Report of Geotechnical Exploration
City of Decatur Storm Sewer Replacement
1450 Commerce Drive
Decatur, Georgia 30030
S&ME Project No. 1280-19-022

PREPARED FOR:

ATKINS
1600 RiverEdge Parkway Northwest, Suite 700
Atlanta, Georgia 30328

PREPARED BY:

S&ME, Inc.
4350 River Green Parkway, Suite 200
Duluth, GA 30096

May 6, 2019

May 6, 2019

ATKINS
1600 RiverEdge Parkway Northwest, Suite 700
Atlanta, Georgia 30328

Attention: Mr. John D. Boudreau, RLA

Reference: **Report of Geotechnical Exploration**
City of Decatur Storm Sewer Replacement
1450 Commerce Drive, Decatur, Georgia 30030
S&ME Project No. 1280-19-022

Dear Mr. Boudreau:

S&ME, Inc. (S&ME) has completed a geotechnical exploration for the referenced project. Our services were performed in general accordance with our Proposal No. 12-1900092, Revision 1, dated March 1, 2019. This report describes our understanding of the project and the subsurface conditions encountered, and presents our geotechnical recommendations for the planned sewer line replacement. We appreciate the opportunity to serve as the geotechnical consultant during this phase of the project. Please contact us if you have questions about this report, or if we may be of further service.

Sincerely,

S&ME, Inc.

Stephen M. Revell

Kenneth A Ball

Stephen M. (Matt) Revell, P.E.
Project Engineer
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Appendix

1.0 Purpose

The purpose of this geotechnical exploration was to obtain subsurface data so we could evaluate soil conditions above and to a moderate distance below the invert elevations of the pipes that are to be replaced and assess their characteristics relative to the planned sewer line replacement process. This report provides the following:

- A summary of the project information;
- A summary of current site conditions, topography, and area geology;
- A summary of the field exploration methods;
- A summary of the subsurface conditions encountered in the test borings;
- Laboratory test data;
- Conclusions, comments, and/or recommendations regarding the primary concerns of ATKINS listed below in the Project Information section;
- Conclusions or comments regarding anticipated earthwork procedures (excavation difficulty, groundwater control, material handling, etc.);
- Recommendations for backfill placement and compaction; and
- An Appendix including a Test Location Plan, a partial site plan showing existing utility locations, the test boring logs, and laboratory test reports.

2.0 Project Information

Initial project information was provided in a February 19, 2019 telephone conversation and subsequent emails between Mr. George Kakunes, P.E. of ATKINS and Mr. Kenneth Ball, P.E. of S&ME. Additional project information was provided through telephone conversations among Mr. Kakunes, Mr. John Boudreau, RLA of ATKINS, Mr. Ball, and Mr. Matt Revell, P.E. of S&ME. Appended to the emails between Mr. Kakunes and Mr. Ball were an as-built drawing of the referenced sewer lines and adjoining structures, an aerial image outlining the approximate limits of sewer line replacement, a storm sewer easement agreement, still images taken from a November 28, 2018 video inspection of the damaged sewer lines, and a February 5, 2019 report by Schnabel Engineering titled "Pipe Visual Evaluation, Allen Wilson Terrace Apartments, City of Decatur, Georgia".

Based on the provided information, we understand that portions of approximately 600 linear feet (two separate lines) of existing 60-inch high-density polyethylene (HDPE) storm sewer pipe are damaged. Still images from the video inspection mentioned above show collapse of the crown of the pipe in some locations, with backfill material entering the pipe from the failure. Images from other locations show severe downward deflection of the crown of the pipe, and other deficiencies.

The damaged lines are located within the City of Decatur Housing Authority project, located at 1450 Commerce Drive in Decatur, Georgia. The damaged portions of the sewer lines exist between Manhole Structures M-8 and M-4 (northern line) and N-4 and N-1 (southern line). We understand that the failing pipes have caused concern for a potential dropout in the surface of overlying and nearby pavements, resulting in the City of Decatur blocking off the parking area and drives south of the existing Decatur Management Services building.

The portions of the damaged sewer lines lie beneath both paved and grassed areas of the property. A concrete cap approximately 6 to 9 inches thick exists (based on coring for this exploration) beneath the asphalt pavement in some areas where the pipes pass beneath existing parking and driveway areas. We were not provided with construction records of the pipe installation and trench backfill compaction process.

ATKINS requested that our geotechnical exploration address the following primary concerns of ATKINS:

- The moisture condition and types of soils located above the storm sewer pipes relative to possible re-use of the material as compacted backfill in the excavations made to remove the pipes (it is possible that it may be necessary to haul off excavated soils regardless of their condition due to spatial constraints);
- The firmness and types of soils at and to about 5 feet below the current (assumed to be the same as planned) pipe, junction box, and/or manhole structure invert elevations relative to the possible need for over-excavation and placement of crushed stone to support the new pipes and to help ATKINS determine if the junction box and structures need to be removed;
- The existing groundwater levels as they relate to the planned excavation and backfilling process;
- The existing groundwater levels as they relate to possible impacts on the adjacent structure if dewatering is required during the construction process (generalized comments about dewatering impacts rather than an in-depth study);
- Deep subsurface conditions in a few spots where the pipes to be removed are closest to the Decatur Management Services building for use by others in planning for possible lateral support of soils nearby building foundation, slab and/or underlying ground improvement systems; and
- Limited shallow soil type, firmness, and strength characteristics relatively near the existing Decatur Management Services building for use by others in planning for possible lateral support of soils near building foundation, slab, and/or ground improvement systems.

3.0 Exploratory and Testing Procedures

3.1 Field Exploration

Our engineer made a site reconnaissance to observe pertinent site features and mark the test boring locations. The locations of the 15 soil test borings, identified as B-01 through B-15, were established by Mr. Matt Revell, P.E. of S&ME by pacing or measuring from the existing manholes and nearby structures. Boring B-02 was offset about 20 west of its planned location due to spatial constraints. The ground surface elevation at each boring location was estimated to the nearest foot based on the provided sewer profiles. Because of the limited accuracy of the methods used, the boring locations shown on the Test Location Plan (Figure No. 2) and the ground surface elevations shown on the Boring Logs in the Appendix should be considered approximate.

The soil test borings for this exploration were made by mechanically twisting hollow stem augers into the soil in general accordance with ASTM D6151, the *Standard Practice for Using Hollow-Stem Augers for Geotechnical Exploration and Soil Sampling*. Soil samples were obtained at 2 ½ to 5 foot intervals in the upper 10 feet, at closely spaced intervals near the estimated pipe/structure invert elevations, and at five-foot intervals thereafter in general accordance with ASTM D1586, *Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils* until the planned termination depths were reached or auger refusal occurred. During standard penetration testing, the sampler was first seated 6 inches and was then driven an additional foot with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler the final foot was recorded and is designated the "standard penetration resistance" or N-value with units of blows per foot (bpf).

In addition to the split-barrel (split spoon) samples, eight bulk soil samples and three relatively undisturbed soil samples (sampled using a thin-walled steel tube sampler) were obtained during the field exploration for laboratory testing.

An automatic hammer was used during the standard penetration testing. Automatic hammers are typically more efficient than manual hammers and can thus yield lower standard penetration resistances than would likely be recorded using a traditional manual hammer. We have accounted for this improved efficiency in our analysis, but the consistency descriptions shown on the boring logs are based on traditional correlations using standard penetration resistance values obtained using a manual hammer.

Subsurface water level readings were taken in the borings upon completion of drilling. Delayed water level readings were attempted for most of the borings. Upon completion of the water level readings, the boreholes were backfilled with soil cuttings and a near-surface borehole closure device. Borings performed in existing paved areas were cored prior to drilling, and these borings were backfilled with the soil cuttings, a near-surface borehole closure device, the pavement core, and a commercially bagged cold-mix asphalt patching material. Boring B-13 was left open and covered with a removable steel plate to allow access for visual inspection or grouting of a void which was found beneath the existing pavement. This will be discussed further in a later section of the report.

After completion of drilling, the obtained split-spoon samples were transported to our laboratory and supplementally classified by members of our engineering staff in general accordance with ASTM D2488, the *Standard Practice for Description and Identification of Soils (Visual-Manual Procedure).* The purposes of this review were to check the field classifications, visually estimate the relative percentages of the soils' constituents (sand, clay, etc.), form an opinion as to soil origin, identify pertinent structural features such as foliation planes and slickensides, and select samples for laboratory testing. The stratification lines shown on the appended boring logs represent the approximate boundaries between soil types, but the transitions may be more gradual than shown.

3.2 Laboratory Testing

Thirteen split-spoon samples were subjected to natural moisture content testing (ASTM D2216). The eight bulk soil samples were subjected to natural moisture content testing (ASTM D2216) and laboratory standard Proctor density testing (ASTM D698). One relatively undisturbed sample obtained at Boring B-02 was subjected to triaxial shear testing (ASTM D4767). The quantities and types of material recovered in the other two relatively undisturbed samples taken at Borings B-01 and B-06 were not sufficient for laboratory triaxial shear testing. The laboratory data are summarized in the Report Section 4.4.

4.0 Site, Geologic, and Subsurface Conditions

4.1 Site Conditions

The site is located in the parking lot south of the Decatur Management Services building and in the grassed area west of the Decatur Management Services building. The site is otherwise bounded by the Allen Wilson Apartments complex and does not extend east of Commerce Drive.

The site is relatively flat and open. The parking lot mentioned above has been blocked to traffic for precautionary reasons. **During our exploration, a void beneath the existing pavement was observed at Boring B-13 that extended generally north toward the Decatur Management Services building. The exact depth and lateral extent of the void were not determined during our exploration**. Pavement cracks were observed in several locations of the parking lot, but no noticeable settlement or sagging of the pavement apparent.

4.2 Geologic Conditions

4.2.1 Residual Materials

The project site is in Georgia's Piedmont physiographic province. The soil overburden of this area was formed by in-place weathering of the parent metamorphic and igneous rocks. *The Geology of the Greater Atlanta Region* (1984) indicates that the site is underlain by quartzite and mica schist, but is mapped near the contact with a biotitic gneiss, mica schist, and amphibolite formation. A typical upland Piedmont soil profile consists of a thin layer of topsoil underlain by a clayey soil stratum that transitions with increasing depth into less clayey, coarser grained soils with varying mica content. Separating the completely weathered soil overburden from the unaltered parent rock is a transition zone of very high consistency materials locally referred to as *Partially Weathered Rock (PWR)*. Partially weathered rock retains much of the appearance and fabric of the parent rock formation, and may consist of alternating layers of high consistency soil and rock. PWR exhibits standard penetration resistances in excess of 100 blows per foot (bpf) (i.e. 50/6”).

The weathering processes that formed the overburden soils and partially weathered rock were extremely variable, depending on such factors as rock mineralogy, past groundwater conditions, and the tectonic history (joints, faults, igneous intrusions, etc.) of the specific area. Differential weathering of the rock mass has resulted in erratically varying subsurface conditions, evidenced by abrupt changes in soil type and consistency in relatively short horizontal and vertical distances. Furthermore, depths to rock can be irregular and isolated boulders, discontinuous rock layers, or rock pinnacles can be present within the overburden and transition zones.

4.2.2 Fill Materials

Fill materials, likely placed in conjunction with previous sewer line construction, were encountered in the borings of this exploration. Fill can be composed of different soil types from various sources and can also contain debris, organics, topsoil, and/or deleterious materials. The engineering properties of fill depend primarily on its composition, density, and moisture content. If observation and/or test reports are available to document the placement of the existing fill materials, we request they be provided to us for review and incorporation into our analyses.

4.2.3 *Alluvial Materials*

Alluvial soils were encountered in borings of this exploration. Soils which have been eroded, transported, and deposited in and adjacent to water courses are termed "alluvium". These deposits comprise the flood plains of rivers and streams. Alluvial soils differ significantly from the residual soil source and can vary from clays to gravel, depending on the depositional environment. Alluvial soils frequently are soft or loose, and differing soil types and consistencies/relative densities can occur in relatively short horizontal and vertical distances.

4.3 Subsurface Conditions

The Boring Logs included in the Appendix should be reviewed for specific information at the individual boring locations. The depth and thickness of the subsurface strata indicated on the Boring Logs are generalized and the transition between materials may be more gradual than indicated. Information about actual subsurface conditions exists only at the specific test locations and is relevant to the time the exploration was performed. Variations may occur and should be expected between and away from the boring locations. The stratification lines were used for our analytical purposes and are intended to aid ATKINS and the City of Decatur in planning for the Storm Sewer Replacement construction phase. The information provided in this report is not intended to be the basis for contractor cost estimates.

4.3.1 *Surface Cover*

Borings B-03, B-05, B-06, B-07, B-08, B-12, B-13, B-14, and B-15 encountered between one and five inches of asphalt. Of those borings, Borings B-05, B-06, B-07, B-13, and B-14 encountered six to nine inches of concrete pavement beneath the asphalt. Borings B-01, B-02, B-04, B-09, and B-11 encountered one to two inches of topsoil, Boring B-10 had no surficial topsoil, asphalt, or concrete.

4.3.2 *Fill*

Beneath the topsoil or pavement cover, the borings encountered between five and twelve feet of fill soils. The fill soils were generally described as sandy silts (ML) and silty sands (SM) with varying amounts of clay, poorly-graded sand (SP), and sandy lean clay (CL). Standard penetration resistance (N) values in the fill ranged from 3 to 21 bpf and were typically 10 bpf or less. Generally, the fill soil samples appeared to be moist, but some of the samples were wet.

4.3.3 *Alluvium*

Alluvium was encountered in Borings B-03 and B-04 underlying the fill soils and extending to a depth of about 13½ and 10 feet, respectively. The alluvial soils were predominantly gray sandy lean clay (CL). N-values in the alluvial materials were 5 bpf. The alluvial samples were assessed to be moist.

4.3.4 *Residual Soils*

Residual soils were encountered in the borings underlying the fill or alluvium. The residual soils were typically described as silty sand (SM) with varying amounts of mica. N-values in the residual soils ranged from 2 to 30 bpf, but were generally less than 15 bpf. The residuum was assessed to be moist to wet.

4.3.5 *Partially Weathered Rock*

Partially weathered rock (PWR) was encountered in Borings B-01, B-02, and B-06. Initial depths of the PWR ranged from 23 ½ to 50 feet below the ground surface. The PWR exhibited standard penetration resistances of greater than 100 bpf (50/1" to 50/5").

4.3.6 *Auger Refusal*

Boring B-06 encountered refusal to further auger penetration at a depth of 60 feet below the ground surface. Refusal materials in the project area and for the type of drilling equipment used are typically interpreted to be the top of competent rock.

4.3.7 *Boring Termination*

Borings B-01 through B-05 and B-07 through B-15 reached their planned termination depths without encountering refusal materials.

4.3.8 *Groundwater*

Groundwater was encountered in many of the borings at depths ranging from 3 to 16 feet below the existing ground surface. We note that groundwater levels will fluctuate with seasonal and yearly rainfall and temperature variations; therefore, future groundwater levels may be higher or lower than those measured during this exploration.

The following table presents the groundwater measurements for the test borings:

Boring No.	Groundwater Depth at Time of Drilling (ft)	Delayed Groundwater Depth (ft)
B-01	14	Caved 16*
B-02	Caved*	Caved 8*
B-03	Caved*	Caved 12*
B-05	Caved*	Caved 14*
B-06	10	Not Measured
B-07	10	Not Measured
B-08	13	9.2
B-09	Caved*	Caved 10*
B-12	Caved*	Caved 3*

Boring No.	Groundwater Depth at Time of Drilling (ft)	Delayed Groundwater Depth (ft)
B-14	Caved*	Caved 4*
B-15	Caved*	Not Measured

*Note: Indicates hole cave-in depth. This is not a direct measurement of groundwater level, but it is common for boreholes in Piedmont soils to cave-in about 1 to 3 feet above the groundwater level.

