REPORT

Subsurface Exploration
Gravel Springs Road Tract
Gravel Springs Road & Brown Road
Gwinnett County
Buford, Georgia

Project Number
2017.1076.02

March 31, 2017

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March 31, 2017

Mr. Heath Milligan
Macallan Real Estate
1642 Powers Ferry Road SE
Suite 250
Marietta, Georgia 30067

Via Email: ***heath@macallanre.com***

RE: Report of Subsurface Exploration
Gravel Springs Road Tract
Gravel Springs Road & Brown Road
Buford, Gwinnett County, Georgia
Project No.: 2017.1076.02

Dear Mr. Milligan:

United Consulting is pleased to submit this report of our Geotechnical Exploration for the above-referenced project. We appreciate the opportunity to assist you with this project and look forward to our continued participation. Please contact us if you have any questions or if we can be of further assistance.

Sincerely,

UNITED CONSULTING

GEORGIA REGISTERED NO. 23121 PROFESSIONAL ENGINEER MEHDI MOAZZAMI

Mehdi Moazzami, P.E.
Senior Geotechnical Engineer

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http://unc-sps/9548/2017.1076.02/Geotechnical Documents/2017.1076.02 geo.docx

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1.0 EXECUTIVE SUMMARY

United Consulting has completed a Geotechnical Exploration on Gravel Springs Road Tract site located to the west of the intersection of Gravel Springs Road & Brown Road in Buford, Gwinnett County, Georgia. Please refer to the text of the report for a more detailed discussion of the items summarized below.

1. A complete geotechnical engineering service is performed through the Observation Method as an indivisible two-phase process. The first phase provides advice about project specific risks and represents our firm's opinion of subsurface conditions with recommendations. Field observation during construction comprises the second phase of our service and provides us the opportunity to assess the reliability of the subsurface data and the appropriateness of our recommendations. Actual conditions sometimes differ from those encountered in the exploration phase.

2. Deleterious materials such as plywood sheets, buckets, tires, asphalt, and other trash and debris were found sporadically across the site. These materials should be properly disposed of.

3. Partially Weathered Rock (PWR) and rock were encountered in twenty of the thirty boring locations at depths of 3 to 19.5 feet. Hard excavation occurred in majority of the test pits at depths of 0 to 15 feet with backhoe refusal at depths of 1 to 16 feet. Auger refusal due to hard rock or boulders occurred in 16 of the borings at depths 3 to 17 feet. Therefore, difficult excavation conditions and reduced excavation rates, including blasting, associated with PWR and rock should be expected for this project.

4. Groundwater was encountered at the time of drilling in boring B-21 and test pit TP-3 at depths of 10 and 9 feet, respectively.

5. Provided that the site is prepared as recommendations, including densification of the near surface low consistency soils, it is our opinion that the proposed single-family residential buildings can be supported on conventional shallow foundations such as spread footings and/or continuous strip footings. An allowable soil bearing pressure of up to 3,000 pounds per square foot (psf) can be used for the design of conventional shallow foundations.

2.0 PROJECT INFORMATION

The project site is a 85.26 acres tract of land, consisting of two parcels of land with Parcel ID Numbers 7143 034 and 7143 010, located southwest of the intersection of Brown Road and Gravel Springs Road in Buford, Gwinnett County, Georgia. At the time of our exploration, the land was heavily wooded.

Based on the client provided site plan, the site will be developed and subdivided into 150 single-family residential lots along with parking and driveway areas and walking trails. The properties surrounding the project site mainly consist of residential housing and wooded areas. The site is bounded to the east by Brown Rd and residential structures, to the south by Brown Road, Sunny Hill Road, and wooded areas, to the west by Sunny Hill Road and wooded areas, and to the north by Gravel Springs Road. An unnamed pond was noted north of the project site. The general location of the project site is shown on the attached Boring and Test Pit Location Plan (Figure 1).

A topographic site plan was not available, but based on our visual observations; the topography at the site is sloping terrain. The highest elevation appeared to be in the northeast and the lowest elevation in the eastern areas of the site.

No structural load information was provided at the time of this geotechnical exploration. Based on our experience with similar structures, we anticipate that the column and wall loads for the proposed single-family residential buildings will be about 40 kips and 5 kips per linear foot (klf), respectively. If the actual loads and site grading information vary significantly from the above anticipated values, United Consulting must be contacted to determine if our recommendations should be re-evaluated and/or revised.

3.0 PURPOSE

The purpose of this geotechnical exploration was to assess potential rock, unsuitable and possible soft areas, to determine if the existing soils are suitable for reuse as engineered fill, and to provide foundation and pavement recommendations.

4.0 SCOPE

The scope of our geotechnical exploration included the following items:

1. A visual reconnaissance of the site from a geotechnical standpoint;

2. Excavating twenty (20) test pits and seven (7) offset pits to evaluate the existing subsurface materials, and to look for areas with shallow rock;

3. Drilling twenty five (25) Standard Penetration Test (SPT) borings and five (5) offset borings to further assess the quality and consistency of the subsurface soils;

4. Visual evaluation of the soil samples obtained during our field testing program for further identification and classification;

5. Performing three (3) field volume change test and laboratory testing consisting of ten (10) natural moisture content tests and two (2) standard proctor test on representative soil samples;

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

7. Preparing this report to document the results of our field-testing program, engineering analysis, and to provide our findings and general recommendations.

5.0 SUBSURFACE CONDITIONS

5.1 Test Pit Exploration

Twenty (20) test pits were excavated at selected locations on the project site. Seven (7) offset test pits were excavated at locations where shallow rock was encountered. Initially, the test pits encountered a thin layer of topsoil. Below the topsoil, the borings encountered residual soils of the Piedmont Physiographic Province. The residual soils encountered generally consisted of sand with varying amounts of silt, clay and mica. The residual soils also contained layers of clay with varying amounts of sand, clay and mica, or clay with varying amounts of sand, silt, and root hairs.

Hard excavating and backhoe refusal was encountered in almost all test pit locations. Hard excavation was encountered at depths ranging from immediately below the topsoil to a depth of 15 feet and extended to termination or auger refusal depths. Backhoe refusal occurred at depths ranging from 1 to 16 feet. Only test pits TP-3, TP-4, TP-9, TP-14, TP-15, and TP-16 could be excavated to termination depths of 18 feet.

Groundwater was encountered in one test pit (test pit TP-3) at a depth of 9 feet at the time of excavation.

A summary of the subsurface conditions encountered at the test pit locations are summarized in Table 1 below.

TABLE 1: SUMMARY OF SUBSURFACE CONDITION AT TEST PIT LOCATIONS

Boring No.	Depth to Hard Excavation (feet)	Depth to Backhoe Refusal (feet)	Termination Depth (feet)	Depth to Groundwater (feet)
TP-1	6	8	NA	NE
TP-2	7	9	NA	NE
TP-3	NE	NE	18	9
TP-4	15	NE	18	NE
TP-5	0	3	NA	NE
TP-6	2	4	NA	NE
TP-7	1	4	NA	NE
TP-8	6	11	NA	NE
TP-9	NE	NE	18	NE
TP-10	3	6	NA	NE
TP-11	4	8	NA	NE
TP-11A	NE	1	NA	NE
TP-11B	4	6	NA	NE
TP-11C	NE	4	NA	NE
TP-12	NE	3	NA	NE
TP-12A	4	6	NA	NE
TP-12B	NE	1	NA	NE
TP-13	4	5.5	NA	NE
TP-13A	2	3.5	NA	NE
TP-13B	2	3	NA	NE
TP-14	6	NE	18	NE
TP-15	5	NE	18	NE
TP-16	7	NE	18	NE
TP-17	5	14.5	NA	NE
TP-18	8	11.5	NA	NE
TP-19	6	11	NA	NE
TP-20	8	16	NA	NE

NE – Not Encountered
NA – Not Applicable

5.2 Standard Penetration Test Data

Initially, the borings encountered a thin layer of topsoil. Below the topsoil, typical residual soils of the Piedmont Physiographic Province of Georgia were encountered. The residual soils encountered generally consisted of very loose to very dense sand with varying amounts of silt, mica, and clay. The residual soils also contained layers of firm to very stiff silt with varying amounts of sand and trace amounts of clay, or firm to stiff sandy clay with trace amounts of silt and rock fragments. The Standard Penetration Test resistances (N-values) within the residual sand soils ranged from 3 to 60 bpf whereas those within the residual silt and clay soils ranged from 6 to 23 bpf. Low consistency (N-values ≤ 7) soils were encountered within the top 2 to 3 feet in borings B-3, B-4, B-8, B-12A, B-13, B-15, B-19, B-20, B-21, and B-22.

Partially Weathered Rock (PWR) was encountered in seventeen of the thirty borings and offset borings at depths ranging from 3 to 19.5 feet. Also, a lens of PWR was encountered in boring B-2 from 8 to 13 feet, boring B-2 from 13 to 18 feet, and in boring B-17 from 8 to 18 feet. PWR is a term for residuum that can be penetrated with soils drilling auger but has N-values in excess of 100 bpf. The Partially Weathered Rock was sampled as very dense sand with varying amounts of silt, mica, and clay.

Auger refusal occurred in sixteen of the borings and offset borings at depths ranging from 3 feet to 17 feet. Auger refusal is the depth that the boring cannot be advanced with soils drilling auger. Auger refusal below residual soils generally represents a seam of dense PWR, boulders, or top of massive bedrock.

Groundwater was encountered at the time of drilling in boring B-21 at a depth of 10 feet. Groundwater levels should be anticipated to fluctuate with the change of seasons, during periods of very low or high precipitation, or due change in floodplain or watershed upstream of the site.

A summary of the subsurface conditions encountered at the test pit locations are summarized in Table 2 below.

TABLE 2: SUMMARY OF SUBSURFACE CONDITION AT BORING LOCATIONS

Boring No.	Depth to PWR (feet)	Depth to Auger Refusal (feet)	Termination Depth (feet)	Depth to Groundwater (feet)
B-1	9.5	10	NA	NE
B-1A	13	17	NA	NE
B-2	8 to 13	NE	20	NE
B-3	13 to 18	NE	20	NE
B-4	NE	16	NA	NE
B -5	19.5	NE	20	NE
B -6	3	5	NA	NE
B -6A	3	5	NA	NE
B -7	3	6	NA	NE
B 7A	NE	3	NA	NE
B -8	NE	NE	20	NE
B -9	NE	11	NA	NE
B -10	13	NE	20	NE
B -11	8	15	NA	NE
B -12	8	10	NA	NE
B -12A	3	9	NA	NE
B -13	3	16	NA	NE
B -14	13	16	NA	NE
B -15	8	14	NA	NE
B -16	13	14	NA	NE
B -17	8 to 18	NE	20	NE
B -18	8	NE	20	NE
B -19	NE	12	NA	NE
B -19A	13	NE	20	NE
B -20	NE	NE	20	NE
B -21	NE	NE	20	10
B -22	4	NE	20	NE
B -23	NE	NE	20	NE
B -24	NE	NE	20	NE
B -25	NE	NE	20	NE

NE – Not Encountered
NA – Not Applicable
PWR – Partially Weathered Rock

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

6.0 LABORATORY TESTING PROGRAM

Laboratory testing for this project included ten (10) natural moisture content tests and two (2) Standard Proctor (ASTM D-698) test. The results of the moisture content tests are shown on boring logs next to the respective samples tested. The result of the Standard Proctor test is provided in the Appendix to this report. Based on the laboratory test results, the maximum dry density of the soil samples obtained ranged from 107.2 to 109.6 pcf with an optimum moisture content ranging from 16.4% to 15.1%. The soils were classified as sand with varying amounts of silt. The natural moisture content for the samples tested ranged from 12.3% to 26.8% which indicated that some on-site samples have moisture contents significantly higher or lower than the optimum moisture content. However, depending on the time of construction, the natural moisture content could be different than those observed. These soils, if removed, will likely require drying or wetting to achieve proper compaction. A narrative description of the laboratory tests is included in The Appendix.

