

**EMERGENCY REQUEST TO QUOTE
FOR
HOWELL MILL ROAD OUTFALL**



Atlanta, Georgia

**Keisha Lance Bottoms
Mayor
City of Atlanta**

**Kishia L. Powell
Commissioner
Department of Watershed Management**

**Mikita K. Browning
Consent Decree Program Director
Department of Watershed Management**

**EMERGENCY REQUEST TO QUOTE
FOR
HOWELL MILL ROAD OUTFALL**

Date: April 30, 2018

Project: **Howell Mill Road Outfall**

Description: The Work to be performed under this Contract shall consist of furnishing all plants, tools, equipment, materials, supplies, and manufactured articles and furnishing all labor, transportation, and services, including fuel, power, water, and essential communications, and performing all work, or other operations required for the fulfillment of the Contract in strict accordance with the Contract Documents. The Work includes but is not limited to, bypass pumping, pre-and post CCTV inspection, replacing existing pipe using conventional open cut methods, replacing existing pipe using pipe-bursting methods, rehabilitation, replacement and or installation of sewer manholes, erosion control, traffic control and the removal and/or replacement of trees.

Work Distribution: The City will work with the Contractor to assign and schedule the work in a logical and efficient format. However, all items in this contract shall be priced such that each item can be assigned independently or combined with other items at the City's sole discretion regarding both quantity and scope. Contractor acknowledges and agrees that the Work is being performed on an emergency basis for substantially completing work in one hundred fifty (150) calendar days, with completion in one hundred eighty (180) calendar days. Contractor agrees to make available all resources necessary to efficiently and timely complete the Work and shall immediately notify the City of any actual and/or potential issues affecting the Work and/or the ability to timely complete the Work.

Due Date: Proposals are due by **Monday, May 21, 2018 @ 1:59 pm**

Submittal: Email a complete Quote Submittal to the following:
Roxanne Neal RONeal@AtlantaGA.gov
Cynthia Lunn CLunn@AtlantaGA.gov
Mikita Browning MBrowning@AtlantaGA.gov
Damian Edwards DEEdwards@AtlantaGA.gov

Instructions: This is Request to Quote for the work described within this document. The proponents shall use the information provided herein to prepare a quote.

Questions: Questions shall be emailed to the contacts listed above by 12:00 pm **Monday, May 14, 2018.**

Addendum: Responses to questions will be emailed to all contractors by 5:00pm **Thursday, May 17, 2018.**

Required Submittals:

1. City of Atlanta Illegal Immigration Reform and Enforcement Act Forms (IIREA)
2. Conflict of Interest Disclosure Form
3. Certifications of Insurance and Bonding Ability;
4. Acknowledgement of Addenda
5. Georgia Utility Contractor's License Certification; and
6. Bid Form - Howell Mill Outfall Sewer Improvements

Note: This Emergency Request solicitation is being made in conjunction with the Howell Mill Road Outfall Repair. The Contractor may submit a proposal for either the Howell Mill Road Outfall Repair, the Oldfield Outfall Repair; or, both Howell Mill and Oldfield Outfall Repairs.

OVERVIEW

HOWELL MILL RD. OUTFALL & OLDFIELD OUTFALL SEWER IMPROVEMENTS

OVERVIEW

Both the Howell Mill and Oldfield Outfalls are existing 8-inch diameter sewers located in the Peachtree Creek Sewer Basin in sewershed PTC, Council District 8, and NPU C. The outfall sanitary sewers are aerial and cross mature sections of Peachtree Creek and are located within the direct vicinity of Atlanta Memorial Park. Similarly both sewers convey sewage flow from the Peachtree Battle community to the 90" diameter Peachtree Creek Trunk sewer that also traverses through the footprint of Atlanta Memorial Park.

The Howell Mill Rd. Outfall has been the source of several sewer overflows as the result of the current flat slope of the pipe which has resulted in debris build-up and sewer back-ups into homes. Likewise, the Oldfield Outfall has experienced two (2) major failures due high and rapid flow in Peachtree Creek. During heavy rain events, large debris is often carried by the current down the creek and has resulted in increasing bank erosion and has also weakened the steel pipe and straps which brace and secure the aerial sewer. Based on hydraulic analysis, both sewers are prone to surcharged and currently have capacity limitations. Also the repeat major sanitary sewer overflows have resulted in regulatory fines levied by the state regulatory agency.

To eliminate the repeat sewer overflows and prevent the potential for another catastrophic breach, sewer realignments are proposed for both aerial sewers. The scope of work for the Howell Mill Outfall will consist of the realignment and construction of roughly 2,700 linear feet 10-inch diameter pipe. Similarly, the scope of work for the Oldfield Outfall sewer will consist of the construction of roughly 2,000 linear feet of 8-inch diameter pipe including the construction of a new duplex pump station. The methods of construction will consist of utilizing both traditional open-cut/replacement and trenchless methods, with the ultimate goal of eliminating sewer overflows, ensure the long-term structural stability of both sewers improve water quality, and protect the public health and safety of our ratepayers.

FIGURE 1: PEACHTREE CREEK LARGE DEBRIS CARRIED BY CURRENT



FIGURE 2: PEACHTREE CREEK LARGE DEBRIS CARRIED BY CURRENT



FIGURE 3: PEACHTREE CREEK LARGE DEBRIS CARRIED BY CURRENT



FIGURE 4: HOWEL MILL OUTFALL AERIAL SEWER



FIGURE 5: HOWELL MILL OUTFALL SEWER (SHALLOW MANHOLE)



FIGURE 6: OLDFIELD OUTFALL AERIAL SEWER



**FIGURE 7: OLDFIELD OUTFALL AERIAL SEWER
(EXPOSED PIPE SEAM)**



FIGURE 8: OLDFIELD OUTFALL AERIAL SEWER (COMPROMISED PIPE STRAP)



SCOPE OF WORK

SECTION 01010**Summary of Work****PART 1 – GENERAL****1.01 SCOPE**

- A. The Work to be performed under this Contract shall consist of furnishing all plants, tools, equipment, materials, supplies, and manufactured articles and furnishing all labor, transportation, and services, including fuel, power, water, and essential communications, and performing all work, or other operations required for the fulfillment of the Contract in strict accordance with the Contract Documents. The Work shall be complete, and all work, materials, and services not expressly indicated or called for in the Contract Documents, which may be necessary for the complete and proper construction of the Work in good faith, shall be provided by the Contractor as though originally so indicated, at no increase in cost to the City.
- B. The quantities shown on the bid form are estimates for the work including the intended rehabilitation method based upon the available information. The assigned means, methods and quantities described herein are subject to revision by the City for various reasons including but not limited to, unforeseen utility conflicts, discovery of subsurface rock strata, unforeseen pipeline encasement, etc. As such, a unit price contract type has been selected to prosecute the work and is not intended to be a guarantee for a minimum amount of work.

1.02 PROJECT LOCATION

- A. The Work is located in the northern area of the City of Atlanta, GA, just east of Interstate 75 and both east and west of Howell Mill Rd. See the contract drawings for the exact location.

1.03 WORK COVERED BY THE CONTRACT DOCUMENTS

- A. The Contract comprises of the realignment and upsizing of both the Howell Mill Rd. and Oldfield Outfall sewers that are located within the City of Atlanta, as designated by the Engineer throughout the course of the work. The Work includes but is not limited to the below items:
 - 1. Bypass Pumping.
 - 2. Pre and Post CCTV Inspection.
 - 3. Replacing existing pipe using conventional open cut methods.

4. Replacing existing pipe using pipe-bursting methods.
 5. Pipe installation via microtunnel method
 6. Installation of package pump station facility
 7. Rehabilitation, replacement, and or installation of sewer manholes and appurtenances.
 8. Sewer lateral reconnections
 9. Demolition of existing sewers
 10. Abandonment of existing sewers
 11. Erosion Control.
 12. Traffic Control.
 13. Remove and/or replace trees and necessary restoration.
- B. Other work associated with the above items. All Work shall be performed according to the requirements of the Contract Documents.

1.04 WORK COORDINATION

- A. The Contractor shall coordinate the Work with third parties (such as public utilities and telephone company) in areas where such parties may have rights to underground property or facilities; and request maps or other descriptive information as to the nature and location of such underground facilities or property.
- B. The Contractor shall also coordinate the Work with owners of private and public property where access is required for the performance of the work. Legal access will be acquired by the Contractor in accordance with Section 01351.
- C. The City will work with the Contractor to assign and schedule the work in a logical and efficient format. However, all items in this contract shall be priced such that each item can be assigned independently or combined with other items at the City's sole discretion in regard to both quantity and scope. There shall be no consideration of any claim for extra payment arising from a decision by the City to assign potential work items under this contract in any combination or in combination with another contract utilizing alternate technologies. The Contractor shall perform only those work items directed by the Department of Watershed Management at the prices specified herein.

1.05 CONDITIONS AT THE SITES

- A. The Contractor shall make all necessary investigations to determine the existence and location of underground utilities.
- B. The Contractor will be held responsible for any damage to and for maintenance and protection of existing utilities, structures, and personal property.
- C. Nothing in these Contract Documents or associated Drawings shall be construed as a guarantee that such utilities are in the location indicated or that they actually exist, or that other utilities are not within the area of the operations.

END OF SECTION

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SECTION 02200**Earthwork****PART 1 – GENERAL****1.01 REQUIREMENTS**

- A. This Section includes earthwork and related operations, including, but not limited to: excavating all classes of material encountered; trenching, handling, storage, transportation, and disposal of all excavated and unsuitable material; construction of fills and embankments; backfilling around structures and pipe; backfilling all trenches and pits; compacting; all sheeting, shoring, and bracing; preparation of subgrades; surfacing and grading; and any other similar, incidental, or appurtenant earthwork operation which may be necessary to properly complete the Work.
- B. The Contractor shall provide all services, labor, materials, and equipment required for all earthwork and related operations necessary or convenient to the Contractor for furnishing complete Work as shown on the Drawings or specified in the Contract Documents.

1.02 RELATED SECTIONS

- B. The Work of the following Sections specifically apply to the Work of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of Work.
 - 1. Section 01410: Testing Laboratory Services
 - 2. Section 02125: Erosion and Sedimentation Control
 - 3. Section 02140: Dewatering

1.03 GENERAL

- A. Safety: Comply with local regulations and with the provisions of the “Manual of Accident Prevention in Construction” of the Associated General Contractors of America, Inc., Occupational Safety and Health Act (OSHA) and all other applicable safety regulations.
- B. Earthwork operations shall be performed in a safe and proper manner with appropriate precautions being taken against all hazards.

- C. All excavated and filled areas for structure, trenches, fills, topsoil areas, embankments and channels shall be maintained by the Contractor in good condition at all times until final acceptance by the City. All damage caused by erosion or other construction operations shall be repaired by the Contractor using material of the same type as the damaged material at no cost to the City.
- D. The Contractor shall control grading in a manner to prevent water running into excavations. Obstruction of surface drainage shall be avoided and means shall be provided whereby storm water can flow uninterrupted in existing open ditches or channels, other surface drains, or temporary drains.
- E. No classification of excavated materials will be made, except for rock excavation. Excavation work shall include the removal and subsequent handling of all materials excavated or otherwise removed in performance of the Work, regardless of the type, character, composition or condition thereof.
- F. All earthwork operations shall comply with the requirements of OSHA Construction Standards, Part 1926, Subpart P, Excavations, Trenching, and Shoring, and Subpart O, Motor Vehicles, Mechanized Equipment, and Marine Operations, and shall be conducted in a manner acceptable to the Engineer.

1.04 CONTRACTOR SUBMITTALS

- A. The Contractor shall submit samples of all materials proposed to be used in the work in accordance with the requirements in Section GC-28 – Working Drawings, Shop Drawings, Data on Material and Equipment, Samples and Licenses. Sample size shall be as determined by the testing laboratory.
- B. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:
 - 1. Copies of permits obtained by the Contractor for the work.
 - 2. Test results, certification of compliance, source, and sample for all imported materials.
 - 3. Samples of fill materials to be used: Samples shall be submitted in 2 weeks in advance of use and shall consist of 0.5 cubic feet of each type of material.

1.05 QUALITY ASSURANCE

- A. Reference Standard: Comply with all federal, state and local laws or ordinances, as well as all applicable codes, standards, regulations and/or regulatory agency requirements including the partial listing below:
1. ASTM C136-84a Standard Method for Sieve Analysis of Fine and Course Aggregates.
 2. ASTM D1556-82 Test Method for Density of Soils in Place by the Sand-Cone Method.
 3. ASTM D698-78 Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5-lb (250-kg) Rammer and 12-in. (305-mm Drop).
 4. ASTM D3017-88 Test Method for Moisture Content of Soil and Rock Aggregate in Place by Nuclear Methods (Shallow Depth).

PART 2 – PRODUCTS

2.01 SUITABLE FILL AND BACKFILL MATERIAL REQUIREMENTS

- A. General: Fill, backfill, and embankment materials shall be suitable selected or processed clean, fine earth, rock, or sand, free from grass, roots, brush, or other vegetation.
- B. Fill and backfill materials to be placed within 6 inches of any structure or pipe shall be free of rocks or unbroken masses of earth materials having a maximum dimension larger than 3 inches.
- C. Suitable Materials: Materials not defined as unsuitable in Section 2.02 are defined as suitable materials and may be used in fills, backfilling, and embankment construction in unpaved areas. In addition, when acceptable to the Engineer, some of the material listed as unsuitable may be used when thoroughly mixed with suitable material to form a stable composite.
- D. Suitable materials may be obtained from on-site excavations, may be processed on-site materials, or may be imported. If imported materials are required by this Section, or to meet the quantity requirements of the project, the Contractor shall provide the imported materials at no additional expense to the City, unless a unit price item is included for imported materials in the bidding schedule.

E. Earthwork Materials:

1. Controlled Fill Soils:

- a. Proposed fill soils shall be laboratory tested prior to construction use to determine their suitability. All material shall be subject to the approval of the Engineer. Testing shall be paid for separately by the City directly to the testing laboratory.
- b. Notification: For approval of imported fill material, notify the Engineering and Testing Laboratory at least three (3) weeks in advance of intention to import material, designate the proposed borrow area, and permit the Testing Laboratory to sample as necessary from the borrow area for the purpose of making acceptance tests to prove the quality of the material. Test results shall be submitted to the Engineer for approval.
- c. All fill material shall be soil exclusive of organic matter, frozen lumps, or other deleterious substances.
- d. It shall contain no rocks or lumps over 3-inches maximum in dimension.
- e. Fill material shall be low to moderate plasticity soil (PI less than 30).

2. Structural Fill and Structural Backfill:

- a. Select on site materials may be suitable. Testing and recommendation of suitability shall be made by the Testing Laboratory and submitted by the Contractor to the Engineer for approval. Testing shall be paid for separately by the City directly to the testing laboratory.
- b. Imported material shall be sand, uniformly graded crushed stone or other select material recommended by the Testing laboratory and submitted by the Contractor to the Engineer for approval. Graded aggregate base material as specified in Section 02575, Removing and replacing pavement, is acceptable.
- c. Crushed Stone: Crushed s used for pipe bedding and drain stone shall conform to the Georgia Department of Transportation Standard Specifications for Construction of Road and Bridges, 800.01 for No. 57 Stone. For concrete, cast iron, steel and galvanized iron pipe less than 12-inch,

use $\frac{3}{4}$ inch gravel, crushed gravel or crushed stone. For plastic pipe use $\frac{1}{4}$ -inch pea gravel.

3. Top Soil: Dark organic weed free loam free of muck.
4. Coarse Aggregate: Coarse aggregate shall conform to the Georgia Department of Transportation Standard Specifications for construction of Road and Bridges, 800.01 for No. 57 Stone, Group II, and shall have the following gradation:

Sieve Size	Percent Passing	
1-1/2 inch	100	-
1 inch	95	100
$\frac{3}{4}$ inch	-	-
$\frac{1}{2}$ inch	25	60
#4	0	10
#8	0	5

- F. Sheeting, Bracing, and Timbering: The Contractor shall furnish, place and maintain all sheeting, bracing and timbering required to properly support trenches and other excavations in open cut and to prevent all movements of the soil, pavement, structures, or utilities outside of the trench or pit.

1. General:
 - a. Sheeting, bracing and timbering shall be so placed as to allow the Work to be constructed to the lines and grades shown on the Drawings and as ordered by the Engineer.
 - b. If at any time the method being used by the Contractor for supporting any material or structure in or adjacent to any excavation is not reasonably safe in the opinion of the Engineer, the Engineer may require and the Contractor shall provide additional bracing and support necessary to furnish the added degree of safety required by the Engineer. The Contractor shall provide bracing and support by such methods accepted by the Engineer as Contractor may elect to use, but the taking of such added precautions shall in no way relieve the Contractor of sole and final responsibility for the safety of lives, work, and structures.
 - c. All sheeting in contact with the concrete or masonry shall be removed or cut off and left in place as instructed by the Engineer.

2. Timber:

- a. Timber may be substituted for steel sheet piling when approved by the Engineer. Timber for shoring, sheeting and bracing shall be sound and free of large or loose knots and in good condition. Size and spacing shall be in accordance with OSHA regulations.
- b. Remove bracing and sheeting in units when backfill reaches the point necessary to protect the work and adjacent property. Leave sheeting in place when, in the opinion of the Engineer, it cannot be safely removed. Cut off sheeting left in place below the finished ground surface as instructed by the Engineer.

3. Steel Sheet Piling:

- a. Steel sheet piling shall be the continuous interlock type. The weight, depth and section modulus of the sheet piling shall be sufficient to restrain the loads if earth pressure and surcharge from existing foundations. Procedure for installation and bracing shall be so scheduled and coordinated with the removal of the earth that the ground under existing structures shall be protected against lateral or vertical movements at all times. In addition to the drawings and computations, the Contractor shall provide closure and sealing details between sheet piling and existing facilities, as well as method of excavation within sheet piling to the Engineer for review before commencing construction operations. Contractor shall be responsible for all damage to existing utilities and structures resulting from installation of sheet piling. Damage to existing utilities and/or structures resulting from installation of sheet piling shall be repaired to the satisfaction of the Engineer at the Contractor's expense.

- G. Other Materials: All other materials, not specifically described but required for proper completion of the work of the Section, shall be as selected by the Contractor subject to prior approval of the Engineer.

2.02 UNSUITABLE SOIL MATERIAL

A. Unsuitable materials include the materials listed below:

- 1. Soils, which, when classified under ASTM D 2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil

Classification System), fall in the classifications of Pt, OH, CH, MH, or OL;

2. Soils that cannot be compacted sufficiently to achieve the density specified for the intended use;
3. Materials that contain hazardous or designated waste materials, including petroleum hydrocarbons, pesticides, heavy metals, and any material which may be classified as hazardous or toxic according to applicable regulations;
4. Soils that contain greater concentrations of chloride or sulfate ions, or have a soil resistivity or pH less than the existing on-site soils;
5. Topsoil except as allowed below.

2.03 MATERIALS TESTING

- A. All soils testing of samples will be done by a testing laboratory selected by the City in accordance with Section 01410. Testing shall be paid for by the City. At its discretion, the Engineer may request that the Contractor supply samples for testing of any material used in the Work.
- B. Particle size analysis of soils and aggregates will be performed using ASTM D 422 - Standard Test Method for Particle-Size Analysis of Soils.
- C. Determination of sand equivalent value will be performed using ASTM D 2419 - Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
- D. Unified Soil Classification System: References in this Section to soil classification types and standards shall have the meanings and definitions indicated in ASTM D 2487. The Contractor shall be bound by all applicable provisions of said ASTM D 2487 in the interpretation of soil classifications.
- E. The testing for chloride, sulfate, resistivity, and pH will be done in accordance with ANSI/AWWA C-105/A21.5 Standard.

2.04 ROCK EXCAVATION

- A. Mechanical rock excavation shall include removal and disposal of the following:
 1. All boulders measuring 1/3 of a cubic yard or more in volume;

2. All rock material in ledges, bedding deposits, and un-stratified masses which cannot be removed without systematic drilling and jack-hammering or blasting.
 3. Conglomerate deposits which are so firmly cemented that they possess the characteristics of solid rock and which cannot be removed without systematic drilling and jack-hammering or blasting.
- B. Blasting – See Specification Section 02405.

PART 3 – EXECUTION

3.01 EXCAVATION - GENERAL

- A. General: Except when specifically provided to the contrary, excavation shall include the removal of all materials of whatever nature encountered, including all obstructions of any nature that would interfere with the proper execution and completion of the Work. The removal of said materials shall conform to the lines and grades indicated or ordered. Unless otherwise indicated, the entire construction site shall be stripped of all vegetation and debris, and such material shall be removed from the site prior to performing any excavation or placing any fill. The Contractor shall furnish, place, and maintain all supports and shoring that may be required for the sides of the excavations. Excavations shall be sloped or otherwise supported in a safe manner in accordance with applicable State safety requirements and the requirements of OSHA Safety and Health Standards for Construction (29CFR1926).
- B. Removal and Exclusion of Water: The Contractor shall remove and exclude water, including stormwater, groundwater, irrigation water, and wastewater, from all excavations. Dewatering wells, wellpoints, sump pumps, or other means shall be used to remove water and continuously maintain groundwater at a level at least two feet below the bottom of excavations before the excavation work begins at each location. Water shall be removed and excluded until backfilling is complete and all field soils testing have been completed.
- C. Topsoil:
1. Remove all topsoil to a depth at which subsoil is encountered, from all areas that are to be cut to lower grades or filled.
 2. Topsoil to be used for finish grading may be stored on the site. It shall be piled properly, sloped to drain, and covered.

3. Other topsoil may be used for fill in non-critical areas with prior approval of the Engineer

D. Bracing and Sheeting:

1. Furnish, install, and maintain all sheeting, bracing, and shoring as may be required to properly support the sides of all excavations and to prevent all movement of earth that could in any way injure the work, adjacent property, or workers.
2. Properly support all trenches for piping and duct bank installation so as to conform to all pertinent rules and regulations and these Specifications. All trenches deeper than 5 feet shall be shored unless cut to the angle of repose of the excavated soils.
3. Exercise care in the removal of sheeting, shoring, bracing and timbering to prevent collapse or caving of the excavation faces being supported and damage to the work and adjacent property.
4. Do not leave any sheeting or bracing in the trench or excavation after completion of the work, unless approved or instructed by the Engineer.
5. All sheeting in contact with concrete or masonry shall be removed or cut off and left in place as instructed by the Engineer.

E. Obstructions:

1. Remove and dispose of all trees, stumps, roots, boulders, pavement, pipes, and the like, as required for the performance of the work.
2. Exercise care in excavating around catch basins, inlets, manholes, piping, duct banks, underground vaults, etc.
3. Avoid removing or loosening castings or pushing dirt into structures.
4. Damaged or displaced casting shall be repaired and replaced, and dirt entering the structures during the performance of the work shall be removed at no additional cost to the City.

F. Utilities to be Abandoned:

1. When piped, conduits, sewers or other structures are removed from the trench leaving dead ends in the ground, such ends shall be fully plugged and sealed as indicated on the Drawings.

2. Abandoned structures such as manholes, catch basins, or chambers shall be entirely removed unless otherwise specified or indicated on the Drawings.

3.02 HEAVE MONITORING AND CONTINGENCY PLANNING

- A. Prior to excavation, pipe bursting or directional drilling, the Contractor shall identify any permanent structure, all buried utilities, all natural gas/petroleum pipelines, and any additional structures, which are within a horizontal distance 1.1 times the depth of any excavation deeper than the structure, utility, or natural gas pipeline. This Section does not limit the Contractor's choice of construction methods based on the site conditions.
- B. The Contractor shall perform, at a minimum, daily visual inspections of the perimeter of the pipe burst, drill path or excavation to identify any signs of excessive heave or movement. The results from visual inspections shall be recorded with the daily survey log. Any area, which appears to be excessively deformed or damaged, shall immediately be brought to the attention of the Engineer and be corrected.
- C. The Contractor shall prepare a contingency plan to mitigate the effects of excessive heave, settlement or movement of existing site features. The contingency plan is not to restrict the Contractor from using the best construction methods available to meet the conditions, but is required to demonstrate a reasonable preparedness to mitigate the effects of excessive heave movement or settlement. The following are minimum requirements for a contingency plan:
 1. The Contractor shall prepare a contingency plan, outlining steps to be taken to protect structures, utilities, or gas pipes and stop excessive heave movement or settlement identified by the heave/settlement monitoring program.
 2. The Contractor shall have all material, manpower, equipment, and other items identified in the contingency plan available at all times while excavations are ongoing or excavated areas are open.

3.03 STRUCTURE, ROADWAY, AND EMBANKMENT EXCAVATION

- A. Excavation Beneath Structures and Embankments: Except where otherwise indicated for a particular structure or ordered by the Engineer, excavation shall be carried to the grade of the bottom of the footing or slab. Where indicated or ordered, areas beneath structures or fills shall be over-excavated. The subgrade areas beneath embankments shall be excavated to remove not less than the top 6 inches of native material and where such subgrade is sloped, the native material shall be benched. When such over-excavation is indicated both over-excavation and subsequent backfill to the

required grade shall be performed by the Contractor. When such over-excavation is not indicated, but is ordered by the Engineer, such over-excavation and any resulting backfill will be paid for under a separate unit price bid item if such bid item has been established; otherwise, payment will be made in accordance with a negotiated price. After the required excavation or over-excavation has been completed, the exposed surface shall be scarified to a depth of 6 inches, brought to optimum moisture content, and rolled with heavy compaction equipment to obtain 98 percent of maximum density.

- B. Excavation Beneath Paved Areas: Excavation beneath paved areas shall be provided at minimum dimension shown on the drawings to minimize the disrupted area and volume of backfill required. All backfill material beneath paved areas shall be graded aggregate base material in accordance with Appendix F – Department of Public Works Public Right of Way Manual. The graded aggregate base surface elevation shall be depressed to receive the final pavement surface course as indicated on the Drawings. Controlled low strength flowable fill material may be provided in lieu of graded aggregate base if directed by the Engineer to provide backfill around sensitive or congested utilities or confined excavations where mechanical compaction is not practical.
- C. Notification of Engineer: The Contractor shall notify the Engineer at least 3 days in advance of completion of any structure excavation and shall allow the Engineer a review period of at least one day before the exposed foundation is scarified and compacted or is covered with backfill or with any construction materials.

3.04 PIPELINE AND UTILITY TRENCH EXCAVATION

- A. Exploratory Excavation:
 - 1. The Contractor shall excavate and expose buried points of connection to existing utilities as required by Engineer.
 - 2. Data, including dates, locations excavated, and sketches, shall be submitted to the Engineer within one week of excavation.
 - 3. Damage to utilities from excavation activities shall be repaired by the Contractor at no charge to the City.
- B. General: Unless otherwise indicated or ordered, excavation for pipelines and utilities shall be open-cut trenches with widths as indicated.
- C. Trench Bottom: Except when pipe bedding is required, the bottom of the trench shall be excavated uniformly to the grade of the bottom of the pipe bedding. Excavations for pipe bells and welding shall be made as required.

- D. Minimum Width of Trench: The minimum width of pipe trenches, measured at the crown of the pipe, shall not be less than 24-inches greater than the exterior diameter of the pipe, exclusive of bells. The minimum base width, measured at the invert of the piping, of such trench shall be not less than 24-inches greater than the exterior diameter of the pipe, exclusive of special structures or connections, and such minimum width shall be exclusive of all trench supports.
- E. Maximum Width of Trench: The maximum allowable width of trench for all pipelines measured at the top of the pipe shall be the outside diameter of the pipe (exclusive of bells or collars) plus 24-inches, and such maximum shall be inclusive of all timbers and/or trench boxes, shoring, etc. A trench wider than the outside diameter plus 24-inches may be used without special bedding if the Contractor, at his expense, will furnish pipe of the required strength to carry the additional trench load. Such modifications shall be submitted to the Engineer and approved in writing. Whenever such maximum allowable width of trench is exceeded for any reason, except as provided for on the Drawings or in the Specifications or by the written instruction of the Engineer, the Engineer shall, at his discretion, require that the Contractor, at its own expense for all labor and materials, cradle the pipe in Class "B" concrete, or other approved pipe bedding.
- F. Maximum length of Open Trench: Except by special permission by the Engineer, only that amount of pipe construction will be permitted, including excavation, construction of pipelines, and backfill in any one location, which can be completed in one day; however, maximum length of open trench shall never exceed 100 feet. This length includes open excavation, pipe laying and appurtenant construction and backfill that had not been temporarily resurfaced.
- G. Trench Side Slopes:
1. Temporary trench excavation shall at all times conform to the safety requirements of OSHA.
 2. Loose cobbles or boulders shall be removed from the sides of the trenches before allowing workers into the excavation, or the trench slopes must be protected with screening or other methods. Trench side slopes shall be kept moist during construction to prevent local sloughing and raveling. Surcharge loads due to construction equipment shall not be permitted within 5 feet of the top of any excavated slope.
 3. If the Contractor elects to shore or otherwise stabilize the trench sides, he shall file with the Engineer for review, copies of drawings for same prepared and signed by a Civil Engineer duly registered in the State Georgia before commencing excavation.