4.4 Laboratory Test Data

Soil moisture content tests were performed on selected split-spoon and bulk samples in general accordance with ASTM D 2216. The following table presents the moisture content test results for the selected split-spoon samples:

Boring No.	Sample Depth (feet)	Moisture Content (%)
B-01	8.5-10	18.9
B-02	8.5-10	24.7
B-03	3.5-5	16.5
B-04	3.5-5	14.4
B-05	13.5-15	66.2
B-06	8.5-10	44.7
B-07	13.5-15	26.0

Boring No.	Sample Depth (feet)	Moisture Content (%)
B-08	3.5-5	36.1
B-10	3.5-5	18.5
B-11	1.5-3	16.2
B-13	1.5-3	28.2
B-14	4.5-6	32.1
B-15	1.5-3	13.4

Standard Proctor test results (ASTM D698) and natural (in-place) moisture contents for the bulk samples are tabulated below:

Sample No.	Boring No.	Sample Depth (ft)	Maximum Dry Density (pcf)	Optimum Moisture Content (%)	Natural Moisture Content (%)
1	B-04	0 – 5	111.8	14.9	13.9
2	B-08	0 – 5	114.8	13.8	34.4
3	B-02	5 – 10	111.9	15.6	15.5
4	B-09	5 – 10	107.0	16.6	29.0
5	B-07	10 – 15	110.9	14.4	26.5
6	B-05	5 – 10	113.9	15.2	23.2
7	B-01	0 – 5	110.1	15.0	20.4
8	B-03	10 - 15	111.7	15.5	5.3

Triaxial Shear test results (ASTM D4767) for the relatively undisturbed sample taken at B-02 are tabulated below:

Boring No.	Sample Depth (feet)	Effective Internal Friction Angle (degrees)	Effective Apparent Cohesion (ksf)
B-02	5-7	38.9	0.03

Laboratory data sheets for these tests are provided in the Appendix.

5.0 Conclusions and Recommendations

5.1 Primary Concerns of ATKINS

5.1.1 General

In order to address concerns expressed by AKINS, we performed borings: in fill/backfill soils above the stormwater lines which are to be removed; near the pipes and manhole structures or junction boxes and to about 5 feet below invert elevations; and between the pipe and the Decatur Management Services building.

For the borings above the pipes, it was necessary to stop a foot or two above the top of the pipe to not drill into the pipe. Thus, the lower portion of the backfill material was not drilled into and sampled. Within the depths drilled, no crushed stone (such as No. 57 stone) backfill was encountered (some gravel or rock fragments were intermixed in portions of the sampled fill/backfill soil).

The borings near the pipes were intended to obtain information about the support conditions for the planned replacement pipes. To miss the pipes during drilling, we had to be a few feet away from the anticipated location of the pipe exterior. As such, the borings may or may not have penetrated the backfill materials directly beside the pipe, but should generally indicate conditions that likely were present at the base of the excavations made to install the pipes. While Boring B-01 through B-09 did not find crushed stone beside or below the invert elevation of the pipes or structures, this does not mean that no stone bedding was placed below the pipes or structures.

Borings B-01, B-02, and B-06 were intended to obtain some shallow and deep soil information about soil conditions relative to possible needed shoring or bracing of excavations. The only undisturbed soil sample obtained during the drilling process that could be tested for triaxial shear strength was from a depth of 5 to 7 feet in Boring B-02. The tested soil was either pipe trench backfill or general fill. The tested material may or may not be similar to soils that will be exposed in the sidewalls of the excavations that will be made to replace the pipes.

5.1.2 *Re-Use of Existing Fill Materials at the Site*

Based on information obtained during this geotechnical exploration, we do not recommend the existing fill/backfill materials be re-used as structural fill to backfill the new sewer line excavations. This conclusion is based primarily on soil moisture content. Although some of the tested soil samples had moisture contents near or below the soils' Standard Proctor optimum moisture contents, most of the tested soils had moisture contents well above (greater than 20% in some cases) their optimum levels. The existing fill/backfill soils at the site would also likely be mixed during stockpiling and transporting, further complicating the issue. This indicates that significant moisture conditioning (typically drying of the soil) would be required before the existing fill materials could be re-used as structural fill. It would be very difficult and time-consuming to dry the soils that are far wet of their optimum moisture content in a reasonable amount of time, given the limited space expected to be available for spreading the soil into a thin layer.

5.1.3 *Soil and Groundwater Conditions at Pipe and Structure Invert Elevations*

Based on the provided sewer profiles for existing pipes and information obtained during the geotechnical exploration, we estimate that the bottom of the existing sewer pipes and sewer structures (assumed to be equal to the new pipes and structures) are situated in very loose to medium dense residual soils beneath the water table. Unless the groundwater level was much lower at the time of pipe installation than it appears to be now, soils at the base of the pipe installation trenches would have likely softened rapidly when exposed to infiltrating water. When exposed to infiltrating water without over-excavating and placing crushed stone bedding material, some depth of very loose/very soft soil may have been left in place below the pipes, manhole structures and/or junction boxes (our borings did not penetrate such materials – see Report Section 5.1.1). Unless there was over-excavation or external disturbance for some reason, water-softening is usually confined to the upper ½ to 1 foot of soil for the soil types that the borings indicate existed at invert elevations.

Based on our findings and the comments made above, we do not anticipate the need for deep undercutting below the invert elevations of the new pipes. To facilitate a stable subgrade for pipe, manhole structure, or junction box support, we recommend undercutting the bottom of the trench excavation a minimum of one foot below the bottom of the pipes or structures and backfilling with No. 57 stone. Some areas may have to be undercut further to remove very soft soils resulting from past over-excavation or disturbance during the previous pipe installation process. That will need to be field-determined based on actual conditions exposed during the excavation process. Care must be taken to backfill the over-excavated areas promptly with crushed stone (after excavating only about 5 to 10 linear feet) since the soil at the undercut depth will again soften after a short time period of exposure to water. Making the “final cut” with the cutting teeth parallel to the trench bottom rather than dragging the teeth of the bucket through the soil at a near-vertical inclination will lessen the amount of loose soil left at the bottom of the excavation below the base of the planned pipe or structure.

No. 57 stone should also be used to backfill the excavation to the top of the pipes or to slightly above the elevation at which water is seeping through the sidewalls of the excavation, whichever is higher. After that point, compacted soil may be used to backfill the remainder of the excavation.

Pre-construction dewatering is likely not needed for this project. Gravity-drained trenches with pumps can likely be used to perform local dewatering during construction. The water can be collected at one or more sump pits and pumped out of the excavation.

We could not determine from our borings if existing junction boxes and manholes can be saved; however, it appears that very poor support conditions (trash, organics, poorly compacted fill subject to settlement, etc.) should not have existed at the bottom elevations of these structures. If the amount of construction-related soil disturbance or water-softening of soils below the structures was not more than about a foot and the structures are observed during construction to be in satisfactory condition, it may be possible to re-use them. If safe access can be provided to our personnel during construction, we can attempt to further evaluate shallow support conditions below the structures at that time.

5.1.4 General Comments Regarding the Impacts of Dewatering on Adjacent Structures

It does not appear that deep dewatering will be needed during the planned storm sewer replacement process. Although localized groundwater control in trenches may temporarily lower groundwater levels some distance beyond the construction area, we do not expect it should have much impact on the adjacent building; however, **a detailed study of the possible impact of construction groundwater control on the building was beyond the scope of this the scope of the exploration.**

5.1.5 Deep-Subsurface Soil and Groundwater Conditions and Shallow-Soil Strength Parameters as related to Lateral Support of Soils/Structures Adjacent to the Excavation

Borings B-01, B-02, and B-06 were extended to depths of 35 to 60 feet below the current ground surface to provide preliminary information to be considered when planning for design of shoring systems that may be needed to provide lateral support of the excavation sidewalls (where benching or sloping cannot particularly be accomplished). One triaxial shear test was performed (as discussed in Report Sections 3.2 and 5.1.1), but that may not be representative of soils that will be exposed in excavation sidewalls near the existing building or in other areas.

Design of shoring or other means of excavation support were not part of the scope of this exploration. Information obtained and reported as part of this exploration related to shoring design or dewatering are for conceptual and planning purposes only. The parties responsible for designing shoring for this project should conduct their own subsurface exploration and laboratory testing.

5.2 Earthwork

5.2.1 Stripping and Initial Subgrade Preparation in Areas of Planned Pavement

Topsoil, organics, and any remnants of previous construction should be stripped from the pavement construction areas. After the site has been stripped, at-grade areas and those that are to receive fill should be evaluated by a member of our staff. This should include observing thorough proofrolling of the subgrades with a loaded tandem-axle dump truck or earth-moving scraper. Proofrolling consists of applying repeated passes to the subgrade with this equipment. Any materials judged to deflect excessively under the wheel loads and which cannot be densified by continued rolling should be undercut to stable soils before placing fill.

5.2.2 Excavation Conditions

Existing fill materials, alluvial soils, and residual soils with standard penetration resistance values up to about 30 bpf can generally be excavated using conventional earthmoving equipment such as tracked excavators and pusher-assisted scrapers. Higher consistency soils (greater than about 30 bpf) may require use of a large tracked excavator, a large bulldozer, or a tracked end-loader. The boring data of this exploration did not indicate the likelihood of encountered excavation difficulty due to high consistency soil or rock during the pipe replacement process.

5.2.3 Earth Material Utilization and Fill Placement

No. 57 stone or other crushed stone placed for pipe bedding should be tamped with the backhoe bucket or compacted with a vibratory plate compactor, a remote-controlled vibratory trench compactor, or another similar vibratory compactor. Backfill above the bedding layer should be compacted in one-foot maximum lift thicknesses with similar compaction equipment, excluding the backhoe bucket.

After pipe and structure installation are completed and the necessary No. 57 stone (or similar) has been placed below the groundwater table, areas to receive fill/backfill may be brought to their design subgrade levels with structural fill. Structural fill is defined as inorganic natural soil with maximum particle sizes of about 4 inches and Plasticity Indexes less than 30. Structural fill should be placed in maximum 8-inch loose layers and compacted to at least 95 percent of the soil’s maximum dry density as determined by the standard Proctor compaction test (ASTM D698). Because pavement support characteristics of Piedmont soils typically improve with greater density, we suggest the upper foot be compacted to at least 98 percent for pavement subgrade fills.

As previously noted, we do not believe that it will be practical for the existing fill/backfill soils at the site to be reused as structural fill.

5.2.4 Earth Slopes

We do not expect earth slopes will need to be constructed for the project. Temporary slopes should be no steeper than $1^1/_2$H:1V, and should conform to OSHA guidelines.

6.0 Limitations

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

We relied on project information given to us to develop our conclusions and recommendations. If project information described in this report is not accurate, or if it changes during project development, we should be notified of the changes so that we can modify our recommendations based on this additional information, if necessary.

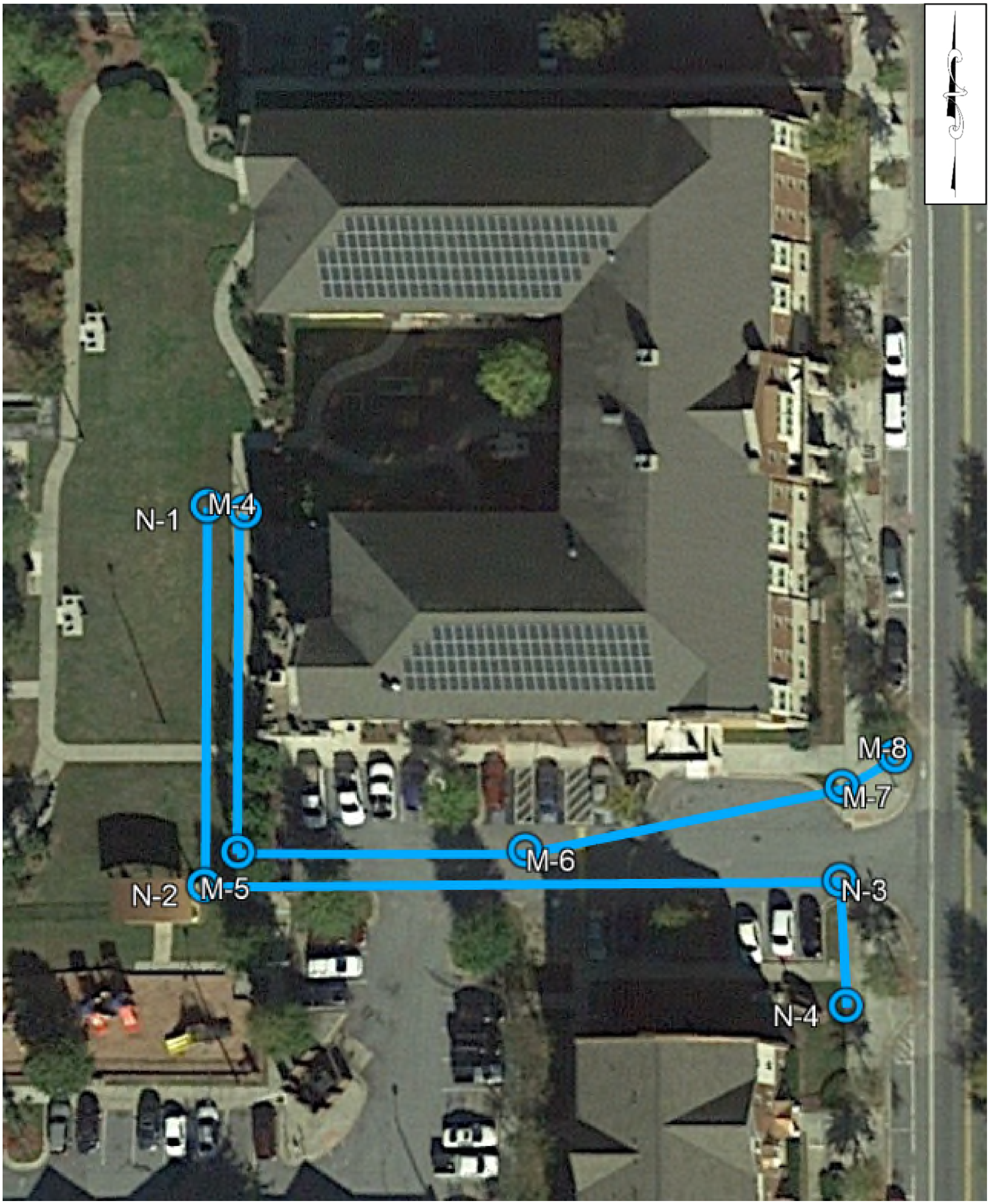
Our conclusions and recommendations are based on limited data from a field exploration program. Subsurface conditions can vary widely between explored areas. Some variations may not become evident until construction. If conditions are encountered which appear different than those described in our report, we should be notified. This report should not be construed to represent subsurface conditions for the entire site.

Unless specifically noted otherwise, our field exploration program did not include an assessment of regulatory compliance, environmental conditions or pollutants or presence of any biological materials (mold, fungi, and bacteria). If there is a concern about these items, other studies should be performed. S&ME can provide a proposal and perform these services if requested.

S&ME should be retained to review the final plans and specifications to check that earthwork, foundation, and other recommendations are properly interpreted and implemented. Further, we recommend that S&ME be retained to observe earthwork construction activities and to perform periodic soil density tests.

For additional information regarding the use and limitations of this report, please read the *Important Information about your Geotechnical Engineering Report* document located in the Appendix.

