APPENDIX A - REPORT OF GEOTECHNICAL EXPLORATION

Report of Geotechnical Exploration
Water System Improvements along Rimer Pond & Hard Scrabble Roads
Blythewood, South Carolina
S&ME Project No. 1461-19-072

PREPARED FOR:

WK Dickson
1320 Main Street, Suite 400
Columbia, South Carolina 29201

PREPARED BY:

S&ME, Inc.
134 Suber Road
Columbia, South Carolina 29210

January 29, 2020

January 29, 2020

WK Dickson
1320 Main Street, Suite 400
Columbia, South Carolina 29201

Attention: Mr. Jaime Wright

Reference: **Report of Geotechnical Exploration**
Water System Improvements along Rimer Pond & Hard Scrabble Roads
Blythewood, South Carolina
S&ME Project No. 1461-19-072

Dear Mr. Wright:

As requested, S&ME, Inc. has completed the geotechnical exploration for the water system improvements site, located in Blythewood, South Carolina. Our work was performed in general accordance with our proposal No. 14-1500169R2, dated December 17, 2019.

This report provides information on the exploration and testing procedures used, our boring records, and our conclusions and recommendations regarding site and subsurface conditions, suitability of on-site soils for use as structural fill, excavation considerations, fill placement and compaction, and dewatering recommendations.

S&ME appreciates this opportunity to work with you as your geotechnical engineering consultant on this project. Please contact us at (803) 561-9024 if you have any questions or need any additional information regarding this report.

Sincerely,

S&ME, Inc.

Andre N. Kruk
Staff Professional

SOUTH CAROLINA CERTIFICATE OF AUTHORIZATION
S&ME, INC.
No. C00473

Robert C. Bruorton, P.E
Senior Engineer/Project Manager

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER
No. 26144
1-29-2020
ROBERT C. BRUORTON

Table of Contents

List of Tables

Appendices

1.0 Project Information

Initial information about the project was provided in a phone conversation between Mr. Stewart Hill, PE and Mr. Chad Bruorton, PE of S&ME on February 17, 2015. During the phone conversation Mr. Hill informed Mr. Bruorton that the project had previously been discussed with S&ME in 2012, and that he would like to set up a meeting to discuss the project as it has evolved to this point. Further information, including project plans entitled *Water System Improvements along Rimer Pond and Hard Scrabble Roads*, produced by WK Dickson, were obtained during the meeting between Mr. Hill and Mr. Bruorton on February 23, 2015. During this meeting Mr. Bruorton, Mr. Hill and Mr. Jaime Wright of WK Dickson reviewed the project plans and current survey permissions list to establish proposed boring locations along the alignment.

On May 1, 2018, Mr. Wright contacted Mr. Bruorton regarding a current proposal, as the project is possibly moving forward again. At that time, a revised proposal was provided. Again, the project was put on hold until Mr. Bruorton was contacted on December 9, 2019 by Mr. Wright. At this time, WK Dickson had received a PO for the project from the City of Columbia, however, the contract fee for the geotechnical and materials testing services did not match previous S&ME proposals. Therefore, a meeting was held on December 11, 2019 between Mr. Hill, Mr. Wright and Ms. Danielle Masi of WK Dickson and Mr. Bruorton. The planned alignment and easement permissions were again reviewed, while the original nineteen (19) boring locations were further reviewed in an attempt to isolate the critical boring locations, to help meet the contracted fee.

From our review of the provided information, it is understood that the proposed development includes the installation of a new water line along Rimer Pond Road and Hard Scrabble Road, as shown on the *Site Location Plan*, attached as Figure 1 in Appendix I. This water line follows along the following general alignment:

- Water Line alignment begins roughly 0.3 miles east of the intersection of Wilson Boulevard and Rimer Pond Road.
- Water Line alignment continues along the south side of Rimer Pond Road for roughly 3.75 miles to the intersection of Rimer Pond Road and Hard Scrabble Road.
- At the intersection of Rimer Pond Road and Hard Scrabble Road, the Water Line alignment turns south and continues along the west side of Hard Scrabble Road.
- After following along the west side of Hard Scrabble Road for roughly 0.3 miles, the Water Line alignment crosses over to the east side of Hard Scrabble Road.
- Once the Water Line alignment crosses to the eastern side of Hard Scrabble Road, it continues for roughly 1.3 miles to its termination.

From our review of the provided plans, the water line will typically consist of 42-inch ductile iron pipe along Rimer Pond Road and 24-inch ductile iron pipe and 24-inch HDPE pipe along Hard Scrabble Road. Several jack and bore and horizontal direction drill (HDD) locations are planned along the alignment, as follows:

Jack and Bore locations:

- Station 451+14 to 45+99 beneath Eagles Glenn Drive,
- Station 125+54 to 127+04 beneath Longtown Road East,

- Station 203+20 to 204+04 beneath Hard Scrabble Road,
- Station 16+39 to 17+19 beneath Hard Scrabble Road,
- Station 57+19 to 58+69 beneath Bud Keef Road,
- Station 68+68 to 69+98 beneath Lake Carolina Boulevard, and
- Station 73+08 to m73+88 beneath Channel Drive.

HDD locations:

- Station 21+74 to 29+37 beneath wetlands, and
- Station 36+79 to 28+29 beneath wetlands.

Planned cover along the water line ranges from roughly 4 to 17 feet.

2.0 Exploration Procedures

The subsurface exploration of this project generally included Standard Penetration Test (SPT) soil borings. The approximate locations of each of the borings are shown in the *Boring Location Plans,* attached as Figures 2 through 12 in Appendix I.

2.1 Reconnaissance of Project Area

On December 30, 2019, a representative from S&ME visited the site to observe current site conditions and lay out the proposed soil test boring locations. Soil test boring locations were marked in the field with white pin flags. Soil test boring locations were laid out using our sub-meter GPS equipment. The boring locations indicated on the attached *Boring Location Plans* must be considered as approximate. No formal survey of boring locations or elevations was conducted by S&ME.

2.2 Field Testing and Sampling

The following sections detail our field and sampling activities at the site. A summary of our exploration procedures is included in Appendix II.

2.2.1 Traffic Control

Traffic control was required for drilling operations along portions of the alignment, within the existing Rimer Pond Road right of way. For this reason, we subcontracted Area Wide Protective, a licensed and bonded traffic control company, to provide personnel and equipment for shoulder closure along Rimer Pond Road. One day of traffic control was required for Borings B-2 and B-5 at stations 45+50 and 125+50, respectively.

2.2.2 Soil Test (SPT) Borings

On January 6 and 8, 2020, our subcontracted driller (Southern Drill) was on-site to perform thirteen (13) soil test borings with SPT sampling and testing. The SPT soil test borings were performed using both a truck-mounted and ATV-mounted CME-55 drill rig. The borings were advanced using 2¼-inch inside diameter hollow-stem augers to termination depths of 10 to 25 feet below the existing ground surface, as detailed in the table below.

Table 2-1 – Boring Summary

Boring No.	Approximate Station*	Depth
B-1	1+40 (RPR)	10
B-2	45+50 (RPR)	15
B-3	61+75 (RPR)	15
B-4	93+26 (RPR)	10
B-5	125+50 (RPR)	10
B-6	127+10 (RPR)	10
B-7	166+75 (RPR)	10
B-8	203+00 (RPR)	10
B-9	16+25 (HSR)	10
B-10	21+75 (HSR)	25
B-11	36+75 (HSR)	15
B-12	57+00 (HSR)	10
B-13	70+00 (HSR)	10

* RPR = Rimer Pond Road stationing, HSR = Hard Scrabble Road stationing

Split-spoon samples and Standard Penetration Test Resistance N-values were obtained at selected intervals in general accordance with ASTM D1586. Representative samples of the soils obtained by the split-spoon sampler were collected and placed in suitably identified, sealed glass jars and transported to our laboratory.

2.2.3 Ground Water Measurements

Ground water measurements were attempted in the borings shortly after drilling was completed. as the borings were located within the roadway right of way and, therefore, within residential properties in many occasions, the boreholes were backfilled prior to our departure from the site. Therefore delayed ground water levels were not obtained. The boreholes were backfilled with auger cuttings and a plastic hole plug was placed within the boreholes at a depth of approximately two feet below existing grade after conclusion of ground water measurements.

3.0 Site Conditions

S&ME's assessment of the geotechnical conditions began with a reconnaissance of the topography and physical features of the site. We also consulted various available topographic and geologic maps for relevant information.

3.1 Surface Conditions

As previously mentioned, the site is located along the existing right of way along Rimer Pond Road and Hard Scrabble Road in Blythewood, South Carolina. Due to the spacing of the boring locations along the alignment, a summary of existing surface conditions observed at our boring locations is provided in the table below. We caution that surface conditions intermediate of our boring locations will vary.

Table 3-1 – Boring Location Surface Conditions Summary

Boring No.	Surface Conditions	General Location
B-1	Located in flat residential area consisting of primarily grass with some trees.	South of intersection of Annie Mills Rd. and Rimer Pond Rd.
B-2	Located adjacent to subdivision entrance landscape/hardscape.	Northwest of intersection of Eagles Ridge Dr. and Rimer Pond Rd.
B-3	Located in the shoulder in brushy area adjacent to a creek.	South side of Rimer Pond Rd.
B-4	Located in an open flat sandy area with some grass and vegetation.	Along private dirt drive, approximately 1/10-mile East of intersection of Rimer Pond Rd and State Rd S 40 2455
B-5	Located in an open grassy area in the shoulder near Blythewood Middle School.	South of intersection of Rimer Pond Rd. and Longtown Rd. E.
B-6	Located in a grassy area along woodline in the shoulder.	East of intersection of Rimer Pond Rd. and Longtown Rd. E.
B-7	Located in an open, grassy area near Village Church.	West of eastern entrance to Village Church, south side of Rimer Pond Rd.
B-8	Located in a brushy area in the shoulder.	Southeast of intersection of Rimer Pond Rd. and Hard Scrabble Rd.
B-9	Located in an open area in the shoulder.	Located 3/10-mile south of intersection of Hard Scrabble Rd. and Romer Pond Rd.
B-10	Located near possible fill from widening of Hard Scrabble Rd northbound, trees nearby, sloping terrain.	Located 4/10-mile south of intersection of Hard Scrabble Rd. and Rimer Pond Rd.
B-11	Located near widened road with nearby trees, sloping terrain.	Northeast of intersection of Hard Scrabble Rd. and Adamas Pond Rd.
B-12	Located near widened road with nearby trees, sloping terrain.	North of Intersection of Hard Scrabble Rd and Bud Keef Rd.
B-13	Located in an open grassy landscaped area of subdivision entrance.	South of intersection of Hard Scrabble Rd and Lake Carolina Blvd.

The USGS historical Blythewood quadrangle was reviewed for existing grades along the alignment. In general, the existing ground surface along the alignment slopes down from the start of the alignment to its crossing with Rice Creek along Rimer Pond Road, then up to a point east of State Road S-40-2455, where it remains relatively level to its intersection with Longtown Road East. That Longtown Road East, the existing ground surface along the alignment slopes down gently to its intersection with Hard Scrabble Road. Along Hard Scrabble Road, the existing ground surface along the alignment then slopes down to its crossing of an unnamed tributary of Rice Creek, then back up in grade to near its intersection with Bud Keef Road. The existing ground surface along the remainder of the alignment slopes down to the end of the alignment, south of another crossing of Rice Creek.

3.2 Subsurface Conditions

Recovered field samples and field boring logs were reviewed in the laboratory by a member of our geotechnical staff. Soil test boring records and other field data are assembled in Appendix II.

3.2.1 Site Geology

The site lies within the White Sand Hills Physiographic Region of the Upper Coastal Plain of South Carolina. The White Sand Hills form the most inland portion of the coastal plain and are underlain by mostly sandy Cretaceous age sediments of the Black Mingo and Middendorf formations. These soils were eroded from a range of mountains in the northwest portion of the state approximately 65,000,000 years ago and laid down in their present positions as fan deposits, where they have weathered in place. In the Columbia metropolitan area these sediments rest unconformably on top of the underlying Piedmont rocks at depths of between 20 and 120 feet.

Review of the *Geologic Map of the Columbia North Quadrangle, Lexington, and Richland Counties, South Carolina*, prepared by the South Carolina Geologic Survey, dated 1972, indicates the site to be underlain by Cretaceous aged sediments mapped as Coastal Plain Undivided (Cpu). Typically, these sediments are referred to as the Middendorf Formation in the literature. Older metamorphic rocks of the Carolina Piedmont consisting of laminated phyllite are mapped as surface outcrops to the northwest of the site, which suggests that these rocks and their associated residual soils to be present beneath the Coastal Plain deposits at the site at greater depths.

Massive, buff or tan kaolin beds are prevalent throughout the sequence, alternating with coarse-grained water-bearing sands and gravels which become increasingly prevalent near the base of the formation. Soil layers exhibit considerable lateral and vertical discontinuity. In many areas, groundwater is relatively shallow and supports heavy forest cover. Fresh soil exposures are typically white, but become pink, purple or rusty orange with weathering. Iron-oxide cemented sandstone beds are common.

In the local area, Coastal Plain sediments have deeply eroded, exposing underlying Piedmont residuum and weathered rock in some of the deeper swales and depressions. Residual soils of the Carolina Piedmont consist of stiff or very stiff micaceous silts and clays, grading to firm sands with depth. These soils have been completely weathered in place from the parent bedrock material, but below depths of a few feet retain most of the relict rock structure. Soil strength derives largely from relict intermolecular bonding and remolded materials generally exhibit lower shear strength than do undisturbed samples.

The term partially weathered rock (PWR) is applied to very dense micaceous sands or silty sands of the Carolina Piedmont, which register SPT N-values in excess of 100 blows per foot. PWR generally varies widely within even small areas owing to minute differences in the chemical properties of the parent bedrock, which results in widely varying rates of weathering. Isolated lenses or seams of PWR often are present within Piedmont Residuum well above the overall PWR level within a given area. PWR is considered excellent bearing material for foundations and is relatively incompressible except in highly stressed deep foundations.

3.2.2 Interpreted Subsurface Profile

The generalized subsurface conditions at the site are described below. The discussed subsurface description is of a generalized nature to highlight the major subsurface stratification features and material characteristics. The boring records included in Appendix II should be reviewed for specific information at each boring location. The depth and thickness of the subsurface strata indicated on the boring records was estimated based on the drill cuttings and the samples recovered. The transition between materials may be more gradual than indicated on the boring records. Information on actual subsurface conditions exists only at the specific boring locations and is relevant to the time the exploration was performed. Variations may occur and should be expected at locations remote from the boring. The stratification lines were used for our analytical purposes and, unless specifically stated otherwise, should not be used as the basis for design or construction cost estimates. Soil test boring records are attached in Appendix II.

<u>Surface Materials</u>

Topsoil measuring up to roughly 4 inches in thickness was encountered at our boring locations along the alignment. We caution that varying depths of topsoil and other surface materials, such as pavements associated with driveways, may be encountered in areas that were not explored by our borings.

<u>Possible Fill Materials</u>

At the existing ground surface and beneath the surface materials in Borings B-10 and B-11, possible fill consisting of sands with trace amounts of fines (SP) were encountered. These soils were encountered to depths of roughly 3 feet below the existing ground surface. Recovered samples were generally brown in color and were moist to wet to the touch. SPT N-values ranged from 3 to 8 blows per foot (bpf), indicating very loose to loose relative densities.

<u>Coastal Plain Deposits</u>

At the existing ground surface, beneath the surface materials and beneath the possible fill materials, the borings encountered native Coastal Plain deposits that extended to depths of roughly 10 to 15 feet below the existing ground surface. The Coastal Plain deposits encountered in our borings generally consisted of sands with varying amounts of low to medium plasticity fines (SP, SP-SC and SC) with some intermittent layers of low plasticity fines with varying amounts of sands (CL). The native Coastal Plain deposits were generally orange, white and brown in color and were dry to moist to the touch. SPT N-values ranged from 2 to 32 bpf, indicating very loose to dense relative densities in the sandy soils and firm to hard consistencies in the clayey soils.

