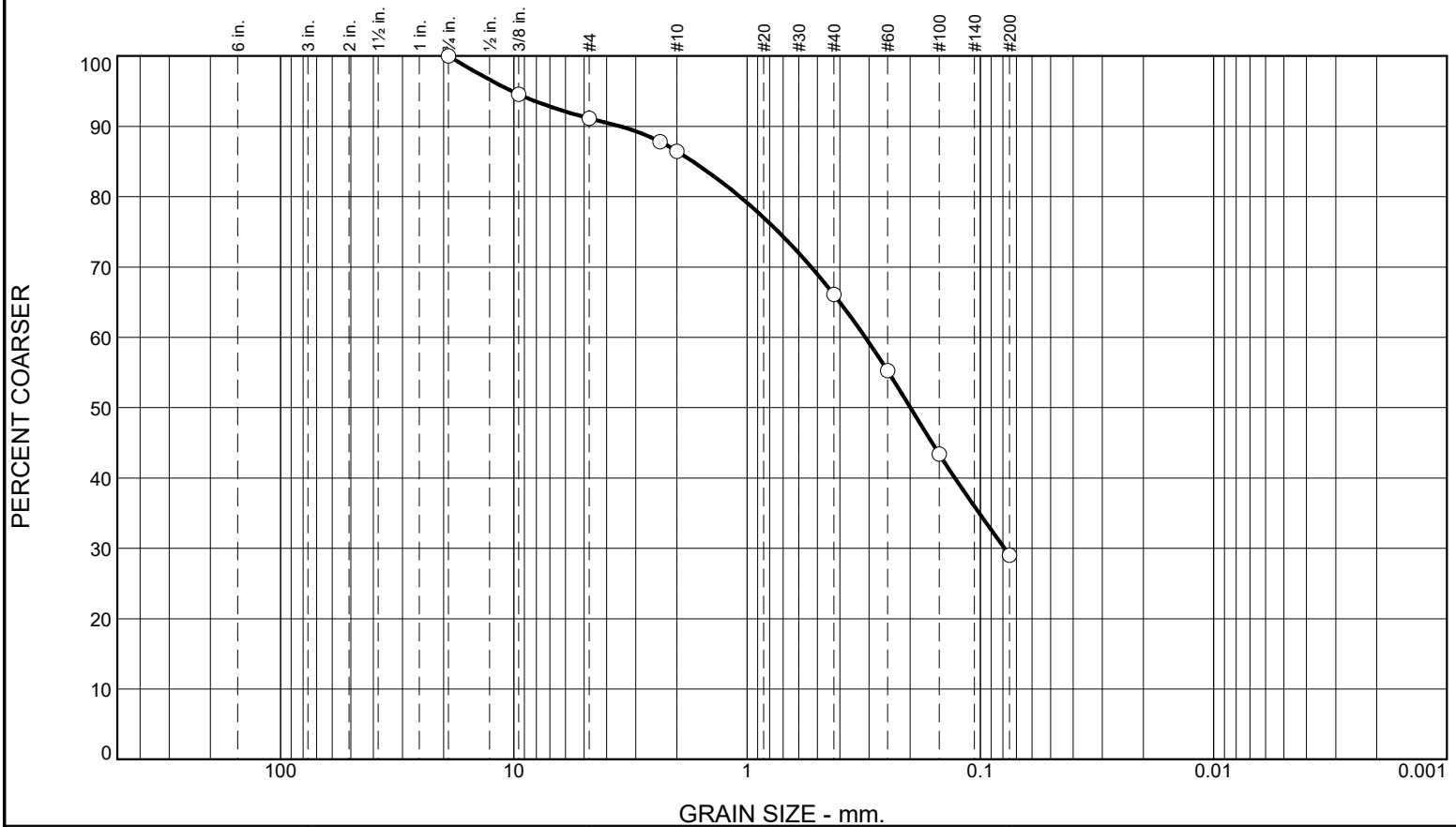
Figure

Contour Engineering, LLC

Tested By: Ray Boyd

Checked By: Chris LeBeau

Particle Size Distribution Report



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.



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