- H. Trench Over-Excavation: Where trenches are indicated to be over-excavated, excavation shall be to the depth indicated, and backfill shall be installed to the grade of the bottom of the pipe bedding.
- I. Over-Excavation: When ordered by the Engineer, whether indicated on the Drawings or not, trenches shall be over-excavated beyond the depth and/or width shown or specified. Such over-excavation shall be to the dimensions ordered. The trench shall then be backfilled to the grade of the bottom of the pipe bedding. Over-excavation less than the limits on the Drawings or less than specified shall be done at no increase in cost to the City. When the over-excavation ordered by the Engineer is greater than the limits shown, additional payment will be made to the Contractor. Said additional payment will be made under separate unit price bid items for over-excavation if such bid items have been established; otherwise, payment will be made in accordance with a negotiated price.
- J. Where pipelines are to be installed in embankments, fills, or structure backfills, the fill shall be constructed to a level at least one foot above the top of the pipe before the trench is excavated.
- K. If a moveable trench shield is used during excavation operations, the trench width shall be wider than the shield so that the shield is free to be lifted and then moved horizontally without binding against the trench sidewalls. If the trench walls cave in or slough, the trench shall be excavated as an open excavation with sloped sidewalls or with trench shoring, as indicated and as required by the pipe structural design.

3.05 OVER-EXCAVATION NOT ORDERED OR INDICATED

- A. Any over-excavation beyond the limits shown on the drawings or specified which was not ordered by the City, shall be backfilled to the required grade with the specified material(s) at no additional cost to the City.

3.06 EXCAVATION IN LAWN AREAS

- A. Where excavation occurs in lawn areas, the sod shall be carefully removed, dampened, and stockpiled to preserve it for replacement. Excavated material may be placed on the lawn, provided that a drop cloth or other suitable method is employed to protect the lawn from damage. The lawn shall not remain covered for more than 72 hours. Immediately after completion of backfilling and testing of the pipeline, the sod shall be replaced and lightly rolled in a manner so as to restore the lawn as near as possible to its original condition. Contractor shall provide new sod if stockpiled sod has not been replaced within 72 hours.

3.07 EXCAVATION IN VICINITY OF TREES

- A. Except where trees are indicated to be removed, trees shall be protected from injury during construction operations according to the Tree Protection Plan. No tree roots over 2 inches in diameter shall be cut without express permission of the Engineer. Trees shall be supported during excavation by any means previously reviewed by the Engineer.

3.08 ROCK EXCAVATION

- A. When rock is encountered in trenches, it shall be removed to a minimum depth of six inches (6") below the bell of the pipe.
- B. The rock shall be stripped and measured by the Engineer at five foot (5 ft.) intervals, and the quantity calculated as the actual length multiplied by the average depth multiplied by the average trench width. Trench width shall be a minimum of twenty-four inches (24"), and a minimum of three inches (3") wider on each side of the pipe bell.

3.09 DISPOSAL OF EXCESS EXCAVATED MATERIAL

- A. The Contractor shall remove and dispose of all excavated material in excess of that required to backfill the excavation and to create necessary fills. This shall be done immediately after the backfill is completed to the satisfaction of the Engineer. All materials removed shall become the property of the Contractor, and he shall make his own arrangements satisfactory to the Engineer for their disposition.
- B. All surplus material and such other materials as the Engineer may deem unfit for use as backfill, shall be disposed of by the Contractor so as to give a minimum of inconvenience to the public. In case of settlement after backfill, the Contractor shall supply sufficient material satisfactory to the Engineer to make up for the deficiency.
- C. When so ordered by the Engineer, the Contractor shall immediately remove all excavated materials from the site and dispose of the same.
- D. Any material, which may spill or drip from vehicles by hauling in the streets, shall be removed and the streets cleaned by the Contractor, to the satisfaction of the Engineer, or the proper officials of the municipality in which the hauling or work is being done.
- D. The surface of all graded and spoil areas shall be left in a smooth and level or evenly sloped condition, free from stones, rubbish, or other debris.

3.10 SOIL BACKFILL – GENERAL

- A. Backfill shall not be dropped directly upon any structure or pipe. Backfill shall not be placed around nor upon any structure until the concrete has attained sufficient strength to withstand the loads imposed. Backfill around water retaining structures shall not be placed until the structures have been tested, and the structures shall be full of water while backfill is being placed.
- B. Except for drain rock materials being placed in over-excavated areas or trenches, backfill shall be placed after all water is removed from the excavation, and the trench sidewalls and bottom have been dried to moisture content suitable for compaction.
- C. If a moveable trench shield is used during excavation, pipe installation, and backfill operations, the shield shall be moved by lifting the shield free of the trench bottom or backfill and then moving the shield horizontally. The Contractor shall not drag trench shields along the trench causing damage or displacement to the trench sidewalls, the pipe, or the bedding and backfill.
- D. Immediately prior to placement of backfill materials, the bottoms and sidewalls of trenches and structure excavations shall have all loose sloughing, or caving soil and rock materials removed. Trench sidewalls shall consist of excavated surfaces that are in a relatively undisturbed condition before placement of backfill materials.

3.11 SOIL BACKFILL AND FILL PLACEMENT

- A. Fill shall be placed in loose lifts not exceeding 8-inches in depth and shall be thoroughly compacted as herein specified.
- B. All fill placements may be subject to fill density and moisture tests, which shall be performed to verify that the specified degree of compaction is being achieved. Testing shall be paid for separately by the City directly to the testing laboratory.
- C. Prior to placement of any material in embankments, the area within embankment limits shall be stripped of topsoil and all unsuitable materials removed as described under Excavation. Area to receive fill shall then be scarified to a depth of at least 6-inches.
- D. Fill materials shall be placed in continuous approximately horizontal layers extending the full width of the embankment cross-section and the full dimension of the excavation where practicable.

- E. Fill materials shall be placed within 2 percent of the optimum moisture content. Optimum moisture shall be maintained by sprinkling the layers with water as placed or by allowing material to dry before placement.
- F. Compaction:
1. Fill material shall be compacted to dry densities as determined by the Standard Proctor Compaction Test performed in accordance with ASTM D698. Testing shall be paid for separately by the City directly to the testing laboratory.
 2. Structural fill material supporting structures and pavement and other areas indicated on the Drawings shall be compacted to 95 percent of the maximum dry density. The upper 8" of fill shall be compacted to 95 percent of the maximum dry density.
 3. Controlled fill for general site grading shall be compared to 90 percent of the maximum dry density.
 4. Compaction of embankments shall be by sheepfoot rollers with staggered uniformly spaced knobs and suitable cleaning devices. The projected area of each knob and the number and spacing of the knobs shall be such that the total weight of the roller and ballast when distributed over the area of one (1) row of knobs shall be 250 psi. Placement and compaction of materials shall extend beyond the final contours sufficiently to insure compaction of the material at the resulting final surface. Final contours shall then be achieved by a tracked bulldozer or grader shaping the face of the embankment.
 5. Compaction of backfill around the structures shall be accomplished by power tamping equipment approved by the Engineer.
 6. If tests indicate that density of backfill is less than that specified, the area shall be re-compacted or undercut, filled, and compacted until specified density is achieved.
- G. Final Grading: Upon completion of construction operations, the area shall be graded to finish contour elevations and grades shown on the Drawings. Graded areas shall be made to blend with remaining ground surfaces. All surfaces shall be left smooth and free to drain.
- H. Moisture:
1. All fill shall be compacted with the moisture content as established by the 95 percent intercept on the moisture density curves or the moisture content at the shrinkage limit, whichever is less.

2. If fill material is too wet, provide and operate approved means to assist the drying of the fill until suitable for compaction
3. If fill material is too dry, provide and operate approved means to add moisture to the fill layers.

I. Proofrolling:

1. All areas where pavement or structures are to be built on compacted fill and other areas where indicated on the Drawings, shall be proofrolled to detect soft spots prior to the placement of fill material or construction of foundations.
2. Proofrolling shall consist of the moving a 20-30 ton loaded dump truck or pneumatic tire roller over the subgrade after the subgrade is shaped. Proofrolling shall be witnessed by the Engineer.
3. Pneumatic-tired rollers shall have not fewer than four pneumatic tired wheels which shall be of such size and ply that tire pressure can be maintained between 80 and 100 pounds per square inch for 25,000 pound wheel load during rolling operations. Unless otherwise required, rolling shall be done with tires inflated to 90 psi. The roller wheels shall be located abreast in a rigid steel frame. Each wheel shall be loaded with an individual weight box so that each wheel will bear an equal load when traversing uneven ground. The weigh boxes shall be suitable for ballast loading such that the load per wheel shall be 25,000 pounds. The spacing of the wheels shall insure that the distance between the nearest edges of adjacent tires shall be not greater than one-half of the tire width of a single tire at the operating pressure for a 25,000 pound wheel load. The roller shall be operated not faster than 5 feet/second.
4. Subgrade shall be proofrolled with 6 passes of the roller. Depressions that develop during the proofrolling operations shall be filled with suitable material and those filled areas shall be proofrolled with 6 passes of the roller. If, after having been filled and proofrolled, the subgrade still contains depressions, the soil shall be undercut to the full depth of the soft material or 5 feet whichever is less, backfilled, and rolled to achieve a subgrade acceptable to the Engineer.
5. After the proofrolled subgrade has been accepted by the Engineer, the surface of the subgrade shall be finished with a smooth steel wheel roller weighing not less than 10 tons. Finished surface of the subgrade shall be within a tolerance of 0.04 feet at every point.
6. Conduits, pipes, culverts and underdrains shall be neither disturbed nor damaged by proofrolling operations. Rollers shall neither pass

over, nor approach closer than 5 feet of conduits, pipes, culverts and underdrains unless the tops of those facilities are deeper than 3 feet.

3.12 PIPE BEDDING

- A. The contractor shall excavate to a minimum of 8-inch below the bells or couplings for the full width of the trench and shall place a minimum of 8-inches of No. 57 crushed stone bedding upon which the pipe is to be laid. In cases as determined by the Engineer, where trench material is suitable for use as bedding, the trench may be excavated to a point above the invert grade, and the trench bottom handshaped so that the bottom segment of the pipe is firmly supported on undisturbed material.
- B. Gravity Sewers and Accessories: Lay all pipes with minimum Type 5 – Class B or C bedding unless shown or specified otherwise. Excavate the bottom of the trench flat at a minimum depth as shown on the Drawings, below the bottom of the pipe barrel. Place and compact bedding material to the proper grade before installing the pipe. After pipe has been brought to the proper grade, haunching material shall be carefully placed by hand and compacted to the top of the pipe.
- C. Manholes: Excavate to a minimum of 12-inch below the planned elevation of the base of the manhole. Place and compact crushed stone bedding material to the required grade before constructing the manhole.
- D. At pipe subgrade, if foundation soil in trench is soft, wet, spongy, and unstable or does not afford solid foundation for pipe, the Contractor shall excavate as instructed by Engineer and provide stable base for placement of pipe bedding. Quantities of in-place crushed rock bedding which are in excess to those required on Drawings will be paid on basis of Unit Prices listed in Bid Form.
- E. Where rock has been excavated in the trench, the Contractor shall construct a base by placing crushed rock upon which a subgrade can be prepared. Crushed rock bedding in excess to that shown on Drawings will be paid for on basis of Unit Prices listed in Bid Form.
- F. Before any pipe is lowered in place, the trench bottom or bedding shall be prepared so that each pipe will have a firm and uniform bearing over the entire length of the barrel and a width equal to one-half the outside diameter of the pipe. All adjustments in line and grade shall be made by scraping away or filling and tamping in under the barrel of the pipe. Wedging and/or blocking are not permitted.

3.13 PIPE AND UTILITY TRENCH BACKFILL

- A. Pipe Zone Backfill:

1. The pipe zone is defined as that portion of the vertical trench cross-section lying between a plane below the bottom surface of the pipe and a plane at a point above the top surface of the pipe. The bedding is defined as that portion of pipe zone, backfill material between the trench subgrade and the bottom of the pipe. The embedment is defined as that portion of the pipe zone backfill material between the bottom of the bedding and a level line of initial backfill (12" above the top of pipe).
2. After compacting the bedding, the Contractor shall perform a final trim using a stringline for establishing grade, such that each pipe section when first laid will be continually in contact with the bedding along the extreme bottom of the pipe. Excavation for pipe bells and welding shall be made as required.
3. The pipe zone shall be backfilled with the indicated backfill material. The Contractor shall exercise care to prevent damage to the pipeline coating, cathodic bonds, and the pipe itself during the installation and backfill operations.
4. If a moveable trench shield is used during backfill operations, the shield shall be lifted to a location above each layer of backfill material prior to compaction of the layer. The Contractor shall not displace the pipe or backfill while the shield is being moved.
5. Selected backfill material for the pipe zone shall consist of specified material herein or native or imported granular material as approved by Engineer in advance of placement. Place material in the trench simultaneously on each side of the pipe for the full width of the trench and the depth of the pipe zone in layers 6-inches in depth. Each layer shall be thoroughly compacted by mechanically tamping or vibrating. In all cases, backfilling of the pipe zone must be done by hand. Particular attention shall be given to underside of the pipe and fittings to provide a firm support along the full length of the pipe. The pipe zone shall be considered to extend 12-inches above the top of the pipe, and shall be compacted to a compaction of not less than 95 percent of maximum dry density at optimum moisture content as herein after specified. Care shall be taken not to damage pipe or special coatings on the pipe.

B. Trench Zone Backfill:

After the pipe zone backfills have been placed, backfilling of the trench zone may proceed. The trench zone is defined as that portion of the vertical trench cross-section lying as indicated between a plane above the top surface of the pipe and a plane at a point 18 inches below the finished surface grade, or if the trench is under pavement, 18 inches below the

roadway subgrade. If flooding, ponding, or jetting is used, the pipe shall be filled with water to prevent flotation.

- C. Backfilling Pipe Trench: After the pipe had been laid in the trench and has been inspected and approved, and backfilling in the pipe zone is complete and compacted, the remainder of the trench may be backfilled. The backfill material shall be suitable material as hereinbefore specified. Care shall be taken to insure that no voids remain under, around or near the pipes.
- D. Compaction: The maximum dry density and optimum moisture content of each soil type used in the controlled compacted fill shall be determined by ASTM D698 compaction method. Field density tests shall be determined in accordance with ASTM D1556. Testing shall be paid for separately by the City directly to the testing laboratory.
- E. Placement and Compaction of Trench Backfill: The placement and compaction of all trench backfill shall conform to one of the following methods, subject to the qualification specified therein:
 - 1. Mechanically Compacted Backfill (Unpaved Areas):. With approval of Engineer, backfill shall be mechanically compacted by means of tamping rollers, sheepfoot rollers, pneumatic tire rollers, vibrating rollers, or other mechanical tampers to a minimum of 95 percent at optimum moisture. Trench backfill compaction above the pipe zone shall be to a minimum 95 percent in areas under buildings and pavements. Where the backfill soil has had a clay-like behavior and has a plasticity index of at least 12, only the upper 3-feet of material placed will require minimum compaction of 95 percent. All such equipment shall be of size and type approved by the Engineer. Impact-type pavement breakers (stompers) will not be permitted over any pipe. Permission to use specific compaction equipment shall not be construed as guaranteeing or implying that the use of such equipment will not result in damage to adjacent ground, existing improvements, or improvements installed under the Contract. The Contractor shall make its own determination in this regard. Mechanically compacted backfill shall be placed in horizontal layers not exceeding the maximum thickness of 8 inches. Each layer shall be evenly spread, the moisture content brought to near optimum condition and then tamped or rolled until the specified compaction and moisture content had been attained.
 - 2. Graded Aggregate Base (Paved Areas) – See Appendix F - Department of Public Works Public Right of Way Manual.
- F. Additional Material: Where final grades above the pre-construction grades are required to maintain minimum cover, additional fill material will be shown on the Drawings. Utilize excess material excavated from the trench, if the material is suitable. No additional payment will be made for additional

material when excavated materials are used. If excess excavated materials are not suitable, or if the quantity available is not sufficient, provide additional suitable fill material.

- G. Final Backfill: Final backfill is all backfill in the trench cross-sectional area within 18 inches of finished grade, or if the trench is under pavement, all backfill within 18 inches of the roadway subgrade.

3.14 BACKFILLING AROUND STRUCTURES

A. General:

1. Remove debris from excavations before backfilling.
2. Do not backfill against foundation walls until so instructed by the Engineer.
3. Wherever possible, backfilling shall be simultaneous on both sides of walls to equalize lateral pressures.
4. Do not backfill on only one (1) side of vertically spanning walls unless walls are adequately shored or permanent construction is in place to furnish lateral support on both top and bottom of wall.

3.15 FIELD TESTING

- A. General: All field soils testing will be done by a testing laboratory of the City's direction except as indicated below. Testing shall be paid for separately by the City.
- B. Where soil material is required to be compacted to a percentage of maximum density, the maximum density at optimum moisture content will be determined in accordance with Method C of ASTM D 698. Where cohesionless, free draining soil material is required to be compacted to a percentage of relative density, the calculation of relative density will be determined in accordance with ASTM D 4253 and D 4254. Field density in-place tests will be performed in accordance with ASTM D 1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method, ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth), or by such other means acceptable to the Engineer.
- C. In case the test of the fill or backfill show non-compliance with the required density, the Contractor shall accomplish such remedy as may be required to insure compliance. Subsequent testing to show compliance shall be by a testing laboratory selected by the City and paid by the Contractor.

- D. The Contractor shall provide test trenches and excavations including excavation, trench support, and groundwater removal for the City's field soils testing operations. The trenches and excavations shall be provided at the locations and to the depths required by the City.

3.16 GRADING

- A. General:

- 1. Perform all rough and finish grading required to attain the elevations indicated on the Drawings.
 - 2. Perform rough grading to an accuracy of plus or minus 0.15 feet.

- B. Grading Around Buildings: Control the grading around buildings so the ground is pitched to prevent water from running into the excavated areas of a building or damaged other site features.

- C. Treatment After Completion of Grading:

- 1. After grading is completed, permit no further excavation, filling or grading, except with the approval of the Engineer.
 - 2. Use all means necessary to prevent the erosion of freshly graded areas during construction and until such time as permanent drainage and erosion control measures have been installed.

3.17 EXCESS WATER CONTROL

- A. Regulations and Permits: Obtain all necessary soil erosion control permits in accordance with the Georgia Soil Erosion and Sedimentation Control Act, and all pertinent rules, laws, and regulations.

- B. Unfavorable Weather:

- 1. Do not place, spread, or roll any fill material during unfavorable weather conditions.
 - 2. Do not resume operations until moisture content and fill density are satisfactory to the Engineer.
 - 3. Any inundated area that freezes shall be removed and refilled at no additional cost to the City.

- C. Provide berms or channels to prevent flooding of subgrade. Promptly remove all water collected in depression.

D. Pumping, Drainage and Dewatering:

1. Provide, maintain and use at all times during construction adequate means and devices to promptly remove and dispose of all water from every source entering the excavations or other parts of the Work
2. Dewater by means that will insure dry excavations, preserve final lines and grades, and do not disturb or displace adjacent soil.
3. All pumping and drainage shall be done with no damage to property or structures and without interference with the rights of the public, owners of private property, pedestrians, vehicular traffic or the work of other contractors, and in accordance with all pertinent laws, ordinances, and regulations.
4. Do not overload or obstruct existing drainage facilities.

3.18 SETTLEMENT

- A. The Contractor shall be responsible for all settlement of backfill, fills, and embankments, which may occur within one (1) year after final acceptance of the Work by the City.
- B. The Contractor shall make, or cause to be made, all repairs, or replacements made necessary by settlement within thirty (30) days after receipt of written notice from the Engineer.

3.19 CLEANING

- A. Upon completion of the Work of this Section, remove all rubbish, trash, and debris resulting from construction operations. Remove surplus equipment and tools. Leave the site in a neat and orderly condition acceptable to the engineer, and in conformance with the General Conditions of the Contract Documents.

END OF SECTION

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Blasting**PART 1 – GENERAL****1.01 SCOPE**

- A. This Section covers the work necessary for the use of explosives and blasting in connection with rock excavation for open cut trench excavation, slip trenches, shafts and other excavations required by the Contractor. Limit the use of explosives in the works to the practicable minimum by utilizing mechanical means of excavation to the maximum feasible extent. Blasting shall be limited to the extent of the work approved by the Engineer and shall not be used outside the extent in plan of the work sites. Controlled blasting is excavation of rock in which the blast hole size, spacing, depth and burden, and the charge size, depth and delay sequence are carefully controlled to excavate the rock to the required limits. Controlled blasting minimizes overbreak and fracturing of the rock beyond the design lines.
- B. Specifications in this Section govern blast design, blast limitations, explosive materials, equipment, labor and supervision for transportation and storage of explosives, drilling and loading of blast holes, protection of existing facilities, test blasts, and damage repairs due to Contractor's blasting operations.

1.02 RELATED SECTIONS

- A. The Work of the following Sections specifically apply to the Work of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of Work.
 - 1. Section 02200: Earthwork
 - 2. Section 02730: Sewer and Accessories
 - 3. Section 02140: Dewatering

1.03 GENERAL

- A. Perform blasting only with a permit from the appropriate jurisdictional agency. Necessary permits include an Explosives License issued by the Georgia Safety Fire Commissioner, and users' permits obtained from Fulton County and from the City of Atlanta. Obey all local, State, Federal and other Governmental regulations applying to transportation, handling, storage and use of explosives, including the requirements of the Bureau

of Fire Prevention of the City of Atlanta, Fulton County and the State of Georgia, and applicable regulations of the Occupational Safety and Health Administration.

- B. Perform blasting operations in trenches, shafts and other open excavations only during daylight hours. No blasting shall be performed on Saturdays, Sundays or on the public holidays observed by the City and listed in the Special Conditions. If an emergency prevents a blast being fired during the permitted hours and the holes are loaded, the blast shall be fired as soon as safety allows. In the event that blasting is found necessary outside the permitted hours, the Contractor shall inform local residents within hearing and vibration range and the jurisdictional agencies prior to firing. The Contractor shall report in writing to the Engineer the following day the conditions which required it to blast outside the permitted hours.
- C. Furnish, install and operate at each site where blasting is being performed using electric methods of initiation an approved thunderstorm monitor and lightning warning device. Make adequate provisions for transmitting alarms from the device to all locations where preparation for blasting using electric initiation are in progress. Install and maintain the system in accordance with the manufacturer's recommendations. Test the entire monitoring and alarm system for satisfactory operation at intervals not exceeding two weeks, and suspend blasting operations until any defects have been corrected.
- D. The blasting supervisor shall be experienced in predicting and evaluating the effects of blasting on nearby structures such that vibration levels at these structures do not exceed a level which will damage the structures or their contents, or cause undue alarm to their occupants. Planning and evaluation of blasting operations shall be performed by the approved blasting supervisor. All blasting plans, test-blasting plans and revisions shall be submitted and signed by the blasting supervisor.

1.04 DEFINITIONS

- A. Smoothwall Blasting (Trim Blasting): A controlled blasting technique used to produce smooth walls in a trench or shaft Trim charges are decoupled to reduce the linear charge density and are placed in holes with reduced spacing and are fired after main charge.
- B. Peak Particle Velocity (PPV): The maximum of the three ground vibration velocities measured in the vertical, longitudinal and transverse directions. Velocity units are expressed in inches per second (ips).
- C. Air-Overpressure: Temporary changes in ambient air pressure caused by blasting. Air-overpressure is expressed in units of psi or dB. Measurements

for blasting are made with microphones having a flat frequency response for over-pressure in the 2 to 200 Hz range. A-weight or C-weight microphones shall not be used for these measurements.

- D. Occupied Building: Structure on or off construction limits that is occupied by humans or livestock.
- E. Residential Building: Includes single and multi-family dwellings, hotels, motels and any other structure containing sleeping quarters.
- F. Scaled Distance: A factor describing relative vibration energy based on distance and charge-per-delay. For ground vibration control and prediction purposes, Scaled Distance (Ds) is obtained by dividing the distance of concern (D) by the square root of the charge-per-delay (W) - $Ds = D/(W)^{1/2}$.
- G. Charge-per-Delay (W): For purposes of vibration control, any charges firing within any 8-millisecond time period are considered to have a cumulative effect on vibration and air-overpressure effects. Therefore, the maximum charge-per-delay equals the sum of the weight of all charges firing within any 8-millisecond time period. For example, if two 10 lb. charges fire at 100 ms and one 15 lb. charge fires at 105 ms, the maximum charge per delay would be 35 lbs.
- H. Line Drilling: A method of controlling overbreak, in which a series of very closely spaced holes are drilled at the perimeter of the excavation. Line holes are generally not loaded with explosives; however, in some applications alternating holes may be loaded with light charges using detonating cord.
- I. Pre-splitting: A blasting technique in which the perimeter charges are detonated first in the firing sequence or as a separate blast ahead of production blasting. This technique is designed to generate a fracture in the plane of the pre-split holes drilled along the perimeter of the excavation.
- J. Production Holes: Blast holes in the main body of the rock mass being removed by drilling and blasting.
- K. Stemming: Crushed stone, tamped clay or other inert earth material placed in the unloaded collar area of blastholes for the purpose of confining explosive charges and limiting rock movement and air overpressure.
- L. Buffer Holes: Holes with reduced energy charges drilled adjacent to smoothwall, trim or open line-drilled holes at the perimeter of the excavation. The explosive charge in buffer holes is generally between 50 and 75 percent of the charge used in normal production blastholes. Buffer holes are usually drilled parallel to adjacent holes at the excavation perimeter.

- M. Primary Initiation: The method whereby the blaster initiates the blast(s) from a remote and safe location. Primary initiation systems use pneumatic tubing or shock-tubes to convey firing energy from blasters to blast locations.
- N. Sub-drilling: The portion of the blasthole that is drilled below or beyond the desired excavation depth or limit. Subdrilling is generally required to prevent the occurrence of high or tight areas of unfractured rock between blastholes.
- O. Surface Blasting: All excavations where surface blasting techniques are required.
- P. Controlled Blasting: Excavation in rock in which the various elements of the blast, including hole size, position, alignment, depth, spacing, burden, charge size, distribution and delay sequence are carefully controlled to excavate the rock to the desired lines with a relatively uniform surface with minimal overbreak and fracturing of rock beyond the design excavation limits and to maintain resulting noise, overpressure and peak particle velocity within specified maximum limits.
- Q. Prohibited Persons: Persons prohibited from handling or possessing explosive materials as defined by the seven categories described in Section 555.11 of 27 CFR ATF Rules).
- R. Delay: Distinct pause of pre-determined time between detonations of single charges or groups of charges.

1.05 REFERENCED STANDARDS

- A. U.S. Department of Justice, Alcohol, Tobacco and Firearms and Explosives Division (ATF27 CFR Part 555, Implementation of the Safe Explosives Act, Title XI, Subtitle C of Public Law 107-296; Interim Final Rule).
- B. Institute of Makers of Explosives
 - 1. Dos and Don'ts - Instructions and Warnings for Consumers in Transporting, Storing, Handling, and Using Explosive Materials
 - 2. Destruction of Commercial Explosives
 - 3. Suggested Code of Regulations for the Manufacture, Transportation, Storage, Sale, Possession and Use of Explosive Materials
 - 4. Safety in the Transportation, Storage, Handling and Use of Explosive Materials
 - 5. Safety Guide for the Prevention of Radio Frequency Radiation Hazards in the Use of Electric Blasting Caps

- C. National Fire Protection Association (NFPA)
 - 1. NFPA 495 - Code for the Manufacture, Transportation, Storage and Use of Explosive Materials, 1985 Edition
 - 2. NFPA 498 - Standard for Explosives, Motor Vehicle Terminals, 1985 Edition
- D. U.S. Department of Labor, Occupational Safety and Health Administration (OSHA), Construction Standards and Interpretations 29 CFR Part 1926, Subpart U, Section 1926.900, "Blasting and Use of Explosives", final rule dated December 16, 1972.
- E. Official Code of Georgia (OCGA); Code Section 25 - Georgia Blasting Standards Act of 1978, Code Section 25-9-1, et seq.
- F. Vibration Subcommittee of the International Society of Explosive Engineers (ISEE), blast monitoring equipment operation standards (1999).