<u>Piedmont Residuum</u>

Beneath the Coastal Plain deposits in Boring B-10, Piedmont residuum was encountered that extended to a depth of roughly 17 feet. The residuum encountered in our boring generally consisted of sand with varying amounts of fines (SC). The sandy residuum was dry to moist to the touch and light gray and brownish-orange in color. These soils exhibited an SPT N-value on the order of 44 bpf, indicating a dense relative density.

Partially Weathered Rock (PWR)

Borings B-10 and B-11 penetrated very hard residuum termed partially weathered rock (PWR) at depths of 17 and 12 feet, respectively. The PWR extended to the termination depths of 25 and 15 feet, respectively. Recovered samples were similar in nature to the overlying residual sands, but with less fines (SP-SC) and exhibited SPT N-values in excess of 100 bpf.

Ground Water

Ground water was encountered in three of the thirteen borings performed along the alignment at the time of drilling. Borehole cave-in was observed in the remaining ten borings. Borehole cave-in is sometimes and indicator of ground water. However, in this case, due to the observed moisture content of the recovered samples, borehole cave-in more likely represent soils which fell into the boreholes as the drilling tools were removed.

A summary of the measured ground water along the alignment is provided in the table below:

Table 3-2 – Summary of Groundwater Depth/Elevation

Boring No.	Depth at TOB	Elevation at TOB	Planned Top of Pipe	Planned Bottom of Pipe
B-3	5 ft.	~384 ft.	378 ft.	374 ft.
B-5	2½ ft.	~444.5 ft.	440 ft.	436 ft.
B-11	2 ft.	~371 ft.	369 ft.	367 ft.

Based upon our understanding of the project, it appears that ground water will impact excavation along the alignment. However, we note that ground-water levels are influenced by precipitation, long term climatic variations, and nearby construction. Measurements of ground water made at different times than our exploration may indicate ground-water levels substantially different than indicated on the boring records in Appendix II.

4.0 Conclusions and Recommendations

The following paragraphs include our conclusions and recommendations for suitability of on-site soils for use as structural fill, excavation considerations, fill placement and compaction, and dewatering recommendations. Specific recommendations regarding the planned jack and bore and HDD locations was beyond our scope.

The soil profile encountered along the alignment appears generally suitable for the proposed development. However, measured ground water elevation is above planned excavation depths at areas along the alignment. Therefore, isolated temporary dewatering techniques will likely be required at these areas. Additionally, very loose sandy soil conditions were encountered along the alignment, within the planned cut depths. Therefore, special care should be taken to properly slope or shore excavations in these areas to protect adjacent roadways and structures from under-mining.

It is important to note that several aspects of construction at this site could adversely affect the adjacent roadways, utilities and nearby structures. Therefore, proper design and special care during construction will be needed to protect the adjoining properties.

4.1 Pre-Construction Survey

Perform a preconstruction survey on existing structures prior to excavation in the immediate vicinity. This should include a detailed inventory of the structural condition, including existing cracks or other damage. A structural engineer should assist in assessing building sensitivity to settlement. Obtain loads on existing foundations from as-built plans. On older structures, it may be necessary to analyze the structure to approximate these loads. This survey is recommended for all existing structures that are to remain after development of the site.

4.2 Excavation Considerations

Based on review of the boring data, it appears that existing fill and native Coastal Plain sandy and clayey soils will mostly be encountered during general excavation. These soils can be typically excavated using track or wheel-mounted excavators and front-end loaders. The degree of difficulty that mobile equipment will encounter rises dramatically in materials exceeding about 70 to 80 blows per foot. These conditions were not encountered in our soil borings within the understood planned excavation depths.

4.2.1 Excavations Adjacent to Existing Pavements/Utilities

Depending on the planned means and methods for the construction along the alignment, proposed excavations may be either adjacent to or within 10 feet of the subgrade supporting the adjacent, existing roadways, driveways and utilities. Excessive horizontal or vertical displacement of the elements may occur due to loss of support to the bearing soils afforded by removal of the excavated soils, unless steps are taken to support these soils.

Depending on the extents of the trench excavation, care must be taken not to undermine the existing roadway, driveways and utilities. Excavation shall not extend closer than one foot to a surface drawn at 45 degrees to the horizontal through the lower edge of any adjacent existing load bearing subgrade, unless such load bearing subgrade is first properly shored or otherwise protected against movement.

4.2.2 Temporary Excavation Stability

Excavations shall be sloped or shored in accordance with local, state, and federal regulations, including OSHA (29 CFR Part 1926) excavation trench safety standards. The contractor is usually solely responsible for site safety. This information is provided only as a service, and under no circumstances shall S&ME be assumed to be responsible for construction site safety.

4.2.3 Excavation Slopes

The planned excavations at the site will be advanced through mainly existing fill and native Coastal Plain sandy and clayey soils to the bottom of trench elevation. Depending on the planned bottom of trench elevation, groundwater may be encountered. Based on our experience and information obtained by borings at the site, we recommend the excavated cut slopes not exceed a maximum inclination of 2H:1V (horizontal:vertical). These values are for planning purposes and will need to be confirmed during construction by direct observation of the excavated slopes, and inclinations modified, if necessary, based on the observed conditions. If these slopes are to be exceeded, then temporary/permanent retainage will be necessary. It is important to note that very loose to loose sandy conditions were encountered along the alignment and that these soil conditions may be less stable within trench excavations.

Recommended slopes are preliminary and assume that groundwater is controlled at the lowest level of the excavation continuously while the excavation is open. Groundwater is assumed not to flow or emerge from soil excavation slopes. Surface water is assumed to be captured by appropriate drainage measures above the slope crest and not allowed to drain down the slope. If perched groundwater is observed emerging from the face of the slope or if surface water is adversely affecting the slope, S&ME should be contacted immediately. It is also assumed that excavated slopes are relatively uniform such that local slopes due not significantly exceed the recommended slopes. Finally, the recommended slope inclination assumes that slopes are monitored for indications of instability and that slopes are flattened or other measures taken if appropriate. Monitoring of the slopes during construction is presently not part of our contracted scope of services for this project.

4.2.4 Temporary Retaining Structures

Depending on the depth of the trench excavation and the stability of the excavation sidewalls, it is possible that temporary retaining structures will be required during excavation and construction of the water line along portions of the alignment. Design of temporary retaining structures for vertical or near-vertical excavations, was beyond our scope. Typically, such designs are done by specialty contractors working directly for the general contractor. Contractor's and designer's responsibilities for design and construction of temporary bracing need to be clearly defined in the contract documents. A typical option of a temporary retaining structure for a scenario similar to this project may include trench boxes.

4.2.5 Temporary Dewatering

Due to the observed ground water elevation, at roughly 2 to 5 feet below the existing ground surface along portions of the alignment, it is assumed that ground water will be encountered during excavation activities in these areas. Design of a dewatering system was beyond our scope. Typically, such designs are done by specialty contractors working directly for the general contractor. A typical option for a temporary dewatering system for a scenario similar to this project may include a sump and pump.

4.2.6 Bedding/Stabilization at Base of Excavation

Based on our experience with similar subsurface conditions and construction activities, we anticipate that the portions of the alignment that encounter ground water or clayey soils within the base of excavation may encounter soften or loosen of the base of excavation prior to completing installation. Hydrostatic pressures and construction equipment among other factors, can all be contributing factors to reducing the allowable bearing capacity at the exposed bearing elevation. Upon completion of the excavations within areas that encounter these conditions, we recommend placing bedding or a "working mat" at the bottom of the excavation on soils suitable for foundation support. The working mat may consist of compacted granular material such as graded aggregate base or screenings. Alternatively, lean concrete or flowable fill could be placed in the base of the excavations as a working mat.

4.3 Use of On-site Soils as Structural Fill

The on-site soils that may be proposed for use as fill at the site have USCS soil classification of sands with varying amounts of fines (SP, SP-SC and SC) and low plasticity clays (CL).

4.3.1 Sandy Proposed Fill Soils

Coarse grained soils, similar to those encountered, are typically suitable for use as structural fill. Before beginning to place fill, sample and test each proposed fill material to determine maximum dry density, optimum moisture content, natural moisture content, gradation and plasticity of the soil.

4.3.2 Low Plasticity Proposed Fill Soils

Fine grained low plasticity clays (CL) containing varying amounts of sand, similar to those encountered, are typically suitable to marginally suitable for use as structural fill. Suitability of these soils for use depends a great deal on the moisture content of the material at time of placement. Before beginning to place fill, sample and test each proposed fill material to determine its maximum dry density, optimum moisture content, natural moisture content, and suitability as a structural fill material.

Marginal suitability refers to the fact that fine grained soils are moisture sensitive to some degree and can be difficult to work if allowed to become wet. These difficulties can include softening of exposed subgrade soils, excessive rutting or deflection under construction traffic, and the difficulty associated with adequately drying and compacting wet soil. Moisture-related earthwork difficulties can be reduced by performing the earthwork during the typically drier months of the year (May through October).

4.4 Fill Placement and Compaction

Structural soil fill material should have less than 5 percent organic matter, a standard Proctor maximum dry density of 90 pcf or greater and a plasticity index (PI) of 30 percent or less. We recommend that off-site borrow meet the organic content, PI and density requirements of this section. Testing will be required before fill placement begins to determine the optimum moisture-density condition for the fill materials. Material to be used as soil fill should be tested and approved by the geotechnical engineer before being placed.

4.4.1 Density and Moisture Requirements

Place new fill in maximum 8-inch loose lifts. In areas that will provide structural support, compact to at least 95 percent of maximum dry density (ASTM D698 Standard Proctor). In non-structural areas, achieving at least 90 percent of the maximum dry density will likely be sufficient. Fill moisture content should be maintained within +/-3 percent of the optimum moisture content. Contractor should be prepared to wet or dry soils as necessary to achieve compaction. In addition to meeting the compaction requirement, fill material should be stable under movement of the construction equipment and should not exhibit rutting or pumping.

4.4.2 Compaction of Granular Soils

A vibratory smooth-drum roller will likely be effective for compaction of the sandy soils with nil to few fines (SP and SP-SC) encountered at the site. Free-draining granular soils containing less than 10 percent fines, particularly those that are gap-graded below the No. 40 sieve size, can often be more effectively compacted when water saturated. Addition of the water breaks down electro-static bonds between the soil particles (termed bulking) and allows easier densification of the soil skeleton. Free water will drain out of the lift during the compaction process.

On poorly graded sands, it is usually difficult to achieve high density close to the surface of each lift. There is low shear strength in poorly graded soils and the top layer tends to rise up behind the drum. This is not a problem when multiple lifts are being compacted. The previous top layer will be compacted when the next layer is rolled. The difficulty of compacting the surface must be considered during density testing, since the loose surface layer will tend to give misleading density data. In this case, density and moisture content testing for record would be more reliably performed at the top of the preceding lift, rather than at the surface, and after sufficient time has elapsed for free water to drain out.

A vibratory sheeps-foot roller will likely be effective for compaction of the clayey sandy soils (SC) encountered at the site. Sheeps-foot compactors will likely be preferable because the pads better penetrate the soil and they tend to break down the natural cohesive bonds between the particles. Pneumatic tire compactors can also be used but will likely be better suited only where the soils have a low to medium plasticity index.

Sandy soils excavated above the water table are usually close enough to optimum moisture content to place and compact efficiently. Soils that are initially too wet or are allowed to become wet due to rainfall are more difficult to use.

4.4.3 Compaction of Cohesive Soils

The compaction characteristics of clayey soils (CL) encountered at this site will be highly dependent on the soil moisture content at the time of construction. Sheeps-foot compactors will likely be preferable because the pads better penetrate the soil and they tend to break down the natural cohesive bonds between the particles. Pneumatic tire compactors can also be used but will likely be better suited only where the soils have a low to medium plasticity index.

The water content of these soils is usually very difficult to modify in the field. Above or below the optimum moisture content, the soils become progressively more difficult to manipulate and compact. Soils excavated above the water table are usually close enough to optimum moisture content to place and compact efficiently. Soils that are initially too wet or are allowed to become wet due to rainfall are more difficult to use. Drying wet clayey and silty soils usually requires favorable weather conditions and often requires repeated disking and rolling with sheeps-foot rollers to lower the moisture content.

4.4.4 Fill Placement along Excavation Slopes

We recommend that fill placed along excavation slopes be benched and terraced into the existing slope face to provide for sufficient access of compaction equipment and aid in the ability to achieve compaction.

4.4.5 Fill Placement near Ground water Elevation

As previously mentioned, temporary dewatering, when necessary, should be maintained until fill placement is a minimum of three feet above the stabilized water level. Where fill will be placed at or near groundwater elevations, the static setting of the roller should be used. The use of the static setting will minimize the capillary action created from an increased pore-water pressure of the underlying saturated soils, which is most commonly created with the use of a vibratory setting of the roller. This will ultimately minimize the saturation of the fill soils and the degradation of previously placed fills.

4.4.6 Monitoring and Testing

Fill placement should be witnessed by an experienced soils technician working under the guidance of the geotechnical engineer. We recommend full time observation by a qualified soils technician with testing at random intervals to confirm compaction is being achieved in structural areas along the alignment. Part-time testing may suffice for non-structural areas along the alignment.

5.0 Qualifications of Report

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.

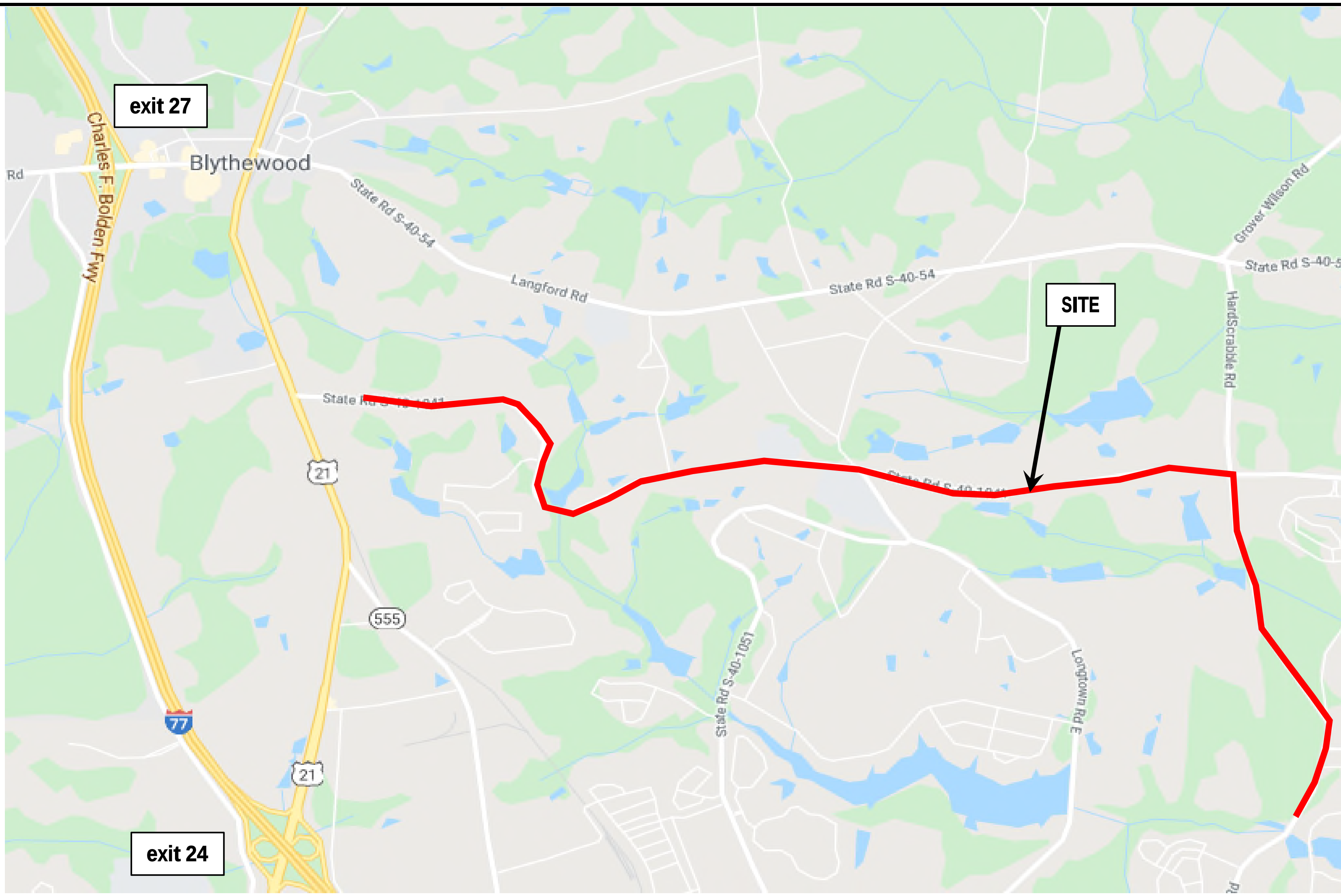
Our conclusions and recommendations are based on limited data from a field exploration program. Subsurface conditions can vary widely between explored areas. Some variations may not become evident until construction. If conditions are encountered which appear different than those described in our report, 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 confirm that earthwork, foundation, and other recommendations are properly interpreted and implemented. The recommendations in this report are contingent on S&ME's review of final plans and specifications followed by our observation and monitoring of earthwork and foundation construction activities.