Three (3) field volume change tests were performed on soil samples obtained at selected locations. The tests were performed by measuring the volume of the in-situ soil with respect to the volume of the disturbed soil. The following table summarized the location, depths and result of the tests.

Sample Location	Volume Change
B-10 at 0 to 5 feet	28.8%
B-12 at 3 to 5 feet	25.9%
B-4 at 3 to 5 feet	17.3%

7.0 DISCUSSION AND RECOMMENDATIONS

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

United Consulting requests the opportunity for a general review of final design documents and specifications in order to verify that earthwork and foundation recommendations have been properly interpreted and implemented in the design and specifications. We recommend that United Consulting, as the Geotechnical Engineer of Record, be consulted during construction to conduct Geotechnical Controls as the Owner's Representative.

7.1 Site Preparation

Prior to development, the existing vegetation and trees including their root mat should be removed from the area of the proposed construction. Removal of trees should include removal of their root ball, which may extend to several feet below grade. Existing trash and debris or other remnants of prior construction should also be completely removed.

After clearing the site and lowering the site grade where planned and prior to placement of engineered fill or commencement of construction, areas to receive fill, foundations, slabs, and pavements, including the area of the proposed structures, should be proofrolled with a fully loaded tandem-axle dump truck. Proofrolling should be performed under the observation of the Geotechnical Engineer or his representatives so that, areas, which exhibit "pumping" (wave type displacement) during proofrolling, may be treated by a method recommended by the Geotechnical Engineer. This method may consist of undercutting, and backfilling with suitable engineered fill, replacing with surge stone, and a layer of crusher run, or some other method that is deemed suitable. We anticipate that the low consistency near surface residual soil, if not removed, should be densified during proofrolling. However, deeper low consistency soils if encountered will likely require over-excavation and replacement as engineered fill.

7.2 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.

7.3 Difficult Excavation

Partially Weathered Rock (PWR) in twenty of the thirty boring locations at depths of 3 to 19.5 feet. Hard excavation occurred in majority of the test pits at depths of 0 to 15 feet with backhoe refusal at depths of 1 to 16 feet. Auger refusal due to rock or boulder occurred in 16 of the borings at depths 3 to 17 feet. Therefore, difficult excavation conditions and reduced excavation rates, including blasting, associated with PWR and rock should be expected for this project.

Conventional scrapers and loaders can generally excavate soils. Lower consistency PWR (50/6", 50/5" and 50/4") typically requires loosening by ripping with large bulldozers pulling single tooth rippers in mass and trench excavation. Denser PWR (50/3" or denser) may be removed by ripping using large dozer pulling single tooth ripper in mass excavation but generally requires blasting in confined (trench) excavation. Relatively sound, massive, rock typically requires blasting for removal in mass or trench excavation.

7.4 Earthwork

The onsite soils should generally be suitable for reuse as engineered fill with proper moisture control. Due to the presence of high silt contents, some of the onsite soil may be sensitive to moisture variation. During rainy seasons, these soils may become unstable and their reuse as

engineered fill may not be feasible. These soils should be placed within a narrow range of their optimum moisture content 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.

7.5 Groundwater Considerations

Groundwater was encountered in boring B-21 and test pit TP-3 at a depth of 10 and 9 feet, respectively. None of the other test holes encountered groundwater at the time of testing. However, due to the presence of soils containing high silt content, the site is susceptible to formation of perched water after rainfall. The contractor should be prepared to remove perched water and/or groundwater as needed. Also, groundwater may have an impact on grading and construction in the low lying areas near the creek.

7.6 Shrinkage Factor

Based on the subsurface exploration and our experience with similar soils, we recommend that a shrinkage factor of 25% be use for the earthwork calculations for this project.

7.7 Slopes

The topography at the site is moderately sloping terrain, except for the steeper sloping northern areas. We recommend that where fill is to be placed on existing slopes or gullies greater than 4(H):1(V), the slopes be benched to prevent sliding of the fill mass along the existing surface. This can be achieved by notching the slope face by at least about two feet horizontally with the compactor blade as each lift is compacted. A typical benching detail is provided in The Appendix.

Permanent slopes should be constructed no steeper than 2(H):1(V). Fill slopes of up to 20 feet in total height constructed to 2(H): 1(V) should be acceptable for this project, assuming proper benching, and placement and compaction of engineered fill. Fill slopes greater than 20 feet must be designed by a licensed professional engineer. If less than desirable soils, such as topsoil, or wet soils are to be wasted on slopes, or if an appropriate level of quality control and compaction testing under the supervision of the geotechnical engineer is not planned during slope construction, 2(H): 1(V) slopes will not likely be adequate and flatter slopes should be considered.

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.

A minimum building or retaining wall setback (from the nearest edge of foundations) of at least 10 feet from the crest of slopes is recommended. A minimum setback of 5 feet is recommended for pavement and curbs.

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.

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.

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.

7.9 Foundation Design and Construction

Following site preparation as recommended, including densification of the near surface low consistency residual soils, the proposed lightly loaded single family residential buildings can be supported on a shallow foundation system. The shallow foundations may consist of shallow strip and/or isolated column footings supported within and underlain by suitable bearing soils. Based on the subsurface exploration data obtained, a maximum net allowable soil bearing pressure of 3,000 pounds per square foot (psf) is recommended for foundation design.

Much higher allowable bearing pressures are available for foundations bearing in PWR or rock. However, we suggest that a single bearing capacity be used for the building. In the area of the proposed building, where PWR or rock is present at the foundation bearing level, we suggest that the building area be excavated to a level below the bottom of footings and under-floor utilities and brought back to grade with compacted soil. This will mitigate the high cost of isolated excavations in PWR and rock, avoid possible damage to piping laid over an irregular rock surface, and decrease the potential for abrupt differential settlement where footings transition from PWR or rock to soil.

We recommend minimum footing dimensions of 20 inches for strip footings and 24 inches for square footings. Footings should bear at least 12 inches below outside finished grades for frost protection.

The Geotechnical Engineer must evaluate each footing excavation prior to steel reinforcement or concrete placement. Conditions that are observed should be compared to the test boring data and design requirements. If unsuitable bearing material is encountered, it should be excavated and replaced or otherwise treated as recommended by the Geotechnical Engineer.

Surface water control should be maintained to prevent accumulation of water in footing excavations. Standing water in footing excavations should be removed promptly. Soil softened by the water should be removed, and the Geotechnical Engineer or his representative should reexamine the area.

7.10 Ground Floor Slabs

A slab-on-grade may be utilized for the proposed timber frame structures. We recommend a subgrade modulus of 125 pounds per cubic inch (pci) be used for slab design. It has been our experience that the floor slab subgrade is often disturbed by weather, foundation and utility line installation, and other construction activities between completion of grading and slab construction. For this reason, our geotechnical engineer should evaluate the subgrade immediately prior to placing the concrete. Areas judged by the geotechnical engineer to be unstable should be redensified or undercut and replaced with engineered soil fill compacted to at least 98 percent of its standard Proctor maximum dry density.

7.11 Retaining Walls

The following retaining wall recommendations pertain to cast-in-place building and site retaining walls and are not intended for modular block or MSE walls. If modular block or MSE walls are planned on the site, United Consulting should be notified because additional evaluation will be required to provide recommendations specific to the planned wall types and locations.

The design of retaining walls must include the determination of the lateral pressure that will act on the wall. The lateral earth pressure is a function of the soil properties, surcharge loads behind the wall, and amount of deformation that the wall can undergo. This deformation is basically dependent upon the relative rigidity of the wall system.

The active earth pressure condition develops when the wall moves away from the soil over a sufficient distance, such as for a freestanding cantilever wall. The at-rest condition exists when there is no lateral strain on the soil, such as walls, which are rigidly restrained like a basement or sub-foundation wall. The passive condition occurs when the wall moves into the soil.

The following equivalent fluid pressures are recommended for three earth pressure conditions.

TABLE 1 - LATERAL EARTH PRESSURES

Earth Pressure Condition	Earth Pressure Coefficient	Recommended Equivalent Fluid Pressure
Active	$K_A = 0.33$	40 psf/foot
At-Rest	$K_O = 0.50$	60 psf/foot
Passive	$K_P = 3.00$	360 psf/foot

We note that considerable horizontal deflections are required to mobilize the passive pressure; therefore, the designer should consider a safety factor of 2 to the stated ultimate passive earth pressure in design.

The recommended equivalent fluid pressures are based on an assumed soil density of 120 pcf, an internal friction angle of 30 degrees and cohesion of zero. A preliminary allowable bearing pressure of up to 3,000 psf and a coefficient of friction of 0.36 for sliding may be used for the retaining wall design.

The parameters listed above are based on a level properly compacted backfill, no friction at the wall-soil interface, and no surcharge effects. For design of retaining walls, which could be inundated, the buoyant unit weight of the inundated soil should be used to determine the lateral earth pressure. The hydrostatic pressure based on the maximum ponding elevation should be utilized in the analysis.

Heavy compaction equipment should not be used to compact backfill within 5 feet laterally behind any retaining wall unless the wall is designed for the increased pressure or temporarily braced. Therefore, light compaction equipment may be required in this zone. Retaining wall backfill should be compacted to 95 percent of the Standard Proctor maximum dry density. A permanent drainage system such as a footing drain, or a fabric drain such as Enka drain, Mira drain, etc., is recommended for any retaining walls which are more than 5 feet in height.

The retaining walls should be designed by a professional engineer familiar with retaining wall design and registered in Georgia. The designer should consider sloping backfill, surcharges and other factors affecting wall loadings.

7.12 Pavement Design Recommendations

An estimated CBR value of 4 has been used in flexible pavement thickness design for the proposed parking and driveway areas. This value corresponds to a vertical subgrade modulus (k) value of approximately 125 pci for rigid pavement design. This assumed CBR value is based on our experience with similar soil types; no CBR tests were performed.

For pavement areas subjected to an assumed average daily traffic volume of up to 400 cars per day, and up to five (5) semi-tractor trailer (maximum wheel load of 9,000 lbs.) trucks per week, we recommend a minimum pavement section consisting of 1.5 inch of asphalt (9.5 mm Superpave or type "E" or "F") underlain by 2.0 inches of binder (19 mm Superpave or type "B")

over 6 inches of graded aggregate base (GAB). This is the minimum section recommended in any area where a truck may have access, whether truck traffic is planned or not. If more trucks including garbage trucks, etc. are anticipated, this section should be increased to reflect the heavier loading.

For light duty areas restricted to passenger cars traffic only with an average maximum daily traffic of approximately 400 cars and an occasional delivery truck per week, we recommend a minimum pavement section consisting of 2.0 inches of asphalt (9.5 mm Superpave or type "E" or "F") underlain by 6.0 inches of graded aggregate base (GAB).