1.06 QUALITY CONTROL

- A. The design and execution of blasting shall be performed under the on-site supervision of a licensed blaster certified in the State of Georgia.
- B. The Contractor shall perform blast monitoring as required to satisfy its legal obligation relative to all permits and all applicable federal, state and local codes, laws, regulations and ordinances, and its contractual responsibilities, including safety.
- C. The Engineer may perform blast monitoring to verify conformance with regard to air-overpressure (noise) and peak particle velocity criteria defined by this Section.
- D. All persons that handle explosive materials, have control over them, or access to them, must not be prohibited persons, as defined in Section 555.11 of 27 CFR (ATF Rules).

1.07 SUBMITTALS

- A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents in writing prior to or at the time indicated. Failure to do so will prevent progression of the Work to the next stage:
- B. Contractor Qualifications and Evidence of Experience: Submit resumes of proposed blasting supervisor or supervisors to the Engineer. Resumes shall

contain listing of experience, references with phone numbers and copies of all required blasting licenses. **(60 Days Prior to Blasting)**

- C. Blasting Supervisor Experience: Provide evidence to confirm that the blasting supervisor (blaster-in-charge) has a minimum of 10 years experience, directly related to the specific types of excavation blasting overseen. The blasting supervisor shall be able to document the completion of at least five projects of similar scope. Furthermore the blasting supervisor shall have experience in monitoring blasting operations (test blasts and production blasts), interpreting ground vibration, air overpressure, and impulse amplitudes for similar construction projects, and preparation of all blasting plans, test-blasting plans, and revisions to any of these plans. All blasting plans, test-blasting plans and revisions shall be submitted and signed by the blasting supervisor. **(60 Days Prior to Blasting)**
- D. Blasting Supervisor Qualifications: The blasting supervisor and supervising shift foremen shall be properly qualified and licensed in accordance with applicable federal, state and local government regulations. Necessary permits include an Explosives License issued by the Georgia Fire Safety Commissioner. The blasting supervisor shall work with the Georgia Licensed Structural Engineer, to be used for building surveys as required in Section 02020, paragraph 3.01, to determine the most effective and expedient seismic monitoring plan, where required. **(All Qualifications & Licenses To Be Provided 60 Days Prior to Blasting)**
- E. Permits: Submit a copy of all applicable permits and licenses for transportation, storage, and use of explosives to the Engineer prior to the start of blasting operations. Submitted permits must include a copy of Federal ATF blasting license listing all responsible persons, blasting use and storage permits issued by the Georgia State Fire Marshals Office, and any other necessary local permits. No explosives can be brought to any work sites until all necessary permits have been submitted to the Engineer. **(30 Days Prior to Blasting)**
- F. Regulations: Contractor shall obtain at least two copies of all applicable federal, state and local codes, laws, regulations and ordinances regarding the use of explosives. One copy of these codes, laws, regulations and ordinances shall be submitted to the Engineer at least 15 days prior to blasting. The second copy shall be maintained on-site in the Contractor's office, for review by all Contractor personnel involved in blasting. **(30 Days Prior to Blasting)**
- G. Blast Designs and Safety Measures: Submit to the Engineer the following information for initial test blasts and proposed production blast design for each shaft or open cut trench excavation as appropriate:
 - 1. Number, location, diameter, depth and orientation of drill holes on a scaled drawing of the excavation;

2. Type of explosive and weight of charge in each hole;
3. Type and nomenclature of detonators;
4. Type and distribution of stemming used to fill hole collars for charge confinement;
5. Total amount of explosives in the blast and maximum charge-per-delay;
6. Delay arrangement showing delay period in each hole;
7. Description of the proposed blasting system; and type of firing source;
8. Specific measures taken to protect structures, buried utilities and other facilities that may be potentially affected by blasting operations;
9. Type and methods of shaft covers, matting and containment of blast area to mitigate fly rock;
10. Description of and locations of signage used to announce blast warning signals to any persons that might enter blast areas;
11. Clearing, guarding and communication procedures to confirm that all persons are evacuated to safe areas and that blast areas are secured prior to blasting;
12. Prediction calculations for noise (air-overpressure) and peak particle velocity (PPV) at the closest structure and at other adjacent structures, pipelines or facilities that maybe potentially affected by blasting operations;
13. Any redesign of the blasting program shall be submitted to the Engineer.
(15 Days Prior to Blasting)

H. Blasting Safety and Security Plans:

1. A complete description of the clearing and guarding procedures that will be employed to ensure personnel, staff, visitors, and all other persons are at safe locations during blasting. This information shall include details regarding visible warning signs or flags, audible warning signals, method of determining blast area zones, access blocking methods, guard placement and guard release procedures, primary initiation method, and the system by which the blaster-in-charge will communicate with site security guards.

2. Detailed description of how explosives will be safely stored, transported and used at the various work sites. Plans shall explain how storage magazines and explosive transport vehicles will satisfy all applicable regulations. This plan shall also indicate how explosives will be inventoried, secured and guarded to prevent theft or unauthorized use of explosives.
3. If the Georgia State Fire Marshal authorizes overnight storage of the explosives, the Contractor must submit a detailed storage plan that includes scaled maps indicating proposed location of detonator and explosives that will be stored overnight, distances to nearest occupied buildings, roadways and other limiting items in the American Table of Distances.
4. Include Material Safety Data Sheets (MSDS) and specific details about hazard communication programs for employees.
5. Equipment that will be used to monitor the approach of lightning storms and in the event of such, evacuation and site safety security plans.
6. Contingency plans for handling of misfires caused by cut-offs or other causes.
7. Fire prevention plan details, including smoking policies, procedures and limitations for work involving any open flames or sparks, description and location of all firefighting equipment, and fire fighting and evacuation plans.
8. Initial and ongoing blasting and fire safety training programs.
9. Description of the personal protective equipment that will be used by the Contractor's personnel, including but not limited to, safety glasses, hard-toe footwear, hard hats and gloves.
10. Description of blast monitoring equipment and listing of individuals that will operate such equipment. Submittal shall indicate that all equipment meets the standards defined in Article 2.02 of this Section.
11. The Contractor's Safety Representative shall ensure that ongoing blasting work complies with all applicable regulations.
12. Submit copies of ATF Employee Possessor questionnaire forms (OMB No. 1140-0072) or ATF letters of clearance for all employees that will possess explosives for this work as defined in 27 CFR Part 555. Contractor employees, without submitted evidence of satisfactory ATF clearance, must not handle, control or have access to explosive materials.

13. Ground vibration and air-overpressure monitoring records: submit two copies of all 4-channel monitoring records done independently of the monitoring performed by the Engineer.
14. Deliver to the Engineer, 15 days prior to the start of blasting at any location, two bound copies of the property condition inspection reports (condition survey) containing all field notes, sketches, diagrams, photos and videos as described by the Engineer.

(15 Days Prior to Blasting)

- I. Blasting Records: Maintain a record of each blast detonated. Within one working day following each blast, the blasting records and information for each blast detonated shall be submitted to the Engineer with the following information:
 1. Depth of blast holes and the location of the blast point in relation to Project stationing;
 2. Type, strength and quantities of all explosives, types and quantities of detonators, powder factor (lb/cy), and actual firing times of all charges;
 3. Total explosive loadings per round and maximum charge per delay;
 4. Type of rock blasted;
 5. Reference to approved blast design submittal noting any modification;
 6. Time spent scaling rock and approval of rock scaling by designated individual;
 7. On a diagram of the approved blast pattern indicate any holes not drilled, drilled but not loaded, changes in spacing or in pattern of delay charges or in loading of holes. Include notes explaining why changes were made;
 8. Submit an evaluation of the blast indicating tights, areas of significant overbreak and any recommended adjustments for future blasts;
 9. Comments by the blaster in charge regarding any misfires, unusual results, or unusual effects;
 10. Date and exact firing time of blast; name of person in responsible charge of loading and firing and blaster permit number;
 11. Signature and title of person making recording entries;

12. Record of peak overpressure: Two copies of all blast vibration monitoring data obtained independent of monitoring performed by the Engineer. Submit hard copies of 4-channel waveforms for each blast;
13. Any other records required by federal, state and local codes, laws, regulations and ordinances.

(One day after Blasting)

J. Notification:

1. For all work sites prior to starting blasting, the Contractor shall notify the appropriate local municipal officials, above- and below-ground utility owners, the general public expected to be potentially affected of the Contractor's intent to conduct controlled blasting operations. Notice shall be given to all operators of all buried pipes, cables, conduits and overhead utility lines and poles located within a 200-foot radial distance of the blast area.
2. Notification to appropriate local municipal officials and utility owners or operators shall be done in writing, at least 48 hours prior to the start of blasting at a particular site or sooner if so required by any applicable local law or regulation, and shall indicate the expected frequency of blasting, hours that blasting might occur and the expected date that blasting will be completed. Upon completion of blasting at the particular site, utility owners or operators shall be notified that blasting has ceased in the area for the duration of the Project.
3. The Contractor shall furnish the Engineer with a list of those parties notified in accordance herewith prior to the start of such blasting. The list shall include names, addresses and telephone numbers.
4. The Contractor must submit copies of written notification letters sent to the responsible fire protection agency for any sites where explosives are stored overnight. These letters shall be submitted to the Engineer at least 48 hours before any explosives are stored at the site. These letters must be submitted by the Contractor to the responsible fire protection agency, 48 hours before explosives are stored at the site.

1.08 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver all explosives to magazines by land transportation in accordance with all applicable federal, state and local codes, laws, regulations and ordinances.
- B. Storage of Explosives

1. Transportation, use and storage of explosives shall be as prescribed by the most stringent of the rules promulgated by all federal, state and local codes, laws, regulations and ordinances, and these Specifications.
2. Initiation devices shall not be stored, transported, or kept in the same place in which other explosives are stored, transported, or kept.
3. Only those explosive materials required for a 24-hour period shall be allowed at the construction sites. Storage of explosives during non-blasting periods is not permitted and the day-storage magazine shall be empty during these periods. If storage permits are obtained, the maximum amount of explosives must not exceed limits set by ATF rules (American Table of Distances).
4. No statement in these Specifications shall be considered to relieve the Contractor from sole responsibility for the safe transportation, use and storage of explosives.

1.09 JOB CONDITIONS

- A. Extra caution and skill will be required to accomplish the Work in a satisfactory manner. Blasting must be safely performed in close proximity to residential communities and other structures. Effects of blasting must also be controlled to maintain the integrity of the grouted rock adjacent to the tunnel and shaft excavations to minimize groundwater inflows. The Engineer will exercise its prerogative to examine carefully the qualifications of any persons whose knowledge and skills may bear on the outcome of the Work. In addition, the Engineer may reject any person who is deemed unqualified for any tasks that may be required.
- B. Methods of construction shall be such as to ensure the safety of the Work, Project participants, the public, third parties, and adjacent property, whether public or private. All work shall comply with all federal, state and local codes, laws, regulations, and ordinances. The Contractor is solely responsible for maintaining safe working conditions at the jobsite at all times.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Only explosive and initiation devices packaged by federally-licensed explosives manufacturing firms shall be used in blasting. All explosives and Blasting agents to be used underground shall meet the Fume Class I requirement of the Institute of Makers of Explosives (IME). This restriction does not apply to detonation cords that may be used for trunk lines or in controlled perimeter blasting charges.

- B. Only packaged or cartridge type, non-flowing explosives shall be used in the works. Black powder and nitroglycerine are prohibited for all blasting.
- C. Non-electric detonating devices shall be used.
- D. Only explosives designed and manufactured for smoothwall (trim) blasting shall be used in perimeter holes for blasting in the shafts, trenches and diversion structure excavations. The linear charge-weight-per-foot of explosives used in shaft perimeter and tunnel back and rib holes shall not exceed 0.4 lb/ft. This limitation does not apply to the primer stick, which must not weigh more than 0.5 pounds. Cartridge configurations and detonating cord shall be included in the linear charge weight-per-foot.
- E. Explosives, blasting agents, primers, initiators, and ancillary blasting materials shall be kept in original packaging with clearly marked date codes. All explosives and initiating devices used shall be less than one year old.
- F. If the Engineer determines that a blasting product appears to be in a damaged or deteriorated condition, the suspect product shall not be used until its condition can be determined. Products found to be damaged or in a deteriorated condition shall be immediately returned to the supplier for safe disposal.

2.02 BLAST MONITORING EQUIPMENT

- A. Equipment for on-site and off-site particle velocity and air overpressure monitoring shall be 4-channel (one overpressure and three seismic channels) units capable of digitally storing collected data. Equipment must be capable of printing ground motion time histories and summaries of peak motion intensities, frequencies and USBM R18507 PPV frequency plots. Printed report records must also include date, time of recording, operator name, instrument number and date of last calibration.
 - 1. Instruments shall have a flat frequency response between 2 and 250 Hz for particle velocity and from 2 to 200 Hz for air-overpressure.
 - 2. The digitizing sampling rate for peak particle velocity and air overpressure measurements shall be at least 1,024 samples per second.
 - 3. Seismographs shall be capable of performing a self-test of velocity transducers and printed event records shall indicate whether or not the sensor test was successful.
 - 4. Seismographs used for off-site compliance monitoring shall be capable of recording overpressure from 100 to 148 dB-L, and particle velocity from 0.05 to 5.0 inches/second.

5. Systems shall be capable of providing printed event reports that include all peak measurements, frequencies and complete waveform plots.
 6. Seismographs shall have adequate memory to digitally record the entire duration of the blast-induced motion.
 7. All seismograph/software systems shall be capable of saving back-up copies of all event files.
 8. If the frequency of blast-induced ground motion for close-in blasting is expected to exceed 250 Hz, monitoring shall be done with instruments that measure acceleration with intensities up to 10 gs and at frequencies between 200 and 5,000 Hz.
- B. The Contractor shall supply the Engineer with four blast monitoring units as described in Article 2.02, Paragraph A, for the duration of the blasting and for each area of the project where blasting is taking place. The Contractor shall provide for annual calibration for each of the blast monitoring units and any repair or maintenance required.

2.03 CONDITION SURVEY

Prior to the commencement of any shaft or open cut trench blasting operation, a pre-construction survey shall be conducted as directed by the Engineer.

PART 3 – EXECUTION

3.01 GENERAL BLASTING LIMITATIONS

- A. Perform blasting operations in trenches, shafts and other open excavations only during daylight hours as noted in paragraph 1.03.
- B. Blasting vibration and air-over pressure (noise) limitations are defined in paragraphs 3.05 and 3.06 below.

3.02 WARNING SYSTEM

- A. The Contractor shall erect signboards of adequate size stating that blasting operations are taking place in the area, and such signs shall be clearly visible at all points of access to the area. These signs shall also clearly display the audible warning signals (horn signals) that will be used to warn all people in the area of the impending blast.
- B. An audible blast warning system shall be established, publicized, and operated only during blasting hours.

- C. The Contractor shall operate a system to ensure that no personnel remain underground during blasting operations and blasting operations shall not be undertaken until it can be demonstrated that all personnel are accounted for and in a safe location.

3.03 BLASTING OPERATIONS

- A. The Engineer shall be notified 24 hours before blasts occur at any specific location. The Contractor shall provide the Engineer with a schedule for all blasts and shall notify the Engineer if any blast is delayed for more than one hour. However, the Contractor will be allowed to re-shoot missed holes and tights, as they are uncovered without advance notice to the Engineer.
- B. Acceptable Controlled Blasting methods will be those utilizing smooth wall blasting, cushion blasting, and line drilling techniques. Use of “pre-splitting” in shafts and surface excavations is specifically prohibited. Maximum drill round lengths, including subdrilling shall not exceed 0.75 times the minimum dimension of the tunnel or shaft opening. The first eight feet of shaft or open cut trench excavation shall utilize rounds that do not exceed four feet in length. The 4-foot round length restriction does not include subdrilling which shall not exceed 6 inches.
- C. Holes shall not be charged with explosives at the same time that drilling or other mechanized equipment not needed to charge the round is being operated within 50 feet of the blast area.
- D. The first blasting operation shall be conducted by the Contractor as a test case. The first test blasts shall be no larger than 25 percent of the planned production design blast sized as measured by charge-weight-per-delay. The second and third test blasts shall be no larger than 60 and 100 percent respectively of the planned production design blast. Alternate test blasting plans may be proposed by Contractor with approval of Engineer. After each test blast and review of test blasting data, the Contractor and Engineer shall meet to review the program. Modifications to the blasting program may be required as a result of this review. Drilling and delay patterns, amount and type of explosive to be used in subsequent production blasts shall be revised according to the results of the test case.
- E. Monitoring and recording of air-overpressure and vibration will be performed by the Engineer for every blast round. The results will be provided to the Contractor within 24 hours of the blast, for review. Changes in drilling and delay patterns and amount of explosives shall be made when tests indicate vibrations and/or overpressures in excess of that specified herein. Any major changes in the production blast design shall be submitted to the Engineer.
- F. All blasts in shaft and open cut trench excavations shall be covered with a sufficient number of steel cable mats or other substantial covering device in

order to prevent injury to persons and property, including the structure and equipment used in connection with shaft or open cut trench operation, from flying rock or other material

- G. All transportation of explosives on the surface or underground and any handling, blast charging or tie-in operations shall be stopped immediately upon the approach of an electrical storm, and all persons shall immediately be evacuated from the blasting area to a place of safety. Persons underground shall be notified of the approach and cessation (all clear) of an electrical storm, each by means of different signals. In shafts, trenches or other excavation handling explosives, loading of holes, connecting up or firing of charges shall not be performed during an electrical storm and all persons shall withdraw to a safe distance from a partially or totally loaded face. During such storms, explosives on the surface shall be left in OSHA-approved transport containers, delivery vehicles, day-storage boxes or in approved storage magazines. At all times, explosives shall be watch guarded and secured by the Contractor's personnel that are in safe locations.
- H. All light and power circuits shall be disconnected and/or removed to a point not less than 100 feet from the face while explosives are being transported into the area and while the loading operations are taking place. During the loading operations only OSHA approved lighting may be used.
- I. Use dust suppressant measures with air-powered or air-flush rock drilling equipment.
- J. Wet down the muck pile after blasting to control dust during mucking operations.

3.04 SHAFT BLASTING

- A. Excavation to final rock surfaces shall be carried out using smoothwall blasting techniques to minimize the damage to the finished rock surface.
- B. The perimeter holes for smoothwall blasting shall conform to the following requirements:
 - 1. Hole spacing shall not exceed 18-inches unless a variance is approved by the Engineer. Justification to increase hole spacing shall be based on results from the test blasts.
 - 2. Explosives, excepting the primer stick, shall be distributed evenly and decoupled from wall of hole. The maximum charge-weight-per-foot of the primary column explosive (loading factor) shall not exceed 0.4 lb/ft. The weight of the primer stick or booster used in smoothwall-perimeter holes shall not exceed 0.5 pounds.
 - 3. Burden shall be between 1.2 and 1.5 times the hole-spacing.

- 4. Lookout of perimeter holes shall be limited to the minimum necessary to collar the next round.
- C. The first eight feet of shaft excavations shall utilize rounds that do not exceed four feet in length.

3.05 VIBRATION/AIR-OVERPRESSURE (NOISE) LIMITATIONS

- A. Air- overpressure shall not exceed 130 decibels when monitored with an instrument with a 2-hertz high pass at any occupied structure. Air overpressure monitoring shall take place at the nearest residential or business structures susceptible to damage or claims of annoyance.
- B. Heavy shaft covers constructed with steel frames covered with wood planking with a minimum thickness of 2.5 inches shall be placed over construction shaft collars to reduce noise and contain flying debris generated by all shaft rounds and open cut trench rounds that could cause flyrock to be ejected from the shaft or exceedance of the air overpressure limits as defined by this section. Overlapping conveyor belt skirts shall be attached to the sides of the shaft cover to close openings between the shaft collar and cover. To meet the specified 130 dB air-overpressure limit, the Contractor should be prepared to install additional sound reducing materials on the shaft cover. If the shaft cover is substantial enough, the Engineer may allow the Contractor to discontinue covering shaft rounds with blasting mats.
- C. All measurements of blast-induced air-overpressure shall be done in accordance with the standards developed by the Vibration Section of the International Society of Explosives Engineers-1999.

3.06 VIBRATION LIMITATIONS AND CONTROL

- A. The maximum intensity of motion in the vertical, longitudinal and transverse directions, measured in the ground near any building or other surface structure shall not exceed 0.5 inches per second at any frequency of motion
- B. The maximum intensity of motion in the vertical, longitudinal and transverse directions, measured on the ground above any buried utility lines or pipes shall not exceed 4 inches per second at any frequency of motion.
- C. The Contractor shall monitor each blast with four (4) seismographs located, as approved, between the blast area and the closest structures and/or utilities. The seismographs used shall be capable of recording Particle Velocity and frequency for three (3) mutually perpendicular components of vibration in the range generally found with Controlled Blasting.

- D. All measurements of blast-induced ground motion shall be performed in accordance with the standards developed by the Vibration Section of the International Society of Explosives Engineers – 1999 not to exceed:
1. At structures and utilities in the vicinity of blasting operations, the peak particle velocity resulting from blasting shall not exceed:
 - a. Frequency < 3 Hz: 0.2 inches/second.
 - b. Frequency 3 - 10 Hz: 0.5 inches/second.
 - c. Frequency 10 - 40 Hz: varying linearly 0.5 to 1.0 inches/second.
 - d. Frequency > 40 Hz: 1.0 inches/second.

The above limits are adopted from modified blasting level criteria given in U.S. Bureau of Mines Recommendations RI-8507.

2. At the nearest structure liable to damage from air blast overpressure, the mean peak air blast overpressure shall not exceed 0.01 psi.

Measure readings for peak particle velocity in three orthogonal directions by equipment approved by the Engineer that is either continually recording or triggered by a preset level of vibration. Determine particle velocity in each frequency range by spectral analysis. Zero crossing method to determine frequency is not acceptable.

- C. If the shaft or open cut trench to be excavated by blasting is for a pipe less than or equal to 18-inch diameter then existing structures within 25-feet of the edge of the shaft or open cut trench shall receive a full structural survey by a Georgia Licensed Engineer. If the shaft or open cut trench to be excavated by blasting is for a pipe greater than 18-inch diameter then existing structures within 50-feet of the edge of the shaft or open cut trench shall receive a full structural survey by a Georgia Licensed Engineer.
- D. Exercise all possible care in drilling and blasting operations to ensure the stability of the remaining rock and to keep overbreak to a minimum. Controlled blasting techniques shall be used.
- E. At each work site where blasting is being performed, erect signboards of adequate size stating that blasting operations are taking place in the work site and such signs shall be clearly visible at all points of access to the work site.
- F. Monitor the first blast at each location as a test case, and modify the initial blast design for that location if the monitoring record indicates that the vibration and air blast overpressure limits were exceeded or may be exceeded in subsequent blasts. Resubmit the blast design to the Engineer. Continue vibration recording and air blast overpressure

monitoring for every blast, and further adjustments to the blast design shall be made when the records indicate vibration or air blast overpressure in excess of the established limits.

- G. Before the firing of any blast where flying material may result in damage to persons, property or the work, cover the rock to be blasted with a suitable matting to prevent flying debris. After a blast is fired, remove all loose and shattered rock or other loose material which may endanger the structure or the workers, and make the excavation safe before continuing with the work. Carry out similar checks on previously excavated sections at least every 48 hours and recheck the support system, tightening lagging and blocking, and adding rock dowels, mesh and other support measures as required. Before drilling new blast holes, thoroughly clean the face and examined the face for holes containing undetonated explosive.
- H. In the event that damage occurs due to blasting work, suspend all blasting immediately and make a report to the Engineer. Before resuming blasting, adjust the blast design and resubmit it to the Engineer, and take any other appropriate measures to control the effects of blasting.
- I. If blasting causes excessive overbreak or excessive fracturing of the surrounding rock, or is otherwise detrimental to the work, modify the blast design as necessary to achieve the desired result, and resubmit it to the Engineer.

3.07 SUSPENSION OF BLASTING

- A. Blasting operations may be suspended by the Engineer for any of the following reasons:
 - 1. The Contractor's safety precautions are inadequate.
 - 2. Air overpressure or ground motion levels exceed specified limits.
 - 3. Existing structural conditions on and off site are aggravated and are damaged by blasting.
 - 4. Blasting cause's instability of slopes or causes damage to rock outside the prescribed limits of excavation.
 - 5. The results of the blasting, in the opinion of the Engineer, are not satisfactory.
 - 6. Failure of the Contractor to adhere to the submitted and accepted blast plan.

- B. Blasting operations shall not resume until the Engineer has approved the Contractor's revised blasting plan with modifications correcting the conditions causing the suspension.

3.08 PRE-BLAST/POST-BLAST INSPECTIONS

Pre-blast and post-blast inspections will be performed as specified by the Engineer.

3.09 DAMAGE REPAIR

When blasting operations damage off-site properties or a portion of the work or material surrounding or supporting the work, promptly repair or replace damaged items to the condition that existed prior to the damage, to the satisfaction of the Engineer.

END OF SECTION

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SECTION 31 90 00
GEOTECHNICAL INSTRUMENTATION

PART 1 GENERAL

1.01 WORK INCLUDED

- A. The purpose of geotechnical instrumentation is to provide data to the Contractor to control operations, and to permit the Engineer to monitor the Contractor's general compliance with the requirements of the Contract regarding ground movement in the vicinity of excavations, and protection of adjacent property. The instrumentation program specified herein and shown on the Plans is not intended to be used to ensure the safety of the work.
- B. The Contractor shall be responsible for monitoring ground conditions as necessary to conform to the requirements of the Contract. The instrumentation program required by this Section does not relieve the Contractor of responsibility for providing additional instrumentation and monitoring if, in the Contractor's opinion, such additional instrumentation and monitoring are necessary to accomplish the work.
- C. The Work specified in this Section includes, but is not limited to, requirements for furnishing, installing, and maintaining geotechnical instrumentation to monitor ground and facility movements and groundwater conditions within, around, and above the tunnel alignment. This Section also includes the settlement monitoring the Contractor is required to perform.
- D. At a minimum, the Contractor shall install the instrumentation shown on the Drawings and as specified. Additionally, the Contractor shall install instrumentation as necessary to control operations, monitor ground conditions, and ground response to achieve specified project requirements and to prevent damage to existing structures and facilities.
- E. The Contractor shall install the instruments as specified at the locations shown on the Drawings. The Contractor will survey and monitor all geotechnical instrumentation and furnish the Engineer with results.
- F. The Contractor shall complete an as-installed position survey to determine the horizontal and vertical positions of settlement and utility markers in accordance with the requirements herein and furnish the Engineer with a copy of the results within 24 hours of field data acquisition.
- G. Unless otherwise noted or instructed by the Engineer, the Contractor shall abandon all instruments upon completion of the work.

1.02 SUBMITTALS

A. In accordance with Item GC-62.2, Submittals

B. Geotechnical Instrumentation:

1. Submittals listed below shall be submitted at least 30 days prior to specific activity.
 - a. Instrumentation shop drawings detailing locations, depths based on general information shown on the Drawings, type, details, and other pertinent information showing the installation details for each type of instrumentation required.
 - b. Drawing that indicates the locations of control points and benchmarks associated with surveys for monitoring geotechnical instrumentation.
 - c. Description of methods for installing and protecting all instruments.
 - d. Schedule of instrument installation related to significant activities or milestones in the overall project.
 - e. Following installation of the instruments and prior to the start of underground construction, submit as-built shop drawings showing the exact installed location, the instrument identification number, the instrument type, the installation date and time, the heading station or portal or shaft excavation depth on the installation date, and installed locations of control points and benchmarks associated with surveys for monitoring geotechnical instrumentation. Include details of installed instruments, accessories, and protective measures including all dimensions and materials used.
2. Reports and Records:
 - a. Submit initial/baseline readings specified herein to the Engineer, in a format approved by the Engineer at least 15 days prior to the start of any construction activity within 100 feet of the tunnel alignment centerline or edge of the workshafts.
 - b. Submit the instrumentation data to the Engineer, in a format approved by the Engineer within 24 hours after the observation has been made.
 - c. As applicable, submit reduced data and updated data plots in ground movements within 2 working days after observations have been made.
 - d. Submit weekly summary of groundwater readings at each piezometer in format accepted by the Engineer with information regarding elevation or station of excavation progress for each reading. Provide brief narrative description on conditions in excavation, precipitation, and any changes in the vicinity of the workshaft area.