APPENDIX



REFERENCE:
Google Earth, As-Built Utility Information provided by ATKINS

DRAWING FOR INFORMATION PURPOSES ONLY

LEGEND:

▬	**Existing Sewer Pipe**
◎	**Existing Manhole or Junction Box**

SITE LOCATION PLAN

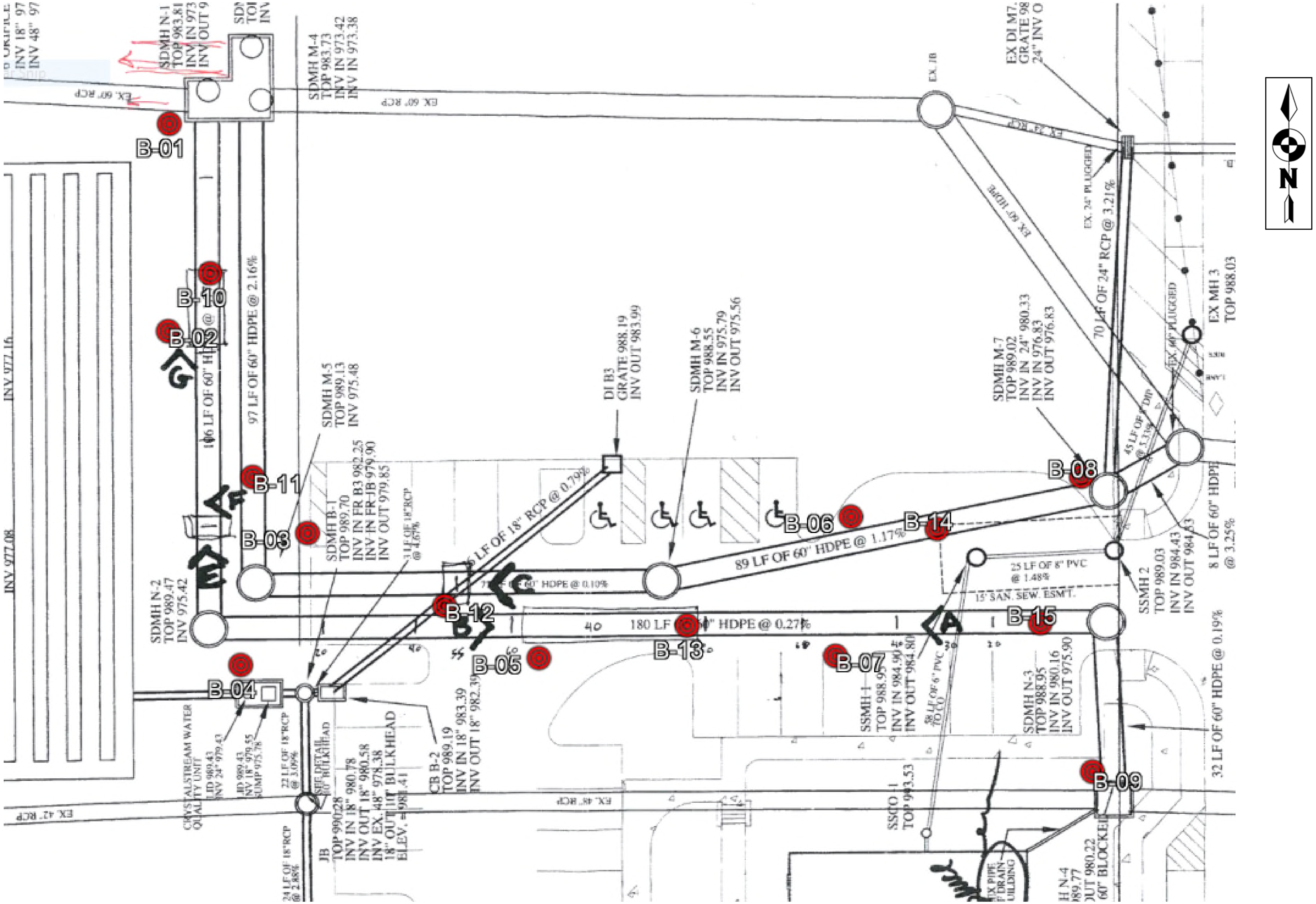
CITY OF DECATUR STORM SEWER REPLACEMENT
1450 COMMERCE DRIVE
DECATUR, GEORGIA

SCALE:
NOT TO SCALE

DATE:
5-3-2019

PROJECT NUMBER
1280-19-022

FIGURE NO.
1



TEST LOCATION PLAN

CITY OF DECATUR STORM SEWER REPLACEMENT
1450 COMMERCE DRIVE
DECATUR, GEORGIA

SCALE:
NOT TO SCALE

DATE:
5-3-19

PROJECT NUMBER
1280-19-022

FIGURE NO.
2

REFERENCE:
As-Built Utility Plan provided by ATKINS

DRAWING FOR ILLUSTRATION PURPOSES ONLY

LEGEND:

● TEST BORING LOCATION

LEGEND TO SOIL CLASSIFICATION AND SYMBOLS

SOIL TYPES

- ■ Topsoil
- ░ Concrete
- ▦ Fill
- ░ Sand
- ▥ Silt
- ▨ Clay
- ▨ Fat Clay
- ▩ Lean Clay
- ▤ Cored Rock
- ▒ Partially Weathered Rock

- ■ Asphalt
- ░ Gravel
- ▥ Silty Sand
- ▨ Clayey Sand
- ▥ Sandy Silt
- ▥ Clayey Silt
- ▨ Sandy Clay
- ▨ Silty Clay
- ■ Organic

SAMPLER TYPES

(Shown in Samples Column)

- ■ Shelby Tube
- ⧗ Split Spoon
- ◫ Rock Core
- ░ No Recovery

CONSISTENCY OF COHESIVE SOILS

Consistency	*Standard Penetration Resistance Blows/Foot*
Very Soft	0 to 2
Soft	3 to 4
Firm	5 to 8
Stiff	9 to 15
Very Stiff	16 to 30
Hard	31 to 50
Very Hard	Over 50

RELATIVE DENSITY OF COHESIONLESS SOILS

Relative Density	*Standard Penetration Resistance Blows/Foot*
Very Loose	0 to 4
Loose	5 to 10
Medium Dense	11 to 30
Dense	30 to 50
Very Dense	16 to 30

WATER LEVELS

(Shown in Water Level Column)

- ▽ Water Level at Termination of Boring
- ▼ Water Level Taken After 24 Hours
- ◀ Loss of Drilling Water
- **HC** Hole Cave

TERMS

Standard Penetration Resistance | The number of blows of a 140 lb. hammer falling 30 inches. Required to drive 1.4 inches I.D. Split Spoon sampler 1 foot. As specified in ASTM D-1586.

REC | Total length of rock recovered in the core barrel divided by the total length of the core run times 100%.

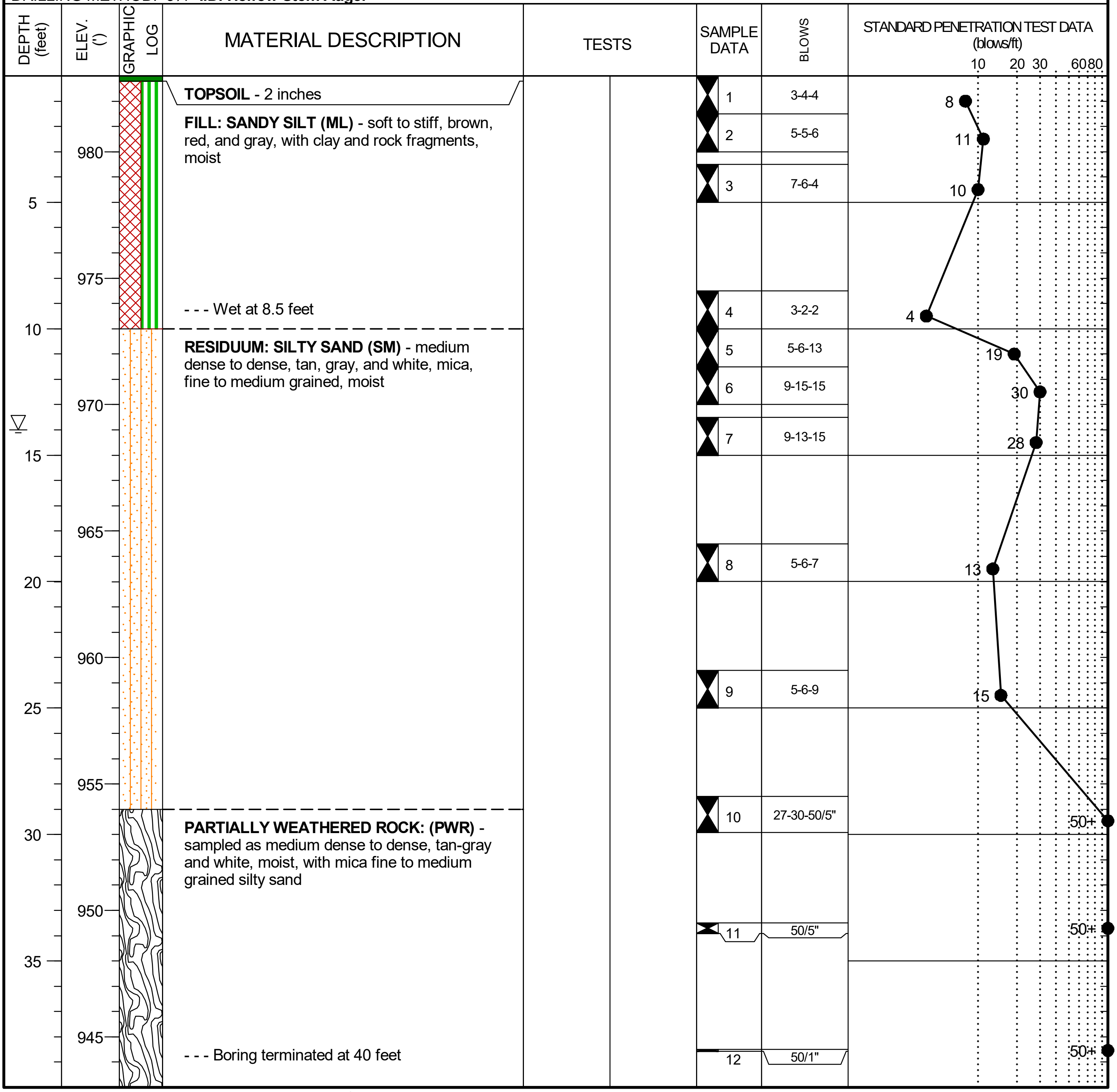
RQD | Total length of sound rock segments recovered that are longer than or equal to 4inches (mechanical breaks excluded) divided by the total length of the core run times 100%.

PROJECT: **City of Decatur Storm Sewer Replace**
Decatur, Georgia
S&ME Project No. 128-19-022

BORING LOG B-01

CLIENT: **ATKINS**
ELEVATION: **983.0 ft**
DATE DRILLED: **4/15/19 - 4/15/19**
BORING DEPTH: **40.0 ft**
DRILL RIG: **Diedrich D-50**
WATER LEVEL: **14 ' ATD**
DRILLER: **Piedmont Environmental Drilling**
CAVE-IN DEPTH: **16'**
HAMMER TYPE: **Automatic**
LOGGED BY: **Matt Revell**
SAMPLING METHOD: **Split Spoon**
DRILLING METHOD: **3¼" I.D. Hollow Stem Auger**

NOTES: Relatively Undisturbed sample taken from 10 to 12 feet



TOPSOIL - 2 inches

FILL: SANDY SILT (ML) - soft to stiff, brown, red, and gray, with clay and rock fragments, moist

- - - Wet at 8.5 feet

RESIDUUM: SILTY SAND (SM) - medium dense to dense, tan, gray, and white, mica, fine to medium grained, moist

PARTIALLY WEATHERED ROCK: (PWR) - sampled as medium dense to dense, tan-gray and white, moist, with mica fine to medium grained silty sand

- - - Boring terminated at 40 feet

SAMPLE DATA	BLOWS
1	3-4-4
2	5-5-6
3	7-6-4
4	3-2-2
5	5-6-13
6	9-15-15
7	9-13-15
8	5-6-7
9	5-6-9
10	27-30-50/5"
11	50/5"
12	50/1"

Boring terminated at 40 feet

NOTES:
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3. ***STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.***
4. ***WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.***
5. ***SOIL DESCRIPTIONS BASED ON SAMPLES OBTAINED.***

PROJECT: **City of Decatur Storm Sewer Replace**
Decatur, Georgia
S&ME Project No. 128-19-022

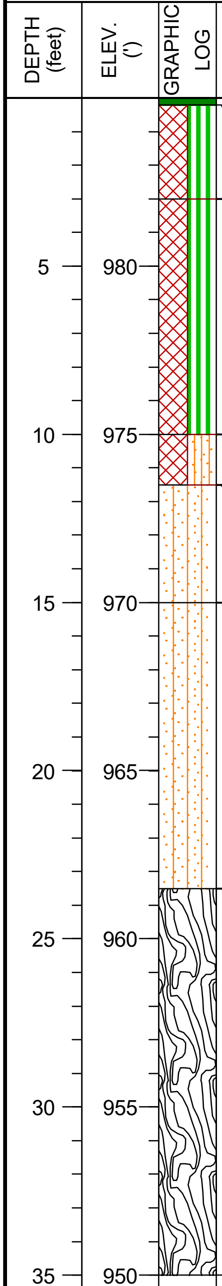
BORING LOG B-02

CLIENT: **ATKINS**	ELEVATION: **985.0 ft**
DATE DRILLED: **4/15/19 - 4/15/19**	BORING DEPTH: **35.0 ft**
DRILL RIG: **Diedrich D-50**	WATER LEVEL: **Dry ATD**
DRILLER: **Piedmont Environmental Drilling**	CAVE-IN DEPTH: **8'**
HAMMER TYPE: **Automatic**	LOGGED BY: **Matt Revell**

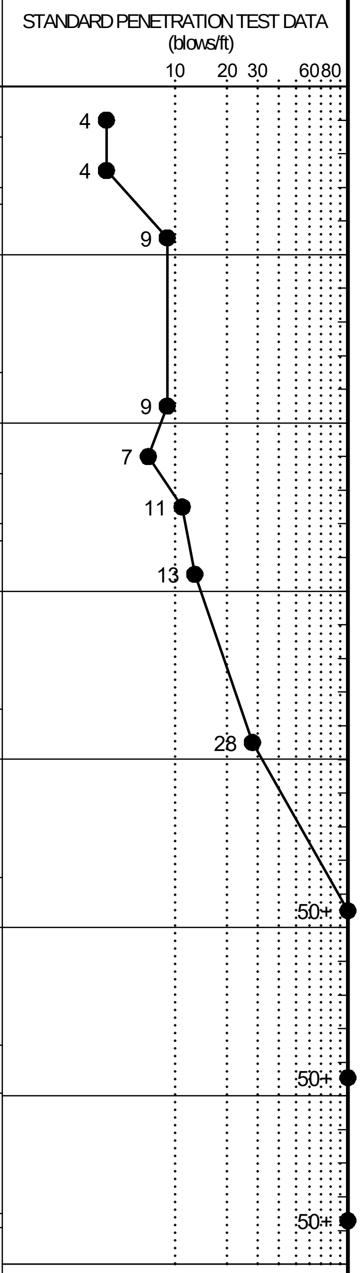
SAMPLING METHOD: **Split Spoon**

DRILLING METHOD: **3¼" I.D. Hollow Stem Auger**

NOTES: Relatively Undisturbed sample taken from 5 to 7 feet



MATERIAL DESCRIPTION	TESTS	SAMPLE DATA	BLOWS
TOPSOIL - 2 inches		1	3-2-2
FILL: SANDY SILT (ML) - soft, red-brown, clay, moist		2	1-2-2
FILL: SANDY SILT (ML) - stiff, red-brown and gray, clay, moist to wet		3 4	3-5-4 2-4-5
FILL: SILTY SAND (SM) - loose, brown and gray, gravel, medium grained, moist		5	3-3-4
RESIDUUM: SILTY SAND (SM) - medium dense, tan-orange and black, fine to medium grained, moist		6 7	3-5-6 5-6-7
RESIDUUM: SILTY SAND (SM) - medium dense, tan-gray and white, mica, fine to medium grained, moist		8	6-12-16
PARTIALLY WEATHERED ROCK: (PWR) - sampled as medium dense, tan-gray and white, moist, fine to grained silty sand		9 10 11	50/5" 12-26-50/5" 27-50/5"
Boring terminated at 35 feet			



S&ME BORING LOG - NEW 128019022 BORING LOGS.GPJ S&ME 12-1-2010 DATA TEMPLATE.GDT 5/6/19

NOTES:
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3. *STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.*
4. *WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.*
5. *SOIL DESCRIPTIONS BASED ON SAMPLES OBTAINED.*

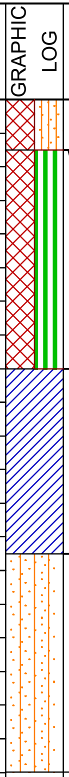
PROJECT:

City of Decatur Storm Sewer Replace
Decatur, Georgia
S&ME Project No. 128-19-022

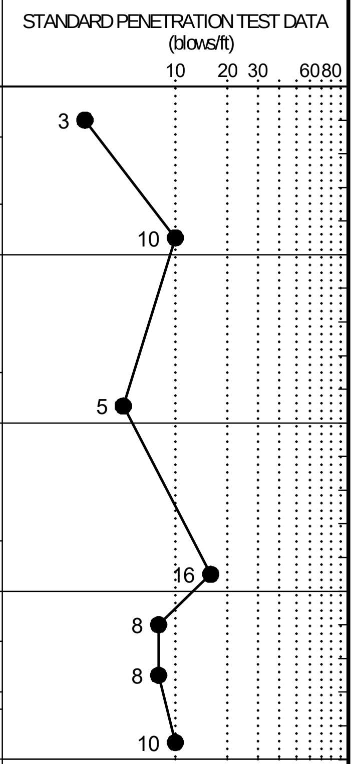
BORING LOG B-03

CLIENT: **ATKINS**
ELEVATION: **989.0 ft**
DATE DRILLED: **4/15/19 - 4/15/19**
BORING DEPTH: **20.0 ft**
DRILL RIG: **Diedrich D-50**
WATER LEVEL: **Dry ATD**
DRILLER: **Piedmont Environmental Drilling**
CAVE-IN DEPTH: **12'**
HAMMER TYPE: **Automatic**
LOGGED BY: **Matt Revell**
SAMPLING METHOD: **Split Spoon**
DRILLING METHOD: **3¼" I.D. Hollow Stem Auger**

NOTES: 5 inches of asphalt cored prior to drilling



DEPTH (feet)	ELEV. ()	MATERIAL DESCRIPTION	TESTS	SAMPLE DATA	BLOWS	STANDARD PENETRATION TEST DATA (blows/ft)
		FILL: SILTY SAND (SM) - very loose, red-brown, mica, fine to medium grained, moist		1	3-1-2	3
		FILL: SANDY SILT (ML) - firm to stiff, brown to gray, moist				
5	985			2	4-5-5	10
10	980	**ALLUVIUM: LEAN CLAY (CL)** - firm, gray, moist		3	1-2-3	5
15	975	**RESIDUUM: SILTY SAND (SM)** - loose to medium dense, tan, orange, and gray, mica, fine to medium grained, moist		4	2-8-8	16
				5	4-4-4	8
				6	2-4-4	8
20	970			7	4-5-5	10
		Boring terminated at 20 feet				



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4. WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.
5. SOIL DESCRIPTIONS BASED ON SAMPLES OBTAINED.