We recommend that the subgrade beneath all pavement areas be compacted to at least 98% of the Standard Proctor density in the upper two feet below subgrade, and to at least 95% of the Standard Proctor maximum dry density elsewhere. We recommend that the graded aggregate base course for each of the preceding pavement sections be compacted to 100% of the materials modified proctor value (ASTM D-1557). Also, all subgrades, base and asphalt materials, concrete, and construction procedures conform to Georgia DOT "Standard Specifications Construction for Transportation Systems", 2013 Edition.

We recommend that a rigid (concrete) slab at least 6-inches thick using 4,000 psi concrete over 12 inches of prepared subgrade be used for dumpster pad areas, if any. These pads should be large enough to accommodate the front wheels of the dumpster truck when the dumpster is being emptied. Concrete pavement is also recommended in any loading areas where heavy trucks will maneuver or trailer jacks will be supported.

The pavement sections selected will require adequate drainage to provide long-term serviceability. Pavement areas should be sloped to drain and ditches or underdrains should be incorporated to promote drainage away from the pavement areas. The most critical factor in providing long-term serviceability for a pavement is a well-prepared, uniform, subgrade. Areas which are not adequately prepared by thorough proofrolling and treating of soft or wet areas can result in potholes or cracking. Even though the potholes will affect only a small percentage of the pavement, the overall pavement serviceability will be significantly reduced.

Pavement should be installed late in construction when most heavy construction traffic will no longer come on-site. If desired, a layer of crushed stone or graded aggregate base can be placed earlier to provide a working surface. However, this is a convenience and some loss of usable stone should be expected. Prior to paving, the site should be proofrolled again, new soft areas treated, the base leveled and thickened as required, and the site paved at the end of construction. This will reduce pavement damage due to construction traffic.

8.0 LIMITATIONS

This report is for the exclusive use of **Macallan Real Estate,** and the designers of the project described herein, and may only be applied to this specific project. Our conclusions and recommendations have been prepared using generally accepted standards of Geotechnical

Engineering practice in the State of Georgia. No other warranty is expressed or implied. Our firm is not responsible for conclusions, opinions or recommendations of others.

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

The scope of this evaluation was limited to an evaluation of the load-carrying capabilities and stability of the subsoils. 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.

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APPENDIX A

General Notes /Narrative of Drilling Operations
Figure 1 – Boring and Test Pit Location Plan
Exploration and Laboratory Procedures
SPT Boring Logs (30)
Test Pit Logs (27)
Moisture Density Relationship (2)
Typical Benching Detail

GENERAL NOTES

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

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

LEGEND

Split Spoon Sample obtained during Standard Penetration Testing

Relatively Undisturbed Shelby Tube Sample

Groundwater Level at Time of Boring Completion

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

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

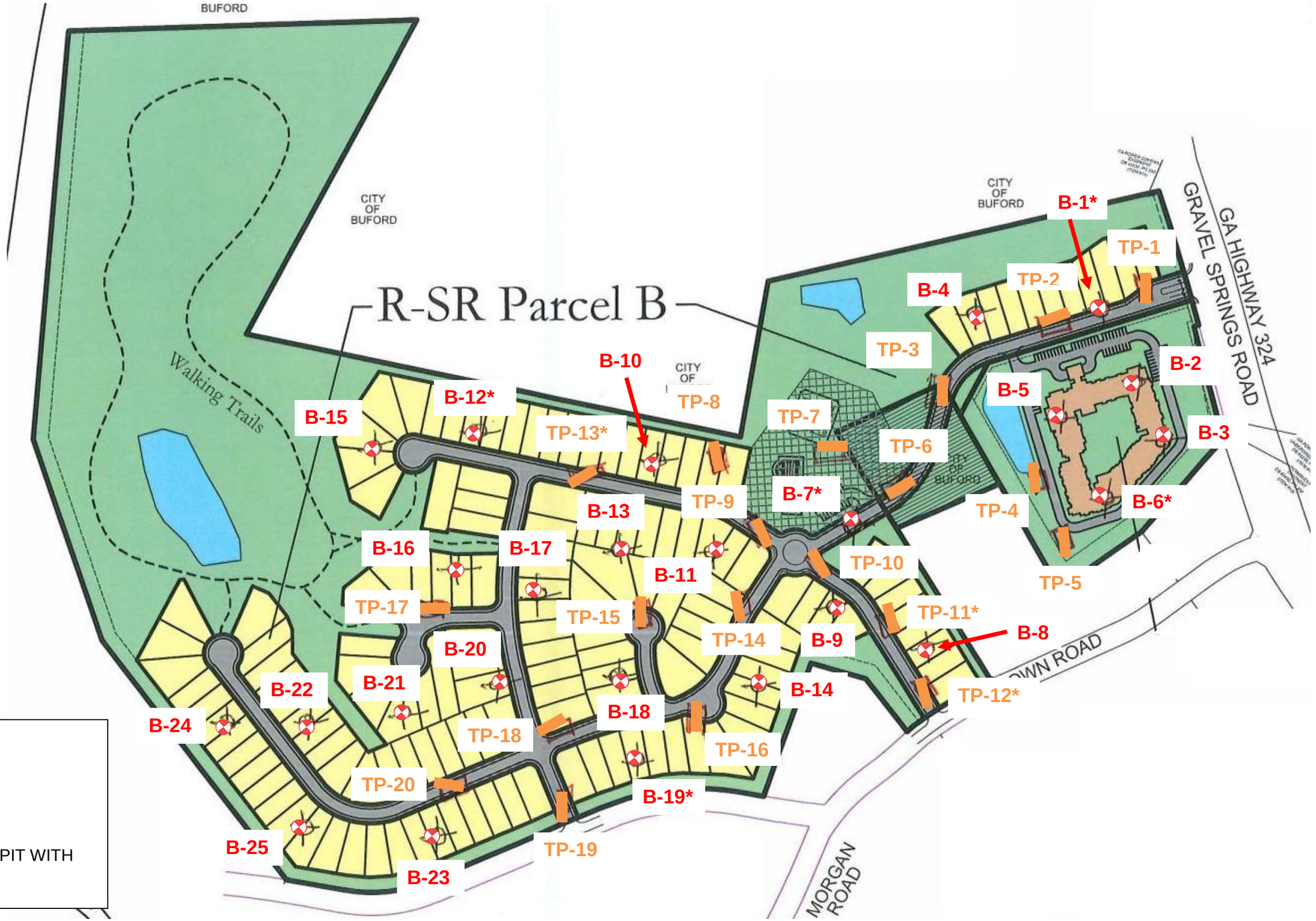
BORING LOG DATA AND NARRATIVE OF DRILLING OPERATIONS

The test borings were made by mechanically advancing helical hollow stem augers into the ground. Samples were covered 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 of a 140 pound hammer freely falling a distance of 30". The number of blows required to drive the sampler each six inches is recorded on the Boring Logs. The total number of blows required to drive the sampler the final foot is designated the "standard penetration resistance." This driving resistance, known as the "N" value, is a measure of the relative density of granular soils and is an indication of the consistency of cohesive deposits.

The Following table describes soil consistencies and relative densities based on standard-penetration resistance values (N) determined by the Standard Penetration Test.

	"N"	Consistency
	0-2	Very Soft
	3-4	Soft
	5-8	Firm
Clay and Silt	9-15	Stiff
	16-30	Very Stiff
	Over 31	Hard

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



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Scale:	NTS
Prepared:	SRT
Checked:	MM
Date:	03/28/2017

Title: Boring and Test Pit Location Plan

Client:	Macallan Group
Project:	Gravel Springs Road Tract
Project No.:	2017.1076.02

FIG. 1

EXPLORATION PROCEDURES

Twenty five (25) SPT borings (designated B-1 through B-25), five (5) offset borings, twenty (20) test pits (designated as test pits TP-1 to TP-20), and seven (7) offset test pits were performed at the approximate locations indicated on the attached Boring & Test Pit Location Plan (Figure 1). The SPT borings were performed in general accordance with ASTM D 1586. 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 test locations in the field were determined by the Project Engineer by measuring distances and estimating angles from existing site features. The test locations should, therefore, be considered approximate.

LABORATORY PROCEDURE

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. These moisture contents may be found at the appropriate depths on the respective Boring Logs and are denoted by "w".

Soil Compaction (Standard/Modified Proctor Test)

This test determines the maximum dry density that could be achieved by using a uniform compactive effort at varying moisture contents. Two primary methods of compaction are used. For standard Proctor, 5.5-lb (2.49-kg) rammer is dropped 12 inches (305-mm) and for modified Proctor, 10-lb (4.54-kg) rammer is dropped 18 inches (457-mm) for compaction on the bulk sample in the cylindrical mold. Compaction is done in 3 and 5 equal layers respectively. The methods are explained in ASTM D 698 and ASTM D 1557, respectively.

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BORING LOG

CONTRACTED WITH: Macallan Group BORING NO.: B-1
PROJECT NAME: Gravel Springs Road Tract DATE: 3/22/2017
JOB NO.: 2017.1076.02 DRILLER: Mike RIG: CME 450 LOGGED BY: TH

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	2" Topsoil	0						
	Sand - some silt, trace clay and mica; firm; tan-brown (Residual)		1		6-7-8	16	22.6	
	- dense; tan-yellow	5	2		15-19-13	16	12.3	
		10	3		13-20-50/1	14		
	Partially Weathered Rock Sampled as: Sand - trace silt and clay; very dense; tan							Groundwater was not encountered at the time of drilling.
	AUGER REFUSAL AT 10 FEET	15						
		20						
		25						
		30						
		35						
		40						

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BORING LOG

CONTRACTED WITH: Macallan Group | BORING NO.: B-1A
PROJECT NAME: Gravel Springs Road Tract | DATE: 3/23/2017
JOB NO.: 2017.1076.02 | DRILLER: Mike | RIG: CME 450 | LOGGED BY: TH

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	2" Topsoil	0						
	Sand - trace silt, clay, mica, and rock fragments; loose; yellow-brown (Residual)		1		5-5-5	16		
	- some silt; firm	5	2		7-9-9	16		
	- dense; tan intrusions	10	3		9-14-30	16		
	Partially Weathered Rock	15	4		50/0	0		
	AUGER REFUSAL AT 17 FEET	20						Groundwater was not encountered at the time of drilling.
		25						
		30						
		35						
		40						

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BORING LOG

CONTRACTED WITH: Macallan Group BORING NO.: B-2
PROJECT NAME: Gravel Springs Road Tract DATE: 3/23/2017
JOB NO.: 2017.1076.02 DRILLER: Mike RIG: CME 450 LOGGED BY: TH

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	4" Topsoil	0						
	Sand - some silt, trace clay and mica; medium dense; yellow-brown (Residual)		1		3-8-15	12		
	- dense; tan-brown	5	2		19-23-23	18		
	Partially Weathered Rock Sampled As: Sand - silty, some mica, trace clay and rock fragments; very dense; tan-brown	10	3		9-50/6	12		
	Sand - silty, some mica, trace clay; firm; light tan	15	4		5-5-7	16		
	- tan grey	20	5		22-10-9	16		Moist
	BORING TERMINATED AT 20 FEET	25						Groundwater was not encountered at the time of drilling.
		30						
		35						
		40						

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BORING LOG

CONTRACTED WITH: Macallan Group | BORING NO.: B-3
PROJECT NAME: Gravel Springs Road Tract | DATE: 3/23/2017
JOB NO.: 2017.1076.02 | DRILLER: Mike | RIG: CME 450 | LOGGED BY: TH