- e. Inform Engineer immediately when Action Limits or Displacement Limit is reached for any instrument.
 - f. Copies of abandonment forms for piezometers, subsurface settlement markers, and subsurface utility settlement markers.
 - 3. Permits and Consents: For drilling holes from ground surface and conducting monitoring activities and if necessary, for potholing to avoid utility interference.
- C. Movement/settlement and support system monitoring:
- 1. The professional engineer licensed in Georgia who prepared the excavation support system shall prepare a movement/settlement monitoring plan covering all excavation and earthwork described in the Sections:
 - a. Section 31 42 00, Shaft Excavation and Support.
 - b. Section 31 70 00, Microtunneling.
 - c. Section 31 70 10, Contact Grouting.
 - d. Section 31 70 12, Backfill Grouting.
 - e. Section 33 05 23, Guided Auger Boring.
 - 2. Submit a single monitoring plan that covers all excavations and trenchless installations that includes the required frequency of monitoring (minimum frequency in Part 3 of this Section) to ensure settlement is controlled. Monitoring shall include:
 - a. Onsite observation of the excavation support system performance, to be performed by the Contractor.
 - b. Position (survey) measurement of geotechnical instrumentation, to be performed by the Engineer, and additional monitoring performed by the Contractor (see paragraph 3 below).
 - c. Review of position measurements to assess ground movement, to be performed by the Contractor.
 - 3. The Contractor shall provide surveyor licensed in the State of Georgia to take position measurements of the instrumentation described in this Specification Section at the frequency indicated in the article "Movement/Settlement Monitoring" in Part 3 of this Section. Additional monitoring as required by the ground support engineer's plan shall be performed by the surveyor licensed in the State of Georgia retained by the Contractor. The Contractor's engineer shall review all measured data as required by this Specification Section.
 - 4. The Contractor shall provide monthly reports from Contractor's engineer on performance of ground support system elements and associated adjacent ground movements and protection of adjacent property. These reports shall also provide submittal of any ground support system design modifications that are required based on field observations and support system behavior.

1.03 DEFINITIONS

- A. Facility Settlement Marker (FM): A readily identifiable existing feature or new paint marking on an existing building; or an inscribed marking, approved surveyor's nail, or brass or stainless steel rod (pin) installed onto a manhole, vault, or other similar structure at predetermined locations to measure vertical elevation changes of a facility or structural element.
- B. Ground Surface Settlement Marker (GM): GMs are stakes, rods, or nails installed in unpaved or paved areas at predetermined locations to measure vertical (elevation) changes of the ground surface.
- C. Open Ground: Ground without any above or below-grade facilities, paved or unpaved roads, and utilities within a 25-foot horizontal radius.
- D. Subsurface Utility Settlement Marker (UM): UMs are rods within protective casings that are installed within holes advanced to the top of existing sewers or other utilities and function to measure elevation changes.
- E. Piezometer (PZ): A monitoring well constructed in a borehole using a riser pipe section near the ground surface and a specially slotted pipe section (well screen) above the bottom of the well. The well screen length and position normally extends from several feet above to several feet below the anticipated water table range.
- F. Water Level Sensor (WS): A water level sensor measures the water level in a well or standpipe by sensing the level of the water when a special electrical contact tip touches the water surface. The tip is attached to the end of a specially marked graduated cable that enables the reader to measure the depth to water below the top of the well riser.
- G. Workshaft: Launching or receiving shaft.

1.04 QUALITY ASSURANCE

- A. The Contractor shall notify the Engineer at least 24 hours prior to all instrumentation installation operations so that the Engineer may monitor the installation work.

1.05 TOLERANCES

- A. GMs and UMs shall be installed within 12 inches of the horizontal locations indicated on the Plans or approved shop drawings.
- B. Should actual field conditions prohibit installation at the locations and elevations indicated on the Drawings, prior acceptance shall be obtained from the Engineer for new instrument locations and elevations.

1.06 PROJECT CONDITIONS

- A. Obtain necessary permits for the installation of monitoring systems.
- B. Provide the Engineer and the Owner access to the instruments at all times.

PART 2 PRODUCTS

2.01 SETTLEMENT MARKERS

- A. Ground surface settlement markers (GM) in unpaved areas shall consist of a 2-inch by 2-inch by 12-inch long hardwood stake or a 12-inch long, 1-inch diameter (No. 8) reinforcing bar driven approximately 10 inches below grade as shown in the Plans. In paved areas GMs shall be hardened surveyor "PK" nails that are securely fastened by driving or epoxy grouting within a properly sized hole, flush with the pavement.
- B. Facility settlement markers (FM) on buildings shall be if possible a readily identifiable existing feature, otherwise FMs shall be a durable paint marking on the building. Facility settlement markers on manholes and similar structures shall be distinct, durable markings located on a high point or other point that is suitable for consistent survey accuracy.
- C. Subsurface Utility Settlement Marker (UM): UMs consist of a rod or pipe installed with centralizes within a protective PVC casing that is grouted in place within a hole advanced to the top of existing sewer or other utility that is being monitored as shown in detail on the Drawings.

2.02 PIEZOMETER/OBSERVATION WELL (PZ)

- A. Piezometers have been installed during the geotechnical investigation phase for the Contractor's and Owner's use. Refer to the Drawings for locations and Geotechnical documents for more data on the installations.

2.03 WATER LEVEL SENSOR (WS)

- A. Water level sensors provided under this contract shall have electronic sensors with both a light and buzzer indicator. The water level sensor shall have a sensitivity dial to adjust for variations in water chemistry. It shall be provide with a 100 foot long cable on a reel with labeled foot marks and depth marks at tenths of a foot. Provide water level sensors with a carrying case.

PART 3 EXECUTION

3.01 GENERAL

- A. Instrumentation shall be installed at the locations indicated on the Plans or approved shop drawings, and as approved by the Engineer.

- B. Locate conduits and underground utilities in all areas where borings are to be drilled and instruments installed. Instrument locations shall be modified, as approved by the Engineer, to avoid interference with the existing conduits and utilities. Repair damage to existing utilities resulting from instrument installations at no additional cost to the Owner.
- C. Engineer shall have access to instrument locations and Contractor's cooperation is required in obtaining monitoring data, including the provision of assistance, as required.
- D. All instruments shall be clearly marked, permanently labeled, and protected to avoid being obstructed or otherwise damaged by construction operations or the general public.
- E. Geotechnical instrumentation shall be installed and baseline surveys or initial readings completed before commencing any excavation work for shafts and tunnels.
- F. Location Surveying: Promptly following installation, the Contractor shall survey and provide horizontal coordinates and vertical elevations of the ground surface and top of all instruments.
- G. Drilling from the Ground Surface: Contractor shall obtain any permits required for boreholes drilled from the ground surface. Obtain necessary permits for each such instrument and conform to the permit requirements during drilling and installation.
- H. Initial Reading: Following instrument installation and prior to the start of any construction activity within 100 feet of the tunnel alignment centerline or edge of the shafts, the Contractor's surveyor, shall take a minimum of two sets of initial readings to provide baseline readings and to demonstrate the adequacy of the completed installation.
 - 1. Installation of the instrumentation by the Contractor does not preclude the Owner, through an independent contractor, from installing instrumentation in, on, near, or adjacent to the construction work.
 - 2. Elevations shall be recorded to a precision of 0.001 of a foot. Horizontal survey accuracy shall be at least 0.01 feet.
 - 3. The Contractor shall take additional survey(s) as requested by the Engineer if in the opinion of the Engineer the two sets of initial readings do not adequately establish the baseline level. After initial readings are approved by the Engineer, the average of the two sets of initial readings shall be used to establish the baseline level of the instrument, unless otherwise directed by the Engineer.

3.02 FACILITY AND GROUND SURFACE SETTLEMENT MARKERS

- A. FMs and GMs shall be installed where indicated on the drawings, and approved submittals. Markers shall be installed firmly to prevent loosening and in a manner and location that allows survey rods to be consistently placed on the high point of the marker head or point being measured.
- B. GMs shall be installed at the required locations as shown on the Plans. The method of installation shall be the Contractor's option; however, the marker shall be rigidly affixed so as not to move relative to the surface to which it is attached.
- C. All FM locations on buildings shall be approved by the Engineer. If on a building foundation a readily identifiable feature cannot be identified for an FM, the Contractor shall use a durable paint that will not damage the surface finish.

3.03 SUBSURFACE UTILITY SETTLEMENT MARKERS

- A. UMs shall be installed where indicated on the plans or the approved submittals. Drilling to install subsurface settlement markers shall be carefully advanced to prevent damage to pipelines. Advancement of the borehole within 12-inches of the top of the pipeline shall be by water jetting action from internal drill rods with little or no further lowering of the drill casing or hollow-stem auger. Alternatively, vacuum excavating or potholing methods shall be used to advance the boreholes to the top of the utility.
- B. A 6-inch minimum thickness bentonite seal (or other sealing material as approved by the Engineer) shall be placed at the bottom of the borehole to prevent annular backfill and surrounding soil from entering the PVC casing. The bentonite shall be hydrated with water prior to placement of the PVC casing. Where the bottom of the borehole is dry, the bentonite pellets may be crushed prior to placement to facilitate hydration.
- C. The PVC casing shall be inserted to the bottom of the borehole, and the annular space outside the PVC casing backfilled with grout. Drill casing or hollow-stem casing shall be withdrawn in a manner to prevent collapse of the borehole and lifting or separation of the PVC casing. After the annular space is filled, the inside of the PVC casing shall be flushed with clean water to remove any soil and grout. A steel rod or pipe with centralizers (see detail in plans) that is cut to the required length shall be set in firm contact with the top of the utility. A protective cover shall be installed. The installation shall conform to the details shown in the Drawings.

3.04 INSTRUMENT PROTECTION, MAINTENANCE AND REPAIR

- A. Flag and protect all locations. Exercise care during construction so as to avoid damage to instrumentation. Repair or replace instrumentation that is damaged as a result of the contractor's operation at his expense. The Engineer will determine whether repair or replacement is required. Complete the repair or replacement as soon as practical after notification by the Engineer as to whether a repair or replacement is required.
- B. Instruments shall be maintained by draining any accumulated water, removing any debris from under protective covers and keeping covers locked and sealed at all times.

3.05 PROTECTION OF PROPERTY AND GROUND MOVEMENT LIMITS

- A. The Contractor shall use whatever means and methods are necessary to limit ground movements, settlements and damage of utilities, structures and other facilities. These means and methods include, but are not limited to ground support systems, tunneling methods, underpinning of vulnerable facilities, grouting and other forms of ground improvement.
- B. The ground movement limits for all instruments are established as follows:

Facility	Action Limit (inch)	Displacement Limit (inch)
Above- and below-grade utilities, Street and general roadway pavement, General facilities	0.5	0.75
Open Ground	1.0	1.5

- C. If settlement of a facility or settlement marker reaches an Action Limit, the likely cause of the settlement shall be reported to the Engineer and actions shall be promptly taken to limit further settlements and to prevent Settlement Limits from being exceeded. Actions to be taken in response to measured settlements shall be reported to the Engineer before being taken, except in emergency situations. The cost of actions required to comply with settlement limits and to repair any damage to adjacent facilities shall be borne by the Contractor with no cost to the Owner.

3.06 MOVEMENT/SETTLEMENT MONITORING

- A. The Contractor shall develop and implement a settlement control plan to protect existing facilities, utilities, structures, roads, streets, and other improvements from damage due to settlement resulting from tunnel construction. The plan shall include the specific tunneling methods that will be used to minimize loss of ground, procedures for monitoring for loss of ground as specified herein, and ground improvement plans.

- B. If necessary, obtain the permission of Engineer, in advance, to work outside of the work hours established for the project. The Contractor shall be responsible for making any necessary changes in construction methods to control loss of ground and minimize settlement to prevent damage to adjacent facilities, existing utilities, and adjacent structures.
- C. Monitoring of structures and ground movement: Submit a movement/settlement monitoring plan that complies with Article 1.02C of this Specification Section. Plan shall be prepared and sealed by a Civil or Structural Engineer registered with the State of Georgia. Monitoring required by this Specification Section is the minimum. If, in the opinion of the Contractor's design support engineer, additional instrumentation is required than that required by the Contract Documents, Contractor shall install the additional instrumentation at no additional cost to the Owner.
- D. For workshafts, monitor as follows: Monitor all instruments within 50-feet of the outer edge of workshaft daily beginning when workshaft construction, ground improvement, excavation or dewatering activity begins, whichever comes first. Continue daily monitoring until excavation is complete. Decrease the frequency of monitoring to twice a month until backfill and removal of excavation support of the workshaft are complete. Provide a brief description of the construction activity in the submittal of monitoring data.
- E. For tunnel excavation, monitor all instruments located within, around and above the excavation as follows:
 - 1. Monitor at least once every 5 hours, but not less than twice per day beginning when tunnel excavation approaches within 100-feet of the station of the instrument location. Continue monitoring at the same frequency until the tunnel drive is completed (i.e. small boring unit completely enters the receiving shaft).
 - 2. Upon completion of the tunnel drive, monitoring daily until contact grouting to fill exterior voids as required in Section 31 70 10, Contact Grouting is complete. Continue to monitor weekly until backfill and removal of excavation support of all workshafts for the project are complete or until directed by the Engineer to end monitoring.
- F. Actions to Mitigate Excessive Ground Movements:
 - 1. If displacement limit of a facility or settlement marker reaches an action limit, the likely cause of the displacement shall be promptly discussed with the Engineer. The Engineer may increase the monitoring frequency for all settlement markers and inclinometers within 100-feet of the location where the displacement action limit was exceeded. Review excavation and ground support operations and make operational changes or implement ground improvement or underpinning measures as appropriate to limit further displacements and to prevent

- displacement limits from being exceeded. Actions to be taken in response to action limits being exceeded shall be reported to the Engineer before being taken, except in emergency situations.
2. If displacement of a facility or settlement marker reaches a displacement limit, cease excavation or other construction operations that result in further displacement until additional operational changes are made to reduce ground loss around excavation. The likely cause of the displacement shall be immediately discussed with the Engineer. The Engineer may further increase the monitoring frequency for all settlement markers within 100 feet of the location where the displacement limit was exceeded and may add additional settlement markers. Review excavation and ground support operations and make operational changes or implement ground improvement or underpinning measures as appropriate to limit further displacements and to prevent displacement limits from being exceeded. Actions to be taken in response to displacement limits being exceeded shall be discussed with and approved by the engineer before being taken, except in emergency situations.
 3. The cost of actions required for complying with displacement limits and to repair any damage to adjacent facilities shall be borne by the Contractor with no additional cost to the Owner.

3.07 DISCLOSURE OF DATA

- A. The Contractor shall not disclose any instrumentation data to third parties and shall not publish data without prior approval and written consent of the Owner.

3.08 ABANDONMENT OF INSTRUMENTS

- A. Settlement Markers: All GMs shall be removed by the Contractor during the cleanup and restoration work, or sooner as allowed or required by the Engineer. Facility settlement markers may be abandoned without removal. UMs and SSMs shall be abandoned by removal of inner rods, filling of the protective casing with grout, and cutting and removal of protective casing to a depth of at least 5 feet below ground surface. Abandonment shall be documented and records submitted to the Engineer and agencies requiring abandonment records.

- B. Grout the full depth of instrument casings and pipes by tremie method or by pressure injection from the ground surface. Grout shall consist of cement and water, with the minimum amount of water necessary to allow pumping. Remove guard casings and valve boxes, and patch holes with materials and to a durability consistent with the surrounding surface. Remove structure settlement markers and inclinometers and patch holes. Salvaged material except readout instruments shall become the property of the Contractor. Readout instruments including any software used with the instruments for data collection will remain the property of the Owner.
- C. Abandon all design phase piezometers, and all piezometers and observation wells installed during the course of the work, unless directed otherwise by the Engineer. Abandonment of subsurface settlement markers, wells, and piezometers shall be in accordance with the requirements of local and State authorities. Submit copies of the complete ADNR abandonment forms to the Engineer within three work days.

END OF SECTION

SECTION 31 42 00
SHAFT EXCAVATION AND SUPPORT

PART 1 GENERAL

1.01 WORK INCLUDED

- A. This Section addresses the provisions and responsibilities to be considered by the Contractor and his ground support system design engineer in meeting requirements to design, furnish and install, and remove when applicable, the initial ground support for workshafts associated with the trenchless installation of the relocated Howell Mill Outfall Sewer.
- B. The initial support system is the support installed prior to or concurrent with excavation, to maintain stability of an excavation to be occupied by workmen, until the excavation is closed. A single system may be used to fulfill the requirements of both initial support system and final lining.

1.02 RESPONSIBILITY

- A. The Contractor shall be responsible for design of initial support systems for excavations not specified herein or shown on the Plans; and initial support systems to accommodate enlargements and other Contractor conveniences such as tail tunnel, switch locations, and thrust blocks. Contractor designed elements shall be in accordance with the Contract Documents, referring to all of the Plans, Specifications, and shop drawings submitted to provide details of support systems, attachments, embedments, finishes and other construction that affects the work covered under this Section.
- B. It is the Contractor's responsibility and his engineer to review the Plans, Specifications, and existing site conditions prior to bidding to ascertain the extent of the work requiring ground support systems.
- C. The design, furnishing of materials, installation, monitoring and removal of ground support systems is the sole responsibility of the Contractor. Ground support system and safety elements necessary for protection of adjacent property, excavation stability and safety of workmen during construction are not shown on the Plans but shall be designed, furnished and installed by the Contractor.
- D. Existing utilities such as underground sewerlines, water, gas, fiberoptic lines, overhead electric lines, and utility poles will be either within or adjacent to some of the workshafts. For utilities that are shown on the Plans, the Contractor is responsible for the protection and relocation of existing utilities, and the removal of abandoned utilities, as required for the construction of the workshafts. If existing utilities shown Drawings are damaged as the result of the

Contractor's construction activities, the Contractor is responsible for the cost of repairing damaged utilities. Unless otherwise shown, inside diameters of the utilities are shown on Drawings. The Contractor should field verify all utilities within 15 feet of the workshafts or the tunnel prior to excavation. Should the Contractor find other utilities not shown on the Plans, the Contractor will be compensated for reasonable time and materials required for relocating these utilities by a Contract modification.

1.03 DESIGN OF GROUND SUPPORT SYSTEMS

- A. The design of the ground support system shall be prepared for the Contractor by a professional engineer licensed in the State of Georgia, and employed or retained by the Contractor. This individual is referred to herein as the Contractor's engineer. The Contractor's engineer shall have at least 5 years of experience with design and construction of similar types of ground support systems and excavations. The Contractor's engineer shall maintain involvement and responsibility from design through installation, performance and abandonment or removal of ground support systems.
- B. All ground support system elements including sheeting, shoring, and bracing of excavations shall conform to the requirements of Subpart P, Excavations (Standard Number 1926.650 and 1926.651 of 29 CFR) of the Occupational Safety and Health Administration (OSHA).
- C. The design shall provide groundwater isolation, bottom stability and system stiffness sufficient to meet the Contract requirements for control of water and for protection of adjacent work and property as specified herein. The design shall be compatible with the Contractor's selected methods of excavation. The design shall provide for placement of initial support systems and removal of initial support systems where required and feasible. The design shall provide for construction of the permanent work, and all other construction operations and requirements.
- D. Design shaft excavation support systems and working slabs to withstand earth pressures, groundwater pressures, bottom heave, equipment loads, thrust block loads from pipe jacking, loads from making a portal for tunneling, applicable traffic and construction loads, and other surcharge loads to allow the safe construction of the tunnel without movement or settlement of the ground, and to prevent damage to or movement of adjacent structures, streets, and utilities. Design excavation support systems to be compatible with the anticipated geologic conditions determined by the Contractor based on information presented in the Geologic Data Report titled, Geotechnical Exploration Howell Mill Sewer Outfall Realignment, Howell Mill Road at Peachtree Battle Avenue NW, Fulton County Atlanta, Georgia, dated October 2016 and in accordance with AISC and ACI code provisions, as applicable.

1. Design each member or support element to support the maximum loads that can occur during construction with appropriate safety factors. Provide a minimum factor of safety of 1.5 for all structural members when subjected to the maximum combination of loads or stresses. The thrust block, if used, shall be normal (square) with the proposed pipe alignment and shall be designed to withstand the maximum jacking pressure anticipated with a factor of safety of at least 2.0, without excessive deflection or displacement.
 2. Design the support system to minimize horizontal and vertical movements, and to protect adjacent utilities from damage. The type and stiffness of each ground support system and the methods of ground support installation shall be designed and constructed in order to meet the ground movement limits and adjacent property protection requirements specified herein and in Section 31 90 00, Geotechnical Instrumentation.
 3. Design support system to maintain the stability of the excavation against sliding or bottom heave. Provide a minimum factor of safety against sliding of 1.5. Provide a minimum factor of safety against bottom heave due to adjacent surcharge pressures and hydrostatic uplift pressures or upward seepage pressures of 1.5.
 4. Employ combinations of wales, struts, tie-back anchors and beams for bracing and lateral support as required to support excavation faces and control groundwater and prevent loss of ground with ring beams and lagging, liner plate, sheeting systems or other methods of ground support. Provide struts with intermediate vertical and horizontal supports as required to prevent buckling. Provide timber lagging, liner plates, or steel sheeting as required to retain soil between supports. Provide dowels or bolts with full covering of mesh, steel ribs and lagging, or steel line plate as required to retain rock between supports. Trench shields and/or speed shores are not allowed for workshaft construction.
 5. Design a gravel pad or concrete working slab equipped with a sump to pump out construction water and storm water for shaft excavation bottoms to provide stable support for construction operations.
 6. Locate workshafts as required to construct the pipeline between the stations indicated on the Drawings.
- E. The support system shall be designed to positively ensure that no earth or other loading will be placed on the new work prior to the completion and until design strength has been reached. The Contractor shall be solely and completely responsible for any loss due to premature loading of the new work.

- F. The design shall specify the following items as a minimum: the quality of materials to be used for ground support systems; constraints on maximum excavation limits relative to support installation steps; tolerances for size and position of ground support elements; required preloading of ground support elements; restrictions on surcharge loads and other loads that may act on the ground support system such as jacking forces and grouting, ground freezing and groundwater pressures; ground support system and adjacent ground movement limits; provisions for subgrade stability and protection; and constraints on removal of support system elements as the permanent work is constructed and backfilling is completed.
- G. The Contractor's engineer shall periodically observe the installation of initial support systems to determine that the work is being put in place in accordance with the design. Site observations shall be made by the Contractor's engineer as often as necessary, to ascertain the installation conformance thereto. The Contractor's engineer shall provide the Contractor, and the Engineer on a monthly basis, a signed and sealed certification of the consistency of the installation with the design, as determined from his site observations and available geotechnical instrumentation data. The Contractor's engineer shall also indicate any significant concerns with the performance of ground support systems and his recommendations for mitigating these concerns.

1.04 RELATED SECTIONS

- A. Section GC-62.2, Submittals.
- B. Section 02140, Dewatering.
- C. Section 02200, Earthwork.
- D. Section 02405, Blasting.
- E. Section 31 70 00, Microtunneling.
- F. Section 31 70 10, Contact Grouting.
- G. Section 31 90 00, Geotechnical Instrumentation.
- H. Section 33 05 23, Guided Auger Boring.

1.05 REFERENCE STANDARDS

- A. The publications and standards listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by the abbreviation only. Unless otherwise stated, the most recent version or edition of each publication or standard is implied.

1. American Society for Testing and Materials (ASTM):
 - a. A36 - Standard Specification for Carbon Structural Steel.
 - b. A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
 - c. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
 - d. ASTM A1011M - Standard Specification for Steel, Carbon, Hot-Rolled Sheet and Strip Commercial Quality.
 - e. ASTM A572 - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Steels of Structural Quality.
2. Occupational Safety and Health Administration (OSHA): Particular attention is called to Subpart S of the OSHA Standards (29 CFR 1926/1920), published as U.S. Department of Labor Publication 2207, Revised October 1, 1979. Second revision dated August 1, 1989. See Federal Register dated June 2, 1989 for revised standard and commentary.

1.06 DEFINITIONS

- A. Initial Ground Support: the support system provided to maintain stability of an excavation made for any purpose and to be occupied by workmen, and construction activity, until the final support system structure is complete in place, and the excavation is closed, and the structure is backfilled. A single system may be used to fulfill the requirements of both initial support system and final support system.
- B. Shaft: The term "shaft" shall mean the manholes or other permanent vertical structures with a final shaft lining placed relatively close to a workshaft excavation. In conventional usage a "shaft" is a structure that is deeper than it is wide, but in the context of these Specifications the term "shaft" includes miscellaneous concrete structures that may be wider than they are deep that are constructed within workshaft excavations as defined below.
- C. Workshaft: The term "workshaft" shall mean the temporary ground excavation requiring a ground support system until the shaft structure to be constructed within the excavation is complete and the excavation around and over the structure is backfilled.

1.07 SUBMITTALS

- A. In accordance with Item GC-62.2, Submittals.

- B. Submit written documentation (in addition to a Certificate of Design) as supporting evidence of the qualifications of the initial ground support design engineer. Drawings and calculations shall be prepared and sealed by a professional civil engineer registered in the State of Georgia with at least three years experience in design and construction of ground support systems similar to those planned.
- C. Prior to beginning any trenchless installation or workshaft excavation, submit a Certificate of Design confirming responsibility for design and professional registration for design of workshaft ground support systems in accordance with the provisions specified herein.
- D. The Contractor shall obtain from his engineer and submit to the Owner's Engineer, no later than the 5th day of each month, a signed and sealed certification (letter memorandum or report) that, based on his observations, the work completed during the previous month pertaining to his (Contractor's engineer) design was installed and is performing substantially in accordance with the design concepts prepared by him. The Contractor's engineer shall also report any significant deviations from the submitted design concepts, any performance concerns observed and actions recommended to remediate these items. The Contractor's engineer certifications shall be made monthly during a period commencing with the start of excavation and ground support system installation, continuing during portal excavation and pipe jacking operations and ending when the ground support system has been abandoned and backfilled or removed and backfilled.
- E. Submit drawings and computations for workshaft excavations, excavation support systems, and other related information. As a minimum, the submittal shall contain the following information:
 - 1. Name and qualifications (including evidence of professional registration in the State of Georgia) of person responsible for ground support system design.
 - 2. Construction method to be used for the installation of each system, including sequence of installation and equipment description.
 - 3. Shop drawings and design calculations showing assumed loading conditions including equipment and stockpile surcharges, codes and reference standards used as a basis for design, estimated ground movements, system component design, arrangement of supports and construction sequence for proposed support system(s). Provide maximum allowable spacing between bracing points on compression members to maintain stability and alignment. Show the elevation of struts, braces, or other supports as related to the depth of excavation at intermediate stages of construction. Provide details of bottom slab, drains, and sump construction. Indicate sizes, shapes, and material specifications for all support elements including lagging, rock bolting,

anchored wire and mesh rock netting, if used. Calculations shall include estimates of likely deflections or deformations of the support system and maximum tolerable values. Calculations shall also show the thrust block design and an adequate structural factor of safety for the thrust block-wall system when subjected to the anticipated maximum jacking forces during pipe jacking.

4. Plans and procedures for protecting adjacent structures, utilities and facilities including: excavation, control of water, ground improvement, underpinning, monitoring and restoration of any damage.
5. A site plan for each workshaft indicating utilities, worksite access, site grading and site development details for the excavation and all work areas, and the proposed limits of disturbance surrounding each excavation.
6. Quality Control Procedures: address materials testing requirements and excavation monitoring provisions.
7. Workshaft abandonment plans, including backfilling and removal of support elements.

F. Submit the following data and reports during the work:

1. Summary of ground and groundwater conditions encountered.
2. As-builts of abandoned ground support system.
3. Any excavation monitoring analysis, including: horizontal and vertical deflections of supports, horizontal and vertical movements of adjacent ground and facilities, and measurements of strut loads being collected by the Contractor as specified by the ground support design engineer.
4. Monthly reports from Contractor's ground support design engineer on performance of ground support system elements and associated adjacent ground movements and protection of adjacent property.