PROJECT:

City of Decatur Storm Sewer Replace
Decatur, Georgia
S&ME Project No. 128-19-022

BORING LOG B-04

CLIENT: **ATKINS**

ELEVATION: **989.0 ft**

DATE DRILLED: **4/15/19 - 4/15/19**

BORING DEPTH: **20.0 ft**

DRILL RIG: **Diedrich D-50**

WATER LEVEL: **Dry ATD**

DRILLER: **Piedmont Environmental Drilling**

CAVE-IN DEPTH: **Not measured**

HAMMER TYPE: **Automatic**

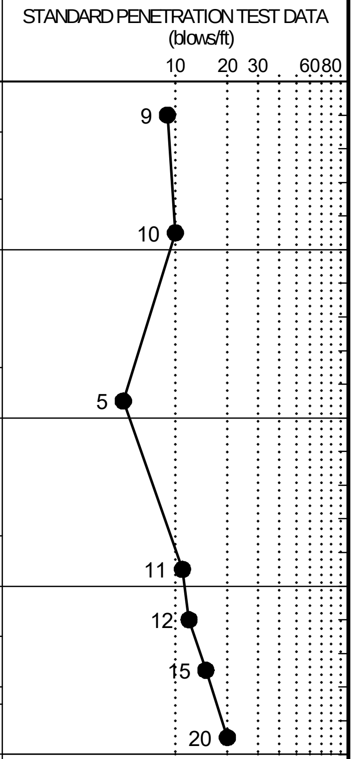
LOGGED BY: **Matt Revell**

SAMPLING METHOD: **Split Spoon**

DRILLING METHOD: **3¼" I.D. Hollow Stem Auger**

NOTES:

DEPTH (feet)	ELEV. ( )	GRAPHIC LOG	MATERIAL DESCRIPTION	TESTS	SAMPLE DATA	BLOWS	STANDARD PENETRATION TEST DATA (blows/ft)
			TOPSOIL - 1 inch		1	5-4-5	9
			FILL: SANDY SILT (ML) - stiff, red-brown, moist				
	985				2	3-5-5	10
5			**ALLUVIUM: LEAN CLAY (CL)** - firm, gray, with organic odor, moist				
	980				3	3-3-2	5
10			**RESIDUUM: SILTY SAND (SM)** - medium dense, tan, gray, and orange, with mica, fine to medium grained, moist				
	975				4	4-5-6	11
15					5	6-6-6	12
					6	6-7-8	15
	970				7	10-8-12	20
20			Boring terminated at 20 feet				



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5. *SOIL DESCRIPTIONS BASED ON SAMPLES OBTAINED.*

PROJECT:

City of Decatur Storm Sewer Replace
Decatur, Georgia
S&ME Project No. 128-19-022

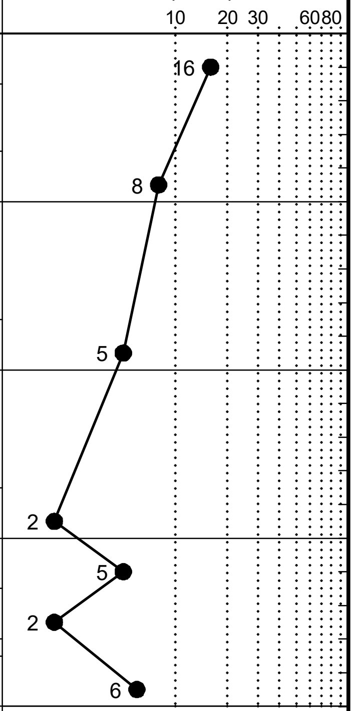
BORING LOG B-05

CLIENT: **ATKINS**
ELEVATION: **989.0 ft**
DATE DRILLED: **4/15/19 - 4/15/19**
BORING DEPTH: **20.0 ft**
DRILL RIG: **Diedrich D-50**
WATER LEVEL: **Dry ATD**
DRILLER: **Piedmont Environmental Drilling**
CAVE-IN DEPTH: **14'**
HAMMER TYPE: **Automatic**
LOGGED BY: **Matt Revell**
SAMPLING METHOD: **Split Spoon**
DRILLING METHOD: **3¼" I.D. Hollow Stem Auger**

NOTES: 3 inches of asphalt and 9 inches of concrete cored prior to drilling

DEPTH (feet)	ELEV. ()	MATERIAL DESCRIPTION	TESTS	SAMPLE DATA	BLOWS
		FILL: SANDY SILT (ML) - very stiff, red-brown, with rock fragments, moist		1	3-4-12
	985	**FILL: SANDY SILT (ML)** - firm, gray-brown, with rock fragments, moist		2	3-4-4
5					
	980			3	2-1-4
10		**RESIDUUM: SILTY SAND (SM)** - very loose to loose, tan, gray, and orange, fine to medium grained, wet			
	975			4	1-1-1
15				5	woh-3-2
				6	woh-woh-2
	970			7	2-3-3
20		Boring terminated at 20 feet			

STANDARD PENETRATION TEST DATA (blows/ft)



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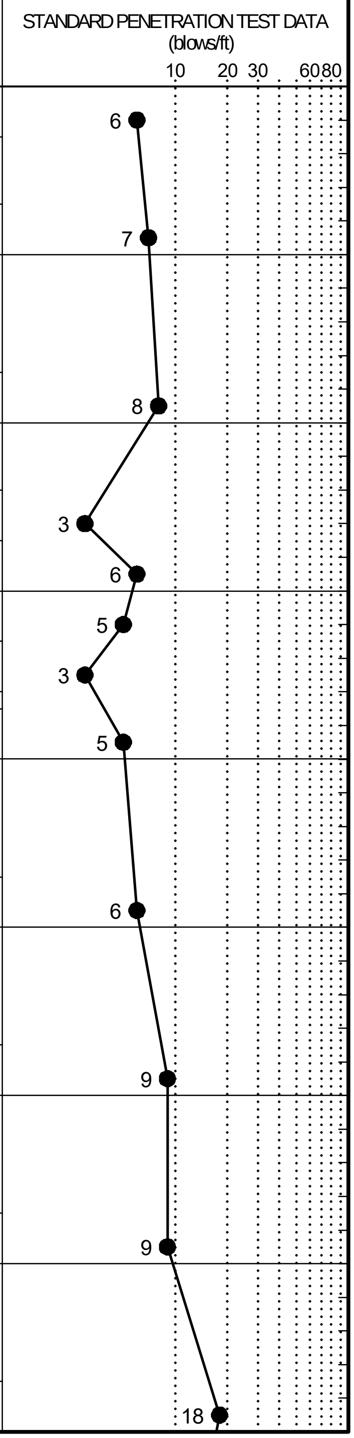
PROJECT:	City of Decatur Storm Sewer Replace Decatur, Georgia S&ME Project No. 128-19-022	**BORING LOG** **B-06**
CLIENT: **ATKINS**	ELEVATION: **988.0 ft**	NOTES: 7 inches asphalt and concrete cored prior to drilling Relatively Undisturbed sample taken from 3 to 5 feet
DATE DRILLED: **4/15/19 - 4/15/19**	BORING DEPTH: **58.0 ft**	
DRILL RIG: **Diedrich D-50**	WATER LEVEL: **10 ' ATD**	
DRILLER: **Piedmont Environmental Drilling**	CAVE-IN DEPTH: **Not measured**	
HAMMER TYPE: **Automatic**	LOGGED BY: **Matt Revell**	
SAMPLING METHOD: **Split Spoon**		
DRILLING METHOD: **3¼" I.D. Hollow Stem Auger**		

DEPTH (feet)	ELEV. ()	MATERIAL DESCRIPTION
	985	**FILL: SILTY SAND (SM)** - firm, red-brown-gray, clay and rock fragments, moist to wet
5	980	
▽10		**RESIDUUM: SILTY SAND (SM)** - very loose to loose, tan, orange, and gray, fine to medium grained, wet
15	975	
	970	**RESIDUUM: SILTY SAND (SM)** - loose to medium dense, gray, tan, and white, mica, fine to medium grained, moist to wet
20	965	
25	960	
30	955	
35	950	

TESTS

SAMPLE DATA	BLOWS
1	3-3-3
2	6-4-3
3	1-2-6
4	woh-woh-3
5	3-3-3
6	2-2-3
7	2-1-2
8	2-2-3
9	3-3-3
10	3-4-5
11	3-4-5
12	5-6-12



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PROJECT: **City of Decatur Storm Sewer Replace**
Decatur, Georgia
S&ME Project No. 128-19-022

BORING LOG B-06

CLIENT: **ATKINS**	ELEVATION: **988.0 ft**
DATE DRILLED: **4/15/19 - 4/15/19**	BORING DEPTH: **58.0 ft**
DRILL RIG: **Diedrich D-50**	WATER LEVEL: **10 ' ATD**
DRILLER: **Piedmont Environmental Drilling**	CAVE-IN DEPTH: **Not measured**
HAMMER TYPE: **Automatic**	LOGGED BY: **Matt Revell**

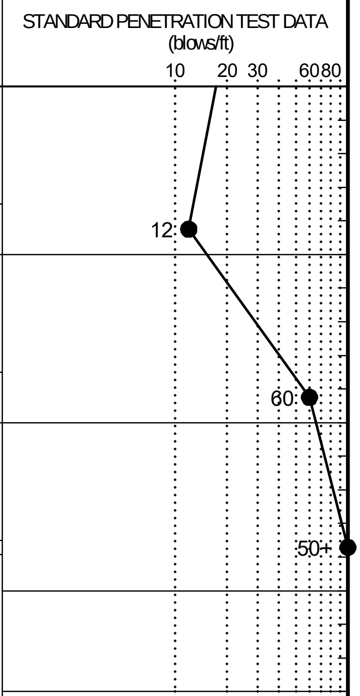
SAMPLING METHOD: **Split Spoon**

DRILLING METHOD: **3¼" I.D. Hollow Stem Auger**

NOTES: 7 inches asphalt and concrete cored prior to drilling

Relatively Undisturbed sample taken from 3 to 5 feet

DEPTH (feet)	ELEV. ( )	GRAPHIC LOG	MATERIAL DESCRIPTION	TESTS	SAMPLE DATA	BLOWS	STANDARD PENETRATION TEST DATA (blows/ft)
45	945		**RESIDUUM: SILTY SAND (SM)** - loose to medium dense, gray, tan, and white, mica, fine to medium grained, moist to wet *(continued)*			5-5-7	12
50	940		**RESIDUUM: SILTY SAND (SM)** - very dense, gray, tan, and white, mica, fine to medium grained, moist			19-28-32	60
55	935 930		**PARTIALLY WEATHERED ROCK: (PWR)** - sampled as very dense, gray, tan, and white, moist, with mica, fine to medium grained silty sand			50/5"	50+
			Refusal at 58 feet Boring terminated at 58 feet				



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PROJECT:

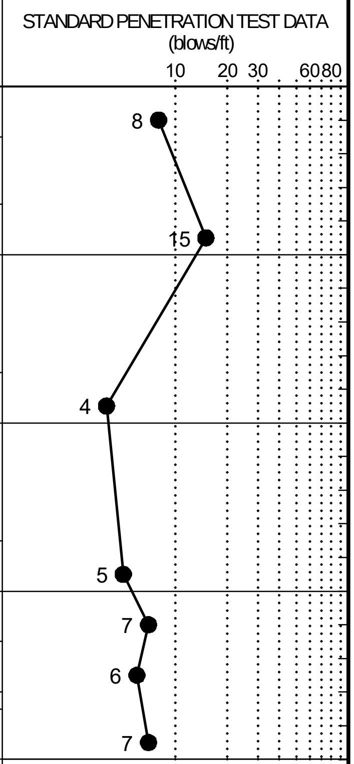
City of Decatur Storm Sewer Replace
Decatur, Georgia
S&ME Project No. 128-19-022

BORING LOG B-07

CLIENT: **ATKINS**
ELEVATION: **989.0 ft**
DATE DRILLED: **4/19/19 - 4/19/19**
BORING DEPTH: **20.0 ft**
DRILL RIG: **Diedrich D-50**
WATER LEVEL: **10 ' ATD**
DRILLER: **Piedmont Environmental Drilling**
CAVE-IN DEPTH: **Not measured**
HAMMER TYPE: **Automatic**
LOGGED BY: **Matt Revell**
SAMPLING METHOD: **Split Spoon**
DRILLING METHOD: **3¼" I.D. Hollow Stem Auger**

NOTES: 2 inches of asphalt and 6 inches of concrete cored prior to drilling

DEPTH (feet)	ELEV. ( )	MATERIAL DESCRIPTION	TESTS	SAMPLE DATA	BLOWS
		FILL: SANDY SILT (ML) - firm, red-brown, with clay and rock fragments, moist		1	2-3-5
	985	**FILL: POORLY GRADED SAND (SP)** - medium dense, gray, with rock fragments, medium grained, moist		2	8-8-7
5	980	**FILL: SILTY SAND (SM)** - very loose, brown-gray, fine to medium grained, wet		3	woh-2-2
▽10	975	**RESIDUUM: SILTY SAND (SM)** - loose, tan-brown-gray, mica, fine to medium grained, moist to wet		4	2-2-3
15				5	3-3-4
				6	2-3-3
	970			7	3-3-4
20		Boring terminated at 20 feet			



S&ME BORING LOG - NEW 128019022 BORING LOGS.GPJ S&ME 12-1-2010 DATA TEMPLATE.GDT 5/6/19

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4. *WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.*
5. *SOIL DESCRIPTIONS BASED ON SAMPLES OBTAINED.*

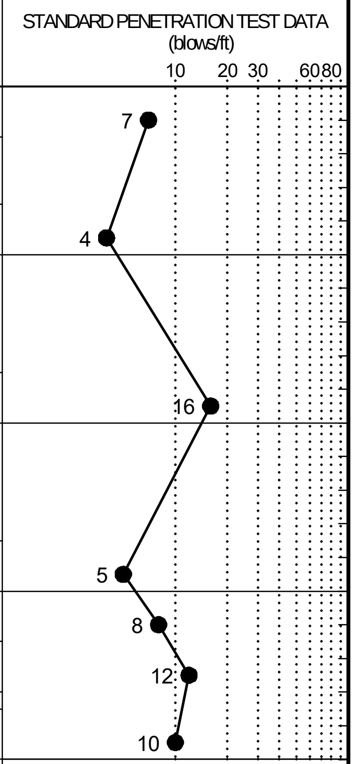
PROJECT:	**City of Decatur Storm Sewer Replace** **Decatur, Georgia** **S&ME Project No. 128-19-022**