Appendices

Appendix I – Figures

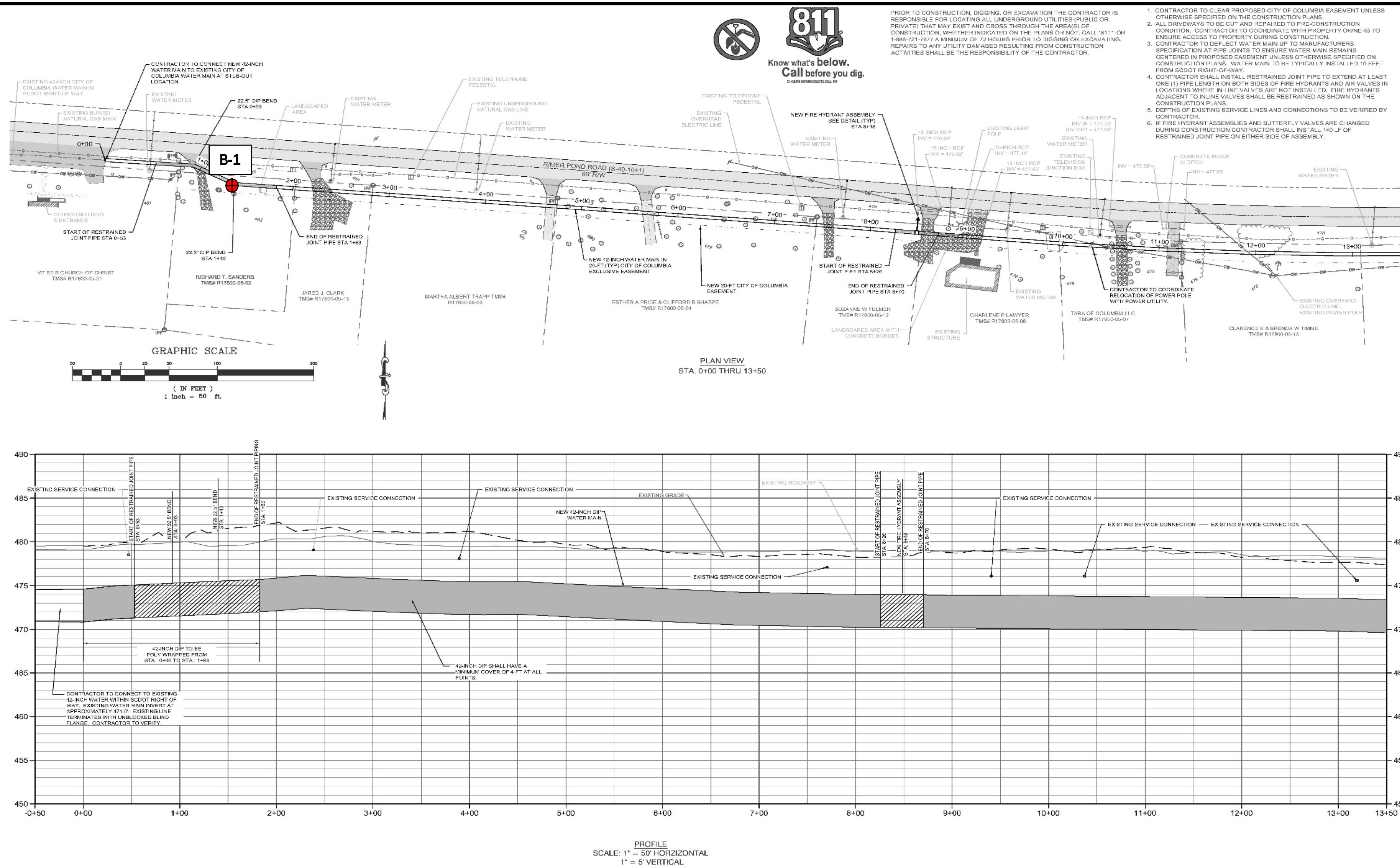


N

SOURCE: Google Maps

SITE LOCATION PLAN

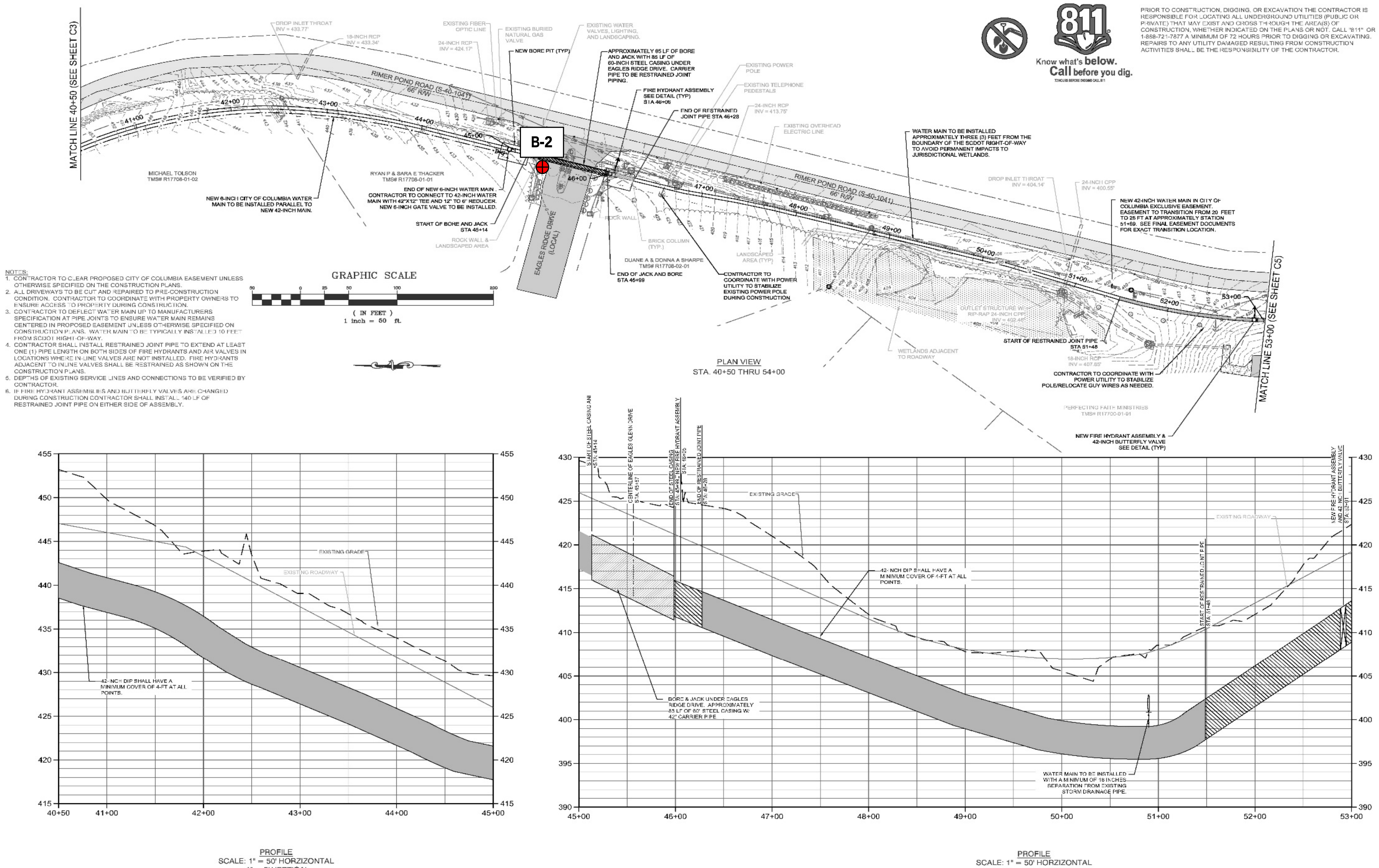
JOB NAME:	Water System Improvements			FIGURE NO.
LOCATION:	Rimer Pond Rd and Hard Scrabble Rd			1
CITY, STATE:	Columbia, SC			
JOB NO.:	1461-19-072			
SCALE:	NTS	CHECKED BY:	RCB	
DATE:	1/2/2020	DRAWN BY:	RCB	



SOURCE: Plan & Profile Sta. 00+00 thru 13+50, by WK Dickson, 2-13-15

BORING LOCATION PLAN

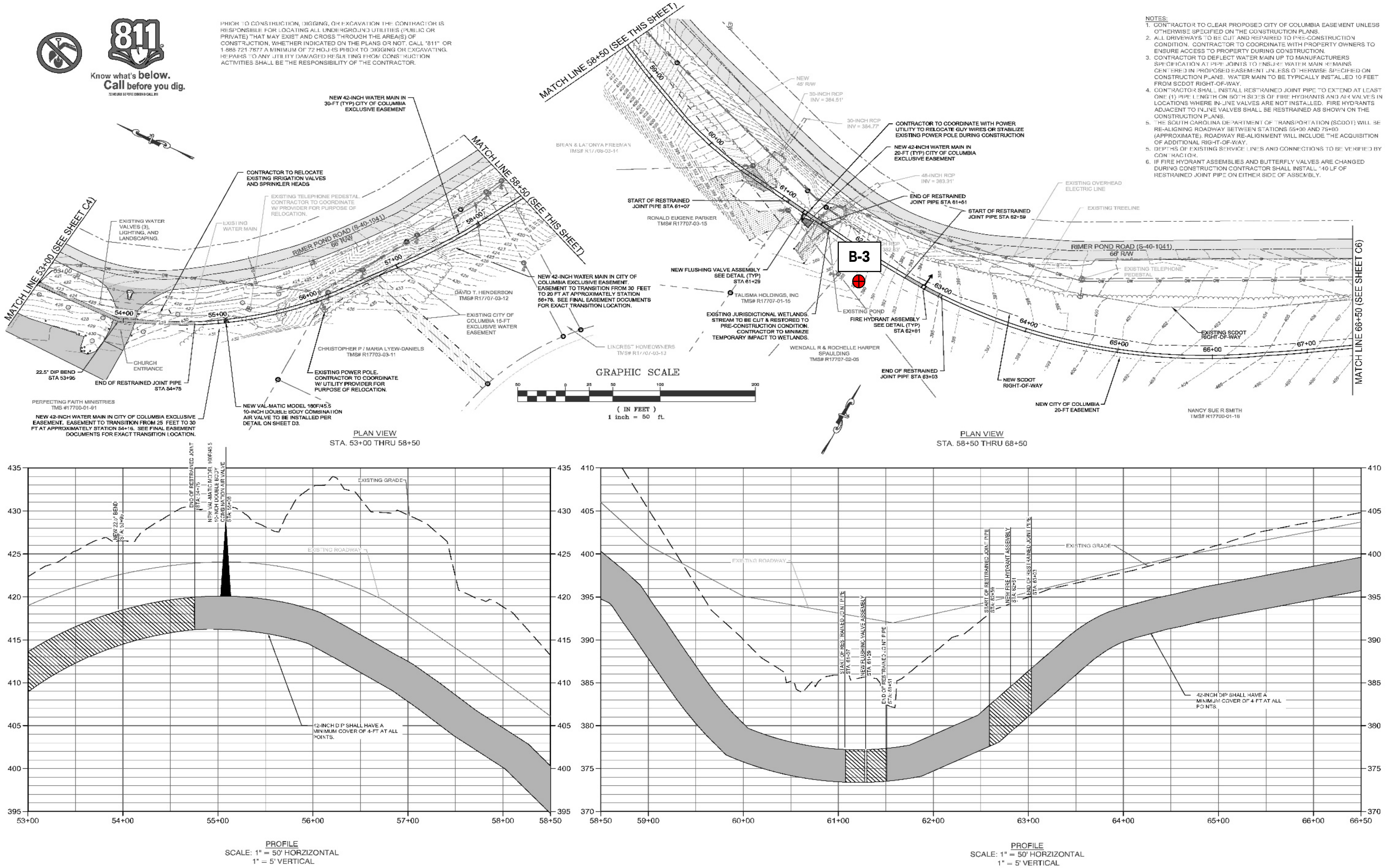
JOB NAME:	Water System Improvements	FIGURE NO.
LOCATION:	Rimer Pond Rd and Hard Scrabble Rd	2
CITY, STATE:	Columbia, SC	
JOB NO.:	1461-19-072	
SCALE: AS SHOWN	CHECKED BY: RCB	
DATE: 1/29/2020	DRAWN BY: ANK	