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	6" Topsoil	0						
	Sand - some clay, trace silt and root hairs; loose; red-brown (Residual)		1		3-3-4	12		
	- trace clay and rock fragments; dense	5	2		14-19-16	16		
	- very dense; white-tan	10	3		23-34-25	14		
	Partially Weathered Rock Sampled As: Sand - some mica, trace silt, clay, and rock fragments; very dense; light tan	15	4		41-24-50/6	16		
	Sand - some mica and silt, trace clay; dense; tan yellow	20	5		19-17-17	16		
	BORING TERMINATED AT 20 FEET	25						Groundwater was not encountered at the time of drilling.
		30						
		35						
		40						

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BORING LOG

CONTRACTED WITH: Macallan Group | BORING NO.: B-4
PROJECT NAME: Gravel Springs Road Tract | DATE: 3/23/2017
JOB NO.: 2017.1076.02 | DRILLER: Mike | RIG: CME 450 | LOGGED BY: TH

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	2" Topsoil	0						
	Silt - sandy, trace clay; firm; brown (Residual)		1		3-3-3	14	26.8	
	Sand - some silt, trace silt, clay, and mica; medium dense; light brown	5	2		4-8-12	14	24.0	
	- medium dense; tan-gray	10	3		15-15-11	16	13.9	
	Silt - some sand, trace clay and mica; very stiff; light gray-white	15	4		14-12-11	16		Moist
	AUGER REFUSAL AT 16 FEET	20						Groundwater was not encountered at the time of drilling.
		25						
		30						
		35						
		40						

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BORING LOG

CONTRACTED WITH: Macallan Group | BORING NO.: B-5
PROJECT NAME: Gravel Springs Road Tract | DATE: 3/23/2017
JOB NO.: 2017.1076.02 | DRILLER: Mike | RIG: CME 450 | LOGGED BY: TH

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	2" Topsoil	0						
	Sand - clayey, some silt, trace root hairs; firm; red brown (Residual)		1		6-6-7	6		
	- trace clay and mica, no root hairs; very dense; yellow tan	5	2		40-32-27	14		
	- firm; tan-brown	10	3		10-10-9	16		
	- medium dense	15	4		9-11-9	16		Moist
		20	5		9-10-50/2	14		
	Partially Weathered Rock Sampled As: Sand - silty, trace clay and mica; very dense; white-tan							Groundwater was not encountered at the time of drilling.
	BORING TERMINATED AT 20 FEET							
		25						
		30						
		35						
		40						

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BORING LOG

CONTRACTED WITH: Macallan Group BORING NO.: B-6
PROJECT NAME: Gravel Springs Road Tract DATE: 3/23/2017
JOB NO.: 2017.1076.02 DRILLER: Mike RIG: CME 450 LOGGED BY: TH

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	3" Topsoil	0						
	Clay - sandy, trace silt, rock fragments, and root hairs; firm; orange-brown (Residual)		1		6-5-3	16		
	Partially Weathered Rock Sampled As: Sand - clayey, trace silt and mica; very dense; white-tan	5	2		50/6	16		
	AUGER REFUSAL AT 5 FEET	10						Groundwater was not encountered at the time of drilling.
		15						
		20						
		25						
		30						
		35						
		40						

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BORING LOG

CONTRACTED WITH: Macallan Group | BORING NO.: B-6A
PROJECT NAME: Gravel Springs Road Tract | DATE: 3/23/2017
JOB NO.: 2017.1076.02 | DRILLER: Mike | RIG: CME 450 | LOGGED BY: TH

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	3" Topsoil	0						Offset 20' South from B-6
	Clay - sandy, trace silt, rock fragments, and root hairs; stiff; orange-brown (Residual)		1		4-5-4	16		
	Partially Weathered Rock Sampled As: Sand - clayey, trace silt and mica; very dense; white-tan	5	2		50/6	16		
	AUGER REFUSAL AT 5 FEET	10						Groundwater was not encountered at the time of drilling.
		15						
		20						
		25						
		30						
		35						
		40						

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BORING LOG

CONTRACTED WITH: Macallan Group BORING NO.: B-7
PROJECT NAME: Gravel Springs Road Tract DATE: 3/22/2017
JOB NO.: 2017.1076.02 DRILLER: Mike RIG: CME 450 LOGGED BY: TH

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	3" Topsoil	0						
	Sand - silty, trace clay; medium dense; light tan (Residual)		1		5-12-10	16		
	Partially Weathered Rock Sampled As: Sand - silty, trace clay and mica; very dense; light-tan	5	2		13-24-50/6	16		
	AUGER REFUSAL AT 6 FEET	10						Groundwater was not encountered at the time of drilling.
		15						
		20						
		25						
		30						
		35						
		40						

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BORING LOG

CONTRACTED WITH: Macallan Group BORING NO.: B-7A
PROJECT NAME: Gravel Springs Road Tract DATE: 3/22/2017
JOB NO.: 2017.1076.02 DRILLER: Mike RIG: CME 450 LOGGED BY: TH

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	3" Topsoil	0						
	Sand - some silt, trace clay; dense; light tan (Residual)		1		7-15-15	16		
	AUGER REFUSAL AT 3 FEET	5						Groundwater was not encountered at the time of drilling.
		10						
		15						
		20						
		25						
		30						
		35						
		40						

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BORING LOG

CONTRACTED WITH: Macallan Group | BORING NO.: B-8
PROJECT NAME: Gravel Springs Road Tract | DATE: 3/22/2017
JOB NO.: 2017.1076.02 | DRILLER: Mike | RIG: CME 450 | LOGGED BY: TH

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	2" Topsoil	0						
	Sand - some silt and clay, trace root hairs; loose; red-brown (Residual)		1		2-3-3	18		
	- dense; tan-orange	5	2		13-24-13	18		
	- trace mica; tan	10	3		20-21-12	16		
	- silty; medium dense	15	4		13-13-13	16		
	- some mica; dense; brown	20	5		13-14-21	16		
	BORING TERMINATED AT 20 FEET	25						Groundwater was not encountered at the time of drilling.
		30						
		35						
		40						

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BORING LOG

CONTRACTED WITH: Macallan Group BORING NO.: B-9
PROJECT NAME: Gravel Springs Road Tract DATE: 3/22/2017
JOB NO.: 2017.1076.02 DRILLER: Mike RIG: CME 450 LOGGED BY: TH

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	4" Topsoil	0						
	Sand - some silt and clay, trace root hairs and rock fragments; firm; red brown (Residual)		1		4-5-9	16		
	- medium dense; brown-tan	5	2		13-13-13	16		
	- dense; tan	10	3		5-9-21	16		
	AUGER REFUSAL AT 11 FEET	15						Groundwater was not encountered at the time of drilling.
		20						
		25						
		30						
		35						
		40						

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BORING LOG

CONTRACTED WITH: Macallan Group | BORING NO.: B-10
PROJECT NAME: Gravel Springs Road Tract | DATE: 3/23/2017
JOB NO.: 2017.1076.02 | DRILLER: Mike | RIG: CME 450 | LOGGED BY: TH

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	5" Topsoil	0						
	Sand - trace silt, clay, and root hairs; firm; yellow-brown (Residual)		1		6-8-8	12		
	- some silt; medium dense; tan-brown	5	2		13-11-13	16	14.1	
	- some clay; medium dense; tan	10	3		13-11-11	16		
	Partially Weathered Rock Sampled As: Sand - silty, trace clay and mica; very dense; light-brown	15	4		50/1	1		
		20	5		50/0	0		
	BORING TERMINATED AT 20 FEET	25						Groundwater was not encountered at the time of drilling.
		30						
		35						
		40						

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BORING LOG

CONTRACTED WITH: Macallan Group | BORING NO.: B-11
PROJECT NAME: Gravel Springs Road Tract | DATE: 3/23/2017
JOB NO.: 2017.1076.02 | DRILLER: Mike | RIG: CME 450 | LOGGED BY: TH

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	2" Topsoil	0						
	Sand - some clay, trace silt and root hairs; firm; red-brown (Residual)		1		6-8-10	12		
	- some silt; firm; light tan	5	2		15-10-6	16		
	Partially Weathered Rock Sampled As: Sand - trace clay, silt, rock fragments, and mica; very dense; white-gray	10	3		50/0	0		
		15	4		50/5	4		
	AUGER REFUSAL AT 15 FEET	20						Groundwater was not encountered at the time of drilling.
		25						
		30						
		35						
		40						

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BORING LOG

CONTRACTED WITH: Macallan Group | BORING NO.: B-12
PROJECT NAME: Gravel Springs Road Tract | DATE: 3/23/2017
JOB NO.: 2017.1076.02 | DRILLER: Mike | RIG: CME 450 | LOGGED BY: TH

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	3" Topsoil	0						
	Sand - some clay, trace silt, rock fragments, and root hairs; loose; yellow brown (Residual)		1		2-3-5	14	22.5	
	- some silt, trace clay; medium dense; yellow tan	5	2		10-15-12	14	13.9	
	Partially Weathered Rock Sampled As: Sand - silty, trace clay, rock fragments, and mica; very dense; white-tan	10	3		29-50/4	10		
	AUGER REFUSAL AT 10 FEET	15						Groundwater was not encountered at the time of drilling.
		20						
		25						
		30						
		35						
		40						

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BORING LOG

CONTRACTED WITH: Macallan Group | BORING NO.: B-12A
PROJECT NAME: Gravel Springs Road Tract | DATE: 3/23/2017
JOB NO.: 2017.1076.02 | DRILLER: Mike | RIG: CME 450 | LOGGED BY: TH

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	3" Topsoil	0						
	Sand - trace silt, clay, rock fragments, and root hairs; loose; brown (Residual)		1		2-2-3	14		
	Partially Weathered Rock Sampled As: Sand - trace silt, clay, rock fragments, and mica; very dense; white-tan	5	2		50/6	6		
	- some silt		3		50/1	1		Groundwater was not encountered at the time of drilling.
	AUGER REFUSAL AT 9 FEET	10						
		15						
		20						
		25						
		30						
		35						
		40						

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BORING LOG

CONTRACTED WITH: Macallan Group | BORING NO.: B-13
PROJECT NAME: Gravel Springs Road Tract | DATE: 3/23/2017
JOB NO.: 2017.1076.02 | DRILLER: Mike | RIG: CME 450 | LOGGED BY: TH

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	2" Topsoil	0						
	Sand - some silt, trace clay; loose; brown (Residual)		1		4-3-3	18		
	Partially Weathered Rock Sampled As: Sand - some silt, trace rock fragments and clay; very dense; yellow-tan	5	2		22-50/4	10		
	- silty, some mica	10	3		50/6	6		
	- some rock fragments, trace silt; white-tan	15	4		39-50/6	12		
	AUGER REFUSAL AT 16 FEET	20						Groundwater was not encountered at the time of drilling.
		25						
		30						
		35						
		40						

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BORING LOG

CONTRACTED WITH: Macallan Group | BORING NO.: B-14
PROJECT NAME: Gravel Springs Road Tract | DATE: 3/24/2017
JOB NO.: 2017.1076.02 | DRILLER: Mike | RIG: CME 450 | LOGGED BY: TH