BORING LOG **B-08**

CLIENT: **ATKINS**	ELEVATION: **988.0 ft**	NOTES: 4 inches of asphalt cored prior to drilling
DATE DRILLED: **4/17/19 - 4/17/19**	BORING DEPTH: **20.0 ft**	
DRILL RIG: **Diedrich D-50**	WATER LEVEL: **13 ' ATD 9.2 ' Delayed**	
DRILLER: **Piedmont Environmental Drilling**	CAVE-IN DEPTH: **Not measured**	
HAMMER TYPE: **Automatic**	LOGGED BY: **Matt Revell**	
SAMPLING METHOD: **Split Spoon**		
DRILLING METHOD: **3¼" I.D. Hollow Stem Auger**		

DEPTH (feet)	ELEV. ( )	MATERIAL DESCRIPTION	TESTS	SAMPLE DATA	BLOWS
0 - 5	988 - 983	**FILL: SANDY SILT (ML)** - soft to firm, red-brown, with clay, moist		1 2	3-3-4 2-2-2
5 - 10	983 - 978	**FILL: POORLY GRADED SAND (SP)** - medium dense, gray, medium grained, moist to wet		3	3-10-6
10 - 20	978 - 968	**RESIDUUM: SILTY SAND (SM)** - loose to medium dense, tan, gray, brown, fine to medium grained, moist		4 5 6 7	3-2-3 2-3-5 4-5-7 3-4-6
20	968	Boring terminated at 20 feet			

STANDARD PENETRATION TEST DATA (blows/ft)



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PROJECT:

City of Decatur Storm Sewer Replace
Decatur, Georgia
S&ME Project No. 128-19-022

BORING LOG B-09

CLIENT: **ATKINS**	ELEVATION: **990.0 ft**
DATE DRILLED: **4/17/19 - 4/17/19**	BORING DEPTH: **15.0 ft**
DRILL RIG: **Diedrich D-50**	WATER LEVEL: **Dry ATD**
DRILLER: **Piedmont Environmental Drilling**	CAVE-IN DEPTH: **10'**
HAMMER TYPE: **Automatic**	LOGGED BY: **Matt Revell**

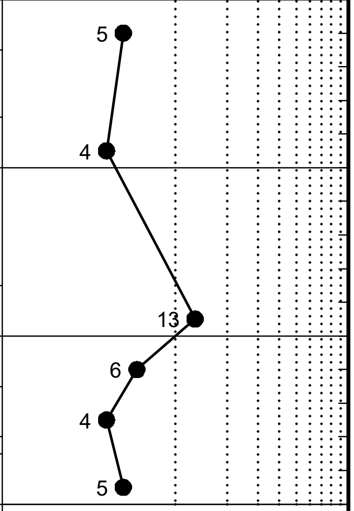
NOTES:

SAMPLING METHOD: **Split Spoon**

DRILLING METHOD: **3¼" I.D. Hollow Stem Auger**

DEPTH (feet)	ELEV. ( )	MATERIAL DESCRIPTION	TESTS	SAMPLE DATA	BLOWS
		TOPSOIL - 2 inches		1	2-2-3
		FILL: SILTY SAND (SM) - loose, red-brown, moist, with large rock fragments			
		FILL: LEAN CLAY (CL) - soft, red-brown-orange, moist to wet		2	woh-2-2
5	985				
		FILL: LEAN CLAY (CL) - firm to stiff, red-brown-orange, moist to wet		3	7-3-10
10	980			4	7-4-2
		RESIDUUM: SANDY SILT (ML) - soft to firm, gray, wet, mica		5	3-2-2
				6	2-2-3
15	975	Boring terminated at 15 feet			

STANDARD PENETRATION TEST DATA (blows/ft)



NOTES:

1. THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.
2. BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.
3. STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.
4. WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.
5. SOIL DESCRIPTIONS BASED ON SAMPLES OBTAINED.

PROJECT: **City of Decatur Storm Sewer Replace**
Decatur, Georgia
S&ME Project No. 128-19-022

BORING LOG B-10

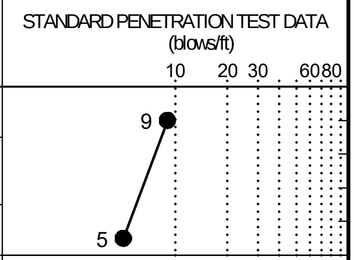
CLIENT: **ATKINS**	ELEVATION: **984.0 ft**
DATE DRILLED: **4/15/19 - 4/15/19**	BORING DEPTH: **5.0 ft**
DRILL RIG: **Diedrich D-50**	WATER LEVEL: **Dry ATD**
DRILLER: **Piedmont Environmental Drilling**	CAVE-IN DEPTH: **Not measured**
HAMMER TYPE: **Automatic**	LOGGED BY: **Matt Revell**

NOTES:

SAMPLING METHOD: **Split Spoon**

DRILLING METHOD: **3¼" I.D. Hollow Stem Auger**

DEPTH (feet)	ELEV. ( )	GRAPHIC LOG	MATERIAL DESCRIPTION	TESTS	SAMPLE DATA	BLOWS	STANDARD PENETRATION TEST DATA (blows/ft)
		▨	**FILL: SANDY SILT (ML)** - firm to stiff, red-brown, gray, with rock fragments, moist		1	4-5-4	9
	980	▨			2	3-2-3	5
5			Boring terminated at 5 feet				



NOTES:
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3. *STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.*
4. *WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.*
5. *SOIL DESCRIPTIONS BASED ON SAMPLES OBTAINED.*

PROJECT:

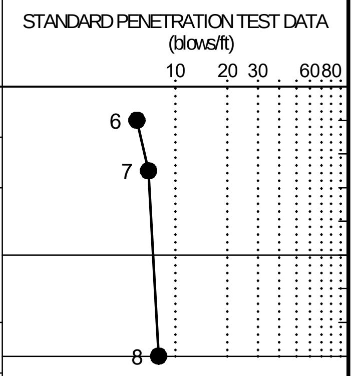
City of Decatur Storm Sewer Replace
Decatur, Georgia
S&ME Project No. 128-19-022

BORING LOG B-11

CLIENT: **ATKINS**
ELEVATION: **988.0 ft**
DATE DRILLED: **4/15/19 - 4/15/19**
BORING DEPTH: **8.0 ft**
DRILL RIG: **Diedrich D-50**
WATER LEVEL: **Dry ATD**
DRILLER: **Piedmont Environmental Drilling**
CAVE-IN DEPTH: **Not measured**
HAMMER TYPE: **Automatic**
LOGGED BY: **Matt Revell**
SAMPLING METHOD: **Split Spoon**
DRILLING METHOD: **3¼" I.D. Hollow Stem Auger**

NOTES: 4 inches of asphalt cored prior to drilling

DEPTH (feet)	ELEV. ( )	GRAPHIC LOG	MATERIAL DESCRIPTION	TESTS	SAMPLE DATA	BLOWS	STANDARD PENETRATION TEST DATA (blows/ft)
		▨	**FILL: SANDY SILT (ML)** - firm, red, gray, and brown, with rock fragments, moist		1	3-3-3	6
	985				2	3-4-3	7
5							
	980				3	6-4-4	8
			Boring terminated at 8 feet				



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2. *BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.*
3. *STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.*
4. *WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.*
5. *SOIL DESCRIPTIONS BASED ON SAMPLES OBTAINED.*

PROJECT: **City of Decatur Storm Sewer Replace**
Decatur, Georgia
S&ME Project No. 128-19-022

BORING LOG B-12

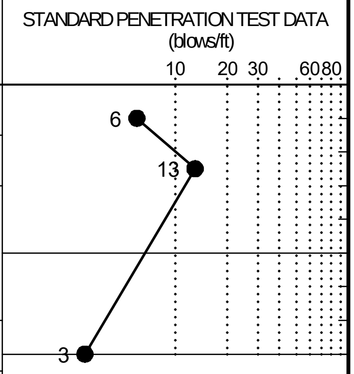
NOTES:

CLIENT: **ATKINS**	ELEVATION: **988.0 ft**
DATE DRILLED: **4/16/19 - 4/15/19**	BORING DEPTH: **8.0 ft**
DRILL RIG: **Diedrich D-50**	WATER LEVEL: **Dry ATD**
DRILLER: **Piedmont Environmental Drilling**	CAVE-IN DEPTH: **3'**
HAMMER TYPE: **Automatic**	LOGGED BY: **Matt Revell**

SAMPLING METHOD: **Split Spoon**

DRILLING METHOD: **3¼" I.D. Hollow Stem Auger**

DEPTH (feet)	ELEV. ( )	MATERIAL DESCRIPTION	TESTS	SAMPLE DATA	BLOWS
		FILL: SILTY SAND (SM) - loose to medium dense, red, brown, and gray, with rock fragments, fine to medium grained, moist		1	7-3-3
				2	3-7-6
	985	**FILL: SILTY SAND (SM)** - very loose, tan, orange, and gray, with rock fragments, fine to medium grained, wet			
5					
				3	2-1-2
	980	Boring terminated at 8 feet			



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3. *STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.*
4. *WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.*
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PROJECT: **City of Decatur Storm Sewer Replace**
Decatur, Georgia
S&ME Project No. 128-19-022

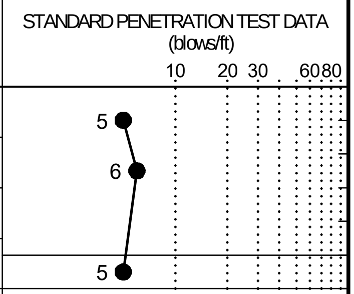
BORING LOG B-13

CLIENT: **ATKINS**
ELEVATION: **989.0 ft**
DATE DRILLED: **4/16/19 - 4/16/19**
BORING DEPTH: **6.0 ft**
DRILL RIG: **Diedrich D-50**
WATER LEVEL: **Dry ATD**
DRILLER: **Piedmont Environmental Drilling**
CAVE-IN DEPTH: **Not measured**
HAMMER TYPE: **Automatic**
LOGGED BY: **Matt Revell**
SAMPLING METHOD: **Split Spoon**
DRILLING METHOD: **3¼" I.D. Hollow Stem Auger**

NOTES: 8 inches (combined) of asphalt and concrete cored prior to drilling

DEPTH (feet)	ELEV. ( )	GRAPHIC LOG	MATERIAL DESCRIPTION	TESTS	SAMPLE DATA	BLOWS
		▨	**FILL: SILTY SAND (SM)** - loose, red, brown, and gray, fine to medium grained, moist		1	2-2-3
		▨	**FILL: SANDY LEAN CLAY (CL)** - firm, red-brown, with rock fragments, moist		2	2-3-3
	985					
5					3	2-2-3
			Boring terminated at 6 feet			

STANDARD PENETRATION TEST DATA (blows/ft)



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3. *STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.*
4. *WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.*
5. *SOIL DESCRIPTIONS BASED ON SAMPLES OBTAINED.*

PROJECT: **City of Decatur Storm Sewer Replace**
Decatur, Georgia
S&ME Project No. 128-19-022

BORING LOG B-14

CLIENT: **ATKINS**	ELEVATION: **988.0 ft**
DATE DRILLED: **4/17/19 - 4/17/19**	BORING DEPTH: **6.0 ft**
DRILL RIG: **Diedrich D-50**	WATER LEVEL: **Dry ATD**
DRILLER: **Piedmont Environmental Drilling**	CAVE-IN DEPTH: **4'**
HAMMER TYPE: **Automatic**	LOGGED BY: **Matt Revell**

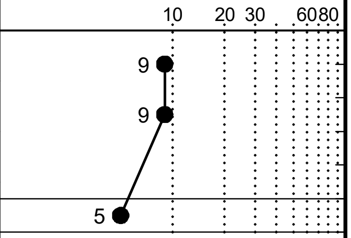
NOTES: 1 inch of asphalt and 6 inches of concrete cored prior to drilling

SAMPLING METHOD: **Split Spoon**

DRILLING METHOD: **3¼" I.D. Hollow Stem Auger**

DEPTH (feet)	ELEV. ( )	GRAPHIC LOG	MATERIAL DESCRIPTION	TESTS	SAMPLE DATA	BLOWS
		▨	**FILL: SANDY SILT (ML)** - firm to stiff, red-brown, with rock fragments and clay, moist		1	2-3-6
	985				2	3-5-4
5					3	3-2-3
			Boring terminated at 6 feet			

STANDARD PENETRATION TEST DATA (blows/ft)



S&ME BORING LOG - NEW 128019022 BORING LOGS.GPJ S&ME 12-1-2010 DATA TEMPLATE.GDT 5/6/19

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3. *STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.*
4. *WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.*
5. *SOIL DESCRIPTIONS BASED ON SAMPLES OBTAINED.*

PROJECT:

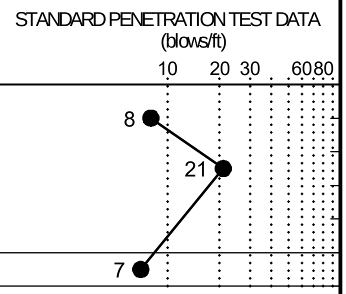
City of Decatur Storm Sewer Replace
Decatur, Georgia
S&ME Project No. 128-19-022

BORING LOG B-15

CLIENT: **ATKINS**
ELEVATION: **989.0 ft**
DATE DRILLED: **4/17/19 - 4/17/19**
BORING DEPTH: **6.0 ft**
DRILL RIG: **Diedrich D-50**
WATER LEVEL: **Dry ATD**
DRILLER: **Piedmont Environmental Drilling**
CAVE-IN DEPTH: **Not measured**
HAMMER TYPE: **Automatic**
LOGGED BY: **Matt Revell**
SAMPLING METHOD: **Split Spoon**
DRILLING METHOD: **3¼" I.D. Hollow Stem Auger**

NOTES: 4.5 inches of asphalt cored prior to drilling

DEPTH (feet)	ELEV. ( )	GRAPHIC LOG	MATERIAL DESCRIPTION	TESTS	SAMPLE DATA	BLOWS
			FILL: SILTY SAND (SM) - loose to medium dense, red, gray, and brown, with rock fragments, fine to medium grained, moist		1	8-4-4
					2	4-10-11
	985					
5					3	5-3-4
			Boring terminated at 6 feet			



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5. *SOIL DESCRIPTIONS BASED ON SAMPLES OBTAINED.*

Form No: TR-D2216-T265-1
Revision No. 1
Revision Date: 08/16/17

LABORATORY DETERMINATION OF WATER CONTENT

ASTM D 2216 ☑ *AASHTO T 265* ☐

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

Project #: 1280-19-022 Report Date: 5/1/19
Project Name: Decatur Storm Sewer Replacement Test Date(s): 4/30-5/1/19
Client Name: Atkins
Client Address: N/A
Sample by: Piedmont Sample Date(s): N/A
Sampling Method: Split Spoon Drill Rig : N/A

Method: **A** **(1%)** ☐ **B** **(0.1%)** ☑
Balance ID. 25128 Calibration Date: 4/2/19
Oven ID. 31332 Calibration Date: 10/21/19

Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt.+ Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture	Note
		ft. or m.		grams	grams	grams	grams	%	
B-1	4	8.5'-10'	433	6.70	252.83	213.63	39.20	18.9%	
B-2	4	8.5'-10'	169	8.20	261.74	211.60	50.14	24.7%	
B-3	2	3.5'-5'	403	6.92	270.33	233.00	37.33	16.5%	
B-4	2	3.5'-5'	393	6.65	231.40	203.12	28.28	14.4%	
B-5	4	13.5'-15'	316	6.68	225.71	138.48	87.23	66.2%	
B-6	3	8.5'-10'	454	6.70	236.53	165.58	70.95	44.7%	
B-7	4	13.5'-15'	482	6.67	290.33	231.77	58.56	26.0%	
B-8	2	3.5'-5'	379	6.64	231.76	172.03	59.73	36.1%	
B-10	2	3.5'-5'	158	8.13	293.75	249.07	44.68	18.5%	
B-11	2	1.5'-3'	374	6.66	217.02	187.63	29.39	16.2%	
B-13	2	1.5'-3'	179	8.33	218.92	172.58	46.34	28.2%	
B-14	3	4.5'-6'	194	8.28	231.65	177.40	54.25	32.1%	
B-15	2	1.5'-3'	387	6.69	228.52	202.33	26.19	13.4%	

Notes / Deviations / References

Jimmy Hanson 5/1/2019
Technician Name *Date*

Jimmy Hanson Geotechnical Lab Supervisor 5/1/2019
Technical Responsibility *Signature* *Position* *Date*