SOURCE: Plan & Profile Sta. 40+50 thru 53+00, by WK Dickson, 2-13-15

BORING LOCATION PLAN

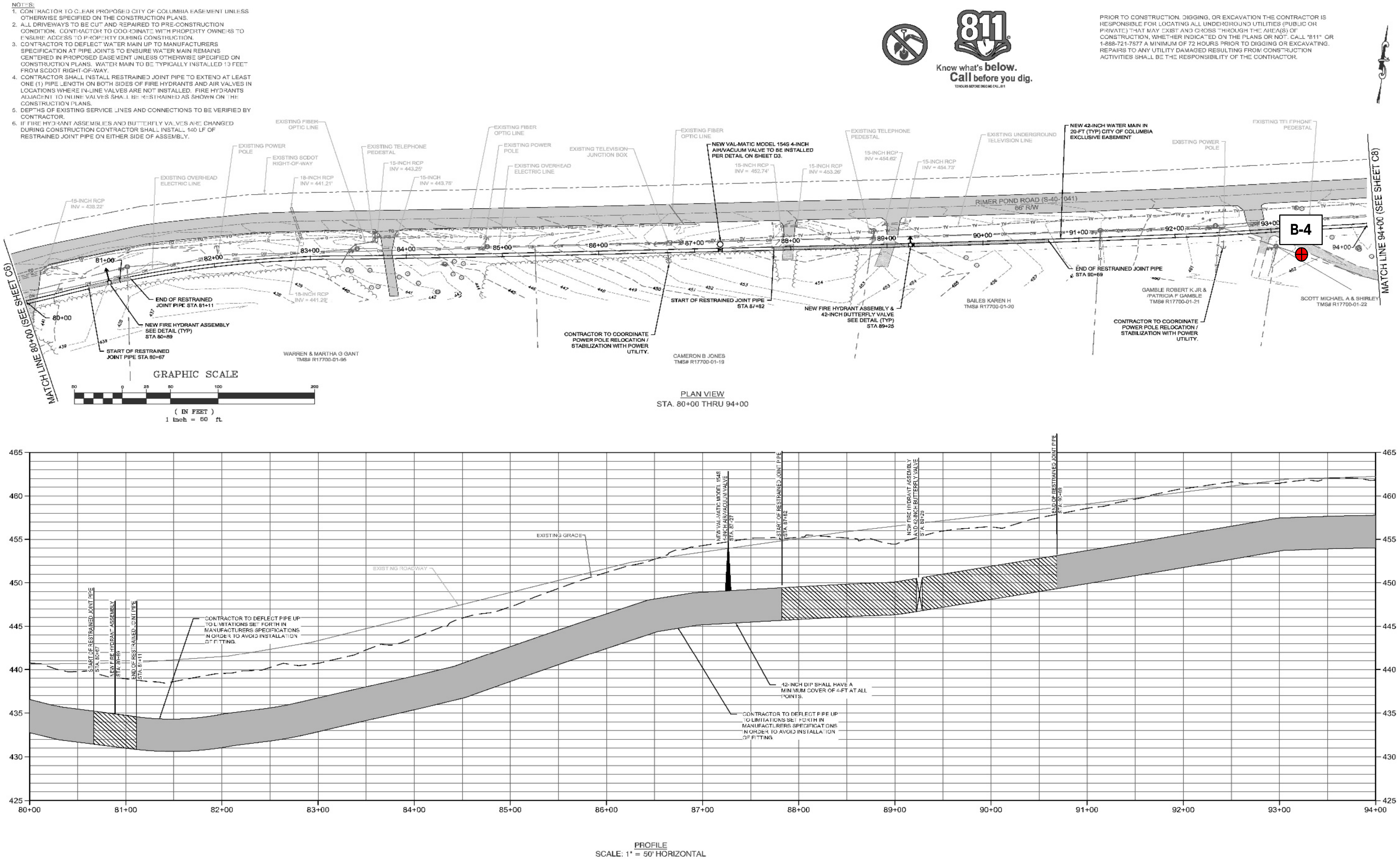
JOB NAME:	Water System Improvements		FIGURE NO.
LOCATION:	Rimer Pond Rd and Hard Scrabble Rd		3
CITY, STATE:	Columbia, SC		
JOB NO.:	1461-19-072		
SCALE: AS SHOWN		CHECKED BY: RCB	
DATE: 1/29/2020		DRAWN BY: ANK	



SOURCE: Plan & Profile Sta. 53+00 thru 66+50, by WK Dickson, 2-13-15

BORING LOCATION PLAN

JOB NAME:	Water System Improvements			FIGURE NO.
LOCATION:	Rimer Pond Rd and Hard Scrabble Rd			4
CITY, STATE:	Columbia, SC			
JOB NO.:	1461-19-072			
SCALE:	AS SHOWN	CHECKED BY:	RCB	
DATE:	1/29/2020	DRAWN BY:	ANK	



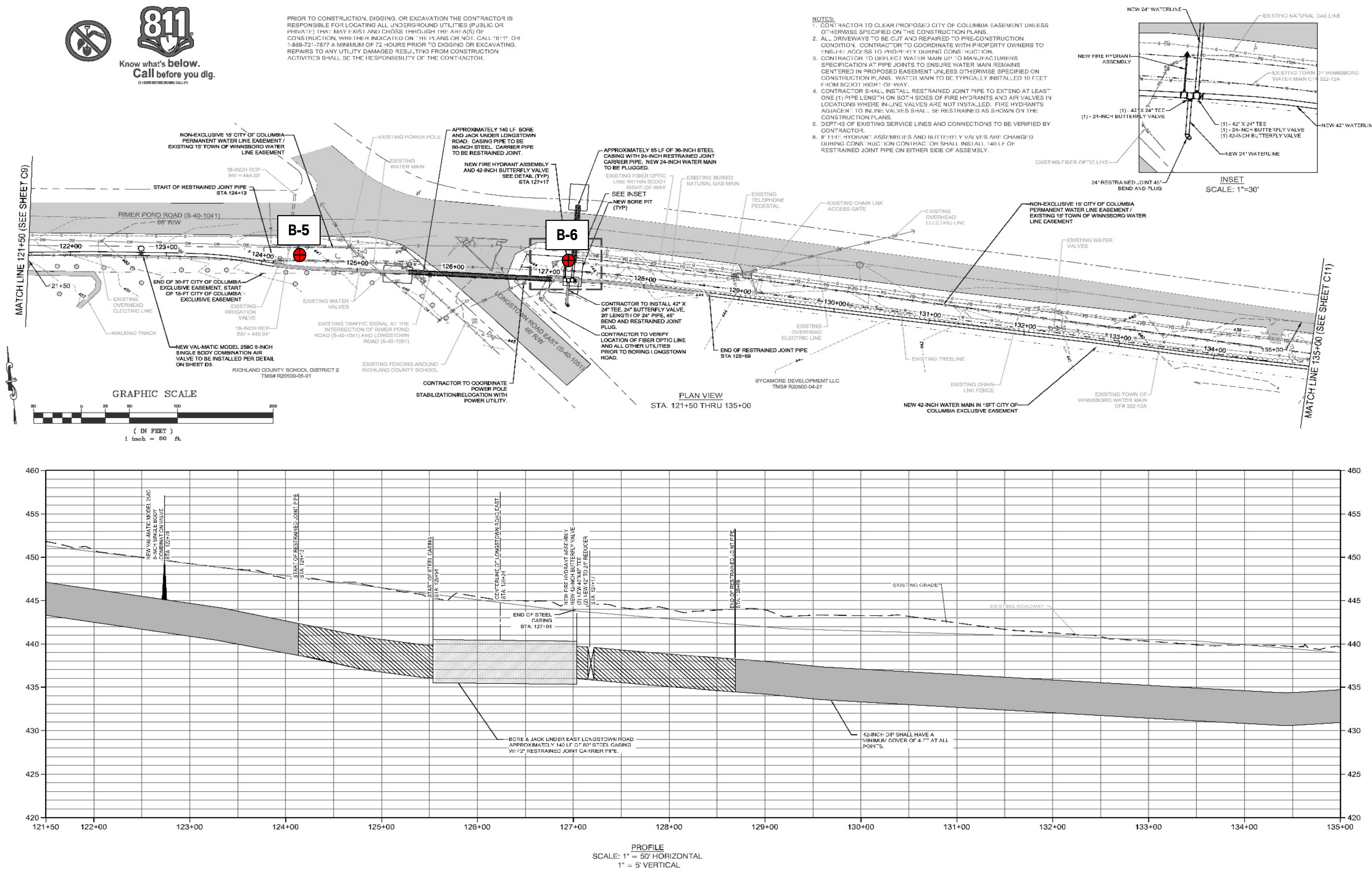
SOURCE: Plan & Profile Sta. 80+00 thru 94+00, by WK Dickson, 2-13-15

BORING LOCATION PLAN

JOB NAME:	Water System Improvements		
LOCATION:	Rimer Pond Rd and Hard Scrabble Rd		
CITY, STATE:	Columbia, SC		
JOB NO.:	1461-19-072		
SCALE:	AS SHOWN	CHECKED BY:	RCB
DATE:	1/29/2020	DRAWN BY:	ANK

FIGURE NO.

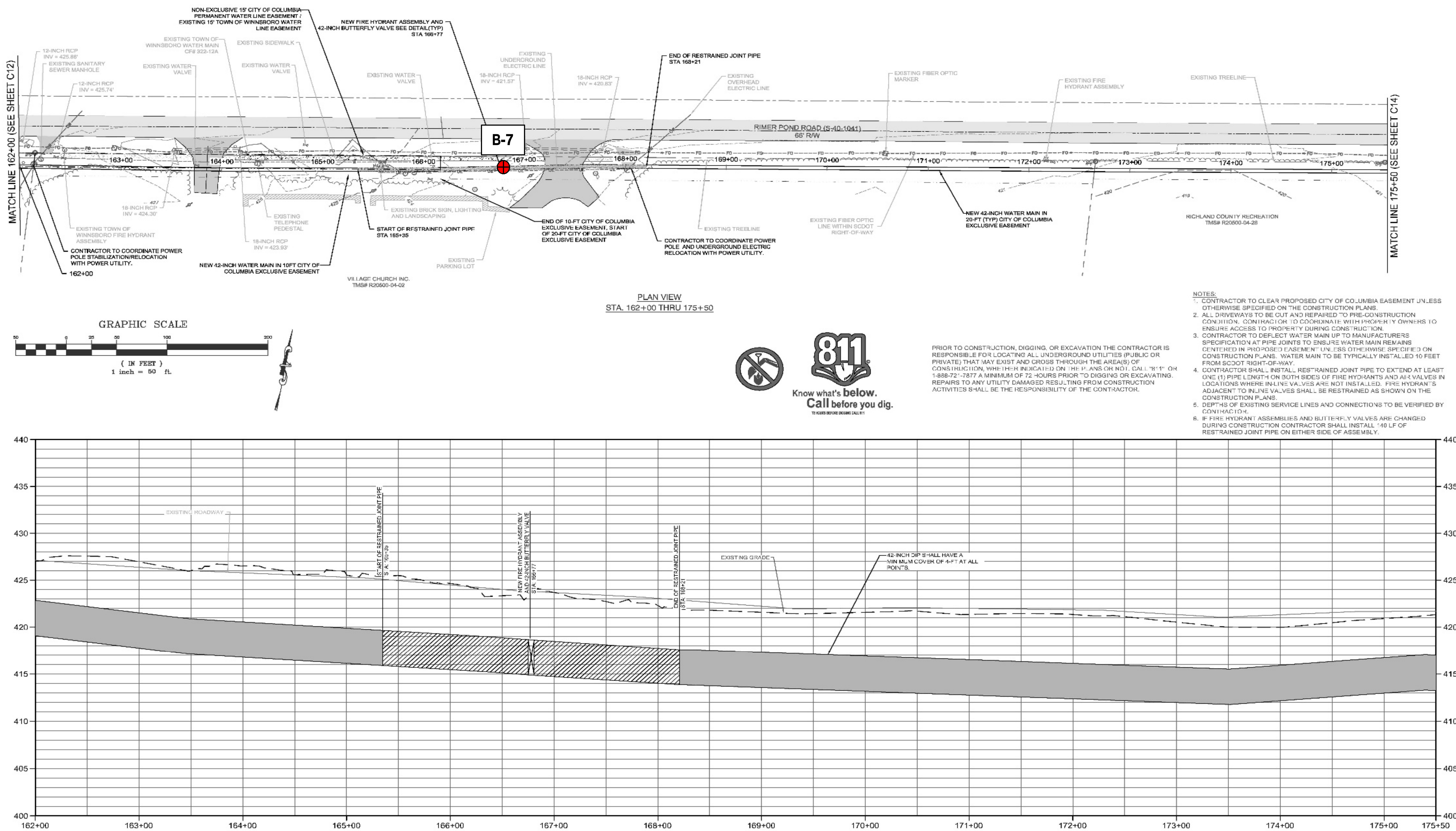
5



SOURCE: Plan & Profile Sta. 121+50 thru 135+00, by WK Dickson, 2-13-15

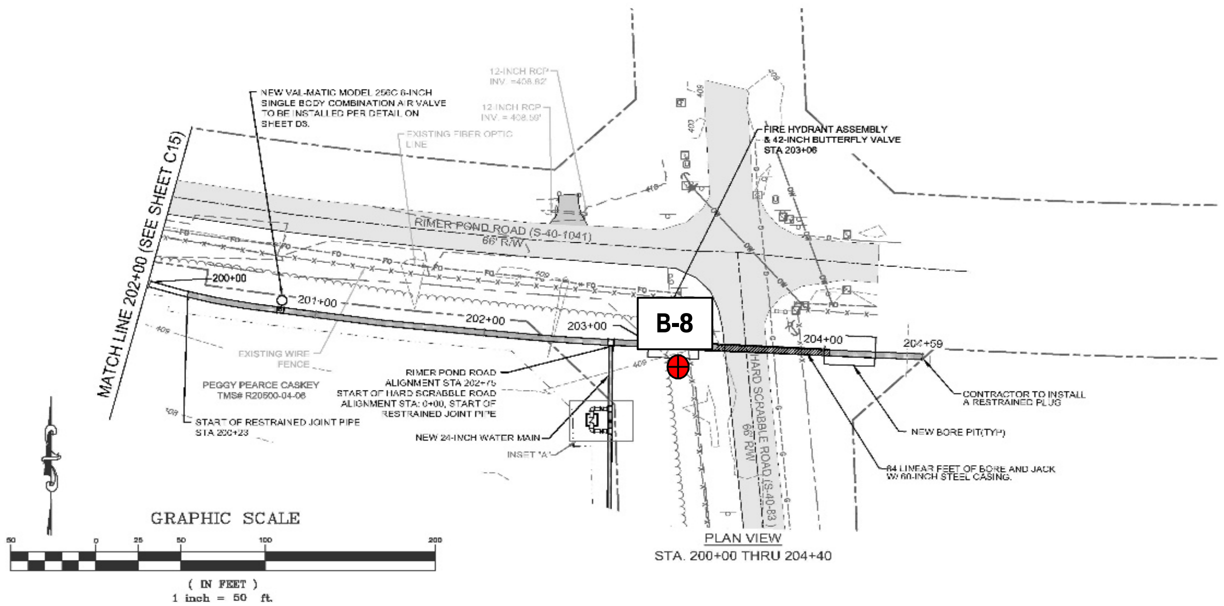
BORING LOCATION PLAN

JOB NAME:	Water System Improvements			FIGURE NO.
LOCATION:	Rimer Pond Rd and Hard Scrabble Rd			6
CITY, STATE:	Columbia, SC			
JOB NO.:	1461-19-072			
SCALE:	AS SHOWN	CHECKED BY:	RCB	
DATE:	1/29/2020	DRAWN BY:	ANK	

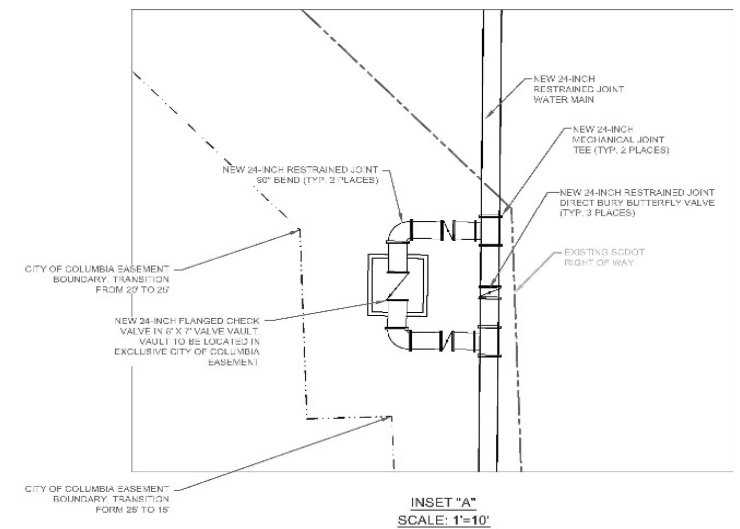


SOURCE: Plan & Profile Sta. 162+00 thru 175+50, by WK Dickson, 2-13-15

BORING LOCATION PLAN		
JOB NAME:	Water System Improvements	FIGURE NO.
LOCATION:	Rimer Pond Rd and Hard Scrabble Rd	7
CITY, STATE:	Columbia, SC	
JOB NO.:	1461-19-072	
SCALE: AS SHOWN	CHECKED BY: RCB	
DATE: 1/29/2020	DRAWN BY: ANK	