PART 2 PRODUCTS

2.01 GENERAL

- A. The Contractor's ground support system design engineer shall specify ground support system material requirements in accordance with the submitted designs. The materials, however, shall meet the minimum requirements listed below.
- B. Incorporation of used prefabricated elements into initial support systems is permitted, provided the strength and stability of used elements is verified prior to incorporation, and allowances made for lost strengths, if any, due to existing damage or deterioration.

2.02 MATERIALS

- A. Materials used in construction of the workshaft support systems shall meet these requirements:
 - 1. Grout: In accordance with Section 31 70 10, Contact Grouting.
 - 2. All timber and structural steel used for the supporting systems, whether new or used, shall be sound and free from defects that may impair their strength.
 - 3. Structural Steel: Conform to ASTM A36 unless approved otherwise.
 - 4. Timber: All timber shall be structural grade with a minimum allowable flexural strength of 1,100 psi.
 - 5. Friction Rockbolts: Friction-type dowels such as Split Sets (Ingersoll Rand) or Swellex (Atlas Copco), or approved equal. Plates shall be as recommended by the manufacturer for supporting the mesh.
 - 6. Mesh: Acceptable Mesh Types:
 - a. Galvanized wire double twist hexagonal mesh: 3.5 x 4.5 x 11-inch gauge.
 - b. Galvanized wire chain link fabric: 2 x 2 x 9-inch gauge.
 - c. Minex Rock Mesh: 100kN x 80kN as manufactured by Tensar Earth Technologies, Inc., Atlanta, GA.

PART 3 EXECUTION

3.01 GENERAL

- A. Whenever necessary to prevent caving during excavation to protect adjacent structures, property, workmen, and the public, excavations shall be adequately sheeted and braced. All sheeting, shoring, and bracing of excavations shall conform to the safety requirements of the Federal, State, or local public agency having jurisdiction over such matters. The most stringent of these requirements shall apply.
- B. Design and install workshaft ground support systems to support all anticipated loads. Contractor designed elements shall be in accordance with these contract documents and shop drawings submitted to provide details of support systems, attachments, embedments, finishes and other construction that affects the work covered under this section.
- C. Review the plans, specifications, and existing site conditions prior to bidding.
- D. Control of water: In accordance with Section 02140, Dewatering.
- E. Workshaft ventilation: Conform to OSHA regulations.

- F. Design and furnish materials for installing, monitoring, maintaining, and removing ground support systems. Design, furnish and install ground support system and safety elements necessary for protection of adjacent property, excavation stability and safety of workmen during construction. These elements are not shown on the Plans.

3.02 BLASTING

- A. In accordance with Specification Section 02405, Blasting.

3.03 INSTALLATION OF INITIAL SUPPORT SYSTEMS IN SOIL

- A. Initial support systems for workshaft and structure excavations in soil shall consist of sheeting and bracing, steel ribs and lagging, steel liner plates, or comparable systems that satisfy the requirements of the Contract.
- B. Support systems shall be installed to permit the safe execution of the work, and to ensure that no ground loading or other loading will be placed on the new work prior to completion and until design strength of the structure being constructed has been reached.
- C. Initial support systems in soil shall be installed in a manner to prevent groundwater inflow into the workshaft excavations; control groundwater inflow into trench excavations; minimize loss of soil into excavations; minimize ground movements outside the excavations; maintain stability of the excavations; and preserve the in situ strength of surrounding soils.
- D. Install initial support systems in advance of excavation or within 5 feet of bottom of excavation as or closer if required for safety or by regulation, and as necessary to conform to these Specifications.
- E. During periods of shutdown, fully support the face and walls of excavations to prevent lost ground.
- F. Install initial support systems in a manner to limit vibrations on the ground adjacent the nearest structure to a peak particle velocity of 0.5 inches per second or less.
- G. In workshaft excavations in soil where the initial support system is located in an oversized excavation, such as sunken caisson systems, a bentonite or polymer slurry shall be continuously injected behind the support system to stabilize the soils surrounding the excavation.

- H. Where the ground support system selected and installation method result in more than 1 inch of void space outside of the support system in soil, contact grouting shall be performed behind initial support systems in soil as specified herein. Contact grouting shall be performed to control groundwater inflow and ground movement into the excavation, and to provide firm and uniform contact between the support system and the ground. Grout holes shall be located as necessary to fill all voids.

3.04 INSTALLATION OF INITIAL SUPPORT SYSTEMS IN ROCK

- A. Initial support systems for excavations in rock shall consist of steel ribs and lagging, dowels, bolts, mesh, or comparable systems that satisfy the requirements of the Contract.
- B. Install initial support systems in rock in a manner to maintain stability of the excavation, to prevent loosening or slabbing of the rock, and to control groundwater inflow to the excavation. Vary support systems as necessary to suit the rock conditions encountered in the excavation.
- C. Cover exposed rock surfaces in shafts with mesh, tight lagging, or comparable systems to prevent rock falls that could endanger personnel. Conform to OSHA requirements.

3.05 STEEL RIBS AND LAGGING

- A. Place ribs so that they conform to the Contractor's design and function as load carrying members. Eccentricity at dutchmen shall not cause overstress or excess deflection in the Contractor's design, as determined by its engineer.
- B. Install steel supports true to the lines and grades determined by the Contractor's engineer's design. The Contractor shall replace or repair support not located within design tolerances or damaged due to any cause whatsoever at no additional cost to the Owner.
- C. Vertical and horizontal deflections of circular or horseshoe shaped steel ribs shall be restrained by appropriate measures, that are to be identified in the Contractor's submittals.
- D. Contact between the ground and the rib and lagging system is to be maintained by the Contractor's selected means, such as: expansion of ribs; blocking; cribbing; wedging; grouting; or such other means compatible with the Contractor's engineer's design.

- E. Based on the Contractor's engineer's design, steel ribs shall be secured against horizontal or vertical movements or distortion by steel tie members and compression struts. Lagging, installed between flanges of the steel ribs may function as compression struts if considered in the design. The amount of blocking and lagging used with steel ribs shall not exceed the practical minimum that the Contractor's engineer considers necessary to safely support the ground.
- F. If skin tight lagging is necessary to support the ground, all voids between the lagging and the ground shall be filled with grout as specified herein, or by other means acceptable to the Engineer.

3.06 LINER PLATE

- A. Install liner plate in conformance with the plate manufacturer's recommendations, and in a manner that will not deform or overstress the completed rings. Prevent liner plate from deflecting more than 3 percent of design diameter under applied ground load.
- B. Install bolts and nuts specified in the liner plate design, and tighten in conformance with manufacturer's recommendations. Flanges shall be clean and free from material that could interfere with proper bearing. Stagger longitudinal joints in adjacent rings by one-half plate or at least two bolt spaces.
- C. Place steel rib supports. Use tie rods and braces to secure ribs against distortion. Block ribs against liner plate with hardwood wedges or blocks, and nail wedges as necessary to prevent loosening.
- D. Liner plate shall be assembled in a true circle and to the lines and grades presented on the initial support system plans. Contractor shall use hog rods or other restraint as he determines to maintain liner plate in a true circle until his grouting operations are completed.
- E. Contact grout annular space behind liner plate as specified herein. Place grout to maintain firm and uniformly distributed contact between the liner plate and the ground. Contact grout as frequently as necessary, but at least once per shift. Maintain liner plate ring in a true circle until contact grout is placed and set, using steel ribs, tie rods, or other restraint as necessary.
- F. Construct in a manner to allow drainage of groundwater from behind the support system, unless the support system has been designed to support hydrostatic loads.
- G. Prior to allowing excavation to stand overnight, advance the liner plate to within one liner plate width of the face, and contact grout.

3.07 DRIVEN INTERLOCKED STEEL SHEETPILES

- A. If driven steel sheetpiles are selected for workshaft support, the workshaft support system submittal shall, as a minimum, address the following items: interference with utilities, advancement past boulder obstructions; hard driving and sheeting advancement without damage within anticipated dense or hard ground; vibrations, noise and densification impacts; provisions for maintaining horizontal and vertical alignment control; size and method of structure and manhole placement, sequence of installation, structural design of the bracing system, structural design of thrust blocks for pipe jacking, method of constructing a bottom plug; and removal/abandonment plans.

3.08 CONTROL OF VIBRATIONS

- A. Vibrations from pavement breaking, demolition or installation and removal of driven sheeting for initial support systems shall be controlled to prevent damage to the work or adjacent property.
- B. The Contractor shall monitor ground vibrations at locations of structures as necessary to control adverse effects of vibrations. The Contractor shall monitor ground settlements as necessary to control adverse effects of settlements due to densification of loose soils from vibrations.

3.09 CONTACT GROUTING

- A. In accordance with Section 31 70 10, Contact Grouting.

3.10 BACKFILLING OF SHAFTS/PITS

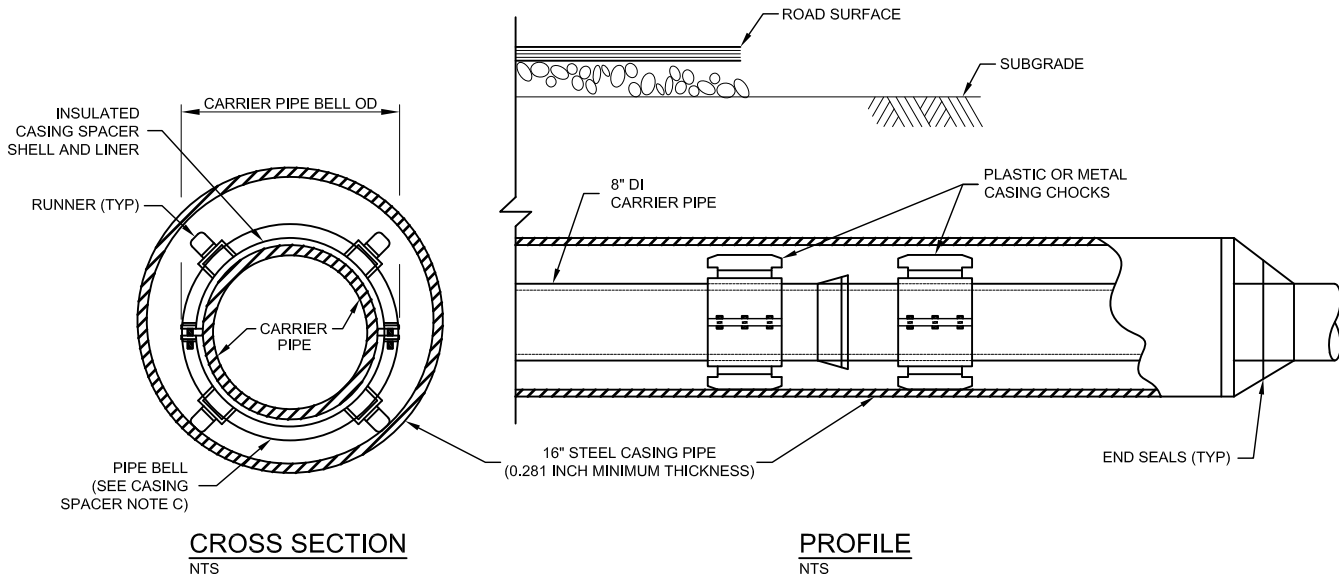
- A. Seal shaft/pit opening and backfill at shafts when no longer required.
- B. Backfill in accordance with Section 02200, Earthwork.

3.11 REMOVAL OF INITIAL SUPPORT SYSTEMS

- A. The Contractor shall be responsible for repairing any settlement or damage to the Work or to adjacent property as a result of removing initial support systems. Initial support systems that cannot be safely removed and without causing settlement or damage to the work or adjacent property shall be left in place, at no additional cost to the Owner.

- B. Remove ground support systems that are left in place following shaft construction to a depth of at least 6 feet below the finished ground surface. Leave in place deeper workshaft ground support system elements that cannot be removed safely and without causing settlement or damage to the work or adjacent property. If backfill material is loosened to an extent that it settles more than one inch as a result of attempts to remove sheeting or other ground support members, the Contractor shall be responsible for remedial measures to re-compact or consolidate the loosened backfill. The Contractor's engineer shall be responsible for determining if ground support system can be safely removed. Initial support system elements that are left in place shall be at the Contractor's expense. Restoration of any damage and the cost of remediating disturbed backfill or adjacent property damage caused by removal of ground support systems shall be at the Contractor's expense.

END OF SECTION



CASING PIPE:

- A. THE CASING PIPE SHALL MEET GDOT REQUIREMENTS AS SPECIFIED IN SECTION 660 - SANITARY SEWERS AND SECTION 847 - MISCELLANEOUS PIPE.

CASING SPACERS:

A. FABRICATION:

1. SPACER BAND MATERIAL: CARBON STEEL COATED WITH FUSION BONDED EPOXY OR TYPE 304 STAINLESS STEEL.
2. SPACER LINER MATERIAL: PVC OR NEOPRENE.
3. SPACER WIDTH: AS RECOMMENDED BY SPACER MANUFACTURER FOR THE SPECIFIC APPLICATION.
4. SPACER RUNNERS:
 - a. SUITABLE FOR SUPPORTING THE WEIGHT OF THE CARRIER PIPE
 - b. MANUFACTURED OF MATERIAL HAVING A LOW COEFFICIENT OF FRICTION AND DESIGNED TO SUPPORT THE CARRIER PIPE WITHOUT DAMAGE OR EXCESSIVE WEAR
5. SIZE: SUFFICIENT TO PROVIDE A MINIMUM CLEARANCE OF 2 INCHES BETWEEN OUTSIDE OF CARRIER PIPE BELLS OR COUPLINGS AND INSIDE OF CASING.

B. APPROVED MANUFACTURERS:

1. PIPELINE SEAL AND INSULATOR, INC. (PSI) HOUSTON, TX.
2. ADVANCE PRODUCTS AND SYSTEMS, INC., LAFAYETTE, LA.
3. CASCADE WATERWORKS MFG. CO., YORKVILLE, IL.

- C. THE DIMENSIONS OF CASING SPACER RISERS AND RUNNERS SHALL BE AS RECOMMENDED BY THE CASING SPACER MANUFACTURER, AS REQUIRED TO PROVIDE 2" MINIMUM CLEARANCE BETWEEN THE PIPE BELL AND THE CASING, AND TO ALLOW INSTALLATION OF THE CARRIER PIPE AT THE ELEVATIONS SHOWN ON THE PLAN AND PROFILE. INSTALL THE CASING AT THE ELEVATIONS CORRESPONDING TO THE CASING SPACER RISER AND RUNNER DIMENSIONS SO THAT THE CARRIER PIPE IS AT THE ELEVATIONS SHOWN ON THE PLAN AND PROFILE.

CASING END SEALS

- A. SYNTHETIC RUBBER CONICAL SHAPE PULL ON OR WRAP AROUND STYLE WITH TYPE 304 STAINLESS STEEL BANDS.

B. APPROVED MANUFACTURERS:

1. PIPELINE SEAL AND INSULATOR, INC. (PSI) HOUSTON, TX.
2. ADVANCE PRODUCTS AND SYSTEMS, INC., LAFAYETTE, LA.
3. CASCADE WATERWORKS MFG. CO., YORKVILLE, IL.

CARRIER PIPE

- A. SPACERS SHALL BE PLACED ON EACH SIDE OF EACH JOINT AND AT SPACING RECOMMENDED BY THE CASING SPACER MANUFACTURER. CHECK EACH JOINT MAKEUP AND PIPE SEGMENT PRIOR TO PUSHING CARRIER PIPE SEGMENTS INTO CASING.
- B. FOR JOINTED PIPE, INSTALL RESTRAINED JOINT PIPE OR MECHANICAL JOINT WITH RESTRAINERS.
- C. CASING END SEALS SHALL BE PROVIDED AT THE END OF THE CASING PIPE AFTER INSTALLATION OF THE CARRIER PIPE.

		DRAWING IS TO BE CONSIDERED PRELIMINARY UNLESS APPROVED										
 Know what's below. Call before you dig.		REVISIONS			CITY OF ATLANTA DEPARTMENT OF WATERSHED MANAGEMENT OFFICE OF ENGINEERING SERVICES WOODWARD WAY CASING PIPE DETAIL STA 23+00 TO 29+83							
		NO.	DATE	DESCRIPTION								
ENGINEER OF RECORD					SURVEYOR	FIELD	BOOKS	LL	DIST.	COUNTY	SCALE AS NOTED	
					DRAWN BY	DESIGNED	BY	CHECKED	BY	APPROVED	BY	DATE
		PROJECT NUMBER:						SHEET 1 OF 1				

Bid Schedule and Pricing Information

To: The City of Atlanta, Georgia

From: _____

Submitted: _____, 201__.

Howell Mill Outfall Sewer Improvements

C-_____

All items listed below shall include furnishing all products, materials, and equipment and performing all labor necessary to complete and put into operation the **Howell Mill Outfall Sewer Improvements** Project with the City of Atlanta Department of Watershed Management's drawings, specifications and standards. A unit price must be provided for each cost item unless otherwise noted. An itemized breakdown of costs is required for all items noted with an asterisk (*). Failure to provide a complete Bid Form and data may deem the bid non-responsive.

See Section 01200, Measurement and Payment, for a detailed description of cost items. Any items not specifically listed in the Bid Form or Measurement and Payment shall be included in the project and the Bidder shall price all work within the appropriate work items.

A Mobilization					
1-A-1000	1	LS	Mobilization/Demobilization (Not to exceed 3% of Bid Total)		
1D General					
D Traffic Control (for Work in Commercial Streets)					
1-D-1405	2	LINK	Work Zone Staging and Traffic Control; FC 17-Collector Street (Per Link)		
1-D-1410	3	LINK	Work Zone Staging and Traffic Control; FC 16-Minor Arterial Street (Per Link)		
2 SITEWORK - GENERAL					
H Earthwork					
2-H-2910	0.3	LF	Clearing, Disposal & Grading for Access Route		

2-H-3020	200	CY	Unsuitable Soil Haul Off & Replace		
2-H-3025	700	CY	Additional Pipe Bedding		
M Fences & Gates					
2-M-3010	5300	LF	Tree Protection Fence		
N Rip-Rap & Rock Lining					
2-N-1410	100	SY	Rip Rap		
S Erosion Control Items					
2-S-1010	4	EA	Construction Exit (Co)		
2-S-1225	5600	LF	Sediment Barrier (Silt Fence - Type C)		
2-S-1240	8	EA	Inlet Sediment Trap (Sd2)		
2-S-1285	1	EA	Temporary Stream Crossing, Maximum 40' Span (Sr)		
4 SEWER COLLECTIONS					
A Pipe – Gravity Pipe					
4-A-2108	259	LF	Sewer Collections, PVC, Gravity Pipe (Replace), 8" Diameter, 0'-8' Cut		
4-A-2110	255	LF	Sewer Collections, PVC, Gravity Pipe (Replace), 10" Diameter, 0'-8' Cut		
4-A-2216	259	LF	Add/Deduct cost for providing 8" DIP in lieu of PVC pipe		
4-A-2217	79	LF	Add/Deduct cost for providing 10" DIP in lieu of PVC pipe		
B Manholes, Drops, & Other					

4-B-1048	3	EA	Sewer Manholes, 48" Diameter, 0 - 10' Depth (Pre-Cast Concrete or HDPE)		
4-B-1148	156	VF	Sewer Manholes, 48" Diameter, >10' Depth (Pre-Cast Concrete or HDPE)		
4-B-1540	7	EA	Sewer Manhole Frame and Cover, 24" Dia., Traffic Load		
4-B-1610	1	EA	Sewer Manhole, Outside Drop Connection		
C <i>Laterals & Cleanouts</i>					
4-C-1010	5	EA	Expose Service Lateral Reconnect 4" – 6" Diameter – 0 – 8' Depth, up to 16 LF		
4-C-1011	3	EA	Individual Grinder Pumps		
I <i>Internal Pipe Inspection</i>					
4-I-1050	558	LF	Sewer, Internal Pipe Inspection, 6" to 24" Diameter		
L <i>Internal Cleaning</i>					
4-L-1014	558	LF	Sewer, Internal Cleaning 18" to 24" Diameter		
4-L-1205	5	TON	Sewer, Debris Removal and Disposal from Cleaning		
S <i>Pipe-bursting</i>					
4-S-1210	558	LF	Sewer, Replacement with HDPE Using Pneumatic or Static Pipe-bursting Methods, 8" & 10" to 10" Diameter, All Depths		
4-S-5005	2	EA	Pipeburst Launch & Receiving Pits, 0' – 10' Depths		
T <i>Microtunneling</i>					

4-T-5412	1230	LF	Microtunnel, 10" DIP, 20' Depth		
4-T-5420	1172	LF	Steel Casing Pipe, 48" Diameter (0.50" THK) including spacers		
4-T-7410	7	EA	Microtunnel, Launch/Receive Pits (All Depths)		
4-T-7420	270	LF	Augor Bore, 10" VCP, 20' Depth		
X Abandonment/Cap & Plug Removal					
4-X-1004	405	LF	Sewer, Abandon (grout fill) Existing Sewer Line in Place, 8" Diameter		
4-X-2008	3	EA	Sewer, Cut & Plug Existing Sewer Line, 8" Dia		
4-X-4010	2	EA	Remove & Dispose of Existing Manhole, 0' to 10' Depth, All Sizes		
4-X-4020	420	LF	Remove & Dispose of Existing Sewer Line, 8" Diameter		
4-X-4030	2	EA	Remove & Dispose of Pier Structures		
6 RESTORATION					
A Asphalt Pavement					
6-A-1410	4415	SY	Asphalt Pavement Patch - Sewer Trench Section		
E Curb & Gutter					
6-E-2410	50	LF	Concrete and Granite, Curb and Gutter		
F Sidewalks/Ramps/Driveway					
6-F-3410	173	SY	Concrete Sidewalk		
6-F-3440	133	SY	Asphalt or Cementitious Concrete Driveway Replacement		
T Trees & Shrubs					
6-T-1015	25	EA	Tree Restoration – All Except Pine		
6-T-5110	5	EA	Native Bush Restoration on Private Property - up to 36" Diameter		

U Seeding & Sodding					
6-U-2450	1500	SY	Seeding		
Subtotal 1 (Bid Item Sections 1,2,4 and 6)					
9			ALLOWANCES		
Z			General Allowances		
9-Z-2410	1	LS	Owner Controlled Contingency	\$275,796.38	\$275,796.38
9-Z-2480	1	LS	Material Testing	\$68,949.10	\$68,949.10
9-z-4450	1	LS	City Directed Site Restoration (Private & City Properties)	\$45,966.06	\$45,966.06
9-Z-4460	1	LS	City Directed Additional Work	\$68,949.10	\$68,949.10

Subtotal 2 (Bid Item - Section 9 Only) \$459,660.64

BID TOTAL, ITEMS 1, 2, 4, 6 AND 9, INCLUSIVE, THE AMOUNT OF (WRITTEN) _____

_____ DOLLARS(\$ _____).
(FIGURE)

The undersigned declares that he understands that the quantities shown are approximate only and are subject to either increase or decrease and that should the quantities of any of the items of work be increased, the undersigned agrees to do the additional work at the unit prices set forth herein, and should the quantities be decreased, he also understands that payment will be made on the actual quantities installed at the unit bid price, and the undersigned will make no claims for anticipated profits for any decrease in the quantities. Actual quantities will be determined upon completion of the job.

The undersigned also agrees that extra work, if any, performed in accordance with Items GC-41 and GC-42 of the General Conditions will be paid for in accordance with the provisions of those Articles.

Amounts shall be shown in both words and figures, where indicated. In case of discrepancies between the figures shown in the unit prices and the totals, the unit prices shall apply and the totals shall be corrected to agree with the unit prices. In case of discrepancies between written amounts and figures, written amounts shall take precedence over figures and the sum of all Bid extensions (of unit prices) plus lump sum items shall take precedence over BID TOTAL.

The bid prices shall include all costs of completion of the work except as otherwise specified in the Contract Documents.

The names and residence addresses of all persons and parties interested in the foregoing bid as principals are as follows:

(Give first and last names in full. In the case of a corporation, give name of president, treasurer, and manager, and in the case of a partnership, give names and addresses of members.)

The undersigned hereby certifies that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work.

Notice of acceptance should be mailed, telegraphed, or delivered to the undersigned bidder at the following address:

(Name of Bidder)_____

(Signature of Authorized Representative)_____

(Title)_____

(Business Address)_____

(City and State)_____

(Telephone Number)_____

(Fax Number)_____

The following information is required as a part of this Bid.

BID DATA

The Bidder shall designate below the one manufacturer or source for each product listed to be furnished and installed if awarded the Work. The Bidder understands that if this information is not provided, offering products meeting all Specification requirements and having the approval of the Owner, then the Owner reserves the right either to determine the Bidder non-responsive and reject the Bid or to designate the manufacturer of the products to be provided which will meet all specification requirements, which Owner-designated manufacturer products must be furnished by the Bidder at no increase in the Contract Price.

1. Product: High Density Polyethylene Pipe (HDPE)
Manufacturer: _____
2. Product: Ductile Iron Pipe (DIP)
Manufacturer: _____
3. Product: Steel Casing Pipe
Manufacturer: _____
4. Product: Vitrified Clay Pipe (VCP)
Manufacturer: _____
5. Product: _____
Manufacturer: _____
6. Product: _____
Manufacturer: _____

END OF BIDDING DOCUMENTS

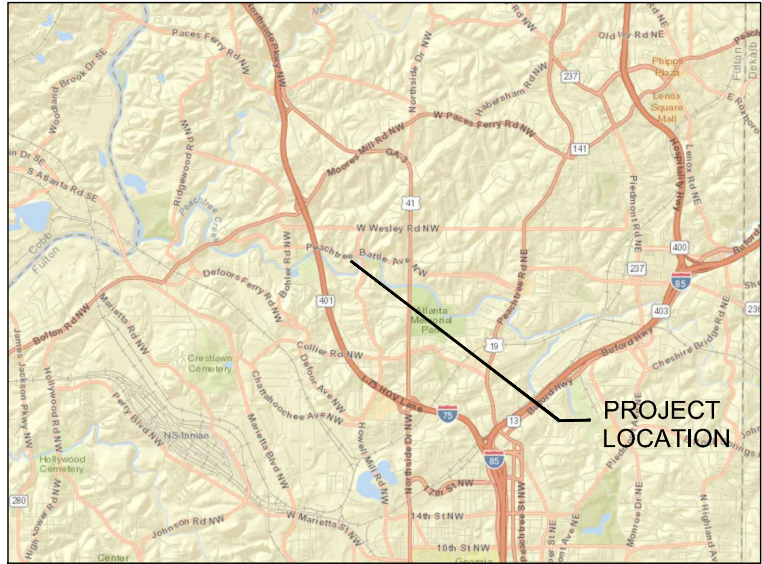
DRAWINGS

HOWELL MILL ROAD SEWER IMPROVEMENTS

(29 Pages)

CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT
OFFICE OF ENGINEERING SERVICES

CITY OF ATLANTA
KEISHA LANCE BOTTOMS
MAYOR



LOCATION MAP

PROJECT DESCRIPTION:
THE CONTRACT WILL COMPRISE THE REALIGNMENT OF AN EXISTING 8-INCH SEWER TO ELIMINATE AN EXISTING AERIAL CROSSING OF PEACHTREE CREEK. THE WORK SHOWN HEREIN INCLUDES, BUT IS NOT LIMITED TO, THE INSTALLATION OF APPROXIMATELY 1,516 LINEAR FEET OF 10-INCH GRAVITY SEWER BY TRENCHLESS METHODS, THE INSTALLATION OF APPROXIMATELY 558 LINEAR FEET OF 10-INCH GRAVITY SEWER BY PIPE BURSTING, THE DIRECT REPLACEMENT OF EXPOSED 8-INCH GRAVITY SEWER WITH 220 LINEAR FEET OF 10-INCH GRAVITY SEWER AT AN EXISTING AERIAL CROSSING OF PEACHTREE CREEK, THE DEMOLITION AND REMOVAL OF AN EXISTING AERIAL SEWER CROSSING AND ITS ANCILLARY COMPONENTS (APPROXIMATELY 465 LF), THE INSTALLATION OF APPROXIMATELY 260 LINEAR FEET OF NEW 8-INCH GRAVITY SEWER AND APPURTENANCES, AND THE ABANDONMENT OF APPROXIMATELY 325 LINEAR FEET OF 8-INCH GRAVITY SEWER.