Form No. TR-D698-2
Revision No. : 1
Revision Date: 07/25/17

MOISTURE - DENSITY REPORT

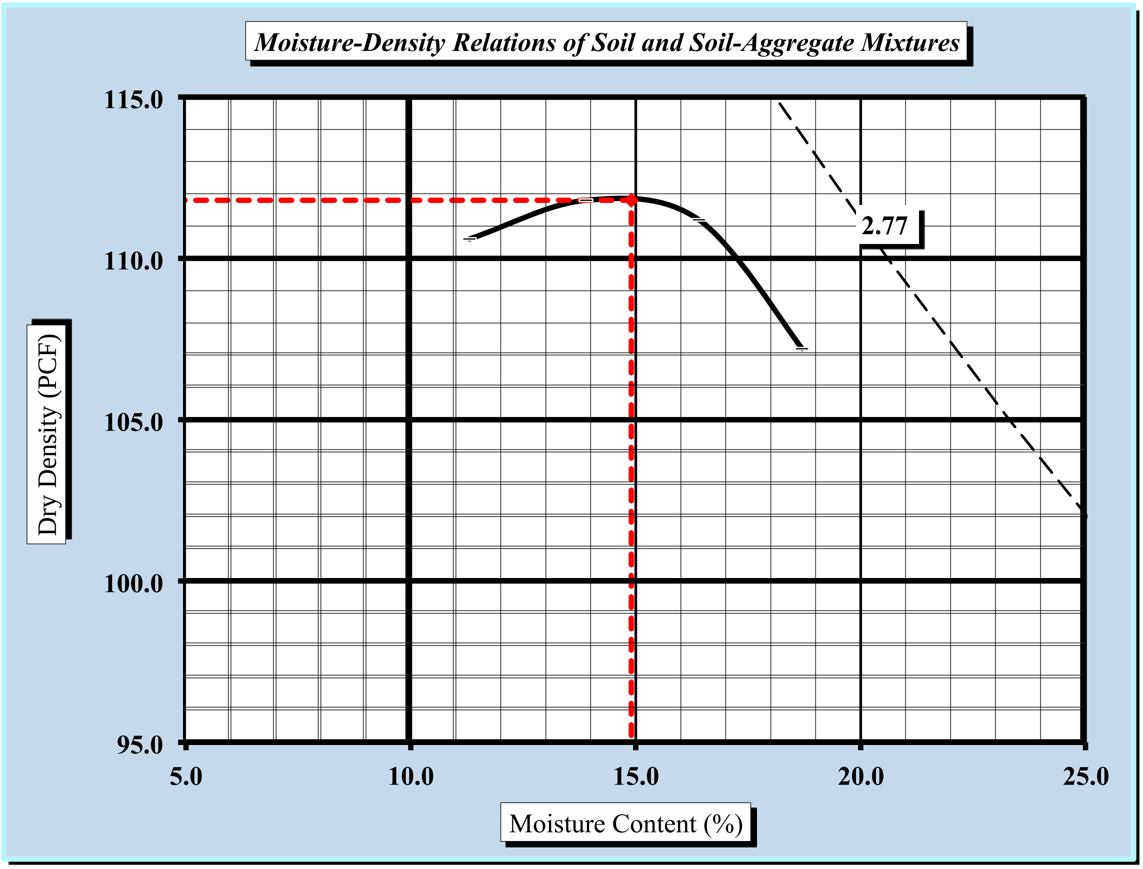
Quality Assurance

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

S&ME Project #: 1280-19-022 Report Date: 4/26/2019
Project Name: Decatur Storm Sewer Replacement Test Date(s): 4/25/2019
Client Name: ATKINS
Client Address: 1600 RiverEdge Parkway Northwest, Suite 700, Atlanta GA., 30328
Boring #: B-4 Sample #: 1 Sample Date: 4/16/2019
Location: B-4 0'-5' Depth:
Sample Description: Red brown sandy silt with some Mica

Maximum Dry Density 111.8 PCF. Optimum Moisture Content 14.9%

ASTM D 698 - - Method B



Soil Properties

Natural Moisture Content	13.9%

% Passing

3/8"	97.4%

Oversize Fraction

Bulk Gravity
% Moisture
% Oversize
MDD
Opt. MC

Moisture-Density Curve Displayed: Fine Fraction o Corrected for Oversize Fraction (ASTM D 4718) x
Sieve Size used to separate the Oversize Fraction: #4 Sieve o 3/8 inch Sieve x 3/4 inch Sieve o
Mechanical Rammer o Manual Rammer x Moist Preparation o Dry Preparation x

References / Comments / Deviations:

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

Jacob T. David		Staff Professional II	5/1/2019
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D698-2
Revision No. : 1
Revision Date: 07/25/17

MOISTURE - DENSITY REPORT

Quality Assurance

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

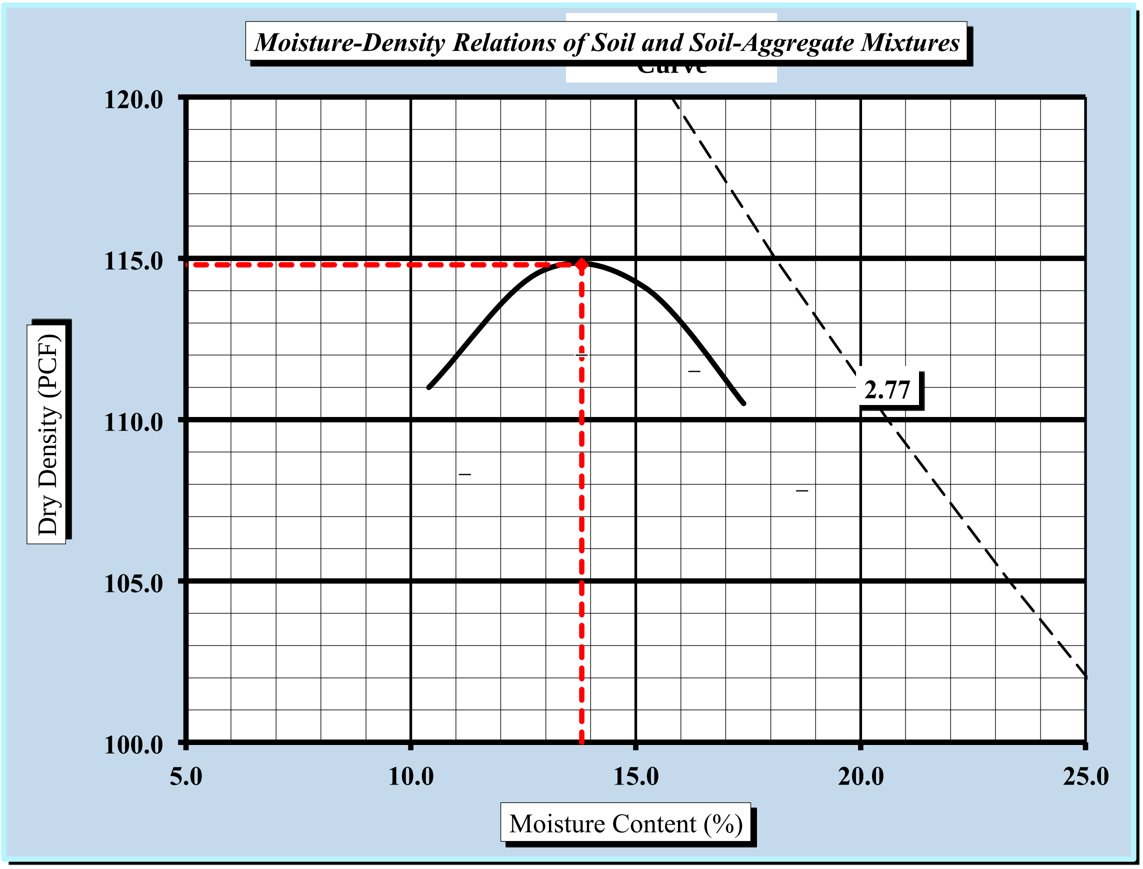
S&ME Project #:	1280-19-022	Report Date:	4/29/2019
Project Name:	Decatur Storm Sewer Replacement	Test Date(s):	4/26/2019
Client Name:	ATKINS		
Client Address:	1600 RiverEdge Parkway Northwest, Suite 700, Atlanta GA.,		30328

Boring #:	B-8	Sample #:	2	Sample Date:	4/16/2019
Location:	B-8 0'-5'			Depth:	

Sample Description: Brown-Red Sandy Silt with clay, trace Mica, and Rock Fragments

Maximum Dry Density 114.8 PCF. Optimum Moisture Content 13.8%

ASTM D 698 - - Method C



Soil Properties

Natural Moisture Content	34.4%

% Passing

3/4'	92.9%

Oversize Fraction

Bulk Gravity	2.640
% Moisture	
% Oversize	7.1%
MDD	114.9
Opt. MC	13.8%

Moisture-Density Curve Displayed: Fine Fraction o Corrected for Oversize Fraction (ASTM D 4718) x
Sieve Size used to separate the Oversize Fraction: #4 Sieve o 3/8 inch Sieve o 3/4 inch Sieve x
Mechanical Rammer o Manual Rammer x Moist Preparation o Dry Preparation x

References / Comments / Deviations:

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

Jacob T. David		Staff Professional II	5/1/2019
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D698-2
Revision No. : 1
Revision Date: 07/25/17

MOISTURE - DENSITY REPORT

Quality Assurance

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

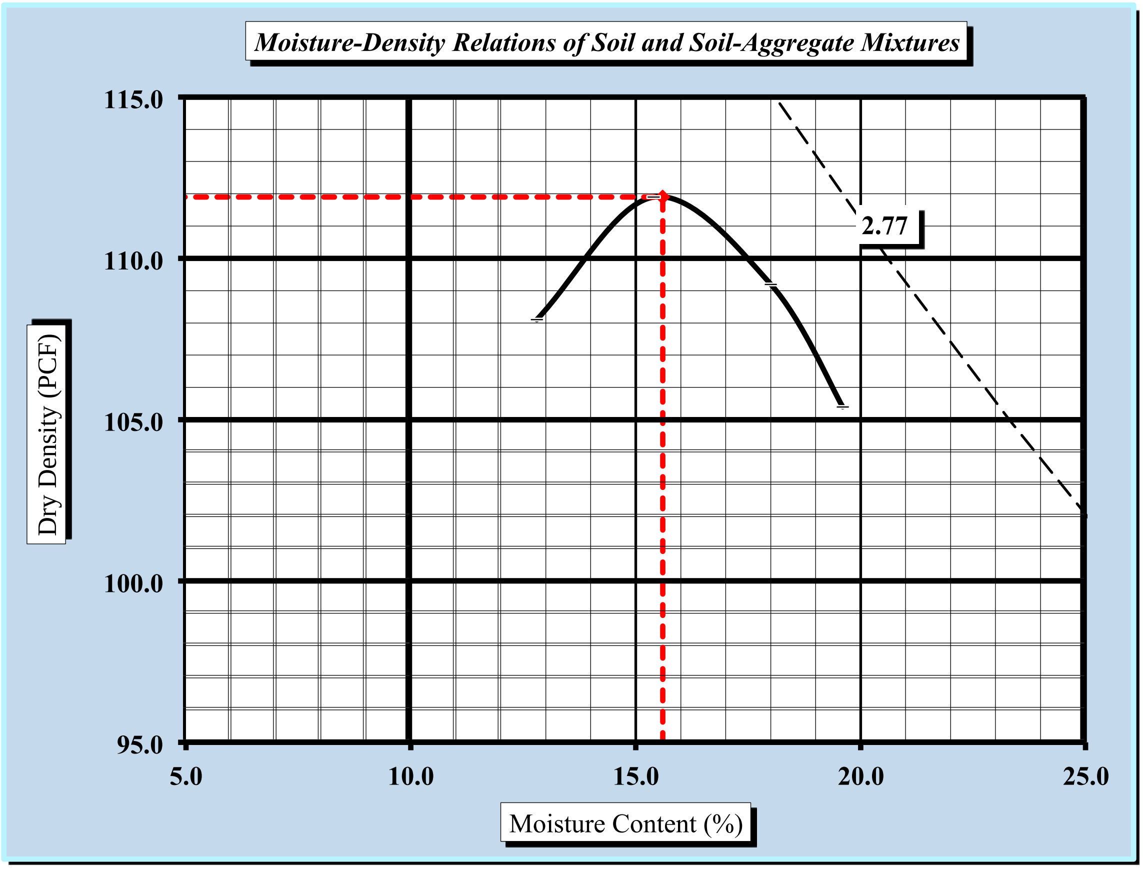
S&ME Project #:	1280-19-022	Report Date:	4/26/2019
Project Name:	Decatur Storm Sewer Replacement	Test Date(s):	4/25/2019
Client Name:	ATKINS		
Client Address:	1600 RiverEdge Parkway Northwest, Suite 700, Atlanta GA.,		30328

Boring #:	B-02	Sample #:	3	Sample Date:	4/16/2019
Location:	B-02 5'-10'			Depth:	

Sample Description: Red brown sandy silt with clay

Maximum Dry Density 111.9 PCF. Optimum Moisture Content 15.6%

ASTM D 698 - - Method B



Soil Properties

Natural Moisture Content	15.5%

% Passing

3/8"	96.3%

Oversize Fraction

Bulk Gravity
% Moisture
% Oversize
MDD
Opt. MC

Moisture-Density Curve Displayed: Fine Fraction x Corrected for Oversize Fraction (ASTM D 4718) o
Sieve Size used to separate the Oversize Fraction: #4 Sieve o 3/8 inch Sieve x 3/4 inch Sieve o
Mechanical Rammer o Manual Rammer x Moist Preparation o Dry Preparation x

References / Comments / Deviations:

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

Jacob T. David		Staff Professional II	5/1/2019
Technical Responsibility	*Signature*	*Position*	*Date*

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Revision Date: 07/25/17

MOISTURE - DENSITY REPORT

Quality Assurance

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

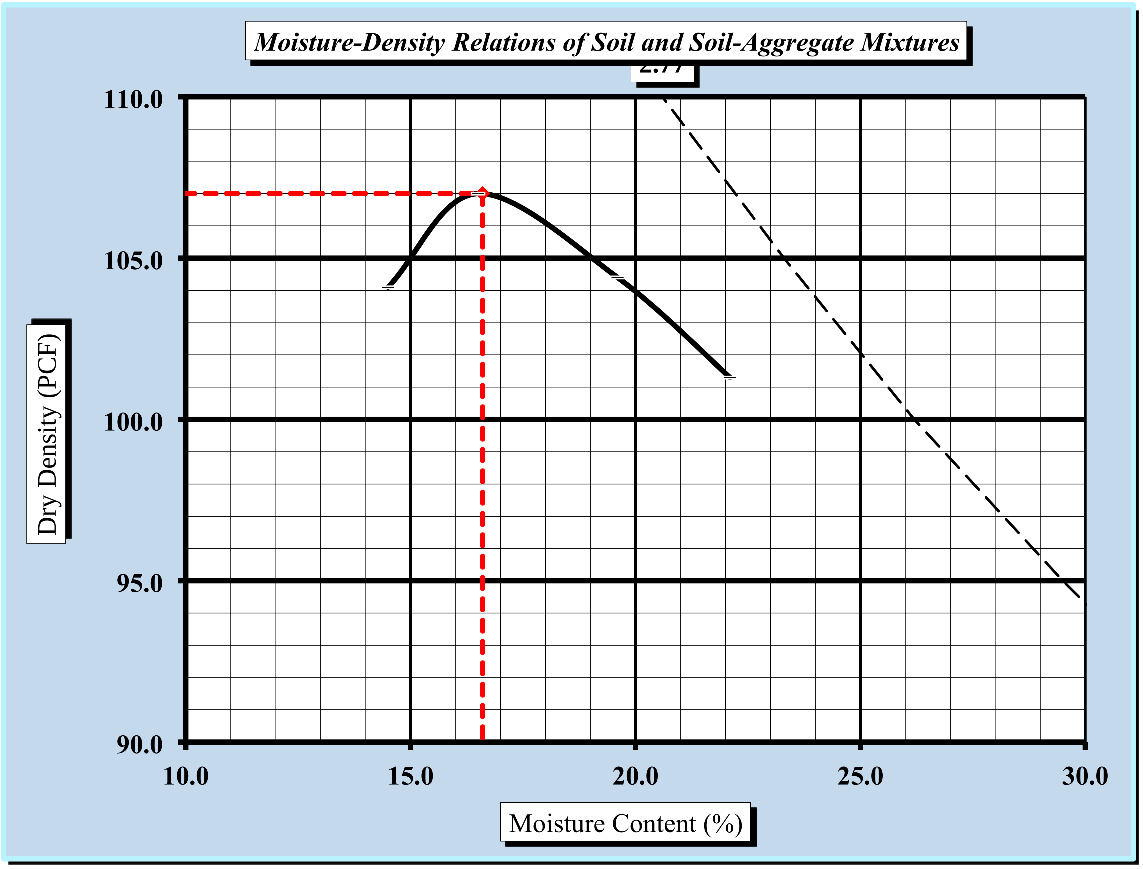
S&ME Project #:	1280-19-022	Report Date:	4/26/2019
Project Name:	Decatur Storm Sewer Replacement	Test Date(s):	4/25/2019
Client Name:	ATKINS		
Client Address:	1450 River Green Parkway, Suite 200, Duluth, GA 30096		