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	3" Topsoil	0						Offset 30' SW due to slope
	Sand - some clay, trace silt ; firm; red-brown (Residual)		1		4-6-7	12		
	- some silt, trace clay	5	2		8-8-9	10		
	- trace silt and mica; dense; light gray	10	3		32-29-14	14		
	Partially Weathered Rock Sampled As: Sand - trace silt, rock fragments, and clay; very dense; yellow-gray	15	4		16-26-50/2	12		
	AUGER REFUSAL AT 16 FEET	20						Groundwater was not encountered at the time of drilling.
		25						
		30						
		35						
		40						

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BORING LOG

CONTRACTED WITH: Macallan Group | BORING NO.: B-15
PROJECT NAME: Gravel Springs Road Tract | DATE: 3/24/2017
JOB NO.: 2017.1076.02 | DRILLER: Mike | RIG: CME 450 | LOGGED BY: TH

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	3" Topsoil	0						
	Sand - some clay, trace silt ; loose; brown (Residual)		1		2-3-2	16	14.4	
	- medium dense; tan-white	5	2		9-17-11	14	18.5	
	Partially Weathered Rock	10	3		50/0	0		
	AUGER REFUSAL AT 14 FEET	15	4		50/0	0		Groundwater was not encountered at the time of drilling.
		20						
		25						
		30						
		35						
		40						

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BORING LOG

CONTRACTED WITH: Macallan Group | BORING NO.: B-16
PROJECT NAME: Gravel Springs Road Tract | DATE: 3/24/2017
JOB NO.: 2017.1076.02 | DRILLER: Mike | RIG: CME 450 | LOGGED BY: TH

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	2" Topsoil	0						
	Sand - some clay, trace silt and root hairs; loose; red brown (Residual)		1		3-4-5	10		
	- some silt, trace clay; dense; light-brown	5	2		13-18-21	14		
	- very dense; yellow tan	10	3		20-21-30	16		
	Partially Weathered Rock Sampled As: Sand - some silt, trace clay and rock fragments; very dense; yellow tan	15	4		50/3	3		Groundwater was not encountered at the time of drilling.
	AUGER REFUSAL AT 14 FEET	20						
		25						
		30						
		35						
		40						

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BORING LOG

CONTRACTED WITH: Macallan Group | BORING NO.: B-17
PROJECT NAME: Gravel Springs Road Tract | DATE: 3/24/2017
JOB NO.: 2017.1076.02 | DRILLER: Mike | RIG: CME 450 | LOGGED BY: TH

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	2" Topsoil	0						
	Sand - some clay, trace silt and root hairs; firm; yellow-brown (Residual)		1		4-4-8	18		
	- some silt, trace clay; medium dense	5	2		17-10-10	14		
	Partially Weathered Rock Sampled As: Sand - some silt, trace clay and rock fragments; very dense; tan gray	10	3		50/1	0		
		15	4		50/6	6		
	Sand - some silt, trace clay; medium dense; light brown-yellow	20	5		22-11-9	18		
	BORING TERMINATED AT 20 FEET	25						Groundwater was not encountered at the time of drilling.
		30						
		35						
		40						

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BORING LOG

CONTRACTED WITH: Macallan Group | BORING NO.: B-18
PROJECT NAME: Gravel Springs Road Tract | DATE: 3/24/2017
JOB NO.: 2017.1076.02 | DRILLER: Mike | RIG: CME 450 | LOGGED BY: TH

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	2" Topsoil	0						
	Sand - some clay, trace silt and root hairs; firm; red-brown (Residual)		1		6-6-8	12		
	- tan	5	2		10-9-6	14		
	Partially Weathered Rock Sampled As: Sand - trace silt, clay, and rock fragments; very dense; yellow-tan	10	3		50/6	5		
		15	4		9-13-50/4	16		
		20	5		50/0	0		
	BORING TERMINATED AT 20 FEET	25						Groundwater was not encountered at the time of drilling.
		30						
		35						
		40						

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BORING LOG

CONTRACTED WITH: Macallan Group BORING NO.: B-19
PROJECT NAME: Gravel Springs Road Tract DATE: 3/24/2017
JOB NO.: 2017.1076.02 DRILLER: Mike RIG: CME 450 LOGGED BY: TH

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	2" Topsoil	0						
	Sand - some silt and clay, trace root hairs; very loose; dark brown (Residual)		1		2-1-2	14		
	- trace silt; medium dense; brown-tan	5	2		7-10-14	14		
	- firm; yellow-tan	10	3		40-10-6	16		
	AUGER REFUSAL AT 12 FEET	15						Groundwater was not encountered at the time of drilling.
		20						
		25						
		30						
		35						
		40						

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BORING LOG

CONTRACTED WITH: Macallan Group | BORING NO.: B-19A
PROJECT NAME: Gravel Springs Road Tract | DATE: 3/24/2017
JOB NO.: 2017.1076.02 | DRILLER: Mike | RIG: CME 450 | LOGGED BY: TH

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	2" Topsoil	0						Offset 10' S of B-19
	Sand - some silt and clay, trace root hairs; loose; dark brown (Residual)		1		3-5-4	10		
	- trace silt; firm; brown-tan	5	2		10-8-7	14		
	- trace clay and mica; firm; yellow-gray tan	10	3		10-7-7	12		
	Partially Weathered Rock Sampled As: Sand - micaceous, trace silt, clay, and rock fragments; very dense; gray brown	15	4		50/6	12		
	- some silt	20	5		50/4	4		
	BORING TERMINATED AT 20 FEET	25						Groundwater was not encountered at the time of drilling.
		30						
		35						
		40						

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BORING LOG

CONTRACTED WITH: Macallan Group BORING NO.: B-20
PROJECT NAME: Gravel Springs Road Tract DATE: 3/24/2017
JOB NO.: 2017.1076.02 DRILLER: Mike RIG: CME 450 LOGGED BY: TH

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	6" Topsoil	0						
	Sand - trace silt, clay, and root hairs; very loose; dark brown (Residual)		1		2-2-2	16		
	- medium dense; yellow brown	5	2		10-10-13	16		
	- trace mica and rock fragments; firm	10	3		6-8-11	16		
	- dense	15	4		17-18-25	14		
	- tan gray	20	5		18-18-14	16		
	BORING TERMINATED AT 20 FEET	25						Groundwater was not encountered at the time of drilling.
		30						
		35						
		40						

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BORING LOG

CONTRACTED WITH: Macallan Group | BORING NO.: B-21
PROJECT NAME: Gravel Springs Road Tract | DATE: 3/24/2017
JOB NO.: 2017.1076.02 | DRILLER: Mike | RIG: CME 450 | LOGGED BY: TH

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	3" Topsoil	0						
	Sand - some silt, trace clay ; very loose; light brown (Residual)		1		3-2-3	14		
	- some silt and rock fragments, trace mica; firm; yellow-tan	5	2		6-8-8	14		
	- no rock fragments; loose	10 ▽	3		4-3-3	16		Groundwater encountered at 10 feet at the time of drilling.
	- loose	15	4		4-4-4	18		
		20	5		3-3-5	12		
	BORING TERMINATED AT 20 FEET	25						
		30						
		35						
		40						

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BORING LOG

CONTRACTED WITH: Macallan Group | BORING NO.: B-22
PROJECT NAME: Gravel Springs Road Tract | DATE: 3/24/2017
JOB NO.: 2017.1076.02 | DRILLER: Mike | RIG: CME 450 | LOGGED BY: TH

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	2" Topsoil	0						
	Sand - trace silt and clay; very loose; brown (Residual)		1		2-2-2	16		
	Partially Weathered Rock Sampled As: Sand - some clay, trace silt; very dense; red brown	5	2		10-50/6	12		
	- some mica, trace clay; light gray	10	3		50/6	6		
	- some silt	15	4		50/6	6		
	- tan	20	5		50/4	4		
	BORING TERMINATED AT 20 FEET	25						Groundwater was not encountered at the time of drilling.
		30						
		35						
		40						

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BORING LOG

CONTRACTED WITH: Macallan Group | BORING NO.: B-23
PROJECT NAME: Gravel Springs Road Tract | DATE: 3/24/2017
JOB NO.: 2017.1076.02 | DRILLER: Mike | RIG: CME 450 | LOGGED BY: TH

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	6" Topsoil	0						
	Sand - some clay, trace silt and root hairs; loose; red brown (Residual)		1		2-3-7	16		
	- some silt and mica, trace clay; firm; brown	5	2		6-8-7	16		
	- trace silt; yellow tan	10	3		7-6-5	16		
	- some silt	15	4		6-7-8	14		
		20	5		8-8-8	16		
	BORING TERMINATED AT 20 FEET	25						Groundwater was not encountered at the time of drilling.
		30						
		35						
		40						

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BORING LOG

CONTRACTED WITH: Macallan Group BORING NO.: B-24
PROJECT NAME: Gravel Springs Road Tract DATE: 3/24/2017
JOB NO.: 2017.1076.02 DRILLER: Mike RIG: CME 450 LOGGED BY: TH

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	2" Topsoil	0						Offset 30' East
	Sand - some clay, trace silt ; firm; yellow brown (Residual)		1		4-6-10	18		
	- some silt and mica, trace clay; dense; yellow tan	5	2		15-18-17	16		
	- firm	10	3		10-10-6	16		
		15	4		10-10-9	14		
	- dense	20	5		13-16-19	16		
	BORING TERMINATED AT 20 FEET							Groundwater was not encountered at the time of drilling.

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BORING LOG

CONTRACTED WITH: Macallan Group | BORING NO.: B-25
PROJECT NAME: Gravel Springs Road Tract | DATE: 3/24/2017
JOB NO.: 2017.1076.02 | DRILLER: Mike | RIG: CME 450 | LOGGED BY: TH

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	W	NOTES
	6" Topsoil	0						
	Sand - some clay, trace silt and root hairs; firm; red brown (Residual)		1		6-8-11	14		
	- some mica; medium dense	5	2		13-11-11	12		
	- firm	10	3		6-6-5	14		
	- micaceous, some silt; yellow-tan	15	4		9-9-10	16		
	- very dense	20	5		10-18-42	16		
	BORING TERMINATED AT 20 FEET	25						Groundwater was not encountered at the time of drilling.
		30						
		35						
		40						

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LOG OF TEST PIT

CONTRACTED WITH: Macallan Group TEST PIT NO.: TP-1

PROJECT NAME: Gravel Springs Road Tract JOB NO.: 2017.1076.02 DATE: 3/22/2017

ELEV.	DESCRIPTION	DEPTH in FEET	NOTES
	Topsoil/Leaves	0	
	Sand - some clay, trace silt, mica, and root hairs; tan (Residual)	3	
	- no root hairs, trace clay; yellow-brown	6	Hard excavation
	BACKHOE REFUSAL AT 8 FEET	9	Groundwater was not encountered at the time of excavation.
		12	
		15	
		18	
		21	
		24	

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LOG OF TEST PIT

CONTRACTED WITH: Macallan Group TEST PIT NO.: TP-2

PROJECT NAME: Gravel Springs Road Tract JOB NO.: 2017.1076.02 DATE: 3/22/2017

ELEV.	DESCRIPTION	DEPTH in FEET	NOTES
	Topsoil/Leaves	0	
	Clay - some sand and root hairs, trace silt and mica; yellow brown (Residual)		Dry
	- no root hairs	3	
	Sand - some silt, trace clay and mica; pink-tan	6	
	- clayey, yellow-brown		
	- trace silt and clay; gray-tan	9	Hard excavation
	BACKHOE REFUSAL AT 9 FEET	12	Groundwater was not encountered at the time of excavation.
		15	
		18	
		21	
		24	