EROSION NOTE:
EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICES (BMP'S) WILL BE EMPLOYED AND ENFORCED PURSUANT TO AN EROSION AND SEDIMENT CONTROL PLAN PREPARED BY A GEORGIA SOIL AND WATER CONSERVATION COMMISSION LEVEL-2 DESIGN PROFESSIONAL. **PRIOR TO LAND-DISTURBING ACTIVITIES, THE CONTRACTOR SHALL SCHEDULE A PRE-CONSTRUCTION MEETING WITH THE AREA EROSION CONTROL INSPECTOR. CALL (404) 546-1300 TO CONTACT THE INSPECTOR.**



CONSTRUCTION PLANS
FOR
HOWELL MILL ROAD SEWER IMPROVEMENTS
JUNE 30, 2017

DEPARTMENT OF WATERSHED MANAGEMENT
KISHIA L. POWELL
COMMISSIONER

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28	SD-2	STANDARD DETAILS
29	SD-3	STANDARD DETAILS



REVISIONS	
DATE	DESCRIPTION
ENGINEER OF RECORD	

GENERAL NOTES:

1.

THE EXISTING UTILITIES SHOWN ON THE CONTRACT DRAWINGS ARE APPROXIMATE. UTILITIES SHOWN ON THESE DRAWINGS HAVE BEEN COMPILED FROM INFORMATION FURNISHED BY THE UTILITY OWNERS AND BY SURVEY. ACCURACY AND COMPLETENESS ARE NOT GUARANTEED. THE CONTRACTOR SHALL FIELD VERIFY THE LOCATION OF EXISTING UTILITIES PRIOR TO THE START OF CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING ALL UTILITY COMPANIES HAVING UTILITIES WITHIN OR ADJACENT TO THE WORK AREA AND FOR COORDINATING ANY NECESSARY RELOCATIONS OR TIE-INS. UTILITIES SHOWN ARE APPROXIMATE. GEORGIA LAW REQUIRES THE CONTRACTOR TO NOTIFY THE UTILITIES PROTECTION CENTER MINIMUM 3 WORKING DAYS BUT NOT MORE THAN 10 DAYS BEFORE BEGINNING CONSTRUCTION. THIS NOTICE WILL REMAIN IN EFFECT FOR 30 WORKING DAYS FROM THE DATE UTILITIES PROTECTION CENTER IS NOTIFIED. IN THE ATLANTA AREA, THE CONTRACTOR IS TO CALL THE UTILITIES PROTECTION CENTER AT 770-623-4344.
2.

CONTRACTOR SHALL RETAIN A LAND SURVEYOR REGISTERED IN THE STATE OF GEORGIA TO REPLACE ANY PROPERTY PINS REMOVED DURING CONSTRUCTION. A COPY OF THE FIELD NOTES SHOWING PINS RESET SHALL BE SENT TO NOLTON JOHNSON, DIRECTOR – OFFICE OF ENGINEERING SERVICES, WATERSHED MANAGEMENT, CITY OF ATLANTA, 72 MARIETTA ST, 5th FLOOR, ATLANTA GA. 30303-0330.
3.

SUBSURFACE INFORMATION FOR SOIL BORINGS SHOWN ARE CONTAINED IN THE GEOTECHNICAL EXPLORATION REPORT PROVIDED BY UNITED CONSULTING.
4.

CONTRACTOR SHALL HAVE A CONFORMED SET OF PLANS AND SPECIFICATIONS ON THE JOB SITE DURING WORKING HOURS.
5.

ALL CONSTRUCTION AND MATERIALS SHALL CONFORM TO THE LATEST CITY OF ATLANTA STANDARDS.
6.

SEWER DISTANCES SHOWN ON THE PROFILE DRAWINGS ARE FROM CENTER-TO-CENTER OF THE MANHOLE STRUCTURES AND ARE FOR LAYOUT PURPOSES ONLY. THE INVERTS SHOWN ARE THE THEORETICAL PIPE INVERTS AT THE CENTER OF THE STRUCTURE.
7.

ALL REINFORCED CONCRETE PIPE SHALL CONFORM TO ASTM-C76 CLASS III OR AS OTHERWISE NOTED ON THE CONTRACT DRAWINGS.
8.

ALL PIPES ENTERING A MANHOLE WILL BE SEPARATED FROM THE MANHOLE WALL BY AN APPROVED MANUFACTURER’S BUTYL RUBBER GASKET WHICH COMPLETELY SURROUNDS THE PIPE, SEALS THE MANHOLE AND PERMITS DIFFERENTIAL MOVEMENT.
9.

CLASS "B" PIPE BEDDING – IN ACCORDANCE WITH SECTION 02200 EARTHWORK, SHALL BE USED IN PUBLIC RIGHT-OF-WAY UNLESS OTHERWISE NOTED ON THE CONTRACT DRAWINGS. CLASS "C" PIPE BEDDING SHALL BE USED IN ALL OTHER AREAS UNLESS OTHERWISE NOTED ON THE CONTRACT DRAWINGS.
10.

THE CONTRACTOR SHALL COORDINATE WORK WITH CITY OF ATLANTA. CONTRACTOR SHALL PROVIDE SUFFICIENT ADVANCE NOTICES OF PROPOSED WORK SCHEDULE AS DEFINED IN THE SPECIFICATIONS.
11.

ALL AREAS DISTURBED AND DAMAGED BY THE CONTRACTOR, INCLUDING CURB, GUTTER AND SIDEWALK, AND TRENCH SETTLEMENT RELATED AREAS, SHALL BE RESTORED TO THE ORIGINAL CONDITIONS TO THE SATISFACTION OF THE CITY OF ATLANTA AND AT NO ADDITIONAL COST TO THE CITY.
12.

CONTRACTOR SHALL INSTALL 6 FOOT HIGH TEMPORARY CHAIN LINK FENCE AROUND ALL WORK AREAS AND TO PROVIDE FOR TEMPORARY ENCLOSURE OF YARDS FOR SECURITY OF PETS, DOMESTIC ANIMALS, AND THE PROPERTY WHEN PERMANENT FENCES MUST BE REMOVED DUE TO CONSTRUCTION OF STORM OR SANITARY SEWER LINES.
13.

CONTRACTOR SHALL CONSTRUCT AND MAINTAIN EROSION AND SEDIMENT CONTROL DEVICES IN ACCORDANCE WITH "THE MANUAL FOR EROSION AND SEDIMENT CONTROL IN GEORGIA", LATEST EDITION.
14.

THE CONTRACTOR SHALL REPLACE ALL FENCING DAMAGED BY CONSTRUCTION. FENCING SHALL BE REPLACED TO ORIGINAL SIZE, QUALITY AND CONDITION, AND TO THE APPROVAL OF THE CITY OF ATLANTA OR ITS AUTHORIZED REPRESENTATIVE.
15.

PRIOR TO FINAL ACCEPTANCE OF WORK, CONTRACTOR SHALL PROVIDE "AS-BUILT" MARK-UP PLANS IN ACCORDANCE WITH PARAGRAPH GC-28.4 OF THE GENERAL CONDITIONS TO THE CITY OF ATLANTA ASSIGNED INSPECTOR FOR FINAL INSPECTION OF ALL NEWLY INSTALLED STORM AND SANITARY SEWERS AS WELL AS ELECTRONIC "AS-BUILT" TABLES PER SPECIFICATION SECTION 01720: RECORD DOCUMENTS. AFTER THE FINAL INSPECTION APPROVAL, CONTRACTOR SHALL PROVIDE "AS-BUILT" DRAWNGS TO THE OFFICE OF ENGINEERING SERVICES, UTILITY DESIGN GROUP, PROJECT DESIGN ENGINEER AND ELECTRONIC "AS-BUILT" TABLES TO THE CITY'S CONSENT DECREE PROGRAM DESIGN MANAGER.
16.

CONTRACTOR SHALL OBTAIN NECESSARY PERMITS FROM THE CITY OF ATLANTA DEPARTMENT OF PUBLIC WORKS AND IF APPLICABLE, FROM THE GEORGIA DEPARTMENT OF TRANSPORTATION PRIOR TO ANY REQUIRED LANE CLOSURES.
17.

INSTALLATION OF NEW STORM AND SANITARY SEWERS, INCLUDING TRENCH EXCAVATION, SHOULD BE FINISHED BY CLOSE OF DAY, OR ADEQUATELY COVERED FOR SAFETY.
18.

CONTRACTOR SHALL INSTALL STEEL COVER PLATES TO PROTECT AREAS, INCLUDING DRIVEWAYS LEFT OPEN AT THE END OF EACH DAY'S WORK. CONTRACTOR SHALL MAINTAIN ACCESS TO DRIVEWAYS AND MAILBOXES AT ALL TIMES.
19.

THE LENGTH OF PIPE FOR PAYMENT PURPOSE WILL BE CONSIDERED THE DISTANCE FROM THE CENTER OF MANHOLE TO CENTER OF MANHOLE, SUBTRACTED BY THE WIDTH OF THE MANHOLE.
20.

CONTRACTOR SHALL ENTER UPON PRIVATE PROPERTY ONLY AFTER OBTAINING RIGHT OF ENTRY LETTER IN ACCORDANCE WITH PARAGRAPH GC-15 OF THE GENERAL CONDITIONS FROM THE CITY OF ATLANTA AND NOTIFYING HOMEOWNER IN ADVANCE.
21.

CONTRACTOR SHALL BE RESPONSIBLE FOR SUPPORTING ALL UTILITIES WITHIN THE EXCAVATION LIMITS DURING CONSTRUCTION.
22.

CONTRACTOR SHALL LOCATE AND REFERENCE ALL WATER METERS AND VALVES WITHIN THE CONSTRUCTION LIMITS. THE REFERENCE POINTS SHALL BE LOCATED SO THAT THE REFERENCE WILL NOT BE DISTURBED AND THE LOCATION OF THE METERS AND VALVES CAN BE RE-ESTABLISHED. A PERMANENT WRITTEN RECORD OF THE REFERENCE POINTS WILL BE FURNISHED TO THE CITY OF ATLANTA. ACCESS TO FIRE HYDRANTS WILL BE MAINTAINED AT ALL TIMES.
23.

ALL TRENCHING AND BACKFILLING SHALL BE IN ACCORDANCE WITH SECTION 02200 EARTHWORK, SECTION 02730 SEWERS AND ACCESSORIES, AND CITY OF ATLANTA STANDARD DETAILS. TEMPORARY TRENCH EXCAVATION SHALL AT ALL TIMES CONFORM TO THE SAFETY REQUIREMENTS OF OSHA.
24.

THE SURVEY INFORMATION SHOWN HEREIN IS BASED ON DATABASE FURNISHED BY THE CITY OF ATLANTA WITH AUGMENTATION BY FIELD SURVEYS. IT IS THE CONTRACTOR’S RESPONSIBILITY TO STAKEOUT ALL PROPOSED WORK AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES PRIOR TO STARTING CONSTRUCTION.
25.

AT COMPLETION OF SEWER AND WATER CONSTRUCTION SET ALL MANHOLES, VALVE BOXES, METERS, AND APPURTENANCES FOR PROPER FINAL GRADE. CONTRACTOR SHALL BE RESPONSIBLE FOR DAMAGE TO THE ABOVE ITEMS UNTIL SYSTEM IS ACCEPTED BY THE CITY.
26.

TRENCH BACKFILL MATERIAL SHALL BE COMPACTED TO AT LEAST 95% OF THE MAXIMUM DRY DENSITY FOR THE SOIL AS DETERMINED BY THE STANDARD PROCTOR TEST (ASTM D-698 AND AASHTO T-99) RESULTS IN ACCORDANCE WITH SPECIFICATION SECTION 02200, EARTHWORK. BACKFILL MATERIAL SHALL BE FREE OF ROOTS, ROCKS AND OTHER DELETERIOUS MATTER.
27.

TOP OF CASTING FOR ALL NEW MANHOLES ARE PROJECTED ELEVATIONS BASED ON TOPOGRAPHICAL DATA. ALL ELEVATIONS ARE TO BE VERIFIED TO CONTRACTOR’S SATISFACTION.
28.

CONTRACTOR SHALL FIELD VERIFY ALL INVERT ELEVATIONS, ANGLES, AND SERVICE STATUS.
29.

MANHOLES WITHIN PUBLIC RIGHT-OF-WAY TO BE ABANDONED IN PLACE IN ACCORDANCE WITH ATLANTA SPECIFICATIONS.

TRAFFIC NOTES:

1.

CONTRACTOR SHALL MAINTAIN ONE-WAY TRAVEL ALONG PEACHTREE BATTLE AVENUE BETWEEN PEACHTREE BATTLE CT AND HOWELL MILL ROAD. CONTRACTOR SHALL PROVIDE A DETOUR ROUTE PLAN IN ACCORDANCE WITH SECTION 01550 TRAFFIC REGULATION.
2.

CONTRACTOR SHALL BE RESPONSIBLE FOR PREPARING AND SUBMITTING TRAFFIC CONTROL PLANS AND DETAILS TO THE AUTHORITY HAVING JURISDICTION INCLUDING, BUT NOT LIMITED TO THE CITY OF ATLANTA DIVISION OF TRAFFIC AND TRANSPORTATION IN ACCORDANCE WITH SECTION 01550 TRAFFIC REGULATION. TRAFFIC CONTROL PLANS SHALL BE PREPARED BY AND SIGNED AND SEALED BY A PROFESSIONAL ENGINEER LICENSED IN STATE OF GEORGIA.
3.

VEHICULAR AND PEDESTRIAN TRAFFIC IS TO BE MAINTAINED OVER THE EXISTING ROADWAYS AND INTO THE EXISTING DRIVEWAYS WITHIN THE LIMITS OF THE PROJECT AT ALL TIMES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION WITH THE CITY OF ATLANTA DIVISION OF TRAFFIC AND TRANSPORTATION AND THE CITY OF ATLANTA POLICE DEPARTMENTS FOR TRAFFIC OPERATIONS AND PARKING PROHIBITIONS DURING CONSTRUCTION.
4.

PROPERTY OWNERS AND OWNERS OF ADJOINING PROPERTIES SHALL BE GIVEN A WRITTEN NOTICE AT LEAST FIVE DAYS PRIOR TO THE BEGINNING OF ANY WORK WHICH INTERFERES WITH THE OWNER'S NORMAL PASSAGE.
5.

THE CONTRACTOR SHALL OBTAIN LANE CLOSURE PERMITS IN ACCORDANCE WITH SECTION 01550 TRAFFIC REGULATION.
6.

CONTRACTOR SHALL CONSULT THE CITY OF ATLANTA’S RIGHT-OF-WAY MANUAL FOR STREET DESIGNATIONS AND RESTRICTIONS FOR WORKING WITHIN THE CITY’S RIGHT-OF-WAY.
7.

ALL MAINTENANCE AND PROTECTION OF TRAFFIC DEVICES SHALL CONFORM TO THE GEORGIA DEPARTMENT OF TRANSPORTATION REQUIREMENTS AND THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, LATEST EDITION.
8.

FINAL RESPONSIBILITY FOR THE INSTALLATION OF ADEQUATE PRECAUTIONS AND FOR THE MAINTENANCE AND PROTECTION OF THE TRAVELING PUBLIC AND HIS OWN PERSONNEL SHALL REST WITH THE CONTRACTOR.

LEGEND

DESCRIPTION	EXISTING	PROPOSED
RIGHT OF WAY		
LAND LOT LINE		
PROPERTY LINE		
CENTER LINE/BASE LINE		
EASEMENT (DRAINAGE, SANITARY)		
EASEMENT (TEMPORARY)		
DEMOLITION AREA		
FENCE		
EDGE OF PAVEMENT		
CENTER LINE OF SWALE/CREEK		
CONTOUR		
FLOODPLAIN ELEVATION		
UNDERGROUND POWER		
OVERHEAD POWER		
UNDERGROUND TELEPHONE		
UNDERGROUND TV CABLE		
GAS LINE		
WATER LINE		
SANITARY SEWER LINE		
SANITARY SEWER LINE (REPLACE)		
SANITARY SEWER LINE (ABANDON)		
STORM DRAIN LINE		
GUY POLE		
UTILITY POLE (T=TELEPHONE, P=POWER, L=LIGHT)		
UNDERGROUND TELEPHONE BOX		
TELEPHONE MANHOLE		
METER BOX (W=WATER, G=GAS)		
CATCH BASIN		
DROP INLET		
HEADWALL		
CITY OF ATLANTA CONTROL POINT (DELTA POINT)		
PROPERTY MARKER (IPF=IRON PIN FOUND)		
RETAINING WALL		
CLEANOUT		
SIDEWALK		
CURB AND GUTTER		
SIGNIFICANT TREES		
SOIL BORING		
WATER VALVE		
WATER METER		
FIRE HYDRANT		
SANITARY SEWER MANHOLE		
STORM DRAIN MANHOLE		

EROSION CONTROL LEGEND

	WRESTED VEGETATION ELEVATION
	25' GAEPD UNDISTURBED BUFFER
	75' CITY OF ATLANTA STREAM BUFFER
	ORANGE SAFETY FENCE
	SILT FENCE
	COMPOST FILTER SOCK
	INLET PROTECTION
	CONSTRUCTION EXIT
	CONTRACTOR WORK AREA
	DISTURBED AREA
	GAEPD BUFFER IMPACT AREA
	TEMPORARY STREAM CROSSING
	SOIL TYPE BOUNDARY
	SOIL TYPE
	DISTURBED AREA STABILIZATION (WITH MULCHING ONLY)
	DISTURBED AREA STABILIZATION (WITH TEMPORARY SEEDING)
	DISTURBED AREA STABILIZATION (WITH PERMANENT SEEDING)
	DUST CONTROL
	STREAMBANK STABILIZATION

C-A

D-1

D-2

D-3

D-4

S-1

UTILITY COMPANIES

- A.G.

ATLANTA GAS LIGHT COMPANY
- B.D.W.

BUREAU OF DRINKING WATER
- G.P.

GEORGIA POWER COMPANY
- CTV

UNDERGROUND CABLE COMPANIES
- UT

UNDERGROUND TELEPHONE COMPANIES

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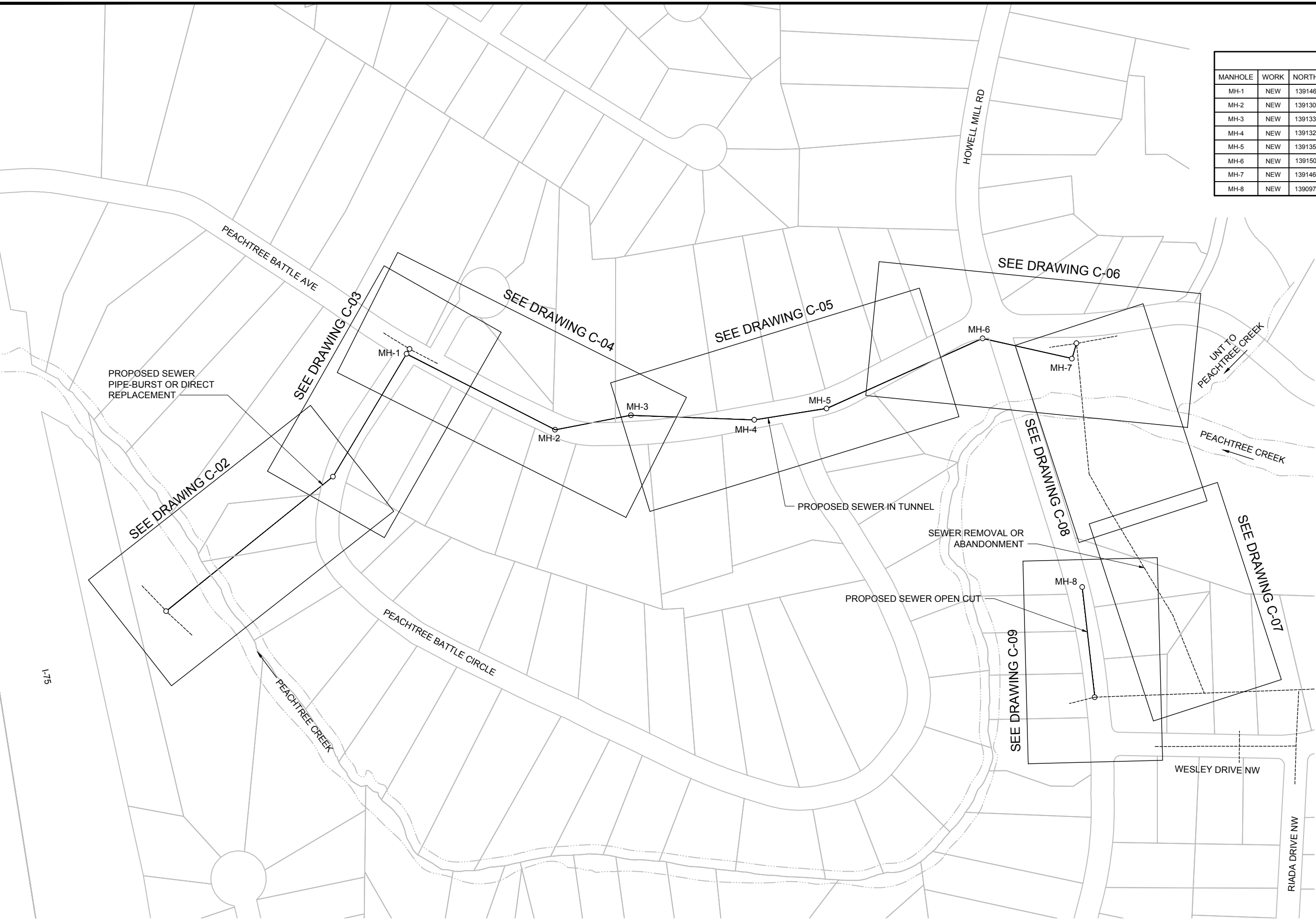
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	REVISIONS			CITY OF ATLANTA DEPARTMENT OF WATERSHED MANAGEMENT OFFICE OF ENGINEERING SERVICES								
	NO.	DATE	DESCRIPTION									
				HOWELL MILL ROAD SEWER IMPROVEMENTS GENERAL NOTES								
				SURVEYOR		FIELD	BOOKS	L.L.	DIST.	COUNTY	SCALE	
				DRAWN BY D CORBETT		DESIGNED BY J BURTON		CHECKED BY D JENKINS		APPROVED BY T KELLEY	DATE JUN 2017	
	ENGINEER OF RECORD				PROJECT NUMBER:						2	SHEET OF

ABBREVIATIONS

ABAND	ABANDONED
APPROX	APPROXIMATE
BRK	BRICK
CB	CATCH BASIN
CC	CENTER TO CENTER
CIRCUM	CIRCUMFERENCE
CL	CLASS
CO	CLEAN OUT
CCTV	CLOSED CIRCUIT TELEVISION
COMB	COMBINED
CONC	CONCRETE
CP	CLAY PIPE
C	CONDUIT
CMP	CORRUGATED METAL PIPE
CULV	CULVERT
DIAG	DIAGONAL
DIA	DIAMETER
DIM	DIMENSION
DWG	DRAWING
DW	DRIVEWAY
DIP	DUCTILE IRON PIPE
DI	DROP INLET
E/P	EDGE OF PAVEMENT
EL	ELEVATION
EXIST	EXISTING
FH	FIRE HYDRANT
FT	FOOT OR FEET
G	GAS
GM	GAS METER
GV	GAS VALVE
HORIZ	HORIZONTAL
HE	HORIZONTAL ELLIPTICAL
IN	INCH
ID	INSIDE DIAMETER
INV	INVERT
LT	LEFT
LF	LINEAR FEET
LOC	LIMITS OF CONSTRUCTION
MH	MANHOLE
MAX	MAXIMUM
MIN	MINIMUM
NTS	NOT TO SCALE
NO	NUMBER
OD	OUTSIDE DIAMETER
P	PIPE
PL	PROPERTY LINE
PROP	PROPOSED
R	RADIUS
RCP	REINFORCED CONCRETE PIPE
RQD	REQUIRED
REV	REVISED OR REVISION
RT	RIGHT
R/W	RIGHT-OF-WAY
SECT	SECTION
SPEC	SPECIFICATION (S)
STL	STEEL
SD	STORM DRAIN SEWER
SS	SANITARY SEWER
ST	STREET
T	TELEPHONE
TYP	TYPICAL
UG	UNDERGROUND
VCP	VITRIFIED CLAY PIPE
VERT	VERTICAL
W	WATER
WM	WATER METER
WV	WATER VALVE
UNT	UNNAMED TRIBUTARY

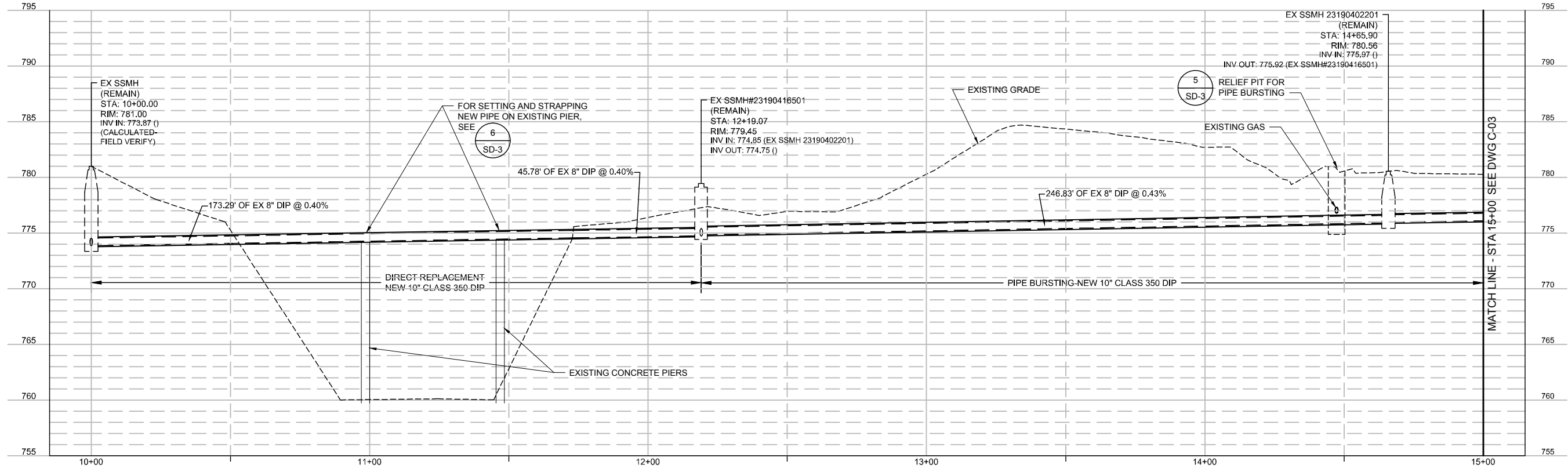
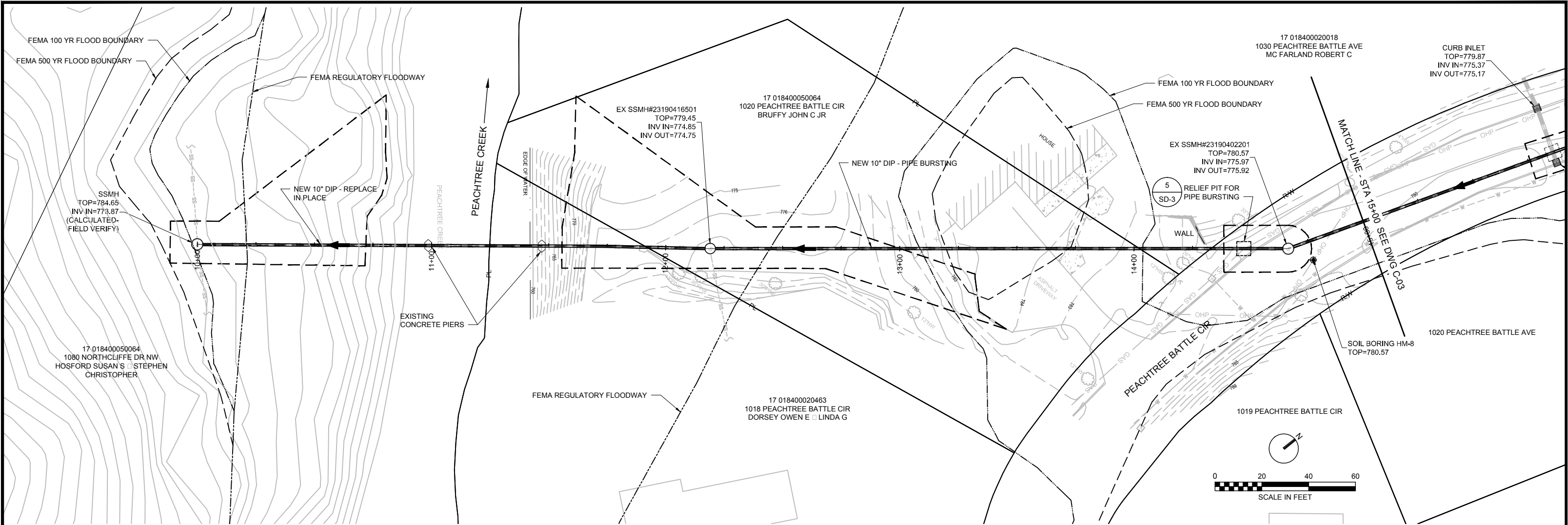
MANHOLE TABLE					
MANHOLE	WORK	NORTHING	EASTING	DIAMETER	COVER TYPE
MH-1	NEW	1391469.61	2219409.12	4-FT	SOLID FRAME AND COVER
MH-2	NEW	1391304.73	2219731.49	4-FT	SOLID FRAME AND COVER
MH-3	NEW	1391336.22	2219896.66	4-FT	SOLID FRAME AND COVER
MH-4	NEW	1391326.00	2220164.67	4-FT	SOLID FRAME AND COVER
MH-5	NEW	1391350.67	2220321.41	4-FT	SOLID FRAME AND COVER
MH-6	NEW	1391503.11	2220660.47	4-FT	SOLID FRAME AND COVER
MH-7	NEW	1391460.98	2220846.87	4-FT	SOLID FRAME AND COVER
MH-8	NEW	1390979.86	2220868.27	4-FT	SOLID FRAME AND COVER




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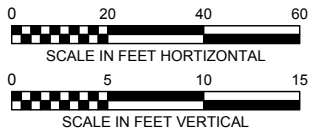
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REVISIONS			CITY OF ATLANTA DEPARTMENT OF WATERSHED MANAGEMENT OFFICE OF ENGINEERING SERVICES HOWELL MILL ROAD SEWER IMPROVEMENTS OVERALL PLAN						
NO.	DATE	DESCRIPTION	SURVEYOR	FIELD BOOKS	L.L.	DIST.	COUNTY	SCALE	
			DRAWN BY D CORBETT	DESIGNED BY J BURTON	CHECKED BY D JENKINS	BY	APPROVED BY T KELLEY	DATE JUN 2017	
ENGINEER OF RECORD			PROJECT NUMBER:			SHEET 3 OF 29			



PIPE BURSTING NOTES:

- CONTRACTOR TO PERFORM PRE AND POST CONSTRUCTION CCTV INSPECTION OF THE SEWER TO BE REPLACED IN ACCORDANCE WITH SECTION 02752 INTERNAL SEWER CONDITION ASSESSMENT.
- CONTRACTOR SHALL REPAIR PIPE BLOCKAGES AND/OR SAGS IN ACCORDANCE WITH SECTION 02757 POINT REPAIR OF SANITARY SEWERS THAT WOULD IMPEDE OR PROHIBIT THE INSTALLATION OF NEW PIPING BY PIPE BURSTING AT PROPER LINE AND GRADE.
- CONTRACTOR TO PREPARE AND SUBMIT BYPASS PUMPING/FLOW DIVERSION PLAN IN ACCORDANCE WITH SECTION 02601 WASTEWATER FLOW CONTROL PRIOR TO PIPE BURSTING OPERATIONS. THE PLAN SHALL BE AGREED TO BY THE DEPARTMENT OF WATERSHED MANAGEMENT OR ITS REPRESENTATIVES BEFORE THE CONTRACTOR SHALL BE ALLOWED TO COMMENCE BYPASS PUMPING OR FLOW DIVERSION OPERATIONS.