Boring #:	B-9	Sample #:	4	Sample Date:	4/16/2019
Location:	B-9 5'-10'			Depth:	

Sample Description: Brown Sandy Clay with silt and some Mica

Maximum Dry Density 107.0 PCF. Optimum Moisture Content 16.6%

ASTM D 698 - - Method B



Soil Properties

Natural Moisture Content	29.0%

% Passing

3/8"	98.3%

Oversize Fraction

Bulk Gravity
% Moisture
% Oversize
MDD
Opt. MC

Moisture-Density Curve Displayed: Fine Fraction o Corrected for Oversize Fraction (ASTM D 4718) x
Sieve Size used to separate the Oversize Fraction: #4 Sieve o 3/8 inch Sieve x 3/4 inch Sieve o
Mechanical Rammer o Manual Rammer x Moist Preparation o Dry Preparation x

References / Comments / Deviations:

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

Jacob T. David		Staff Professional II	5/1/2019
Technical Responsibility	*Signature*	*Position*	*Date*

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MOISTURE - DENSITY REPORT

Quality Assurance

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

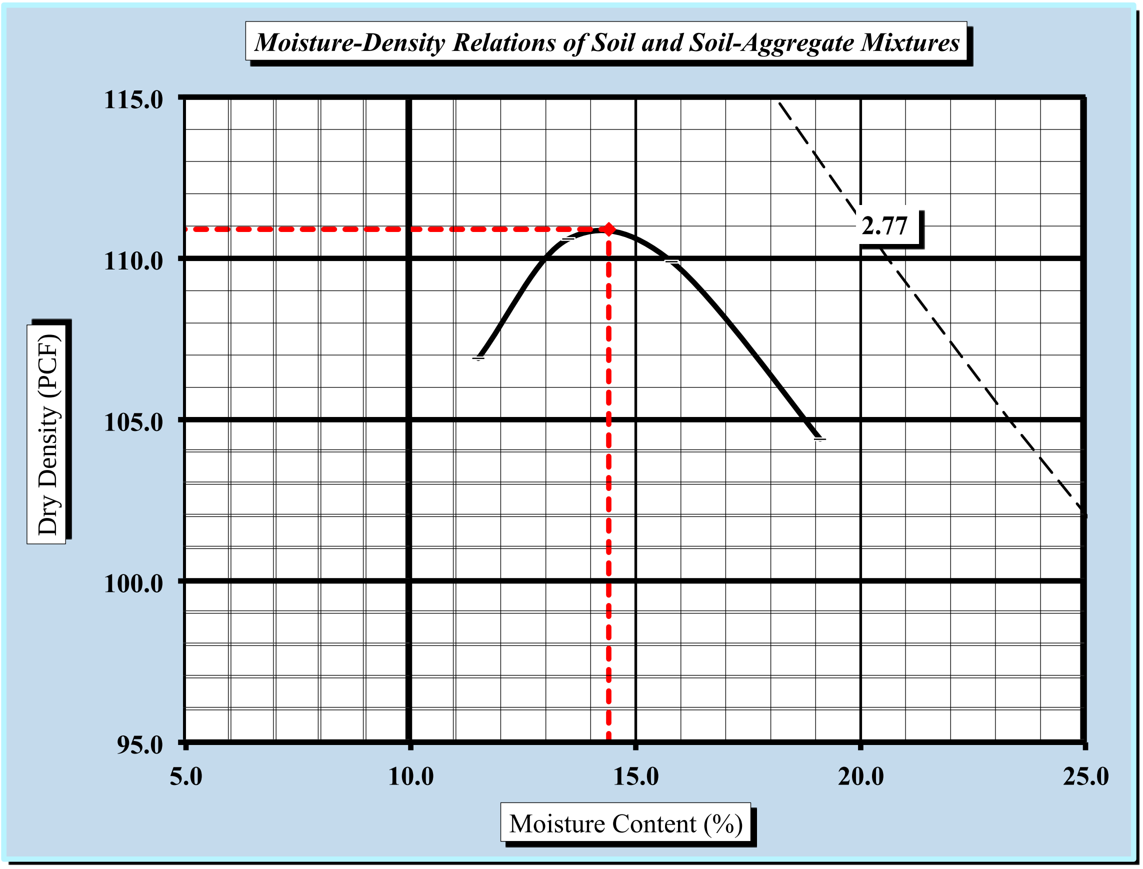
S&ME Project #:	1280-19-022	Report Date:	4/29/2019
Project Name:	Decatur Storm Sewer Replacement	Test Date(s):	4/46/2019
Client Name:	ATKINS		
Client Address:	1600 RiverEdge Parkway Northwest, Suite 700, Atlanta GA.,		30328

Boring #:	B-07	Sample #:	5	Sample Date:	4/16/2019
Location:	B-07 10'-15'			Depth:	

Sample Description: Brown-Gray Silty Sand with some Mica

Maximum Dry Density 110.9 PCF. Optimum Moisture Content 14.4%

ASTM D 698 - - Method B



Soil Properties

Natural Moisture Content	26.5%

% Passing

3/8"	96.6%

Oversize Fraction

Bulk Gravity
% Moisture
% Oversize
MDD
Opt. MC

Moisture-Density Curve Displayed: Fine Fraction x Corrected for Oversize Fraction (ASTM D 4718) o
Sieve Size used to separate the Oversize Fraction: #4 Sieve o 3/8 inch Sieve x 3/4 inch Sieve o
Mechanical Rammer o Manual Rammer x Moist Preparation o Dry Preparation x

References / Comments / Deviations:

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

Jacob David		Staff Professional II	5/1/2019
Technical Responsibility	*Signature*	*Position*	*Date*

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MOISTURE - DENSITY REPORT

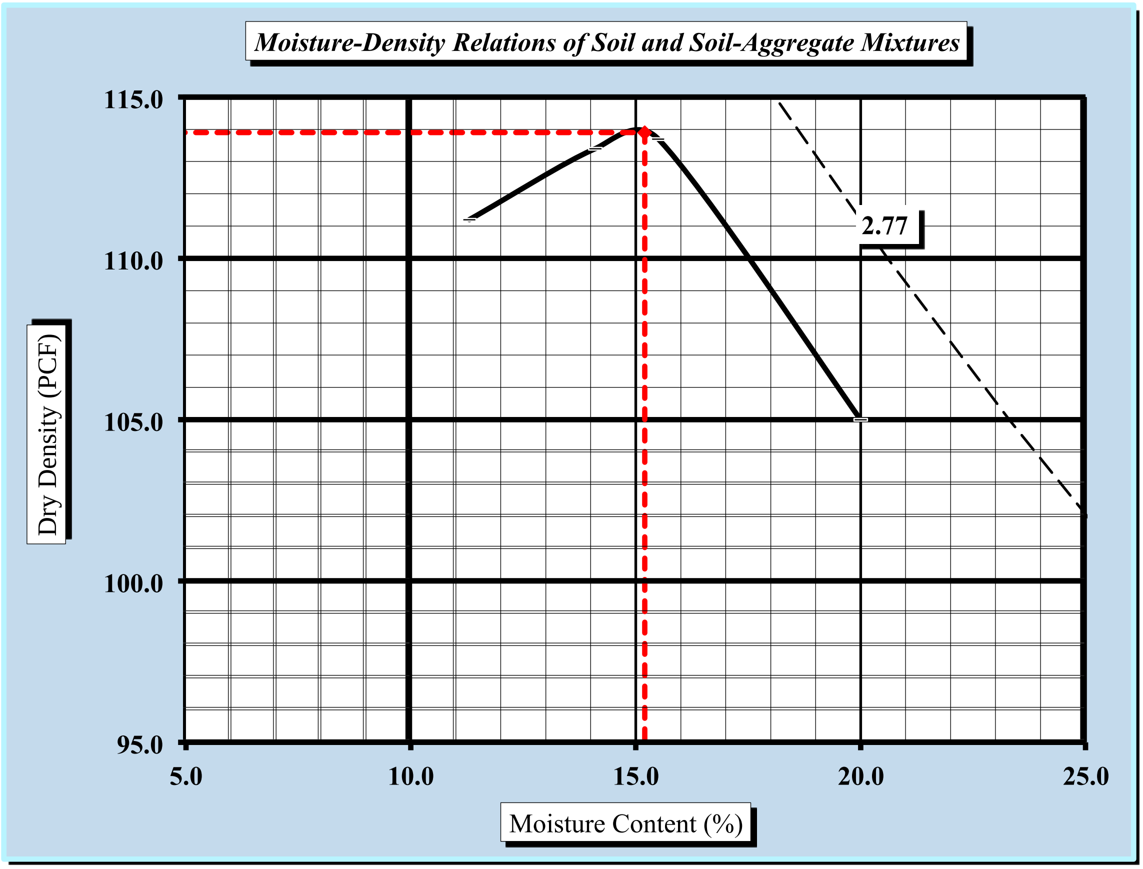
Quality Assurance

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

S&ME Project #: 1280-19-022
Report Date: 4/29/2019
Project Name: Decatur Storm Sewer Replacement
Test Date(s): 4/46/2019
Client Name: ATKINS
Client Address: 1600 RiverEdge Parkway Northwest, Suite 700, Atlanta GA., 30328
Boring #: B-05
Sample #: 6
Sample Date: 4/16/2019
Location: B-05 5'-10'
Depth:
Sample Description: Gray-Brown Sandy Silt with trace Mica and Rock Fragments

Maximum Dry Density 113.9 PCF.
Optimum Moisture Content 15.2%

ASTM D 698 - - Method C



Soil Properties

Natural Moisture Content 23.2%

% Passing

3/4" 98.1%

Oversize Fraction

Bulk Gravity
% Moisture
% Oversize
MDD
Opt. MC

Moisture-Density Curve Displayed: Fine Fraction x Corrected for Oversize Fraction (ASTM D 4718) o
Sieve Size used to separate the Oversize Fraction: #4 Sieve o 3/8 inch Sieve o 3/4 inch Sieve x
Mechanical Rammer o Manual Rammer x Moist Preparation o Dry Preparation x

References / Comments / Deviations:

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

Nathaniel Price	Signature on File	Lab Group Leader	
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D698-2
Revision No. : 1
Revision Date: 07/25/17

MOISTURE - DENSITY REPORT

Quality Assurance

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

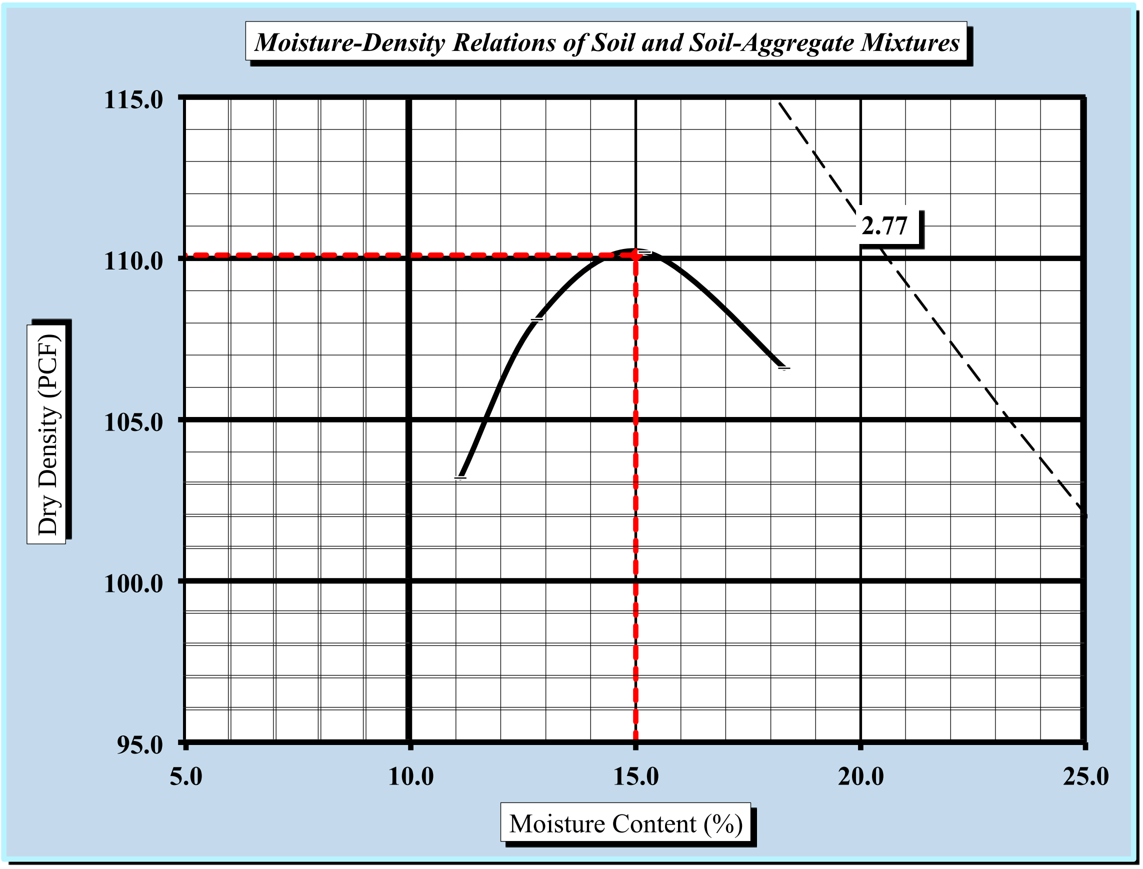
S&ME Project #:	1280-19-022	Report Date:	4/26/2019
Project Name:	Decatur Storm Sewer Replacement	Test Date(s):	4/25/2019
Client Name:	ATKINS		
Client Address:	1600 RiverEdge Parkway Northwest, Suite 700, Atlanta GA.,		30328

Boring #:	B-01	Sample #:	7	Sample Date:	4/16/2019
Location:	B-01 0'-5'			Depth:	

Sample Description: Brown, Red, and Gray Sandy Silt with clay and some Mica

Maximum Dry Density 110.1 PCF. Optimum Moisture Content 15.0%

ASTM D 698 - - Method B



Soil Properties

Natural Moisture Content	20.4%

% Passing

3/8"	95.1%

Oversize Fraction

Bulk Gravity
% Moisture
% Oversize
MDD
Opt. MC

Moisture-Density Curve Displayed: Fine Fraction o Corrected for Oversize Fraction (ASTM D 4718) x
Sieve Size used to separate the Oversize Fraction: #4 Sieve o 3/8 inch Sieve x 3/4 inch Sieve o
Mechanical Rammer o Manual Rammer x Moist Preparation o Dry Preparation x

References / Comments / Deviations:

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

Nathaniel Price	Signature on File	Lab Group Leader	
Technical Responsibility	*Signature*	*Position*	*Date*