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LOG OF TEST PIT

CONTRACTED WITH: Macallan Group TEST PIT NO.: TP-3

PROJECT NAME: Gravel Springs Road Tract JOB NO.: 2017.1076.02 DATE: 3/22/2017

ELEV.	DESCRIPTION	DEPTH in FEET	NOTES
	Topsoil/Leaves/Grass	0	
	Sand - trace clay, root hairs, silt, and mica; yellow brown (Residual)		
		3	
	- no root hairs		Moist
		6	
	- some clay		
		9 ▽	Groundwater encountered at 9 feet at the time of excavation.
		12	
	- trace clay, some mica; brown-tan	15	
		18	
	TEST PIT TERMINATED AT 18 FEET		
		21	
		24	

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LOG OF TEST PIT

CONTRACTED WITH: Macallan Group TEST PIT NO.: TP-4

PROJECT NAME: Gravel Springs Road Tract JOB NO.: 2017.1076.02 DATE: 3/22/2017

ELEV.	DESCRIPTION	DEPTH in FEET	NOTES
	Topsoil/Pine Needles	0	
	Sand - some silt, trace clay, root hairs, and mica; red brown (Residual)		
	- no root hairs	3	Dry
	- tan-gray	6	
		9	
	- tan-pink	12	
		15	
	- trace silt; gray-white-tan	18	Moist/Hard Excavation
	TEST PIT TERMINATED AT 18 FEET	21	Groundwater was not encountered at the time of excavation
		24	

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LOG OF TEST PIT

CONTRACTED WITH: Macallan Group TEST PIT NO.: TP-5

PROJECT NAME: Gravel Springs Road Tract JOB NO.: 2017.1076.02 DATE: 3/22/2017

ELEV.	DESCRIPTION	DEPTH in FEET	NOTES
	Topsoil/Pine Needles	0	
	Sand - trace clay, silt, mica, and root hairs; gray-tan (Residual)		Rock at surface 2' N of TP-5 Hard Excavation
	- no root hairs	3	
	BACKHOE REFUSAL AT 3 FEET	6	Groundwater was not encountered at the time of excavation.
		9	
		12	
		15	
		18	
		21	
		24	

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LOG OF TEST PIT

CONTRACTED WITH: Macallan Group TEST PIT NO.: TP-6

PROJECT NAME: Gravel Springs Road Tract JOB NO.: 2017.1076.02 DATE: 3/22/2017

ELEV.	DESCRIPTION	DEPTH in FEET	NOTES
	Topsoil/Pine Needles	0	
	Sand - trace clay, silt, mica, and root hairs; yellow-brown (Residual)		
	- tan-gray	3	Hard excavation
	BACKHOE REFUSAL AT 4 FEET	6	Groundwater was not encountered at the time of excavation.
		9	
		12	
		15	
		18	
		21	
		24	

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LOG OF TEST PIT

CONTRACTED WITH: Macallan Group TEST PIT NO.: TP-7

PROJECT NAME: Gravel Springs Road Tract JOB NO.: 2017.1076.02 DATE: 3/22/2017

ELEV.	DESCRIPTION	DEPTH in FEET	NOTES
	Topsoil/Pine Needles	0	
	Sand - trace clay, silt, mica, rock fragments, and root hairs; yellow-brown (Residual)	3	Hard excavation
	BACKHOE REFUSAL AT 4 FEET	6 9 12 15 18 21 24	Groundwater was not encountered at the time of excavation.

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LOG OF TEST PIT

CONTRACTED WITH: Macallan Group TEST PIT NO.: TP-8

PROJECT NAME: Gravel Springs Road Tract JOB NO.: 2017.1076.02 DATE: 3/23/2017

ELEV.	DESCRIPTION	DEPTH in FEET	NOTES
	Topsoil/Grass	0	
	Clay - trace sand, silt, mica, and root hairs; red-brown (Residual)		
	Sand - some silt, trace clay and mica; yellow brown	3	Dry
	- trace rock fragments		
	some mica; tan	6	Hard Excavation
		9	Moist
	BACKHOE REFUSAL AT 11 FEET	12	Groundwater was not encountered at the time of excavation.
		15	
		18	
		21	
		24	

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LOG OF TEST PIT

CONTRACTED WITH: Macallan Group TEST PIT NO.: TP-9

PROJECT NAME: Gravel Springs Road Tract JOB NO.: 2017.1076.02 DATE: 3/22/2017

ELEV.	DESCRIPTION	DEPTH in FEET	NOTES
	Topsoil/Leaves/Pine Needles	0	
	Sand - some clay and silt, trace mica and root hairs; red-brown (Residual)		
	- no root hairs		Dry
		3	
	- trace silt and clay; pink tan		
		6	
	Silt - some sand, trace clay; pink-tan		
		9	
		12	
		15	
	- gray-tan		
		18	
	TEST PIT TERMINATED AT 18 FEET		Groundwater was not encountered at the time of excavation.
		21	
		24	

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LOG OF TEST PIT

CONTRACTED WITH: Macallan Group TEST PIT NO.: TP-10

PROJECT NAME: Gravel Springs Road Tract JOB NO.: 2017.1076.02 DATE: 3/22/2017

ELEV.	DESCRIPTION	DEPTH in FEET	NOTES
	Topsoil/Pine Needles	0	
	Sand - some clay and root hairs, trace silt and mica; red brown (Residual)		
		3	
	trace clay; tan-yellow		Hard Excavation
			Dry
		6	
	BACKHOE REFUSAL AT 6 FEET		Groundwater was not encountered at the time of excavation
		9	
		12	
		15	
		18	
		21	
		24	

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LOG OF TEST PIT

CONTRACTED WITH: Macallan Group TEST PIT NO.: TP-11

PROJECT NAME: Gravel Springs Road Tract JOB NO.: 2017.1076.02 DATE: 3/22/2017

ELEV.	DESCRIPTION	DEPTH in FEET	NOTES
	Topsoil/Pine Needles	0	
	Sand - some silt, trace clay, root hairs, and mica; red brown (Residual)	3	
	- trace silt; gray-tan	6	Hard Excavation Dry
	BACKHOE REFUSAL AT 8 FEET	9 12 15 18 21 24	Groundwater was not encountered at the time of excavation

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LOG OF TEST PIT

CONTRACTED WITH: Macallan Group TEST PIT NO.: TP-11A

PROJECT NAME: Gravel Springs Road Tract JOB NO.: 2017.1076.02 DATE: 3/22/2017

ELEV.	DESCRIPTION	DEPTH in FEET	NOTES
	Topsoil/Pine Needles	0	Offset 20' E from TP-11
	Sand - some silt, trace clay, root hairs, and mica; red brown (Residual)		Groundwater was not encountered at the time of excavation
	BACKHOE REFUSAL AT 1 FEET	3	
		6	
		9	
		12	
		15	
		18	
		21	
		24	

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LOG OF TEST PIT

CONTRACTED WITH: Macallan Group TEST PIT NO.: TP-11B

PROJECT NAME: Gravel Springs Road Tract JOB NO.: 2017.1076.02 DATE: 3/22/2017

ELEV.	DESCRIPTION	DEPTH in FEET	NOTES
	Topsoil/Pine Needles	0	
	Sand - some silt, trace clay, root hairs, and mica; red brown (Residual)	3	Offset 20' W from TP- 11
	trace silt and mica; gray-tan	6	Hard Excavation
	BACKHOE REFUSAL AT 6 FEET	9 12 15 18 21 24	Groundwater was not encountered at the time of excavation

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LOG OF TEST PIT

CONTRACTED WITH: Macallan Group TEST PIT NO.: TP-11C

PROJECT NAME: Gravel Springs Road Tract JOB NO.: 2017.1076.02 DATE: 3/22/2017

ELEV.	DESCRIPTION	DEPTH in FEET	NOTES
	Topsoil/Pine Needles	0	
	Sand - some silt, trace clay, root hairs, and mica; red brown (Residual)		Offset 20' S from TP- 11
		3	
	BACKHOE REFUSAL AT 4 FEET		Groundwater was not encountered at the time of excavation
		6	
		9	
		12	
		15	
		18	
		21	
		24	

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LOG OF TEST PIT

CONTRACTED WITH: Macallan Group TEST PIT NO.: TP-12

PROJECT NAME: Gravel Springs Road Tract JOB NO.: 2017.1076.02 DATE: 3/22/2017

ELEV.	DESCRIPTION	DEPTH in FEET	NOTES
	Topsoil/Pine Needles	0	
	Sand - some silt, trace clay, mica, and root hairs; red-tan (Residual)	3	
	BACKHOE REFUSAL AT 3 FEET	6	Groundwater was not encountered at the time of excavation.
		9	
		12	
		15	
		18	
		21	
		24	

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LOG OF TEST PIT

CONTRACTED WITH: Macallan Group TEST PIT NO.: TP-12A

PROJECT NAME: Gravel Springs Road Tract JOB NO.: 2017.1076.02 DATE: 3/22/2017

ELEV.	DESCRIPTION	DEPTH in FEET	NOTES
	Topsoil/Pine Needles	0	
	Sand - some silt, trace clay, root hairs, and mica; red brown (Residual)		Offset 20' W from TP- 12
		3	
	- trace silt ; gray-tan		Hard Excavation
		6	
	BACKHOE REFUSAL AT 6 FEET		Groundwater was not encountered at the time of excavation
		9	
		12	
		15	
		18	
		21	
		24	

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LOG OF TEST PIT

CONTRACTED WITH: Macallan Group TEST PIT NO.: TP-12B

PROJECT NAME: Gravel Springs Road Tract JOB NO.: 2017.1076.02 DATE: 3/22/2017

ELEV.	DESCRIPTION	DEPTH in FEET	NOTES
	Topsoil/Pine Needles	0	Offset 20' S from TP 12
	Sand - some silt, trace clay, mica, and root hairs; red-tan (Residual)		
	BACKHOE REFUSAL AT 1 FEET	3	Groundwater was not encountered at the time of excavation.
		6	
		9	
		12	
		15	
		18	
		21	
		24	

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LOG OF TEST PIT

CONTRACTED WITH: Macallan Group TEST PIT NO.: TP-13

PROJECT NAME: Gravel Springs Road Tract JOB NO.: 2017.1076.02 DATE: 3/23/2017

ELEV.	DESCRIPTION	DEPTH in FEET	NOTES
	Topsoil/Pine Needles	0	
	Sand - some clay, trace silt, mica, and root hairs; red brown (Residual)		Dry
	- some silt, no root hairs; gray-tan	3	
	- some mica, trace clay		Hard Excavation
	BACKHOE REFUSAL AT 5.5 FEET	6	Groundwater was not encountered at the time of excavation.
		9	
		12	
		15	
		18	
		21	
		24	

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LOG OF TEST PIT

CONTRACTED WITH: Macallan Group TEST PIT NO.: TP-13A

PROJECT NAME: Gravel Springs Road Tract JOB NO.: 2017.1076.02 DATE: 3/23/2017

ELEV.	DESCRIPTION	DEPTH in FEET	NOTES
	Topsoil/Pine Needles	0	
	Sand - some clay, trace silt, mica, and root hairs; red brown (Residual)		Offset 10' W from TP-13
	- some silt, no root hairs; gray-tan		
	some mica, trace clay	3	Hard Excavation
	BACKHOE REFUSAL AT 3.5 FEET		Groundwater was not encountered at the time of excavation.
		6	
		9	
		12	
		15	
		18	
		21	
		24	