PLAN VIEW
STA. 200+00 THRU 204+40

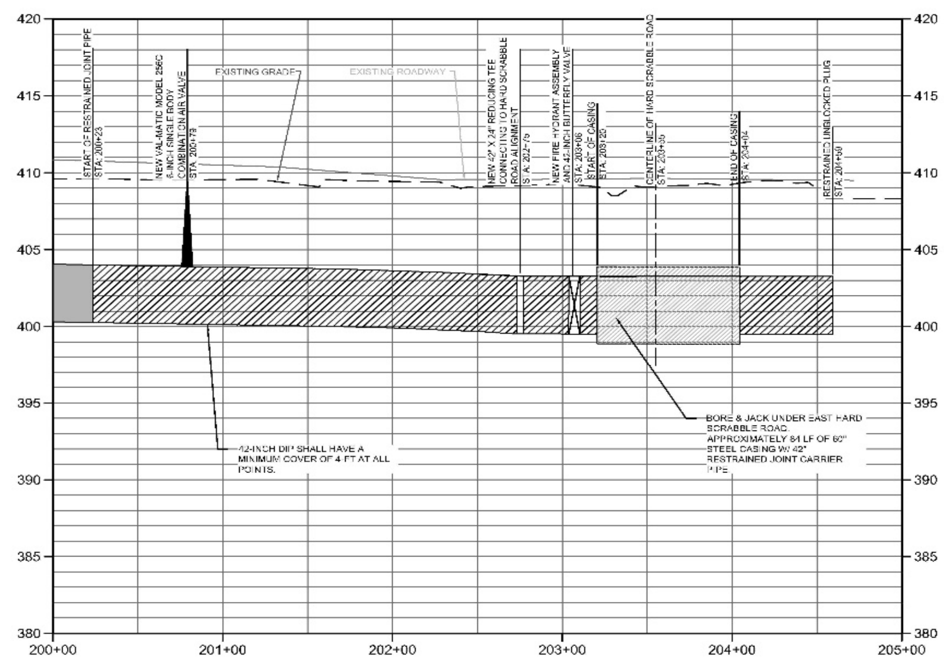


INSET "A"
SCALE: 1'=10'

NOTES:
1. CONTRACTOR TO CLEAR PROPOSED CITY OF COLUMBIA EASEMENT UNLESS OTHERWISE SPECIFIED ON THE CONSTRUCTION PLANS.
2. ALL DRIVEWAYS TO BE CUT AND REPAIRED TO PRE-CONSTRUCTION CONDITION. CONTRACTOR TO COORDINATE WITH PROPERTY OWNERS TO ENSURE ACCESS TO PROPERTY DURING CONSTRUCTION.
3. CONTRACTOR TO DEFLECT WATER MAIN UP TO MANUFACTURERS SPECIFICATION AT PIPE JOINTS TO ENSURE WATER MAIN REMAINS CENTERED IN PROPOSED EASEMENT UNLESS OTHERWISE SPECIFIED ON CONSTRUCTION PLANS. WATER MAIN TO BE TYPICALLY INSTALLED 10 FEET FROM SCDOT RIGHT-OF-WAY.
4. CONTRACTOR SHALL INSTALL RESTRAINED JOINT PIPE TO EXTEND AT LEAST ONE (1) PIPE LENGTH ON BOTH SIDES OF FIRE HYDRANTS AND AIR VALVES IN LOCATIONS WHERE IN-LINE VALVES ARE NOT INSTALLED. FIRE HYDRANTS ADJACENT TO INLINE VALVES SHALL BE RESTRAINED AS SHOWN ON THE CONSTRUCTION PLANS.
5. DEPTHS OF EXISTING SERVICE LINES AND CONNECTIONS TO BE VERIFIED BY CONTRACTOR.
6. IF FIRE HYDRANT ASSEMBLIES AND BUTTERFLY VALVES ARE CHANGED DURING CONSTRUCTION CONTRACTOR SHALL INSTALL 140 LF OF RESTRAINED JOINT PIPE ON EITHER SIDE OF ASSEMBLY.

Know what's **below.**
Call before you dig.

PRIOR TO CONSTRUCTION, DIGGING, OR EXCAVATION THE CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL UNDERGROUND UTILITIES (PUBLIC OR PRIVATE) THAT MAY EXIST AND CROSS THROUGH THE AREA(S) OF CONSTRUCTION, WHETHER INDICATED ON THE PLANS OR NOT. CALL "811" OR 1-888-721-7877 A MINIMUM OF 72 HOURS PRIOR TO DIGGING OR EXCAVATING. REPAIRS TO ANY UTILITY DAMAGED RESULTING FROM CONSTRUCTION ACTIVITIES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

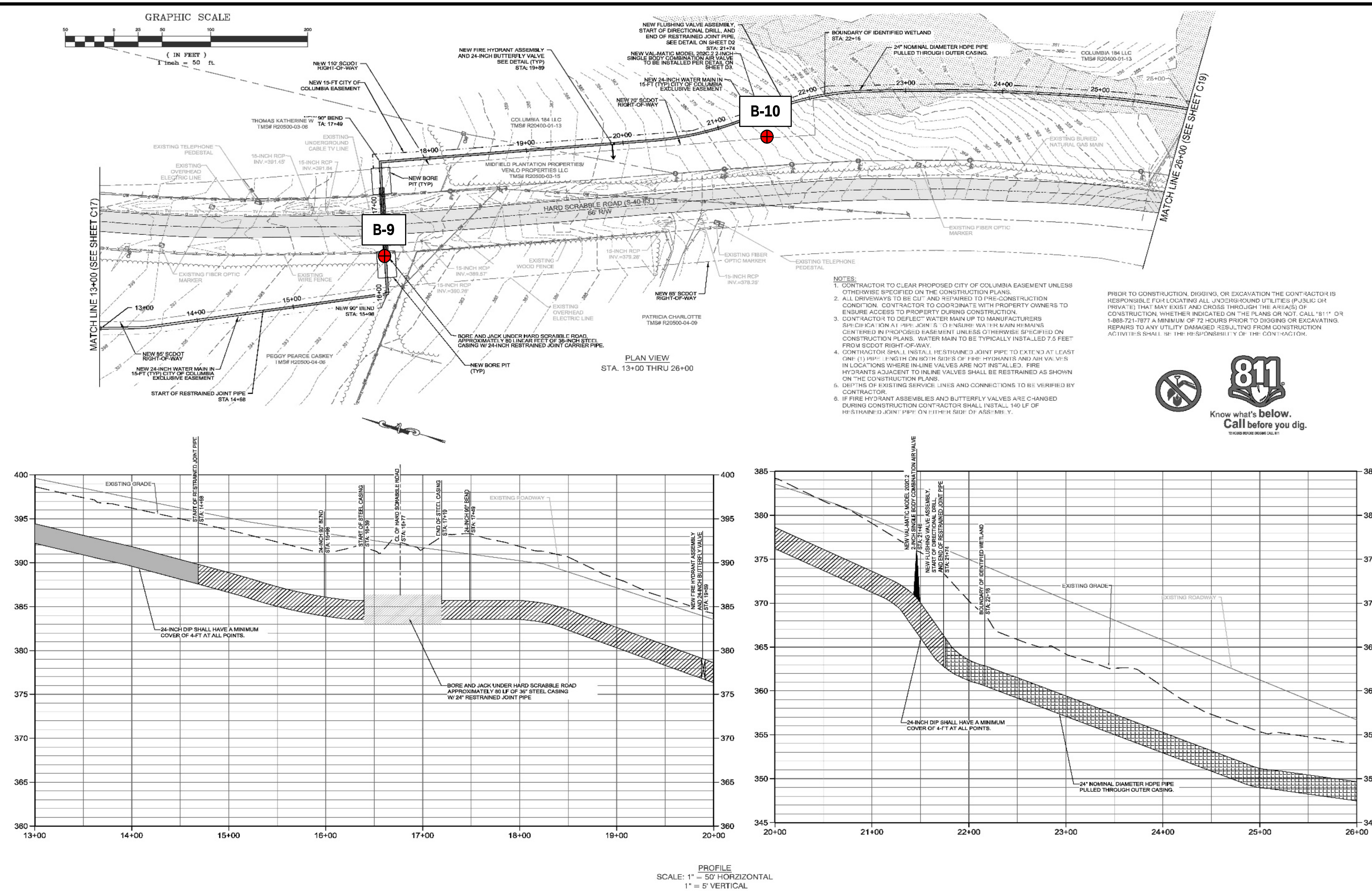


PROFILE
SCALE: 1" = 50' HORIZONTAL
1" = 5' VERTICAL

SOURCE: Plan & Profile Sta. 200+00 thru 204+40, by WK Dickson, 2-13-15

BORING LOCATION PLAN

JOB NAME:	Water System Improvements			FIGURE NO.
LOCATION:	Rimer Pond Rd and Hard Scrabble Rd			8
CITY, STATE:	Columbia, SC			
JOB NO.:	1461-19-072			
SCALE:	AS SHOWN	CHECKED BY:	RCB	
DATE:	1/29/2020	DRAWN BY:	ANK	

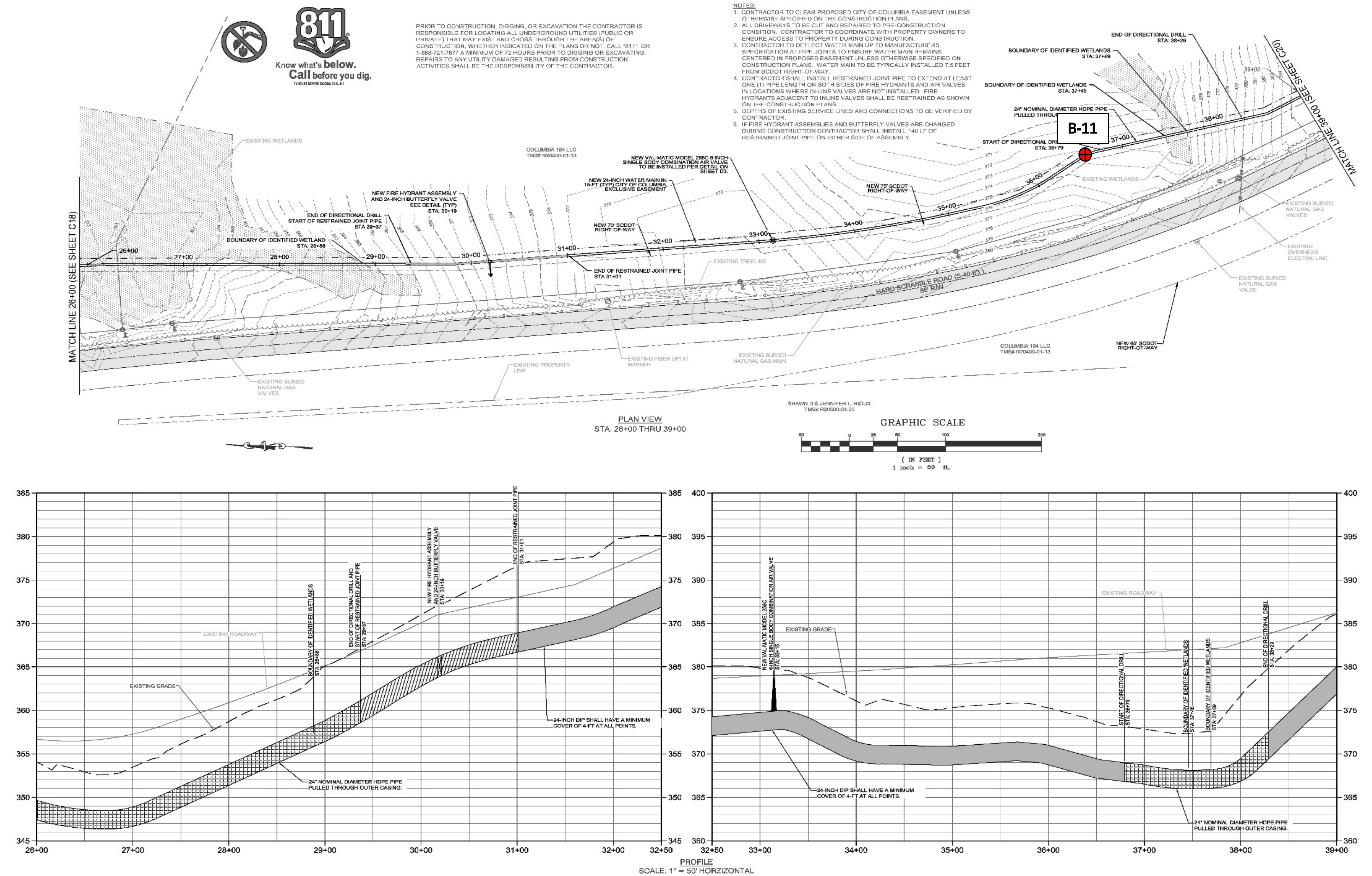


SOURCE: Plan & Profile Sta. 13+00 thru 26+00, by WK Dickson, 2-13-15

S&ME

BORING LOCATION PLAN

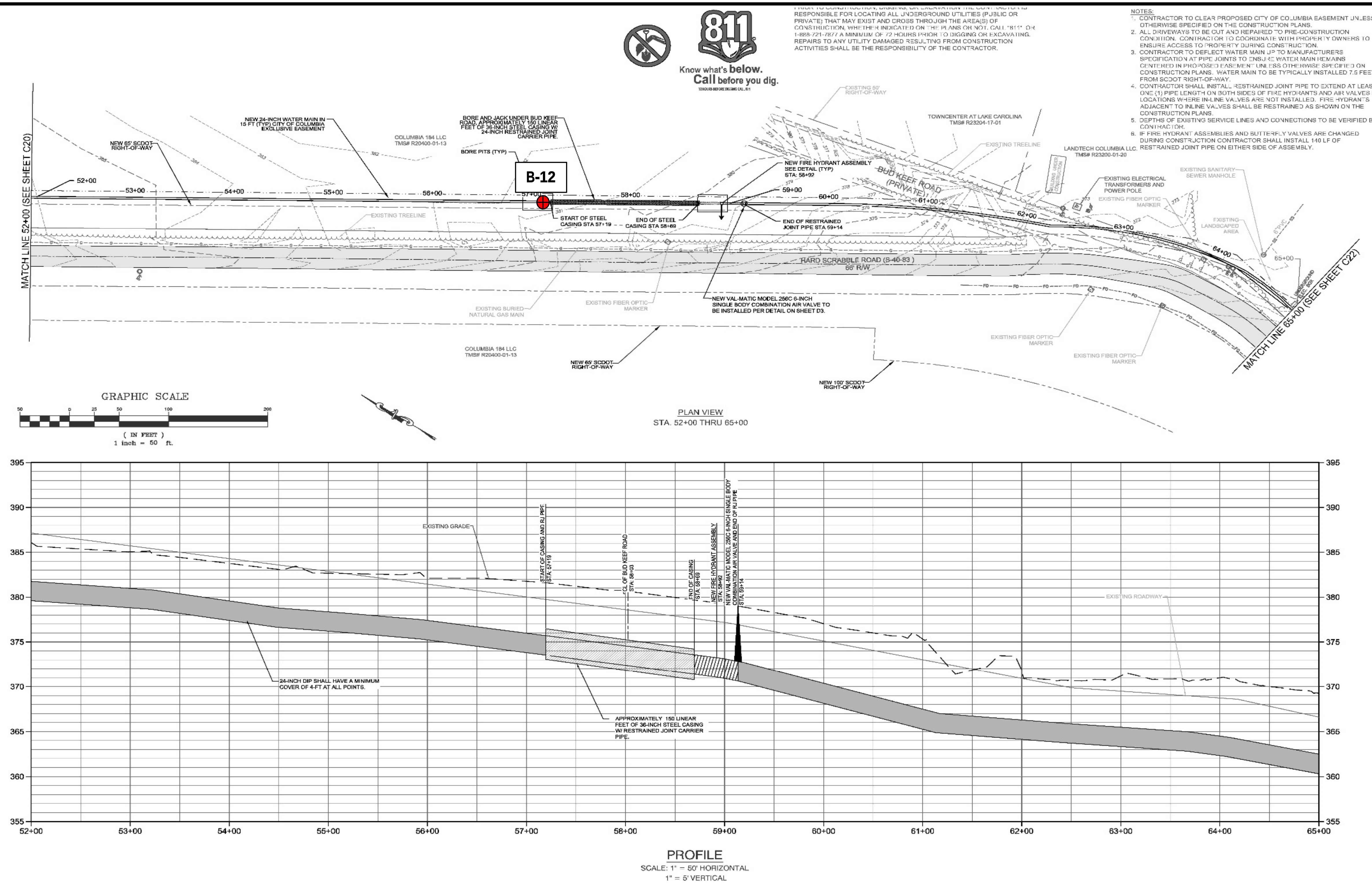
JOB NAME:	Water System Improvements		FIGURE NO.
LOCATION:	Rimer Pond Rd and Hard Scrabble Rd		9
CITY, STATE:	Columbia, SC		
JOB NO.:	1461-19-072		
SCALE:	AS SHOWN	CHECKED BY:	RCB
DATE:	1/29/2020	DRAWN BY:	ANK