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MOISTURE - DENSITY REPORT

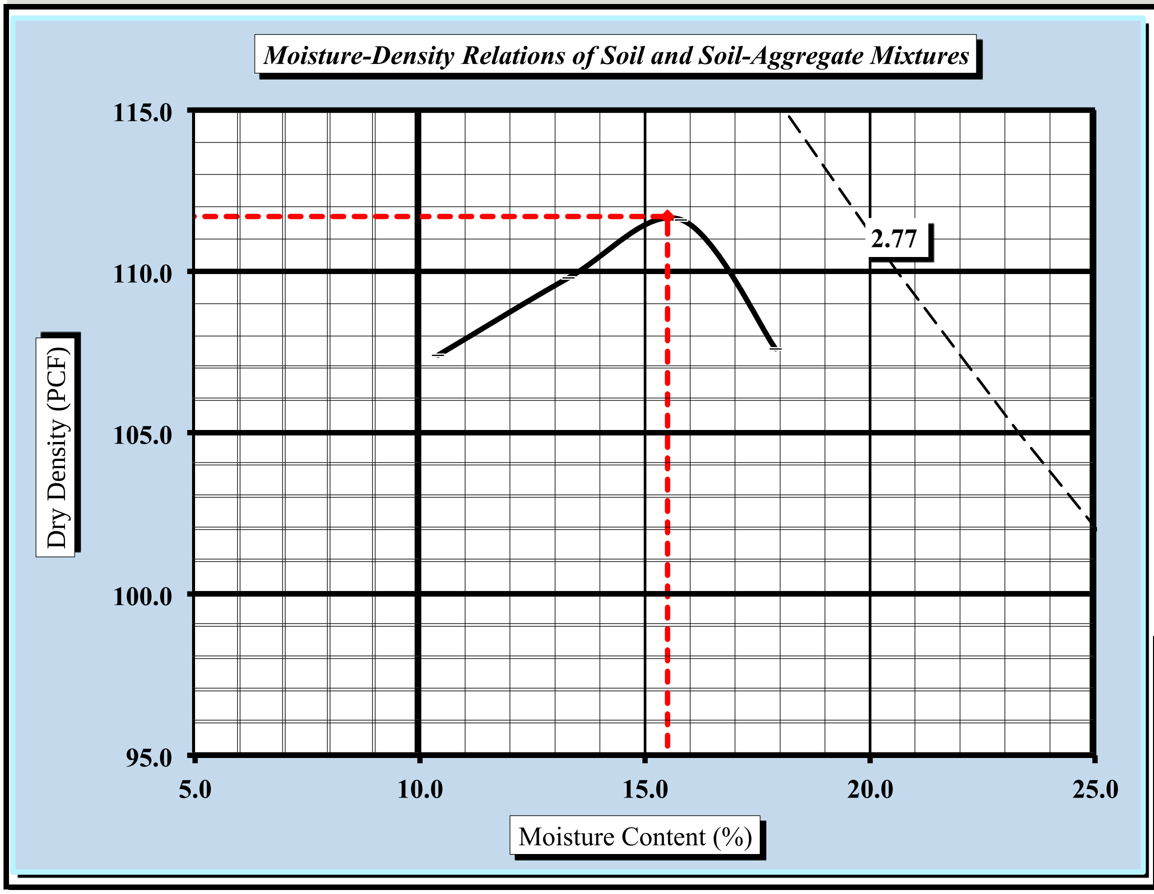
Quality Assurance

S&ME, Inc. - Atlanta: 4350 River Green Parkway, Suite 200, Duluth, GA 30096

S&ME Project #: 1280-19-022 Report Date: 4/29/2019
Project Name: Decatur Storm Sewer Replacement Test Date(s): 4/46/2019
Client Name: ATKINS
Client Address: 1600 RiverEdge Parkway Northwest, Suite 700, Atlanta GA., 30328
Boring #: B-03 Sample #: 8 Sample Date: 4/16/2019
Location: B-03 10'-15' Depth:
Sample Description: Gray Sandy Clay with some silt

Maximum Dry Density 111.7 PCF. Optimum Moisture Content 15.5%

ASTM D 698 - - Method C



Soil Properties

Natural Moisture Content 5.3%

% Passing

3/4"	95.8%

Oversize Fraction

Bulk Gravity
% Moisture
% Oversize
MDD
Opt. MC

Moisture-Density Curve Displayed: Fine Fraction x Corrected for Oversize Fraction (ASTM D 4718) o
Sieve Size used to separate the Oversize Fraction: #4 Sieve o 3/8 inch Sieve o 3/4 inch Sieve x
Mechanical Rammer o Manual Rammer x Moist Preparation o Dry Preparation x

References / Comments / Deviations:

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

Nathaniel Price	Signature on File	Lab Group Leader	
Technical Responsibility	*Signature*	*Position*	*Date*

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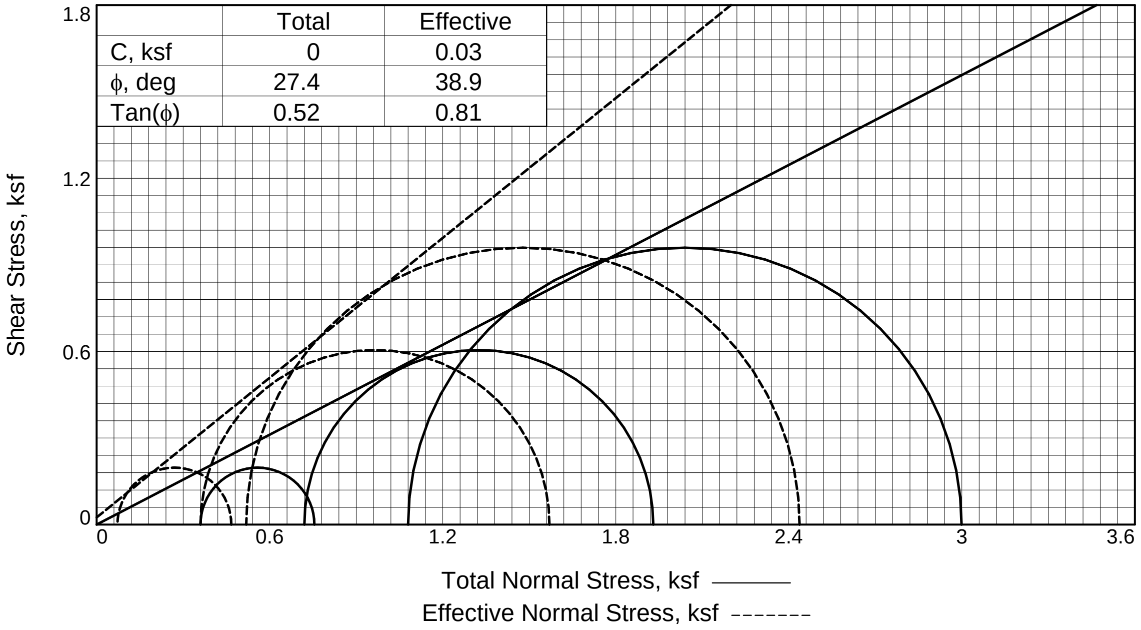
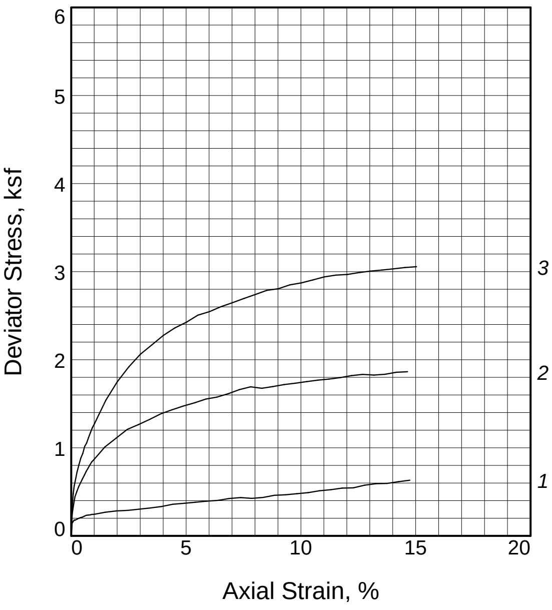
C & phi are not test results but an interpretation of the test results. The designer is responsible for interpreting test data as provided by S&ME.



	Total	Effective
C, ksf	0	0.03
ϕ, deg	27.4	38.9
Tan(ϕ)	0.52	0.81



	Sample No.	1	2	3
Initial	Water Content, %	18.0	28.5	22.6
	Dry Density, pcf	98.6	88.9	100.3
	Saturation, %	70.4	87.9	92.2
	Void Ratio	0.6780	0.8605	0.6501
	Diameter, in.	2.865	2.871	2.870
	Height, in.	6.151	6.149	6.022
At Test	Water Content, %	24.2	32.4	23.4
	Dry Density, pcf	100.8	89.0	102.0
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.6406	0.8578	0.6214
	Diameter, in.	2.843	2.870	2.853
	Height, in.	6.105	6.146	5.987
	Strain rate, %/min.	0.08	0.08	0.08
	Back Pressure, psi	70.00	70.00	70.00
	Cell Pressure, psi	72.50	75.00	77.50
	Fail. Stress, ksf	0.39	1.21	1.92
	Excess Pore Pr., ksf	0.29	0.36	0.56
	Ult. Stress, ksf	0.63	1.86	3.06
	Excess Pore Pr., ksf	0.20	0.04	-0.06
	$\bar{\sigma}_1$ Failure, ksf	0.47	1.57	2.44
	$\bar{\sigma}_3$ Failure, ksf	0.07	0.36	0.52

Type of Test:
CU with Pore Pressures

Sample Type: Intact

Description: Reddish brown silty sand with some gravel

LL= N/A **PI=** N/A

Assumed Specific Gravity= 2.65

Remarks: Trimmed intact specimens to length

Figure 1

Client: ATKINS

Project: City of decatur Storm Sewer Replacement

Location: B-2

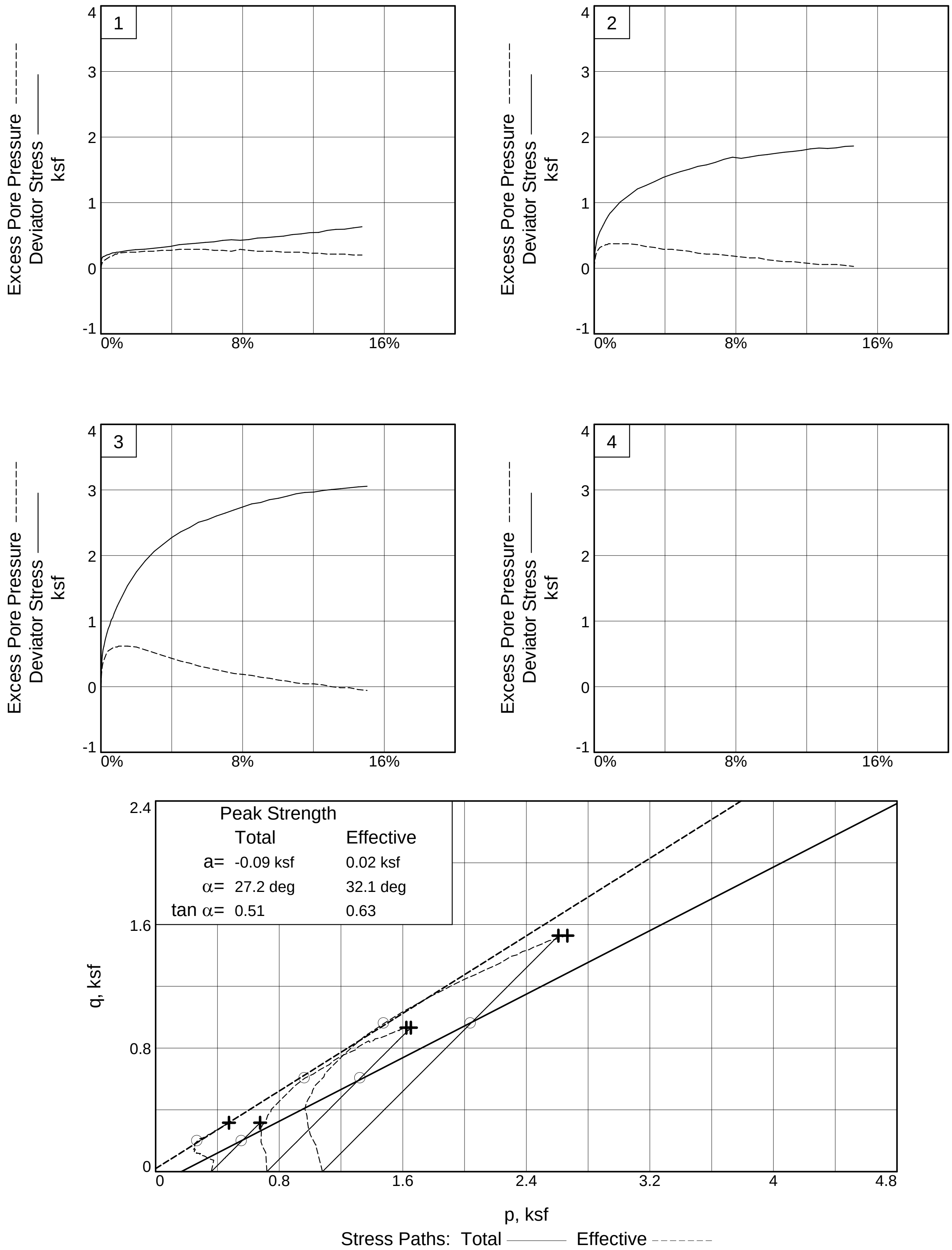
Sample Number: UD-1 **Depth:** 5'-7'

Proj. No.: 1280-19-022 **Date Sampled:** 4/20/19

TRIAXIAL SHEAR TEST REPORT
S&ME, Inc.
Duluth, Georgia

Tested By: Jimmy Hanson

C & phi are not test results but an interpretation of the test results. The designer is responsible for interpreting test data as provided by S&ME.



Peak Strength

	Total	Effective
a=	-0.09 ksf	0.02 ksf
α=	27.2 deg	32.1 deg
tan α=	0.51	0.63

Client: ATKINS

Project: City of decatur Storm Sewer Replacement

Location: B-2 **Depth:** 5'-7' **Sample Number:** UD-1

Project No.: 1280-19-022

Figure 2

S&ME, Inc.

Tested By: Jimmy Hanson

BUILT FOR VERSATILITY

Important Information About Your Geotechnical Engineering Report

Variations in subsurface conditions can be a principal cause of construction delays, cost overruns and claims. The following information is provided to assist you in understanding and managing the risk of these variations.

Geotechnical Findings Are Professional Opinions

Geotechnical engineers cannot specify material properties as other design engineers do. Geotechnical material properties have a far broader range on a given site than any manufactured construction material, and some geotechnical material properties may change over time because of exposure to air and water, or human activity.

Site exploration identifies subsurface conditions at the time of exploration and only at the points where subsurface tests are performed or samples obtained. Geotechnical engineers review field and laboratory data and then apply their judgment to render professional opinions about site subsurface conditions. Their recommendations rely upon these professional opinions. Variations in the vertical and lateral extent of subsurface materials may be encountered during construction that significantly impact construction schedules, methods and material volumes. While higher levels of subsurface exploration can mitigate the risk of encountering unanticipated subsurface conditions, no level of subsurface exploration can eliminate this risk.

Scope of Geotechnical Services

Professional geotechnical engineering judgment is required to develop a geotechnical exploration scope to obtain information necessary to support design and construction. A number of unique project factors are considered in developing the scope of geotechnical services, such as the exploration objective; the location, type, size and weight of the proposed structure; proposed site grades and improvements; the construction schedule and sequence; and the site geology.

Geotechnical engineers apply their experience with construction methods, subsurface conditions and exploration methods to develop the exploration scope. The scope of each exploration is unique based on available project and site information. Incomplete project information or constraints on the scope of exploration increases the risk of variations in subsurface conditions not being identified and addressed in the geotechnical report.

Services Are Performed for Specific Projects

Because the scope of each geotechnical exploration is unique, each geotechnical report is unique. Subsurface conditions are explored and recommendations are made for a specific project. Subsurface information and recommendations may not be adequate for other uses. Changes in a proposed structure location, foundation loads, grades, schedule, etc. may require additional geotechnical exploration, analyses, and consultation. The geotechnical engineer should be consulted to determine if additional services are required in response to changes in proposed construction, location, loads, grades, schedule, etc.

Geo-Environmental Issues

The equipment, techniques, and personnel used to perform a geo-environmental study differ significantly from those used for a geotechnical exploration. Indications of environmental contamination may be encountered incidental to performance of a geotechnical exploration but go unrecognized. Determination of the presence, type or extent of environmental contamination is beyond the scope of a geotechnical exploration.

Geotechnical Recommendations Are Not Final

Recommendations are developed based on the geotechnical engineer's understanding of the proposed construction and professional opinion of site subsurface conditions. Observations and tests must be performed during construction to confirm subsurface conditions exposed by construction excavations are consistent with those assumed in development of recommendations. It is advisable to retain the geotechnical engineer that performed the exploration and developed the geotechnical recommendations to conduct tests and observations during construction. This may reduce the risk that variations in subsurface conditions will not be addressed as recommended in the geotechnical report.

Portion obtained with permission from "Important Information About Your Geotechnical Engineering Report", ASFE, 2004