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LOG OF TEST PIT

CONTRACTED WITH: Macallan Group TEST PIT NO.: TP-13B

PROJECT NAME: Gravel Springs Road Tract JOB NO.: 2017.1076.02 DATE: 3/23/2017

ELEV.	DESCRIPTION	DEPTH in FEET	NOTES
	Topsoil/Pine Needles	0	
	Sand - some clay, trace silt, mica, and root hairs; red brown (Residual)		Offset 10' E from TP-13
	- some silt, no root hairs; gray-tan		
	some mica, trace clay	3	Hard Excavation
	BACKHOE REFUSAL AT 3 FEET		Groundwater was not encountered at the time of excavation.
		6	
		9	
		12	
		15	
		18	
		21	
		24	

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LOG OF TEST PIT

CONTRACTED WITH: Macallan Group TEST PIT NO.: TP-14

PROJECT NAME: Gravel Springs Road Tract JOB NO.: 2017.1076.02 DATE: 3/22/2017

ELEV.	DESCRIPTION	DEPTH in FEET	NOTES
	Topsoil/Leaves/Pine Needles	0	
	Sand - silty, trace clay, mica, rock fragments, and root hairs; red-brown (Residual)		
	- no root hairs	3	Dry
	Silt - some sand and clay, trace rock fragments; tan-pink	6	
	Sand - trace silt, mica, rock fragments, and clay; gray-tan	9	Hard Excavation
		12	
		15	
		18	
	TEST PIT TERMINATED AT 18 FEET	21	Groundwater was not encountered at the time of excavation.
		24	

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LOG OF TEST PIT

CONTRACTED WITH: Macallan Group TEST PIT NO.: TP-15

PROJECT NAME: Gravel Springs Road Tract JOB NO.: 2017.1076.02 DATE: 3/23/2017

ELEV.	DESCRIPTION	DEPTH in FEET	NOTES
	Topsoil/Leaves	0	Asphalt pieces at ground surface
	Sand - some clay, trace silt, mica, and root hairs; red-brown (Residual)		
	- no root hairs, trace clay; gray-tan	3	Dry
	trace silt rock fragments; pink-tan	6	Hard Excavation
		9	
	- orange intrusions	12	
		15	
		18	
	TEST PIT TERMINATED AT 18 FEET	21	Groundwater was not encountered at the time of excavation.
		24	

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LOG OF TEST PIT

CONTRACTED WITH: Macallan Group TEST PIT NO.: TP-16

PROJECT NAME: Gravel Springs Road Tract JOB NO.: 2017.1076.02 DATE: 3/23/2017

ELEV.	DESCRIPTION	DEPTH in FEET	NOTES
	Topsoil/Leaves	0	
	Sand - some silt, trace clay and mica; red-brown (Residual)		
	- no root hairs, some mica; brown-tan	3	Dry
	- black and yellow intrusions	6	
	- micaceous, trace silt and rock fragments; pink-tan with white intrusions	9	Hard Excavation
	- silty; gray-tan	12	
		15	
		18	Moist
	TEST PIT TERMINATED AT 18 FEET	21	Groundwater was not encountered at the time of excavation.
		24	

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LOG OF TEST PIT

CONTRACTED WITH: Macallan Group TEST PIT NO.: TP-17

PROJECT NAME: Gravel Springs Road Tract JOB NO.: 2017.1076.02 DATE: 3/23/2017

ELEV.	DESCRIPTION	DEPTH in FEET	NOTES
	Topsoil/Grass	0	
	Clay - sandy, trace silt, mica, and root hairs; red-brown (Residual)		
	Sand - trace silt, clay, and mica; tan brown	3	Dry
	- trace rock fragments		
	- some silt; tan white	6	Hard Excavation
	- gray-tan		
	- pink intrusions	9	
	- micaceous; white intrusions	12	
	- silty; gray-tan		
	BACKHOE REFUSAL AT 14.5 FEET	15	Groundwater was not encountered at the time of excavation.
		18	
		21	
		24	

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LOG OF TEST PIT

CONTRACTED WITH: Macallan Group TEST PIT NO.: TP-18

PROJECT NAME: Gravel Springs Road Tract JOB NO.: 2017.1076.02 DATE: 3/23/2017

ELEV.	DESCRIPTION	DEPTH in FEET	NOTES
	Topsoil/Pine Needles	0	
	Sand - clayey, trace silt, mica, and root hairs; red-brown (Residual)		
	- some silt and clay	3	Dry
	- trace rock fragments and clay, no root hairs; brown-tan	6	
	- trace silt and mica	9	Hard Excavation
	- white intrusions		
	BACKHOE REFUSAL AT 11.5 FEET	12	Groundwater was not encountered at the time of excavation.
		15	
		18	
		21	
		24	

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LOG OF TEST PIT

CONTRACTED WITH: Macallan Group TEST PIT NO.: TP-19

PROJECT NAME: Gravel Springs Road Tract JOB NO.: 2017.1076.02 DATE: 3/23/2017

ELEV.	DESCRIPTION	DEPTH in FEET	NOTES
	Topsoil/Pine Needles	0	
	Sand - clayey, trace silt, mica, and root hairs; red-brown (Residual)		
	- some silt and clay	3	Dry
	- no root hairs		
	- trace silt, mica, and clay; tan brown	6	Hard Excavation
	- silty, white intrusions	9	
	BACKHOE REFUSAL AT 11 FEET	12	Groundwater was not encountered at the time of excavation.
		15	
		18	
		21	
		24	

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LOG OF TEST PIT

CONTRACTED WITH: Macallan Group TEST PIT NO.: TP-20

PROJECT NAME: Gravel Springs Road Tract JOB NO.: 2017.1076.02 DATE: 3/23/2017

ELEV.	DESCRIPTION	DEPTH in FEET	NOTES
	Topsoil/Grass	0	
	Clay - sandy, trace silt, mica, and root hairs; red-brown (Residual)		
	Sand - trace silt, clay, and mica; tan brown	3	Dry
	- trace rock fragments	6	
	some silt and mica; tan white	9	Hard Excavation
	- pink intrusions	12	
		15	
	BACKHOE REFUSAL AT 16 FEET	18	Groundwater was not encountered at the time of excavation.
		21	
		24	

COMPACTION TEST REPORT

Project No.: 2017.1076.02 **Date:** 3/28/2017
Project: GRAVEL SPRINGS ROAD TRACT
Client: MACALLAN PROPERTIES, LLC/ THE MACALLAN G
Sample Number: B-5 **Depth:** 0-5.0 ft

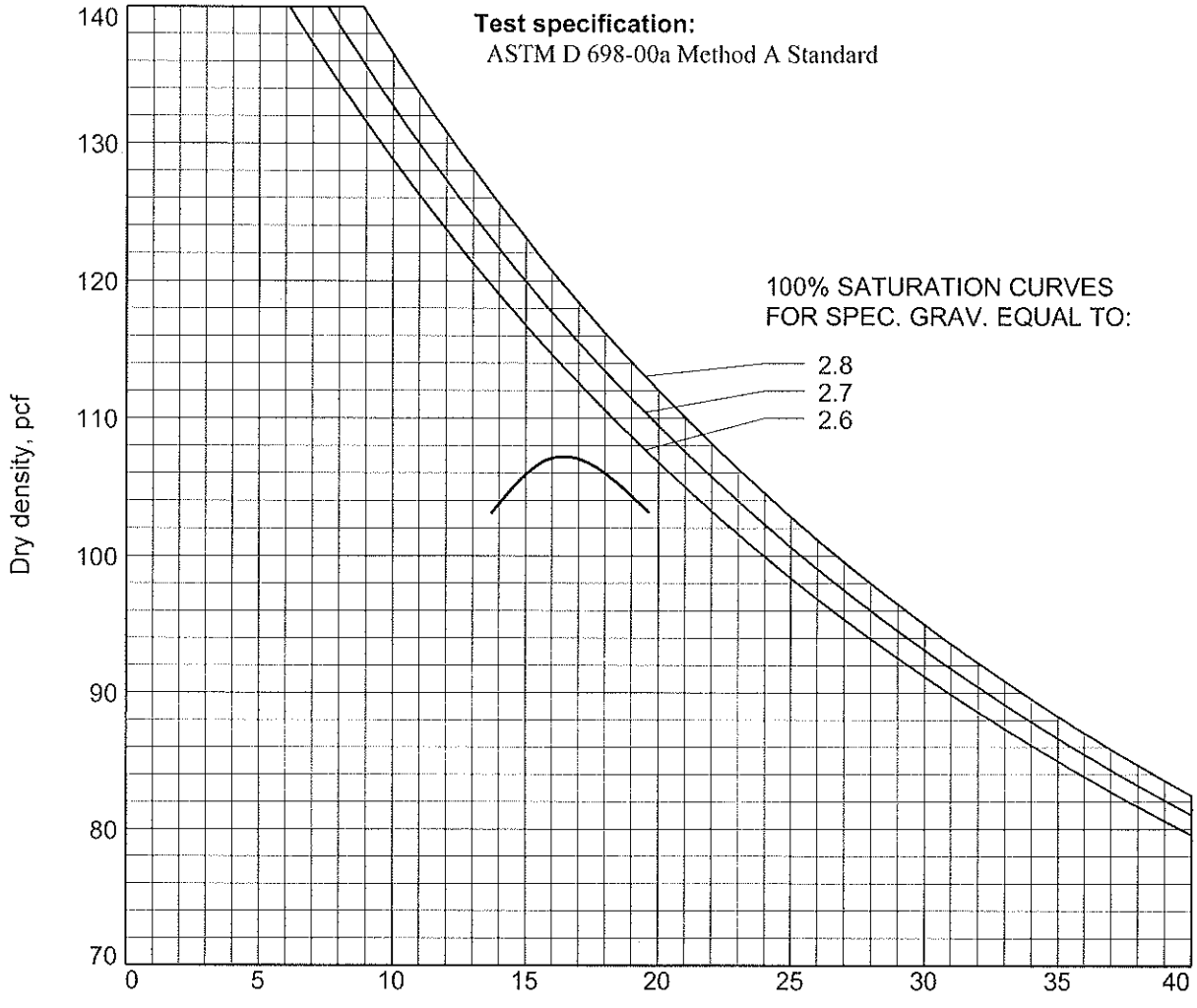
Remarks:

MATERIAL DESCRIPTION

Description: Sand-silty, light brown

Classifications - **USCS:** **AASHTO:**
Nat. Moist. = 16.7 %
Liquid Limit =
Sp.G. =
Plasticity Index =
% < No.200 =

TEST RESULTS
Maximum dry density = 107.2 pcf
Optimum moisture = 16.4 %



Figure

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COMPACTION TEST REPORT

Project No.: 2017.1076.02 **Date:** 3/28/2017
Project: GRAVEL SPRINGS ROAD TRACT
Client: MACALLAN PROPERTIES, LLC/ THE MACALLAN G
Sample Number: B-13 **Depth:** 0-5.0 ft