SOURCE: Plan & Profile Sta. 26+00 thru 39+00, by WK Dickson, 2-13-15

BORING LOCATION PLAN

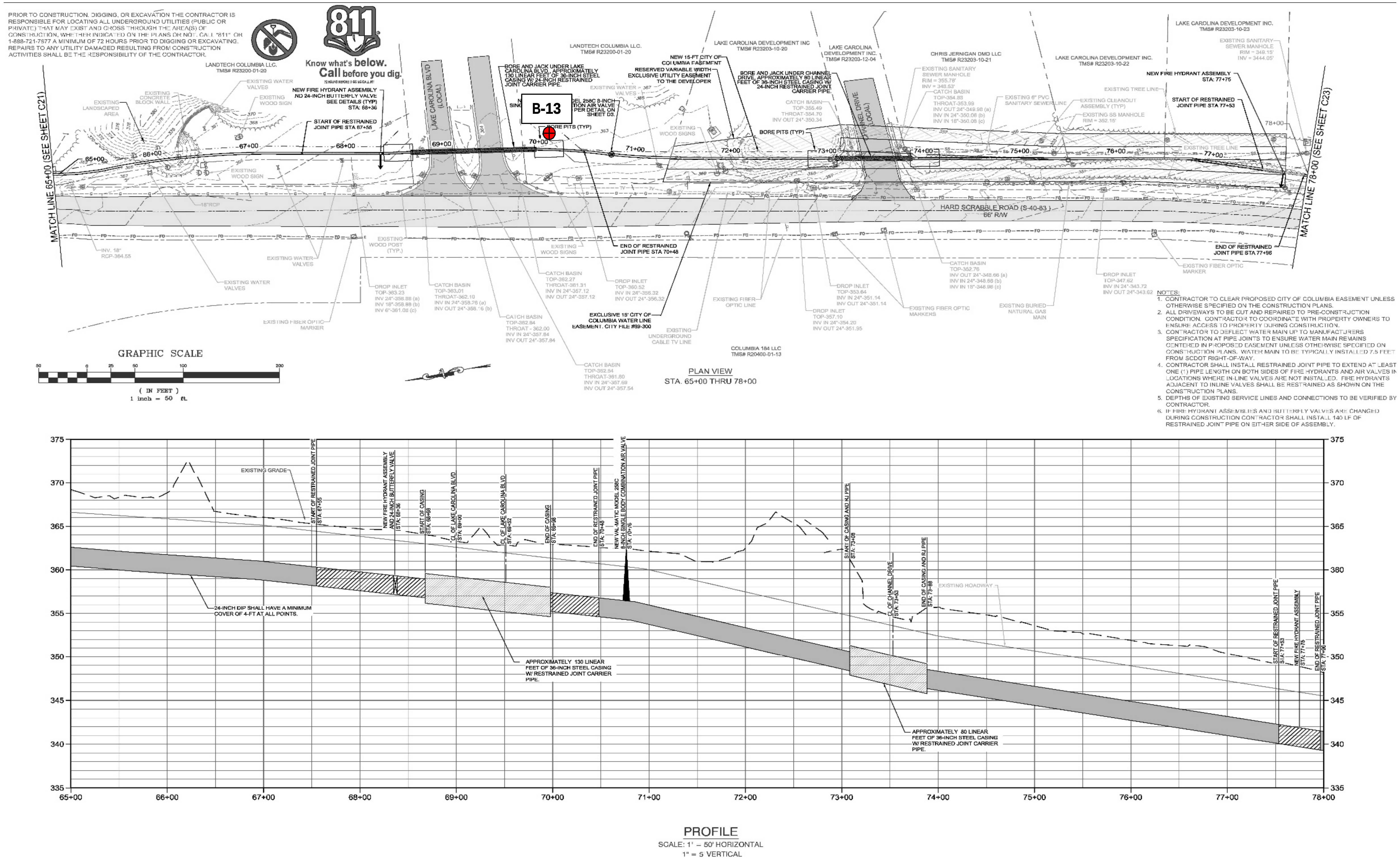
JOB NAME:	Water System Improvements		FIGURE NO.
LOCATION:	Rimer Pond Rd and Hard Scrabble Rd		10
CITY, STATE:	Columbia, SC		
JOB NO.:	1461-19-072		
SCALE: AS SHOWN		CHECKED BY: RCB	
DATE: 1/29/2020		DRAWN BY: ANK	



SOURCE: Plan & Profile Sta. 52+00 thru 65+00, by WK Dickson, 2-13-15

BORING LOCATION PLAN

JOB NAME:	Water System Improvements			FIGURE NO.
LOCATION:	Rimer Pond Rd and Hard Scrabble Rd			11
CITY, STATE:	Columbia, SC			
JOB NO.:	1461-19-072			
SCALE:	AS SHOWN	CHECKED BY:	RCB	
DATE:	1/29/2020	DRAWN BY:	ANK	



SOURCE: Plan & Profile Sta. 65+00 thru 78+00, by WK Dickson, 2-13-15

BORING LOCATION PLAN

JOB NAME:	Water System Improvements		
LOCATION:	Rimer Pond Rd and Hard Scrabble Rd		
CITY, STATE:	Columbia, SC		
JOB NO.:	1461-19-072		
SCALE:	AS SHOWN	CHECKED BY:	RCB
DATE:	1/29/2020	DRAWN BY:	ANK

FIGURE NO.

12

Appendix II – Field Data

LEGEND TO SOIL CLASSIFICATION AND SYMBOLS

SOIL TYPES

(Shown in Graphic Log)

- Fill
- Asphalt
- Concrete
- Topsoil
- Gravel
- Sand
- Silt
- Clay
- Organic
- Silty Sand
- Clayey Sand
- Sandy Silt
- Clayey Silt
- Sandy Clay
- Silty Clay
- Partially Weathered Rock
- Cored Rock

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

CONSISTENCY OF COHESIVE SOILS

CONSISTENCY	STD. 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	STD. PENETRATION RESISTANCE BLOWS/FOOT
Very Loose	0 to 4
Loose	5 to 10
Medium Dense	11 to 30
Dense	31 to 50
Very Dense	Over 50

SAMPLER TYPES

(Shown in Samples Column)

- Shelby Tube
- Split Spoon
- Rock Core
- No Recovery

TERMS

Standard Penetration Resistance - The Number of Blows of 140 lb. Hammer Falling 30 in. Required to Drive 1.4 in. 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 4" (mechanical breaks excluded) Divided by the Total Length of the Core Run Times 100%.

PROJECT: **Water System Improvs. - Rimer Pond/Hard Scrabble Rds**
Columbia, South Carolina
S&ME Project No. 1461-19-072

BORING LOG B-1

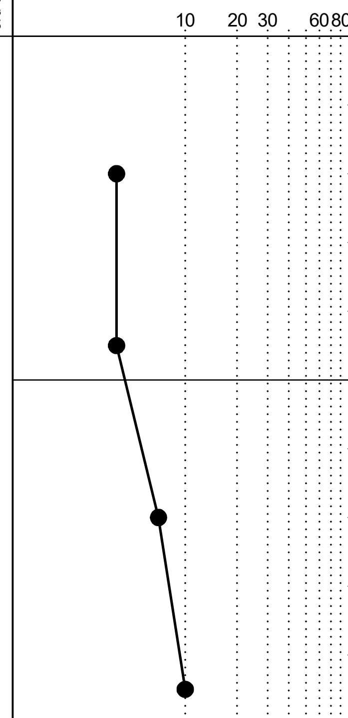
DATE DRILLED: **1/6/20**	ELEVATION: **481.0 ft**
DRILL RIG: **CME 55**	BORING DEPTH: **10.0 ft**
DRILLER: **H. Wessinger**	WATER LEVEL: **Not Encountered**
HAMMER TYPE: **Auto**	LOGGED BY: **Andre Kruk**
SAMPLING METHOD: **Split spoon**	
DRILLING METHOD: **2¼" H.S.A.**	

NOTES: Northing/Easting converted from Latitude/Longitude estimated from Google Earth. Elevations obtained from Plan & Profile plan, produced by WK Dickson, dated 2-13-15.

NORTHING: **860828** EASTING: **2010344**

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
0	**SURFACE MATERIALS - SANDY TOPSOIL-** 4 inches.							
	COASTAL PLAIN - POORLY GRADED SAND (SP) - mostly medium sands, trace low plasticity fines, moist, brown, very loose.			SS-1	1	2	2	4
				SS-2	2	2	2	4
5		HC	476.0					
	- - - @ 6 feet - loose			SS-3	2	3	4	7
				SS-4	3	4	6	10
10	Boring terminated at 10 ft		471.0					

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS



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.***

S&ME BORING LOG 1461-19-072 BORING LOGS- AK.GPJ SME COLUMBIA GINT DATA TEMPLATE.GDT 1/29/20

PROJECT: **Water System Improvs. - Rimer Pond/Hard Scrabble Rds Columbia, South Carolina** S&ME Project No. 1461-19-072	**BORING LOG B-2**

DATE DRILLED: **1/6/20**	ELEVATION: **430.0 ft**	**NOTES:** Northing/Easting converted from Latitude/Longitude estimated from Google Earth. Elevations obtained from Plan & Profile plan, produced by WK Dickson, dated 2-13-15.
DRILL RIG: **CME 55**	BORING DEPTH: **15.0 ft**	
DRILLER: **H. Wessinger**	WATER LEVEL: **Not Encountered**	
HAMMER TYPE: **Auto**	LOGGED BY: **Andre Kruk**	
SAMPLING METHOD: **Split spoon**		NORTHING: **859538** EASTING: **2013828**
DRILLING METHOD: **2¼" H.S.A.**		

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
0	**COASTAL PLAIN - POORLY GRADED SAND WITH LEAN CLAY (SP-SC)** - mostly medium sands, few low plasticity fines, moist, orange-brown, very loose.			SS-1	2	1	1	2
3	**SANDY LEAN CLAY (CL)** - mostly low plasticity fines (kaolinite), some fine-medium sands, dry to moist, light gray, stiff.			SS-2	3	4	6	10
5			425.0					
6	- - - @ 6 feet - little fine-medium sand			SS-3	4	7	5	12
8	**CLAYEY SAND (SC)** - mostly fine-medium sands, some low plasticity fines, trace moderately cemented pieces, moist to dry, brown-orange and light gray, loose.	HC		SS-4	3	3	6	9
10			420.0					
12	**LEAN CLAY (CL)** - mostly low plasticity fines, trace fine-medium sands, moist to dry, light gray and orange-brown, firm.			SS-5	2	3	5	8
15	Boring terminated at 15 ft		415.0					

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS: 10 20 30 60 80

S&ME BORING LOG 1461-19-072 BORING LOGS- AK.GPJ SME COLUMBIA GINT DATA TEMPLATE.GDT 1/29/20

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.*

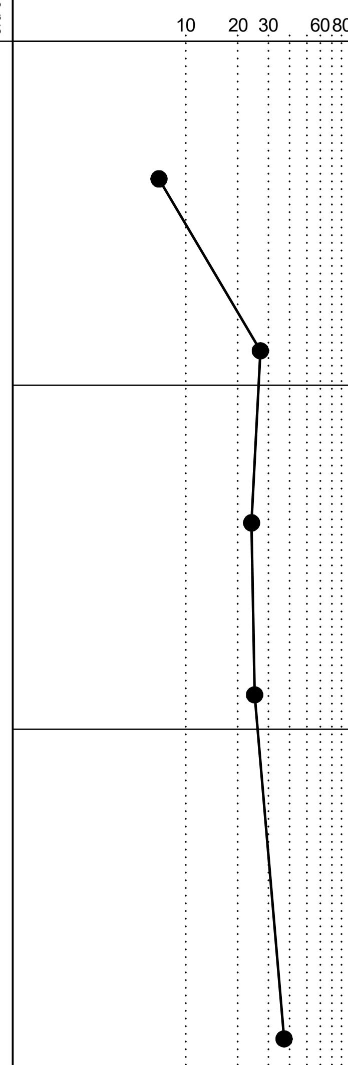
PROJECT: **Water System Improvs. - Rimer Pond/Hard Scrabble Rds**
Columbia, South Carolina
S&ME Project No. 1461-19-072

BORING LOG B-3

DATE DRILLED: **1/8/20**	ELEVATION: **389.0 ft**	**NOTES:** Northing/Easting converted from Latitude/Longitude estimated from Google Earth. Elevations obtained from Plan & Profile plan, produced by WK Dickson, dated 2-13-15.
DRILL RIG: **CME 550**	BORING DEPTH: **15.0 ft**	
DRILLER: **H. Wessinger**	WATER LEVEL: **5' ATD**	
HAMMER TYPE: **Auto**	LOGGED BY: **Andre Kruk**	
SAMPLING METHOD: **Split spoon**		NORTHING: **858251** / EASTING: **2014312**
DRILLING METHOD: **2¼" H.S.A.**		

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SAMPLE TYPE	1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
0	**SURFACE MATERIALS - SANDY TOPSOIL** - 4 inches.								
	COASTAL PLAIN - SANDLY LEAN CLAY (CL) - mostly low plasticity fines, little fine sands, dry, orange, very stiff.			SS-1	Split spoon	3	3	4	7
	- - - @ 3.5 feet - very stiff			SS-2	Split spoon	9	11	16	27
5		∇	384.0						
				SS-3	Split spoon	8	10	14	24
				SS-4	Split spoon	6	11	14	25
10			379.0						
	CLAYEY SAND (SC) - mostly fine-medium sands, some low plasticity fines, dry, light gray, dense.			SS-5	Split spoon	12	16	21	37
15	Boring terminated at 15 ft		374.0						

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS



S&ME BORING LOG 1461-19-072 BORING LOGS- AK.GPJ SME COLUMBIA GINT DATA TEMPLATE.GDT 1/29/20

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.*

PROJECT: **Water System Improvs. - Rimer Pond/Hard Scrabble Rds**
Columbia, South Carolina
S&ME Project No. 1461-19-072

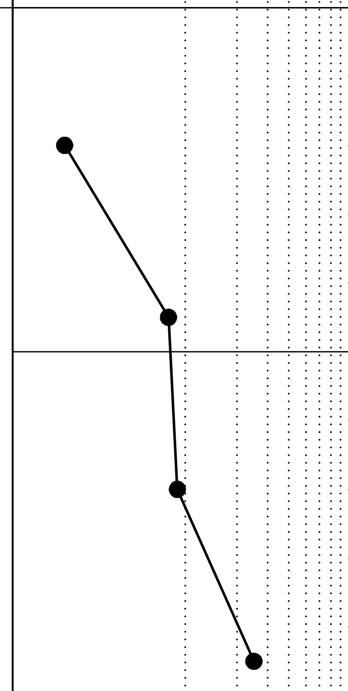
BORING LOG B-4

DATE DRILLED: **1/6/20**	ELEVATION: **462.0 ft**
DRILL RIG: **CME 55**	BORING DEPTH: **10.0 ft**
DRILLER: **H. Wessinger**	WATER LEVEL: **Not Encountered**
HAMMER TYPE: **Auto**	LOGGED BY: **Andre Kruk**
SAMPLING METHOD: **Split spoon**	NORTHING: **859198**
DRILLING METHOD: **2¼" H.S.A.**	EASTING: **2017202**

NOTES: Northing/Easting converted from Latitude/Longitude estimated from Google Earth. Elevations obtained from Plan & Profile plan, produced by WK Dickson, dated 2-13-15.