- INSERTION AND RECEIVING PITS SHALL BE PREPARED AND BACKFILLED IN ACCORDANCE WITH SECTION 02200 EARTHWORK. THE LOCATION OF INSERTION AND RECEIVING PITS ARE TO BE DETERMINED BY THE CONTRACTOR AND APPROVED BY THE DEPARTMENT OF WATERSHED MANAGEMENT OR ITS REPRESENTATIVES.
- CONTRACTOR SHALL LOCATE AND PHYSICALLY DISCONNECT ALL LATERALS FROM THE EXISTING MAIN PRIOR TO PIPE BURSTING.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR DISCONNECTING AND RECONNECTING ALL LIVE LATERALS TO THE MAIN PIPE. CAPPED AND/OR ABANDONED LATERALS SHALL NOT BE RECONNECTED TO THE NEW MAIN.
- LEAK TEST NEW SANITARY SEWER MAIN PRIOR TO PERMANENT RESURFACING IN ACCORDANCE WITH 02730 SEWERS AND ACCESSORIES.



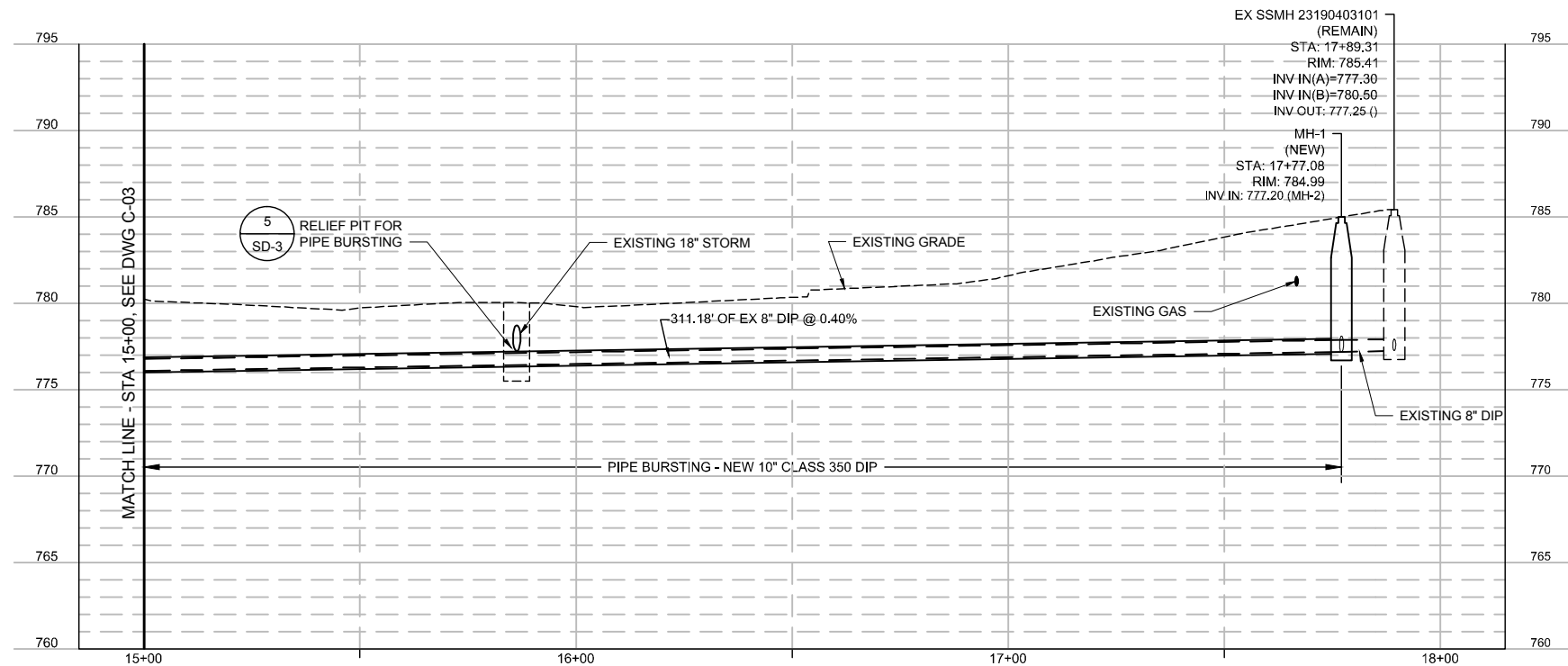
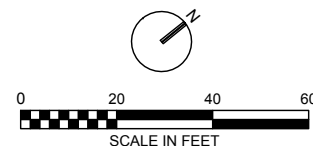
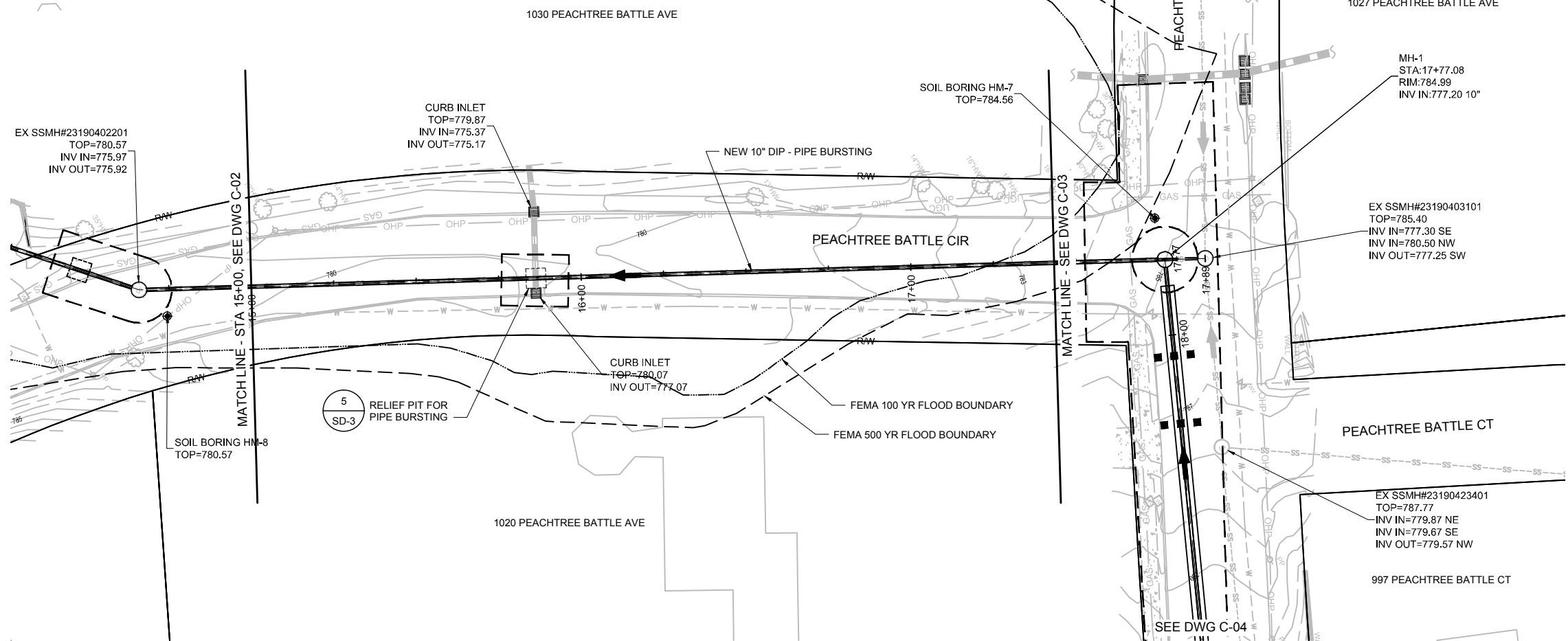
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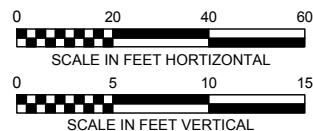
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NO.	DATE	DESCRIPTION	HOWELL MILL ROAD SEWER IMPROVEMENTS PLAN AND PROFILE-STA 10+00 TO STA 15+00						
			SURVEYOR	FIELD BOOKS	L.L.	DIST.	COUNTY	SCALE	
			DRAWN BY D CORBETT	DESIGNED BY J BURTON	CHECKED BY D JENKINS	APPROVED BY T KELLEY	DATE JUN 2017		
			PROJECT NUMBER:			SHEET OF 29			



PIPE BURSTING NOTES:

1. CONTRACTOR TO PERFORM PRE AND POST CONSTRUCTION CCTV INSPECTION OF THE SEWER TO BE REPLACED IN ACCORDANCE WITH SECTION 02752 INTERNAL SEWER CONDITION ASSESSMENT.
2. CONTRACTOR SHALL REPAIR PIPE BLOCKAGES AND/OR SAGS IN ACCORDANCE WITH SECTION 02757 POINT REPAIR OF SANITARY SEWERS THAT WOULD IMPEDE OR PROHIBIT THE INSTALLATION OF NEW PIPING BY PIPE BURSTING AT PROPER LINE AND GRADE.
3. CONTRACTOR TO PREPARE AND SUBMIT BYPASS PUMPING/FLOW DIVERSION PLAN IN ACCORDANCE WITH SECTION 02601 WASTEWATER FLOW CONTROL PRIOR TO PIPE BURSTING OPERATIONS. THE PLAN SHALL BE AGREED TO BY THE DEPARTMENT OF WATERSHED MANAGEMENT OR ITS REPRESENTATIVES BEFORE THE CONTRACTOR SHALL BE ALLOWED TO COMMENCE BYPASS PUMPING OR FLOW DIVERSION OPERATIONS.

4. INSERTION AND RECEIVING PITS SHALL BE PREPARED AND BACKFILLED IN ACCORDANCE WITH SECTION 02200 EARTHWORK. THE LOCATION OF INSERTION AND RECEIVING PITS ARE TO BE DETERMINED BY THE CONTRACTOR AND APPROVED BY THE DEPARTMENT OF WATERSHED MANAGEMENT OR ITS REPRESENTATIVES.
5. CONTRACTOR SHALL LOCATE AND PHYSICALLY DISCONNECT ALL LATERALS FROM THE EXISTING MAIN PRIOR TO PIPE BURSTING.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DISCONNECTING AND RECONNECTING ALL LIVE LATERALS TO THE MAIN PIPE. CAPPED AND/OR ABANDONED LATERALS SHALL NOT BE RECONNECTED TO THE NEW MAIN.
7. LEAK TEST NEW SANITARY SEWER MAIN PRIOR TO PERMANENT RESURFACING IN ACCORDANCE WITH 02730 SEWERS AND ACCESSORIES.



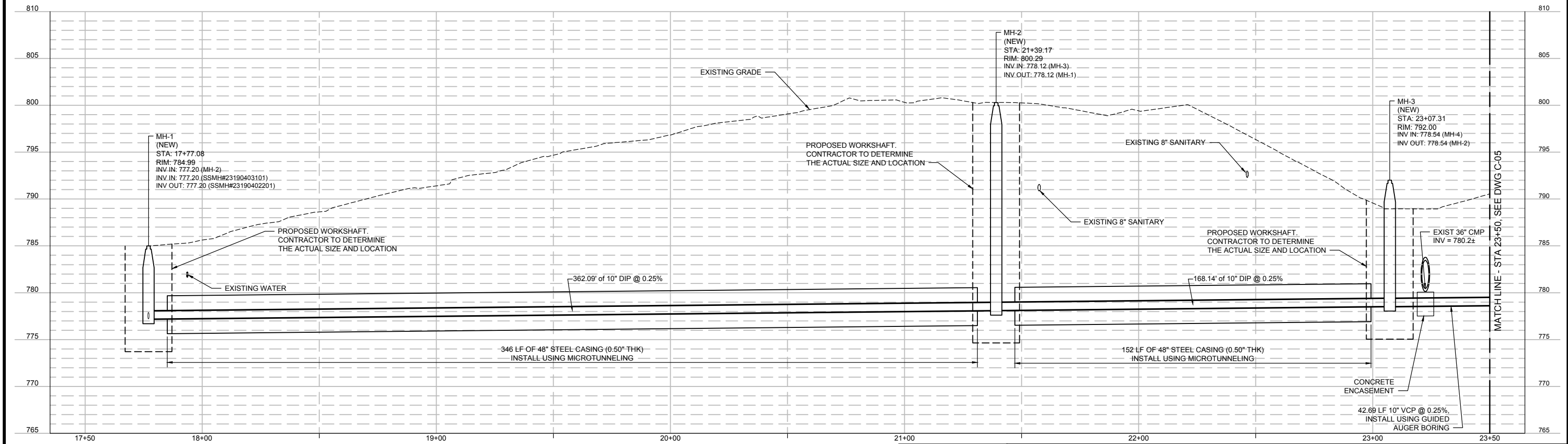
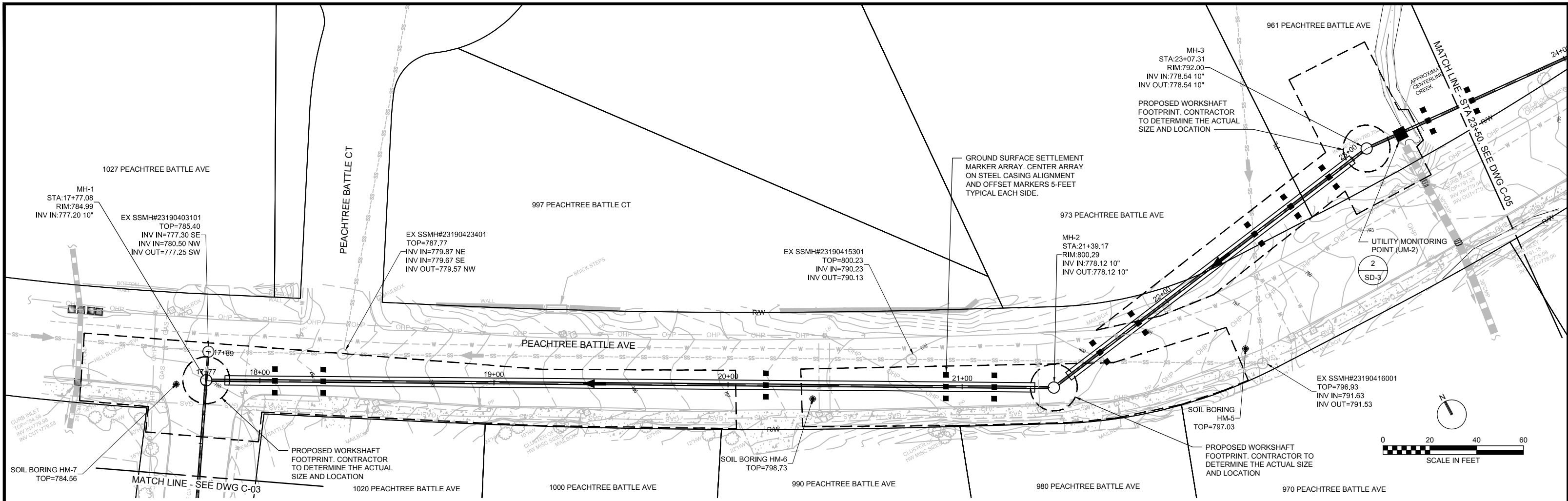
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NO.	DATE	DESCRIPTION			HOWELL MILL ROAD SEWER IMPROVEMENTS PLAN AND PROFILE- STA 15+00 TO 17+77.08				
					SURVEYOR	FIELD BOOKS	L.L.	DIST.	COUNTY
					SCALE				
					DRAWN BY D CORBETT	DESIGNED BY J BURTON	CHECKED BY D JENKINS	APPROVED BY T KELLEY	DATE JUN 2017
					PROJECT NUMBER:				SHEET OF 29



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DEPARTMENT OF WATERSHED MANAGEMENT

OFFICE OF ENGINEERING SERVICES

HOWELL MILL ROAD SEWER IMPROVEMENTS

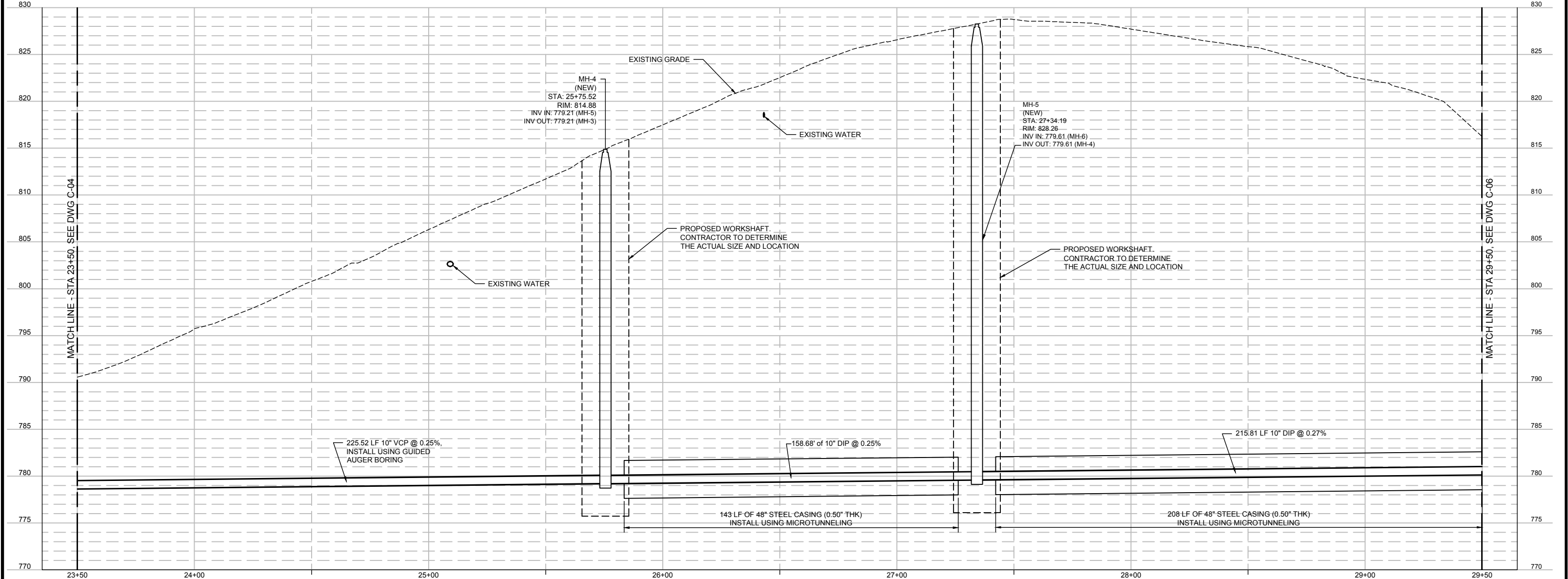
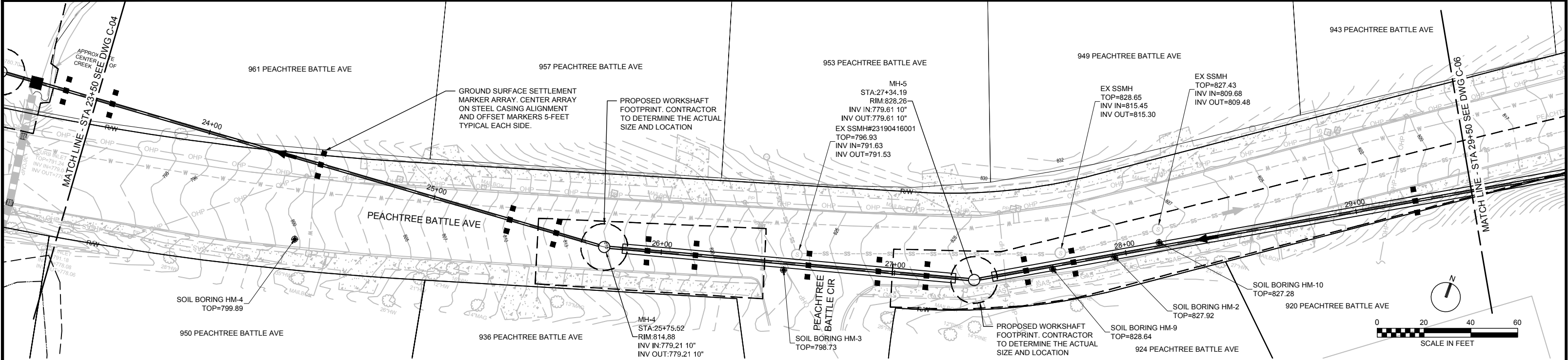
PLAN AND PROFILE-STA 17+77.08 TO STA 23+50

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DRAWN BY D CORBETT	DESIGNED BY J BURTON	CHECKED BY D JENKINS	APPROVED BY T KELLEY	DATE JUN 2017		

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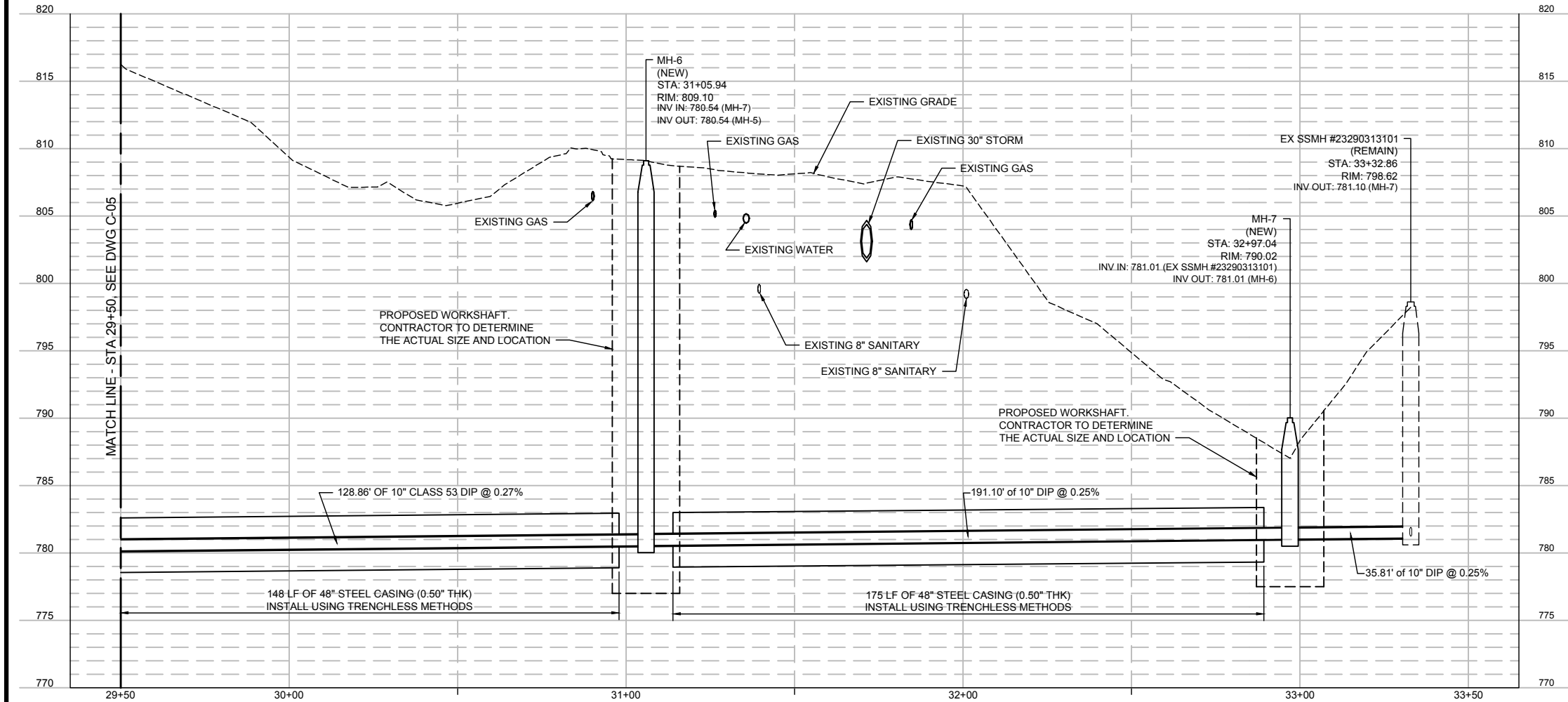
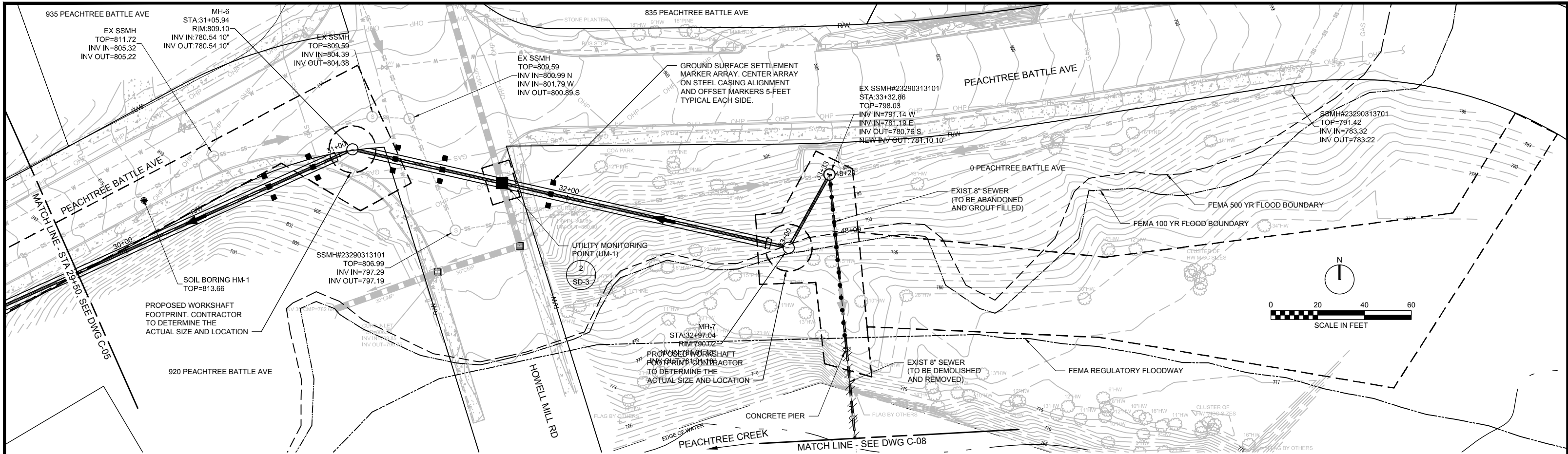
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SCALE IN FEET HORIZONTAL