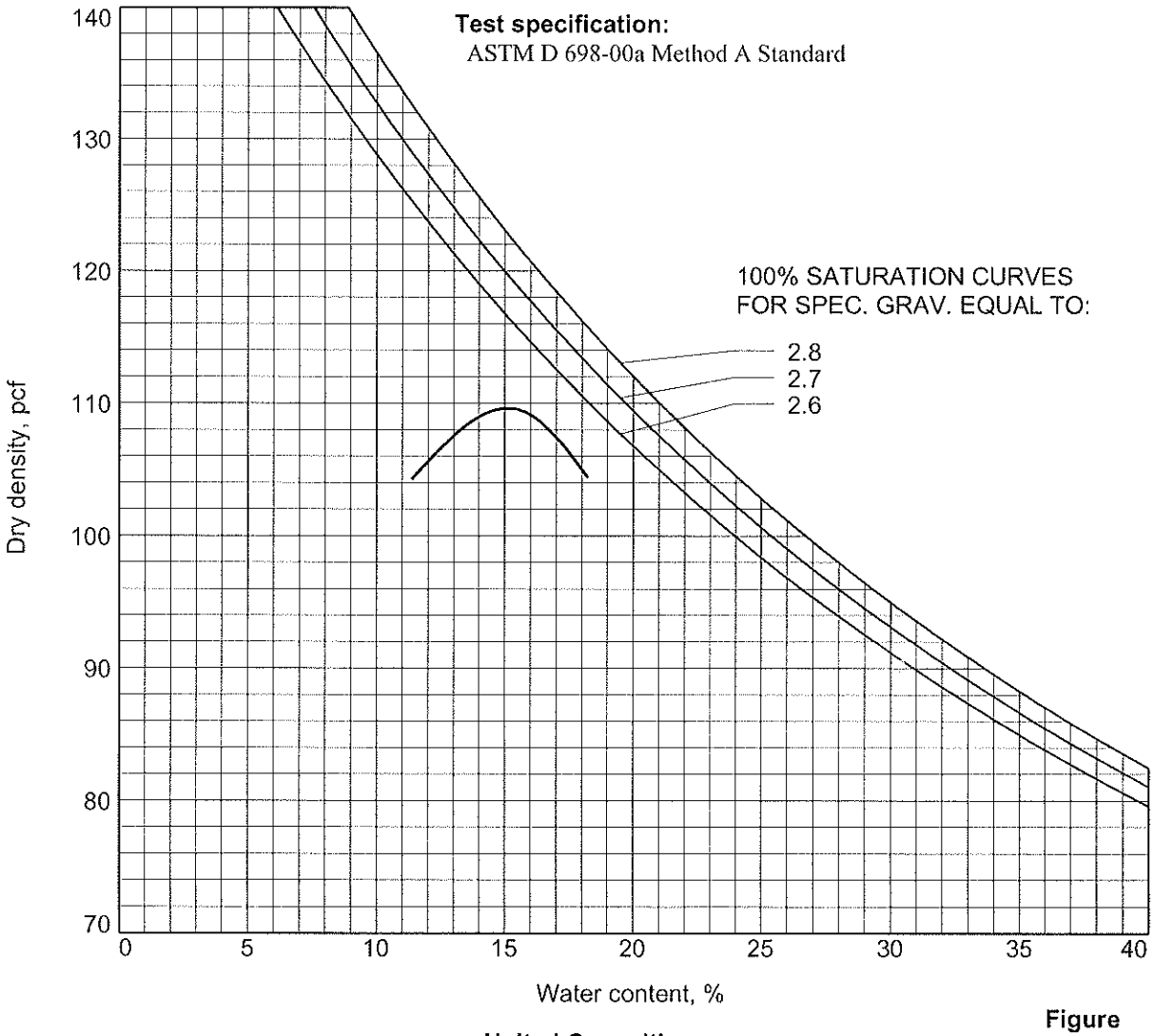
Remarks:

MATERIAL DESCRIPTION

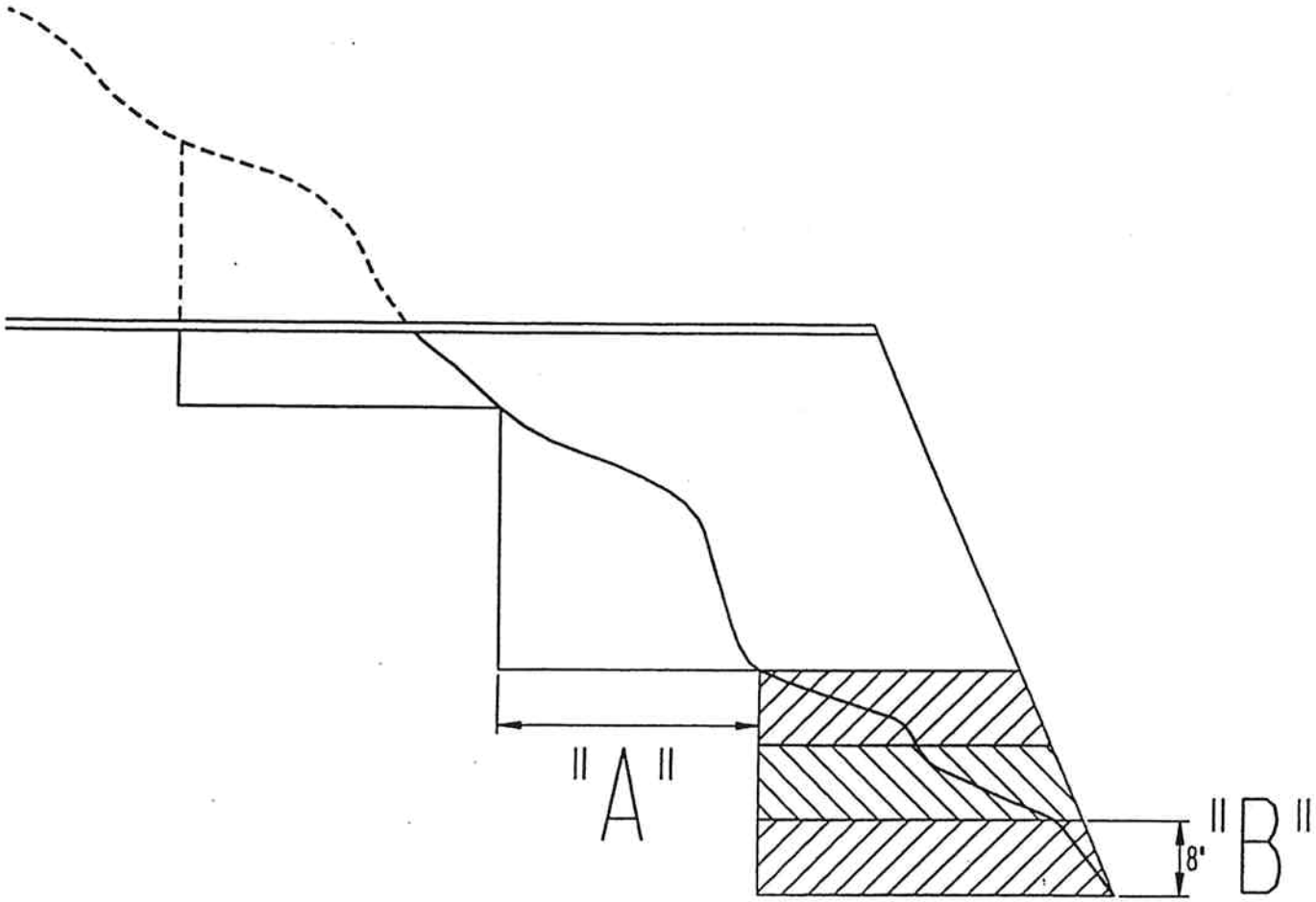
Description: Sand, some silt, tan

Classifications - **USCS:** **AASHTO:**
Nat. Moist. = 8.8 %
Liquid Limit =
Sp.G. =
Plasticity Index =
% < No.200 =

TEST RESULTS
Maximum dry density = 109.6 pcf
Optimum moisture = 15.1 %



Figure



1. THE ABOVE DIAGRAM ILLUSTRATES A TYPICAL BENCHING FOR PLACEMENT OF FILL ON A SLOPING SURFACE.

2. THE DIAGRAM SHOWS THAT BEFORE FILL IS PLACED, THE FIRST STEP IS CUT INTO THE SLOPE A MAXIMUM DISTANCE OF ABOUT 8 FEET "A" (ABOUT ¾ THE WIDTH OF USUAL D-8 BULLDOZER BLADE). SUCCESSIVE LAYERS OF FILL ARE THEN PLACED. BEFORE FINAL LAYER IS PLACED, THE SECOND STEP IS CUT 8 FEET INTO THE SLOPE AND SUCCESSIVE LAYERS ARE AGAIN PLACED.

3. SELECT FILL MATERIAL SHOULD BE PLACED IN 8 INCH LIFTS AND COMPACTED TO THE SPECIFIED DENSITY ("B").

TYPICAL BENCHING DETAIL

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APPENDIX B

Photographs of the Test Pits (22 pages)

Photo # 1: Test Pit TP-1

Photo # 2: Excavated Soil from TP-1

Photo # 3: Test Pit TP-2

Photo # 4: Excavated soil from TP-2

Photo # 5: Test Pit TP-3

Photo # 6: Excavated soil from TP-3

Photo # 7: Test Pit TP-4

Photo # 8: Excavated soil from TP-4

Photo # 9: Test Pit TP-5

Photo # 10: Excavated soil from TP-5

Photo # 11: Test Pit TP-6

Photo # 12: Excavated soil from TP-6

Photo # 13: Test Pit TP-7

Photo # 14: Excavated soil from TP-7

Photo # 15: Test Pit TP-8

Photo # 16: Excavated soil from TP-8

Photo # 17: Test Pit TP-9

Photo # 18: Excavated soil from TP-9

Photo # 19: Test Pit TP-10

Photo # 20: Excavated soil from TP-10

Photo # 21: Test Pit TP-11

Photo # 22: Excavated soil from TP-11

Photo # 23: Test Pit TP-12

Photo # 24: Excavated soil from TP-12

Photo # 25: Test Pit TP-13

Photo # 26: Excavated soil from TP-13

Photo # 27: Test Pit TP-13A

Photo # 28: Excavated Soil from TP-13A

Photo # 29: Test Pit TP-13B

Photo # 30: Excavated Soil from TP-13B

Photo # 31: Test Pit TP-14

Photo # 32: Excavated Soil from TP-14

Photo # 33: Test Pit TP-15

Photo # 34: Excavated Soil from TP-15

Photo # 35: Test Pit TP-16

Photo # 36: Excavated soil from TP-16

Photo # 37: Test Pit TP-17

Photo # 38: Excavated soil from TP-17

Photo # 39: Test Pit TP-18

Photo # 40: Excavated soil from TP-18

Photo # 41: Test Pit TP-19

Photo # 42: Excavated Soil from TP-19

Photo # 43: Test Pit TP-20

Photo # 44: Excavated soil from TP-20

Important Information about This

Geotechnical-Engineering Report

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

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

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

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

Read the Full Report

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

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

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

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

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

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

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

Subsurface Conditions Can Change

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

Most Geotechnical Findings Are Professional Opinions

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

A Report's Recommendations Are Not Final

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

A Geotechnical-Engineering Report Is Subject to Misinterpretation

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

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

Do Not Redraw the Engineer's Logs

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

Give Constructors a Complete Report and Guidance

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

Read Responsibility Provisions Closely

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

Environmental Concerns Are Not Covered

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

Obtain Professional Assistance To Deal with Mold

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

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

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

GEOTECHNICAL BUSINESS COUNCIL
of the Geoprofessional Business Association

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