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SAMPLE TYPE	1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
	SURFACE MATERIALS - SANDY TOPSOIL - 2 inches.								
	COASTAL PLAIN - POORLY GRADED SAND (SP) - mostly medium sands, trace low plasticity fines, wet, brown-orange, very loose.			SS-1		1	1	1	2
	POORLY GRADED SAND WITH CLAY (SP-SC) - mostly medium sands, few medium plasticity fines, moist, brown-orange, loose.			SS-2		2	3	5	8
5			457.0						
	CLAYEY SAND (SC) - mostly medium sands, some low to medium plasticity fines, dry, brown-orange, loose.	HC		SS-3		3	3	6	9
	- - - @ 8.5 feet - moist, orange and red, medium dense.			SS-4		6	12	13	25
10	Boring terminated at 10 ft		452.0						

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS



NOTES:

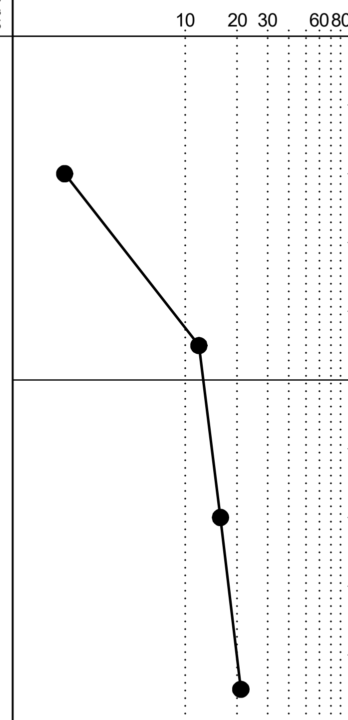
1. *THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.*
2. *BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.*
3. *STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.*
4. *WATER LEVEL IS AT TIME OF EXPLORATION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

PROJECT: Water System Improvs. - Rimer Pond/Hard Scrabble Rds Columbia, South Carolina S&ME Project No. 1461-19-072	BORING LOG B-5

DATE DRILLED: **1/6/20**	ELEVATION: **447.0 ft**	**NOTES:** Northing/Easting converted from Latitude/Longitude estimated from Google Earth. Elevations obtained from Plan & Profile plan, produced by WK Dickson, dated 2-13-15.
DRILL RIG: **CME 55**	BORING DEPTH: **10.0 ft**	
DRILLER: **H. Wessinger**	WATER LEVEL: **2.5' ATD**	
HAMMER TYPE: **Auto**	LOGGED BY: **Andre Kruk**	
SAMPLING METHOD: **Split spoon**		NORTHING: **859319** / EASTING: **2020277**
DRILLING METHOD: **2¼" H.S.A.**		

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
0	**COASTAL PLAIN - POORLY GRADED SAND (SP)** - mostly medium to coarse sands, trace low plasticity fines, moist to wet, brown, very loose.	∇		SS-1	2	1	1	2
	CLAYEY SAND (SC) - mostly medium sands, some low-medium plasticity fines, moist, reddish-orange, medium dense.			SS-2	3	5	7	12
5			442.0	SS-3	6	8	8	16
	POORLY GRADED SAND WITH LEAN CLAY (SP-SC) - mostly medium sands, few low-medium plasticity fines, moist, orange, medium dense.			SS-4	7	9	12	21
10	Boring terminated at 10 ft		437.0					

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS



S&ME BORING LOG 1461-19-072 BORING LOGS- AK.GPJ SME COLUMBIA GINT DATA TEMPLATE.GDT 1/29/20

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.*

PROJECT: **Water System Improvs. - Rimer Pond/Hard Scrabble Rds**
Columbia, South Carolina
S&ME Project No. 1461-19-072

BORING LOG B-6

DATE DRILLED: **1/6/20**	ELEVATION: **444.0 ft**
DRILL RIG: **CME 55**	BORING DEPTH: **10.0 ft**
DRILLER: **H. Wessinger**	WATER LEVEL: **Not Encountered**
HAMMER TYPE: **Auto**	LOGGED BY: **Andre Kruk**
SAMPLING METHOD: **Split spoon**	
DRILLING METHOD: **2¼" H.S.A.**	

NOTES: Northing/Easting converted from Latitude/Longitude estimated from Google Earth. Elevations obtained from Plan & Profile plan, produced by WK Dickson, dated 2-13-15.

NORTHING: **859280** EASTING: **2020560**

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
0	**SURFACE MATERIALS - SANDY TOPSOIL** - 3 inches.							
	COASTAL PLAIN - POORLY GRADED SAND WITH CLAY (SP-SC) - mostly medium sands, few medium plasticity fines, moist, orangish-brown, very loose.			SS-1	2	1	2	3
	CLAYEY SAND (SC) - mostly medium sands, some low-medium plasticity fines, moist, red-orange-gray, medium dense.			SS-2	3	5	6	11
5			439.0					
	- - - @ 6 feet - little medium plasticity fines, reddish-orange, loose.	HC		SS-3	4	4	5	9
	- - - @ 8.5 feet - some low-medium plasticity fines, red-orange-gray, medium dense.			SS-4	5	7	12	19
10	Boring terminated at 10 ft		434.0					

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS: 10, 20, 30, 60, 80

S&ME BORING LOG 1461-19-072 BORING LOGS- AK.GPJ SME COLUMBIA GINT DATA TEMPLATE.GDT 1/29/20

NOTES:

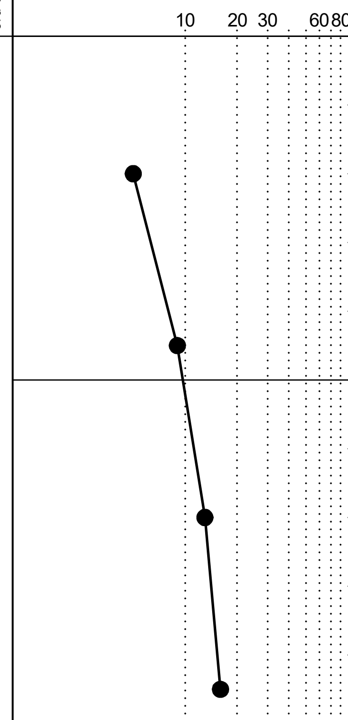
1. *THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.*
2. *BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.*
3. *STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.*
4. *WATER LEVEL IS AT TIME OF EXPLORATION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

PROJECT: **Water System Improvs. - Rimer Pond/Hard Scrabble Rds Columbia, South Carolina** S&ME Project No. 1461-19-072	**BORING LOG B-7**

DATE DRILLED: **1/6/20**	ELEVATION: **424.0 ft**	**NOTES:** Northing/Easting converted from Latitude/Longitude estimated from Google Earth. Elevations obtained from Plan & Profile plan, produced by WK Dickson, dated 2-13-15.
DRILL RIG: **CME 55**	BORING DEPTH: **10.0 ft**	
DRILLER: **H. Wessinger**	WATER LEVEL: **Not Encountered**	
HAMMER TYPE: **Auto**	LOGGED BY: **Andre Kruk**	
SAMPLING METHOD: **Split spoon**		NORTHING: **858842** EASTING: **2024441**
DRILLING METHOD: **2¼" H.S.A.**		

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
0	**COASTAL PLAIN - POORLY GRADED SAND (SP)** - mostly medium sands, trace low plasticity fines, moist, brown, loose.							
				SS-1	3	2	3	5
	- - - @ 3 feet - trace medium plasticity fines, orange.			SS-2	3	5	4	9
5			419.0					
	CLAYEY SAND (SC) - mostly medium sands, some low-medium plasticity fines, dry, red-brown-gray, medium dense.	HC		SS-3	3	4	9	13
				SS-4	4	6	10	16
10	Boring terminated at 10 ft		414.0					

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS



S&ME BORING LOG 1461-19-072 BORING LOGS- AK.GPJ SME COLUMBIA GINT DATA TEMPLATE.GDT 1/29/20

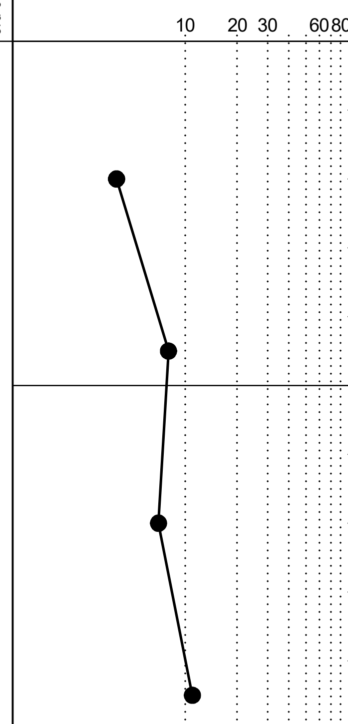
NOTES:

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.*

PROJECT: **Water System Improvs. - Rimer Pond/Hard Scrabble Rds Columbia, South Carolina** S&ME Project No. 1461-19-072	**BORING LOG B-8**

DATE DRILLED: **1/6/20**	ELEVATION: **409.0 ft**	**NOTES:** Northing/Easting converted from Latitude/Longitude estimated from Google Earth. Elevations obtained from Plan & Profile plan, produced by WK Dickson, dated 2-13-15.
DRILL RIG: **CME 55**	BORING DEPTH: **10.0 ft**	
DRILLER: **H. Wessinger**	WATER LEVEL: **Not Encountered**	
HAMMER TYPE: **Auto**	LOGGED BY: **Andre Kruk**	
SAMPLING METHOD: **Split spoon**		NORTHING: **859126** EASTING: **2028013**
DRILLING METHOD: **2¼" H.S.A.**		

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS	N VALUE
		COASTAL PLAIN - POORLY GRADED SAND (SP) - mostly medium sands, trace low plastic fines, moist, organish-brown, very loose.			SS-1		2	2	2		4
		- - - @ 3.5 feet - loose			SS-2		2	3	5		8
5				404.0							
			HC		SS-3		4	3	4		7
		POORLY GRADED SAND WITH CLAY (SP-SC) - mostly medium sands, few medium plasticity fines, moist, organish-brown, medium dense.			SS-4		4	5	6		11
10		Boring terminated at 10 ft		399.0							



S&ME BORING LOG 1461-19-072 BORING LOGS- AK.GPJ SME COLUMBIA GINT DATA TEMPLATE.GDT 1/29/20

NOTES:

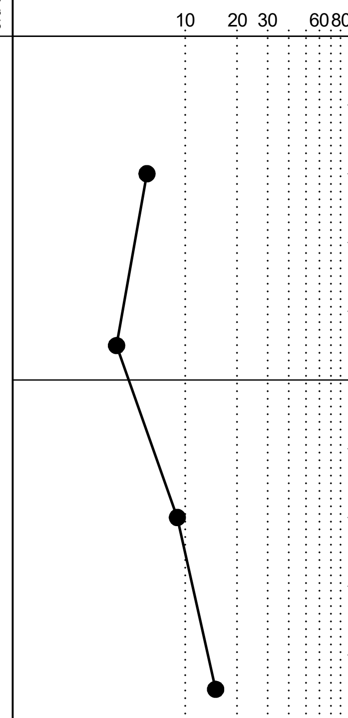
1. ***THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.***
2. ***BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.***
3. ***STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.***
4. ***WATER LEVEL IS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

PROJECT: **Water System Improvs. - Rimer Pond/Hard Scrabble Rds** **Columbia, South Carolina** **S&ME Project No. 1461-19-072**	**BORING LOG B-9**

DATE DRILLED: **1/6/20**	ELEVATION: **392.0 ft**	**NOTES:** Northing/Easting converted from Latitude/Longitude estimated from Google Earth. Elevations obtained from Plan & Profile plan, produced by WK Dickson, dated 2-13-15.
DRILL RIG: **CME 55**	BORING DEPTH: **10.0 ft**	
DRILLER: **H. Wessinger**	WATER LEVEL: **Not Encountered**	
HAMMER TYPE: **Auto**	LOGGED BY: **Andre Kruk**	
SAMPLING METHOD: **Split spoon**		NORTHING: **857597** / EASTING: **2028232**
DRILLING METHOD: **2¼" H.S.A.**		

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
0	**COASTAL PLAIN - POORLY GRADED SAND (SP)** - mostly medium sands, trace low plasticitity fines, moist, organish-brown, loose.							
				SS-1	3	3	3	6
	- - - @ 3.5 feet - very loose							
				SS-2	2	2	2	4
5			387.0					
	- - - @ 6 feet - moist to wet, loose							
				SS-3	2	3	6	9
		HC						
8	**CLAYEY SAND (SC)**- mostly medium sands, some medium plasticity fines, moist, reddish-orange, medium dense.							
				SS-4	4	6	9	15
10	Boring terminated at 10 ft		382.0					

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS



S&ME BORING LOG 1461-19-072 BORING LOGS- AK.GPJ SME COLUMBIA GINT DATA TEMPLATE.GDT 1/29/20

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.*

PROJECT: **Water System Improvs. - Rimer Pond/Hard Scrabble Rds**
Columbia, South Carolina
S&ME Project No. 1461-19-072

BORING LOG B-10

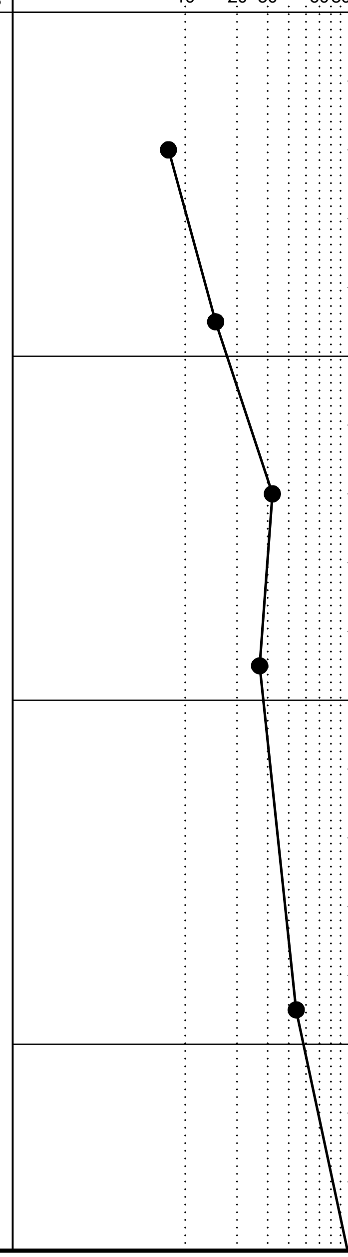
DATE DRILLED: **1/6/20**	ELEVATION: **376.0 ft**
DRILL RIG: **CME 55**	BORING DEPTH: **25.0 ft**
DRILLER: **H. Wessinger**	WATER LEVEL: **Not Encountered**
HAMMER TYPE: **Auto**	LOGGED BY: **Andre Kruk**
SAMPLING METHOD: **Split spoon**	NORTHING: **857219**
DRILLING METHOD: **2¼" H.S.A.**	EASTING: **2028466**

NOTES: Northing/Easting converted from Latitude/Longitude estimated from Google Earth. Elevations obtained from Plan & Profile plan, produced by WK Dickson, dated 2-13-15.

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)
0	**POSSIBLE FILL - POORLY GRADED SAND (SP)** - mostly medium sands, trace low plasticity fines, moist, brown, loose.		
	COASTAL PLAIN - CLAYEY SAND (SC) - mostly medium sands, some medium plasticity fines, dry to moist, red-orange-brown, medium dense.		
5	**SANDY LEAN CLAY (CL)** - mostly medium plasticity fines, some medium sands, dry, red-orange-brown, hard.		371.0
	- - - @ 8 feet - little fine-medium sands, dry to moist, light gray, very stiff.		
10		HC	366.0
	PIEDMONT - CLAYEY SAND (SC) - mostly fine-medium sands, some low plasticity fines, dry to moist, light gray, dense.		
15			361.0

SAMPLE NO.	1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
SS-1	2	3	5	8
SS-2	5	6	9	15
SS-3	7	12	20	32
SS-4	9	13	14	27
SS-5	10	15	29	44

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS



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.*

S&ME BORING LOG 1461-19-072 BORING LOGS- AK.GPJ SME COLUMBIA GINT DATA TEMPLATE.GDT 1/29/20

PROJECT: **Water System Improvs. - Rimer Pond/Hard Scrabble Rds Columbia, South Carolina** S&ME Project No. 1461-19-072	**BORING LOG B-10**

DATE DRILLED: **1/6/20**	ELEVATION: **376.0 ft**	**NOTES:** Northing/Easting converted from Latitude/Longitude estimated from Google Earth. Elevations obtained from Plan & Profile plan, produced by WK Dickson, dated 2-13-15.
DRILL RIG: **CME 55**	BORING DEPTH: **25.0 ft**	
DRILLER: **H. Wessinger**	WATER LEVEL: **Not Encountered**	
HAMMER TYPE: **Auto**	LOGGED BY: **Andre Kruk**	
SAMPLING METHOD: **Split spoon**		NORTHING: **857219** / EASTING: **2028466**
DRILLING METHOD: **2¼" H.S.A.**		

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SAMPLE TYPE	1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS	N VALUE
		PARTIALLY WEATHERED ROCK (PWR) - POORLY GRADED SAND WITH LEAN CLAY (SP-SC) - mostly fine-medium sands, few low to medium plasticity fines, dry to moist, light brown-orange, very dense. *(continued)*			SS-6		50/5"			50/5"	
20				356.0							
		- - - No recovery			SS-7		50/0"			50/0"	
25		Boring terminated at 25 ft		351.0							

S&ME BORING LOG 1461-19-072 BORING LOGS- AK.GPJ SME COLUMBIA GINT DATA TEMPLATE.GDT 1/29/20

NOTES:

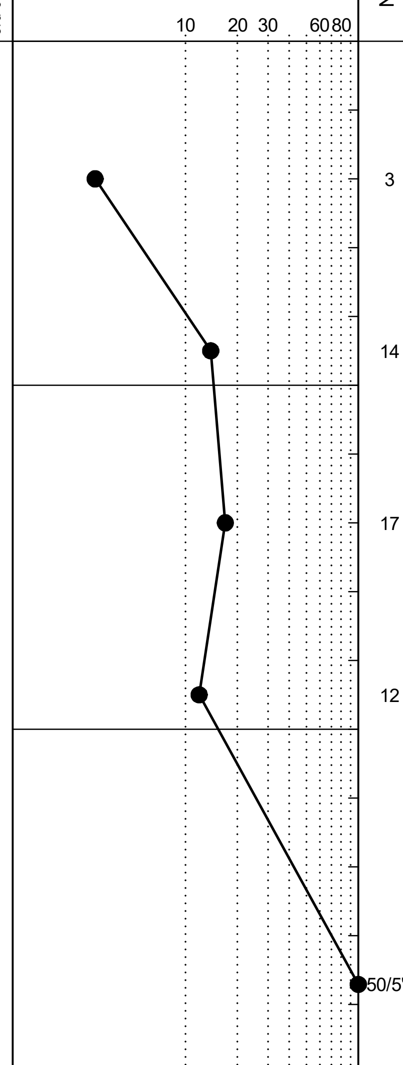
1. ***THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.***
2. ***BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.***
3. ***STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.***
4. ***WATER LEVEL IS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

PROJECT: **Water System Improvs. - Rimer Pond/Hard Scrabble Rds Columbia, South Carolina** S&ME Project No. 1461-19-072	**BORING LOG B-11**

DATE DRILLED: **1/6/20**	ELEVATION: **373.0 ft**	**NOTES:** Northing/Easting converted from Latitude/Longitude estimated from Google Earth. Elevations obtained from Plan & Profile plan, produced by WK Dickson, dated 2-13-15.
DRILL RIG: **CME 55**	BORING DEPTH: **15.0 ft**	
DRILLER: **H. Wessinger**	WATER LEVEL: **2' ATD**	
HAMMER TYPE: **Auto**	LOGGED BY: **Andre Kruk**	
SAMPLING METHOD: **Split spoon**		NORTHING: **855808** / EASTING: **2028794**
DRILLING METHOD: **2¼" H.S.A.**		

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
0–3	**POSSIBLE FILL - POORLY GRADED SAND (SP)** - mostly medium sands, trace low plasticity fines, wet, brown, very loose.	▽ (2 ft)		SS-1	1	2	1	3
3–6	**COASTAL PLAIN - CLAYEY SAND (SC)** - mostly medium sands, little medium plasticity fines, moist to wet, brownish-gray, medium dense.		368.0 (5 ft)	SS-2	3	7	7	14
6–12	**POORLY GRADED SAND WITH LEAN CLAY (SP-SC)** - mostly medium sands, few medium plasticity fines, moist to wet, orange, medium dense.			SS-3	5	6	11	17
	- - - @ 8.5 feet - few low plasticity fines, light gray.		363.0 (10 ft)	SS-4	4	6	6	12
12–15	**PIEDMONT - PARTIALLY WEATHERED ROCK (PWR) - POORLY GRADED SAND WITH LEAN CLAY (SP-SC)**- mostly medium sands, few low plasticity fines, few coarse quartz, moist to wet, light gray, very dense.		358.0 (15 ft)	SS-5	50/5"			50/5"
15	Boring terminated at 15 ft							

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS



S&ME BORING LOG 1461-19-072 BORING LOGS- AK.GPJ SME COLUMBIA GINT DATA TEMPLATE.GDT 1/29/20

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.*

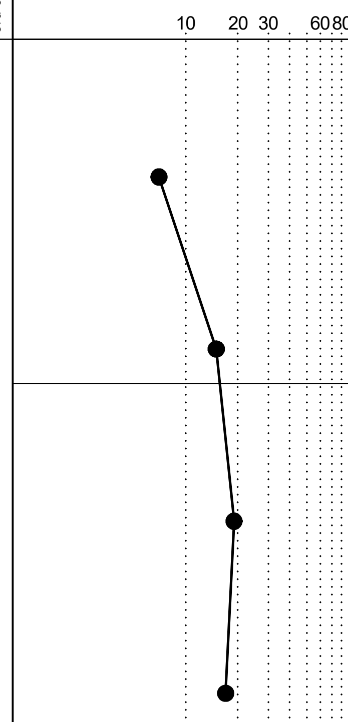
PROJECT: **Water System Improvs. - Rimer Pond/Hard Scrabble Rds**
Columbia, South Carolina
S&ME Project No. 1461-19-072

BORING LOG B-12

DATE DRILLED: **1/8/20**	ELEVATION: **381.0 ft**	**NOTES:** Northing/Easting converted from Latitude/Longitude estimated from Google Earth. Elevations obtained from Plan & Profile plan, produced by WK Dickson, dated 2-13-15.
DRILL RIG: **CME 550**	BORING DEPTH: **10.0 ft**	
DRILLER: **H. Wessinger**	WATER LEVEL: **Not Encountered**	
HAMMER TYPE: **Auto**	LOGGED BY: **Andre Kruk**	
SAMPLING METHOD: **Split spoon**		NORTHING: **854076** EASTING: **2029861**
DRILLING METHOD: **2¼" H.S.A.**		

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
0	**SURFACE MATERIALS - SANDY TOPSOIL** - 3 inches.							
	COASTAL PLAIN - CLAYEY SAND (SC) - mostly fine to medium sands, some low to medium plasticity fines, moist, brown, loose.			SS-1	2	3	4	7
	- - - @3.5 feet - red-orange-brown, medium dense.			SS-2	4	6	9	15
5		HC	376.0					
				SS-3	8	7	12	19
				SS-4	3	6	11	17
10	Boring terminated at 10 ft		371.0					

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS



S&ME BORING LOG 1461-19-072 BORING LOGS- AK.GPJ SME COLUMBIA GINT DATA TEMPLATE.GDT 1/29/20

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.***

PROJECT: **Water System Improvs. - Rimer Pond/Hard Scrabble Rds**
Columbia, South Carolina
S&ME Project No. 1461-19-072

BORING LOG B-13

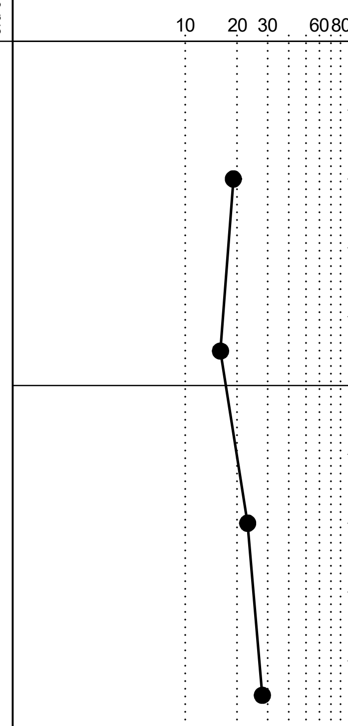
DATE DRILLED: **1/8/20**	ELEVATION: **363.0 ft**
DRILL RIG: **CME 550**	BORING DEPTH: **10.0 ft**
DRILLER: **H. Wessinger**	WATER LEVEL: **Not Encountered**
HAMMER TYPE: **Auto**	LOGGED BY: **Andre Kruk**
SAMPLING METHOD: **Split spoon**	
DRILLING METHOD: **2¼" H.S.A.**	

NOTES: Northing/Easting converted from Latitude/Longitude estimated from Google Earth. Elevations obtained from Plan & Profile plan, produced by WK Dickson, dated 2-13-15.

NORTHING: **852856** EASTING: **2030102**

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA: 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
0–3		**COASTAL PLAIN - CLAYEY SAND (SC)** - mostly medium sands, some low-medium plasticity fines, dry, orange-gray, medium dense.			SS-1		4	7	12	19
3–10		**POORLY GRADED SAND WITH CLAY (SP-SC)** - mostly medium sands, few medium plasticity fines, moist, reddish-orange, medium dense.			SS-2		5	8	8	16
5				358.0						
			HC		SS-3		6	9	14	23
					SS-4		8	12	16	28
10		Boring terminated at 10 ft		353.0						

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS



S&ME BORING LOG 1461-19-072 BORING LOGS- AK.GPJ SME COLUMBIA GINT DATA TEMPLATE.GDT 1/29/20

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.***

Summary of Field Procedures

♦ Boring and Sampling

Soil Test Boring with Hollow-Stem Auger

Soil sampling and penetration testing were performed in general accordance with ASTM D1586, *Standard Test Method for Penetration Test and Split Barrel Sampling of Soils*. Borings were made by mechanically twisting a continuous steel hollow stem auger into the soil. At regular intervals, soil samples were obtained with a standard 1.4-inch I. D., 2-inch O. D., split barrel sampler. The sampler was first seated six inches to penetrate any loose cuttings, then driven an additional 12 inches with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler through the two final six inch increments was recorded as the penetration resistance (SPT N) value. The N-value, when properly interpreted by qualified professional staff, is an index of the soil strength and foundation support capability.

Borehole Closure

Following collection of relevant geotechnical data, boreholes were filled by slowly pouring auger cuttings into the open hole such that minimal “bridging” of the material occurred in the hole. Backfilling of the upper two feet of each hole was tamped as heavily as possible with a shovel handle or other hand held equipment, and the backfill crowned to direct rainfall away on the surface. Where boreholes exceeded five feet in depth, a plastic hole plug was firmly tamped into place within the backfill at a depth of about two feet.

Preservation and Transporting of Soil Samples with Control of Field Moisture

Procedures for preserving soil samples obtained in the field and transportation of samples to the laboratory generally followed those given in ASTM D4220, *Standard Practice for Preserving and Transporting Soil Samples* for Group B samples as defined in Section 4. Group B samples are those samples not suspected of being contaminated and for which only water content and classification, proctor, relative density, or profile logging will be performed. Group B samples also include bulk samples that are intended to be remolded in the laboratory for compaction, swell pressure, percent swell, consolidation, permeability, CBR, or shear testing. Representative samples of the cuttings or split spoon samples, or representative bulk samples, were placed in suitably identified, sealed glass jars or plastic containers and transported to the laboratory. Sample identification numbers on the containers corresponded to sample numbers recorded on field boring records or test pit records. Thin-walled tube samples were sealed at the ends with paraffin and capped with plastic end caps.

♦ Field Tests of Earth Materials

The subsurface conditions encountered during drilling were reported on a field test boring record by the chief driller. The record contains information about the drilling method, samples attempted and sample recovery, indications of materials in the borings such as coarse gravel, cobbles, etc., and indications of materials encountered between sample intervals. Representative soil samples were placed in glass jars and transported to the laboratory along with the field boring records. Recovered samples not expended in laboratory tests are commonly retained in our laboratory for 60 days following completion of drilling. Field boring records are retained at our office.

Measurement of Static Water Levels

Water level readings were made in the open boreholes immediately after completing drilling and withdrawal of the tools. Where feasible, measurements were repeated after an elapsed period of 24 hours to gauge the stabilized water level. Procedures for measurement of liquid levels in open boreholes are described in ASTM D4750, *Standard Test Method for Determining Subsurface Liquid Levels in a Borehole or Monitoring Well (Observation Well)*. A weighted measuring tape was slowly lowered into each borehole until the liquid surface was penetrated by the weighted end. The reading on the tape was recorded at a reference point on the surface and compared to the reading at the demarcation of the wetted and unwetted portions of the tape. The difference between the two readings was recorded as the depth of the liquid surface below the reference point. Measurements made by this method were then repeated until approximately consistent values were obtained.

Summary of Laboratory Procedures

Recovered disturbed and undisturbed samples and the drillers' field logs were transported to the laboratory where they were examined by the geotechnical engineer. Selected samples representative of certain groups of soils were subjected to simple classification tests by hand or other simple means.

♦ Laboratory Tests of Soil

Examination of Split Spoon Soil Samples

Soil and rock samples and field boring records were reviewed in the laboratory by the geotechnical engineer. Soils were classified in general accordance with the visual-manual method described in ASTM D 2488, *Standard Practice for Description and Identification of Soils (Visual-Manual Method)*. The geotechnical engineer also prepared the final boring records enclosed with this report.