SCALE IN FEET VERTICAL

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HOWELL MILL ROAD SEWER IMPROVEMENTS PLAN AND PROFILE-STA 23+50 TO STA 29+50					
SURVEYOR	FIELD BOOKS	L.L.	DIST.	COUNTY	SCALE
DRAWN BY D CORBETT	DESIGNED BY J BURTON	CHECKED BY D JENKINS	BY T KELLEY	APPROVED BY	DATE JUN 2017
PROJECT NUMBER:		SHEET OF 29			

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OFFICE OF ENGINEERING SERVICES

HOWELL MILL ROAD SEWER IMPROVEMENTS

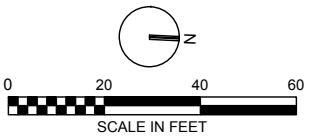
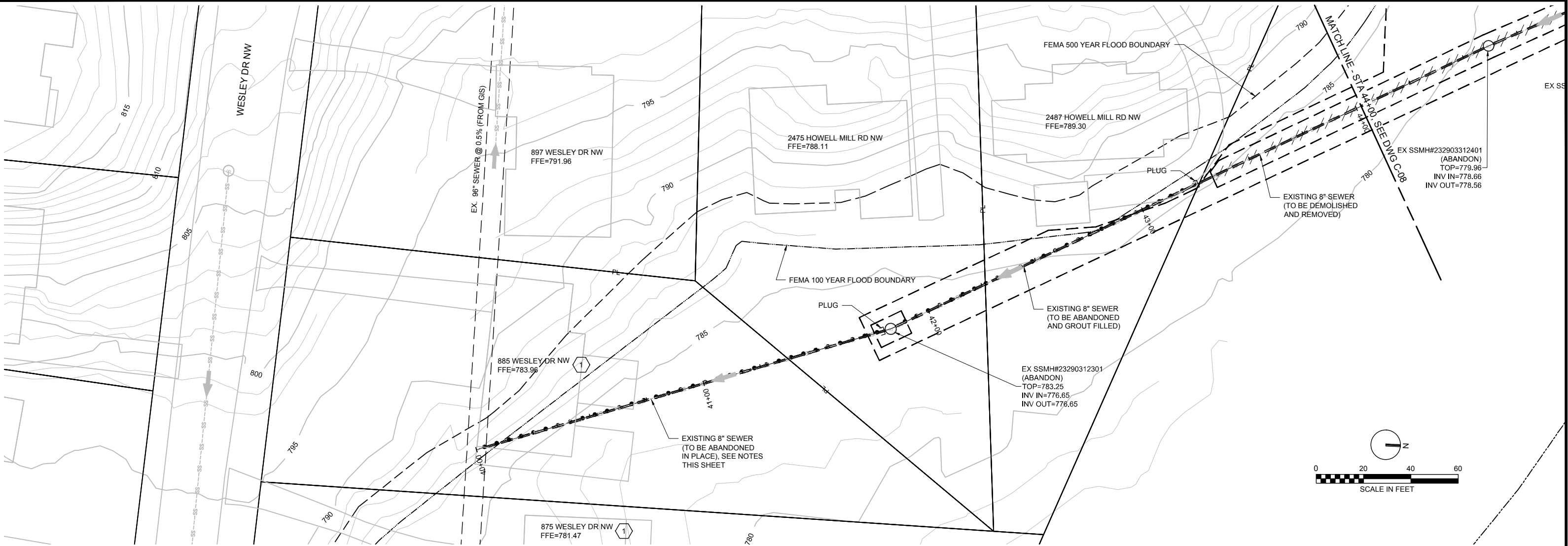
PLAN AND PROFILE-STA 29+30 TO STA 33+18.52

SURVEYOR	FIELD BOOKS	L.L.	DIST.	COUNTY	SCALE
DRAWN BY D CORBETT	DESIGNED BY J BURTON	CHECKED BY D JENKINS	APPROVED BY T KELLEY	DATE JUN 2017	

PROJECT NUMBER:

SHEET 8 OF 29

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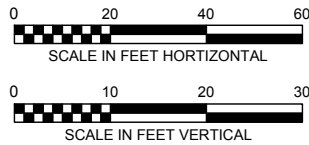
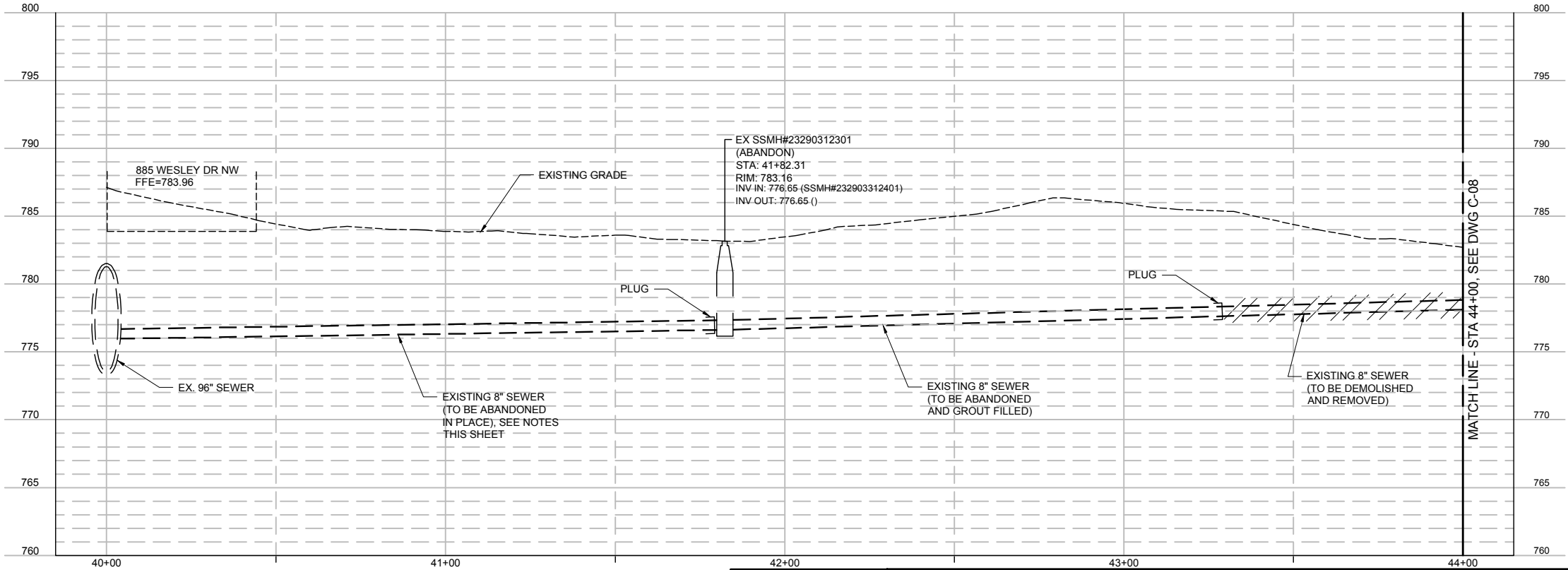


NOTES:

- PRIOR TO BEGINNING THE WORK, CONTRACTOR SHALL CONFIRM THE LOCATION OF EXISTING 8-INCH GRAVITY SEWER, ALL AFFECTED SERVICE LATERALS, AND EXISTING 8-INCH CONNECTION TO THE PEACHTREE CREEK TRUNK SEWER. CONTRACTOR SHALL ALSO CLEAN EXISTING 8-INCH SEWER LINE AND VIDEO WITH CLOSED CIRCUIT TELEVISION TO IDENTIFY CONNECTIONS, LOCATE OBSTRUCTIONS, AND ASSESS THE CONDITION OF THE PIPE.
- CONTRACTOR SHALL ROUTE NEW SERVICE LATERALS TO NEW GRAVITY SEWER MAIN IN ACCORDANCE WITH 02538 SEWER SERVICE CONNECTIONS. EXISTING SERVICE CONNECTION PIPE SHALL BE REMOVED OR ABANDONED AS NECESSARY TO ALLOW FOR NEW SEWER INSTALLATION.
- ABANDONMENT AND PLUGGING OF EXISTING PIPELINES SHALL INCLUDE THE FILLING OF EXISTING SEWERS WITH CONTROLLED LOW STRENGTH MATERIAL (CLSM), INSTALLATION OF A TIGHT FITTING PLUG OR WALL OF CLASS 2 CONCRETE A MINIMUM OF TWO FEET THICK TO SECURELY CLOSE PIPELINE, EXCAVATION, BACKFILL, AND SURFACE RESTORATION. CLSM SHALL BE A FLOWABLE MATERIAL CONSISTING OF TYPE I OR TYPE II CEMENT IN ACCORDANCE WITH ASTM C150, ASTM C33 SIZE 7 AGGREGATE, CLASS F FLY ASH IN ACCORDANCE WITH ASTM C618, AND CLEAN, POTABLE WATER CONTAINING LESS THAN 500 PPM OF CHLORIDES.
- PRIOR TO COMMENCING ANY ABANDONMENT ACTIVITIES, CONTRACTOR SHALL SUBMIT A PLAN FOR ABANDONMENT, DESCRIBING THE PROPOSED GROUTING SEQUENCE, GROUT MIX, WASTEWATER FLOW CONTROL REQUIREMENTS, IF ANY, AND OTHER INFORMATION PERTINENT TO COMPLETION OF THE WORK.
- FOR MANHOLES TO BE ABANDONED, DEMOLISH AND REMOVE MANHOLES FRAMES, COVERS AND OTHER PORTIONS OF THE STRUCTURE TO MINIMUM OF 4 FEET BELOW FINISHED GRADE.
- DURING PLACEMENT OF FLOWABLE FILL, COMPENSATE FOR ANY IRREGULARITIES IN THE SEWER PIPE, SUCH AS OBSTRUCTIONS, OPEN JOINTS, OR BROKEN PIPE TO ENSURE NO VOIDS REMAIN UNFILLED.

KEYNOTES:

- CONTRACTOR TO PERFORM INVESTIGATIVE WORK USING DYE TESTING IN ACCORDANCE WITH SPECIFICATION SECTION 01532F OR ANOTHER ENGINEER APPROVED METHOD TO DETERMINE THE TERMINATION OF EXISTING SERVICE LATERALS AND ENSURE CONTINUED SANITARY SEWER SERVICE TO RESIDENCES. IN THE EVENT THAT SANITARY SEWER SERVICE WOULD BE DISCONTINUED AS A RESULT OF THE WORK, CONTRACTOR SHALL INSTALL A RECEIVE A RESIDENTIAL LOT PUMPING SYSTEM ON THE AFFECTED PROPERTY. CONTRACTOR SHALL BE RESPONSIBLE FOR FURNISHING AND INSTALLING THE RESIDENTIAL LOT PUMP SYSTEM. THE LOCATION OF THE PUMP STATIONS AND ROUTING OF THE FORCEMAIN SHALL BE DETERMINED THROUGH AGREEMENT BETWEEN THE CONTRACTOR AND THE RESIDENTIAL HOME OWNER. THE CITY OF ATLANTA WILL BE RESPONSIBLE FOR THE EXECUTION OF A SERVICE AGREEMENT WITH EACH RESIDENTIAL HOME OWNER. THE INSTALLATION OF THE PUMP STATIONS SHALL BE BY LICENSED PLUMBER AND LICENSED ELECTRICIAN UNDER SUBCONTRACT WITH THE CONTRACTOR. THE PUMP STATIONS SHALL BE A SIMPLEX PUMP STATION MANUFACTURED BY EITHER LIBERTY PUMPS MODEL NO. 2484LSG OR ENVIRONMENT ONE CORPORATION MODEL NO. DH151.



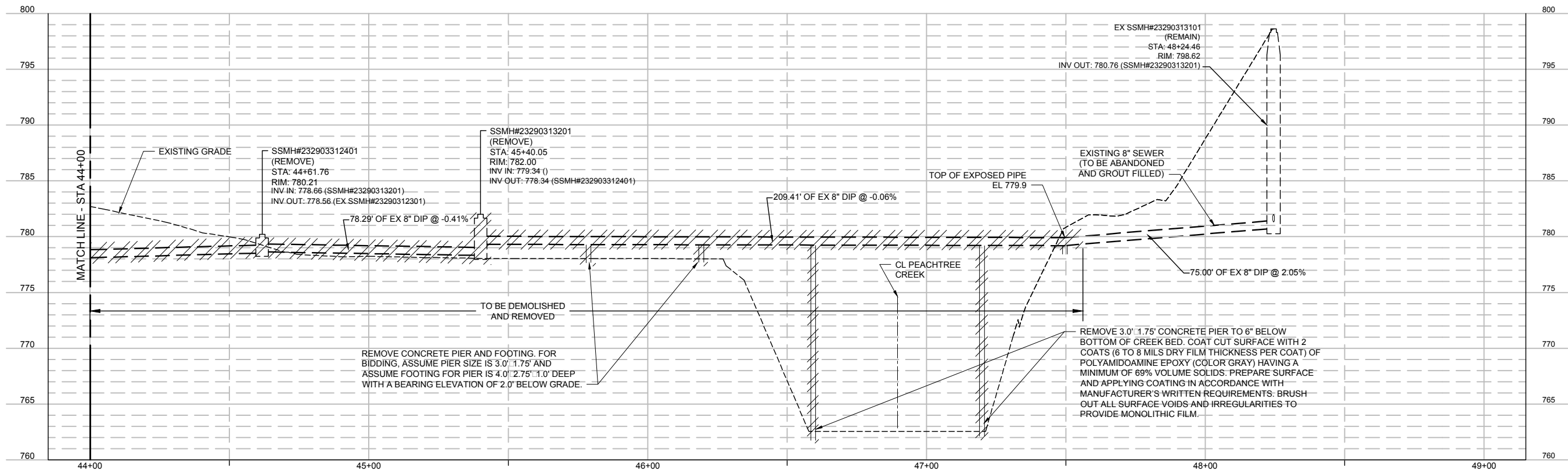
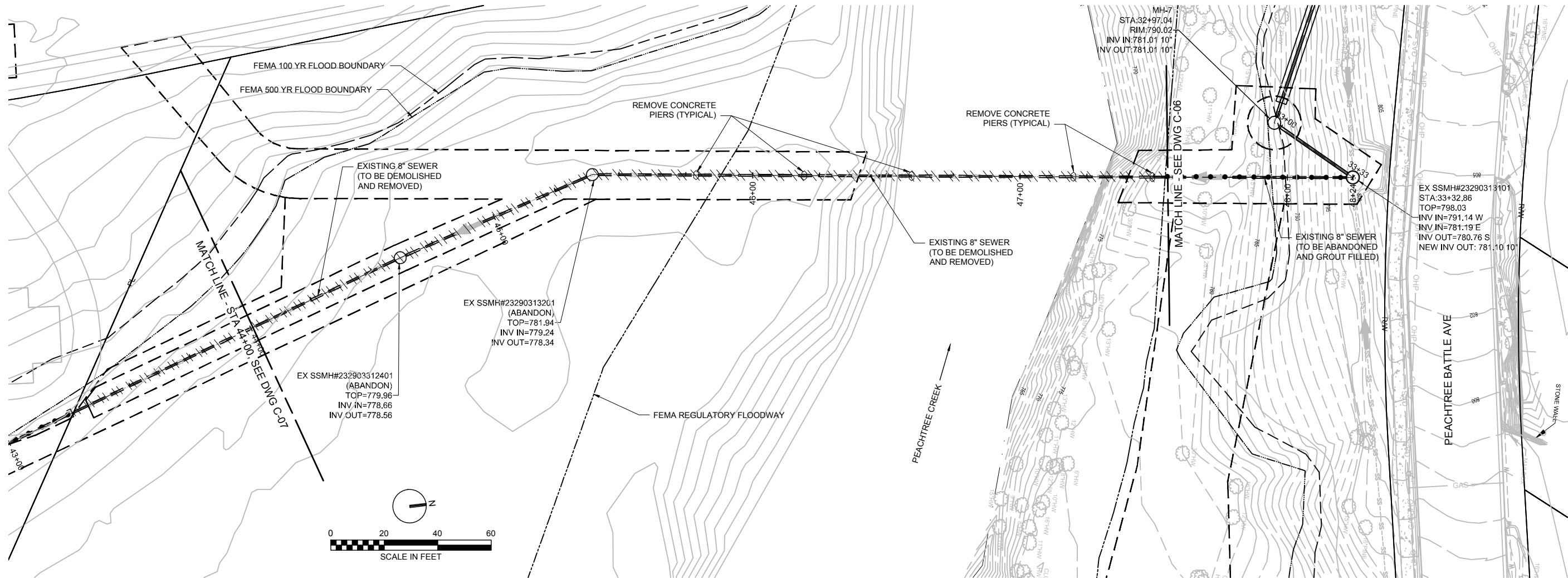
ch2m hill **ROHLDFORX**
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DRAWING IS TO BE CONSIDERED PRELIMINARY UNLESS APPROVED										
	REVISIONS			CITY OF ATLANTA DEPARTMENT OF WATERSHED MANAGEMENT OFFICE OF ENGINEERING SERVICES						
	NO.	DATE	DESCRIPTION							
				HOWELL MILL ROAD SEWER IMPROVEMENTS PLAN AND PROFILE - STA 40+00 TO STA 44+00						
				SURVEYOR		FIELD BOOKS	L.L.	DIST.	COUNTY	SCALE
				DRAWN BY D CORBETT		DESIGNED BY J BURTON	CHECKED BY D JENKINS		APPROVED BY T KELLEY	DATE JUN 2017
ENGINEER OF RECORD				PROJECT NUMBER:					SHEET OF 29	

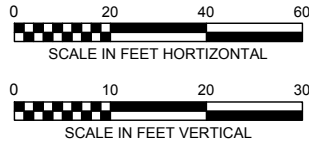


NOTES:

1. PRIOR TO BEGINNING THE WORK, CONTRACTOR SHALL CONFIRM THE LOCATION OF EXISTING 8-INCH GRAVITY SEWER, ALL AFFECTED SERVICE LATERALS, AND EXISTING 8-INCH CONNECTION TO THE PEACHTREE CREEK TRUNK SEWER. CONTRACTOR SHALL ALSO CLEAN EXISTING 8-INCH SEWER LINE AND VIDEO WITH CLOSED CIRCUIT TELEVISION TO IDENTIFY CONNECTIONS, LOCATE OBSTRUCTIONS, AND ASSESS THE CONDITION OF THE PIPE.
2. CONNECTION OF NEW 8-INCH GRAVITY SEWER TO THE 96-INCH PEACHTREE CREEK TRUNK SEWER SHALL BE MADE USING INSERTA TEE® MANIFOLD ADAPTOR W/ SDR 35 PVC GASKETED BELL ENDS OR ENGINEER-APPROVED EQUIVALENT.
3. ABANDONMENT AND PLUGGING OF EXISTING PIPELINES SHALL INCLUDE THE FILLING OF EXISTING SEWERS WITH CONTROLLED LOW STRENGTH MATERIAL (CLSM) AND INSTALLATION OF A TIGHT FITTING PLUG OR WALL OF CLASS 2 CONCRETE A MINIMUM OF TWO FEET THICK TO SECURELY CLOSE PIPELINE, INCLUDING EXCAVATION, BACKFILL, AND REPLACEMENT OF PAVEMENT SECTION AND/OR

- LANDSCAPING AS PRIOR TO WORK). CLSM SHALL BE INJECTED INTO THE PIPE, COMPLETELY FILLING SEGMENTS TO BE ABANDONED IN PLACE. CLSM SHALL BE A FLOWABLE MATERIAL CONSISTING OF TYPE I OR TYPE II CEMENT IN ACCORDANCE WITH ASTM C150, ASTM C33 SIZE 7 AGGREGATE, CLASS F FLY ASH IN ACCORDANCE WITH ASTM C618, AND CLEAN, POTABLE WATER CONTAINING LESS THAN 500 PPM OF CHLORIDES.
4. ABANDONMENT IN PLACE OF EXISTING SANITARY SEWERS AND MANHOLES SHALL BE ACCOMPLISHED USING FLOWABLE FILL. FLOWABLE FILL SHALL BE A CONTROLLED LOW-STRENGTH MATERIAL CONSISTING OF A FLUID MIXTURE OF CEMENT, FLY ASH, AGGREGATE, WATER AND WITH ADMIXTURE AS NECESSARY TO PROVIDE WORKABLE PROPERTIES.
 5. PRIOR TO COMMENCING ANY ABANDONMENT ACTIVITIES, CONTRACTOR SHALL SUBMIT A PLAN FOR ABANDONMENT, DESCRIBING THE PROPOSED GROUTING SEQUENCING, GROUT MIX, WASTEWATER FLOW CONTROL REQUIREMENTS, IF ANY, AND OTHER INFORMATION PERTINENT TO COMPLETION OF THE WORK.

6. FOR MANHOLES TO BE ABANDONED, DEMOLISH AND REMOVE MANHOLES FRAMES, COVERS AND OTHER PORTIONS OF THE STRUCTURE TO MINIMUM OF 4 FEET BELOW FINISHED GRADE.
7. DURING PLACEMENT OF FLOWABLE FILL, COMPENSATE FOR ANY IRREGULARITIES IN THE SEWER PIPE, SUCH AS OBSTRUCTIONS, OPEN JOINTS, OR BROKEN PIPE TO ENSURE NO VOIDS REMAIN UNFILLED.



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				OFFICE OF ENGINEERING SERVICES					
				HOWELL MILL ROAD SEWER IMPROVEMENTS					
				PLAN AND PROFILE - STA 44+00 TO STA 47+88					
				SURVEYOR	FIELD BOOKS	L.L.	DIST.	COUNTY	SCALE
				DRAWN BY D CORBETT	DESIGNED BY J BURTON	CHECKED BY D JENKINS	APPROVED BY T KELLEY	DATE JUN 2017	
				PROJECT NUMBER:			SHEET		
	ENGINEER OF RECORD								

CERTIFICATIONS

DESIGN PROFESSIONAL

1. I CERTIFY UNDER PENALTY OF LAW THAT THIS PLAN WAS PREPARED AFTER A SITE VISIT TO THE LOCATIONS DESCRIBED HEREIN BY MYSELF OR MY AUTHORIZED AGENT, UNDER MY SUPERVISION.

NAME: CHRISTOPHER S. HAMBLÉN

GEORGIA REGISTERED ENGINEER NO: 038034

LEVEL II CERTIFIED DESIGN PROFESSIONAL NO: 0000069253

SIGNATURE: _____

PROJECT INFORMATION

1. PRIMARY PERMITTEE:
NAME: REGINALD CRAYTON
COMPANY: CITY OF ATLANTA, DEPARTMENT OF WATERSHED MANAGEMENT
ADDRESS: 72 MARIETTA STREET NW
CITY/STATE/ZIP: ATLANTA, GA 30303
PHONE: (404) 798-5612

2. ENGINEER:
CH2M
6600 PEACHTREE DUNWOODY ROAD
400 EMBASSY ROW, SUITE 600
ATLANTA GA 30328

3. 24-HR CONTACT: REGINALD CRAYTON, (404) 798-5612

4. TOTAL PROJECT AREA: 1.75 ACRES
TOTAL DISTURBED AREA: 0.81 ACRES

5. GPS LOCATIONS OF PROJECT(WGS84)
BEGINNING OF PROJECT: (33.823434, -84.422503)
END OF PROJECT: (33.8229344, -84.4158655)

6. PROJECT DESCRIPTION
THE CONTRACT WILL COMPRISE THE REALIGNMENT OF AN EXISTING 8-INCH SEWER TO ELIMINATE AN EXISTING AERIAL CROSSING OF PEACHTREE CREEK. THE WORK SHOWN HEREIN INCLUDES, BUT IS NOT LIMITED TO, THE INSTALLATION OF APPROXIMATELY 1,516 LINEAR FEET OF 10-INCH GRAVITY SEWER BY TRENCHLESS METHODS, THE INSTALLATION OF APPROXIMATELY 558 LINEAR FEET OF 10-INCH GRAVITY SEWER BY PIPE BURSTING, THE DIRECT REPLACEMENT OF EXPOSED 8-INCH GRAVITY SEWER WITH 220 LINEAR FEET OF 10-INCH GRAVITY SEWER AT AN EXISTING AERIAL CROSSING OF PEACHTREE CREEK, THE DEMOLITION AND REMOVAL OF AN EXISTING AERIAL SEWER CROSSING AND ITS ANCILLARY COMPONENTS (APPROXIMATELY 465 LF), THE INSTALLATION OF APPROXIMATELY 260 LINEAR FEET OF NEW 8-INCH GRAVITY SEWER AND APPURTENANCES, AND THE ABANDONMENT OF APPROXIMATELY 325 LINEAR FEET OF 8-INCH GRAVITY SEWER.

7. RECEIVING WATERS

- THE RECEIVING WATERS OF THIS PROJECT IS PEACHTREE CREEK, WHICH IS A PART OF THE UPPER CHATTAHOOCHEE WATERSHED (HUC-03130001).
PEACHTREE CREEK IS AN IMPAIRED STREAM SEGMENT AS DEFINED IN THE DRAFT 2016 GEORGIA EPD 305(B)303(D) LIST DUE TO FECAL COLIFORM WATER QUALITY CRITERIA VIOLATIONS.
A TMDL IMPLEMENTATION PLAN FOR SEDIMENT FOR THIS STREAM SEGMENT DOES NOT EXIST.

8. BASE FLOOD INFORMATION

100-YR FLOOD ELEVATION: PEACHTREE CREEK, 782' TO 786'
MAP NUMBER: 13121C0233F
PANEL NUMBER: 0233F
REVISED: SEPTEMBER 18, 2013

9. SOILS TYPE

AS PER NRCS WEB SOIL SURVEY, SOIL TYPES FOR THIS PROJECT ARE DELINEATED ON SHEETS CE-02 THROUGH CE-06. SOIL TYPE LEGEND (WITH DESCRIPTIONS) IS PROVIDED ON SHEET CE-01.

10. WETLANDS

THE PRESENCE OF ON-SITE WETLANDS HAS BEEN INVESTIGATED AND IT WAS DETERMINED THERE ARE NO WETLANDS WITHIN THE PROJECT AREA.

11. STATE WATERS

STATE WATERS LOCATED ON AND WITHIN 200 FEET OF THE PROJECT SITE HAVE BEEN IDENTIFIED AND WILL BE PROTECTED BY ASSOCIATED STATE AND CITY PROTECTION REGULATIONS AND BUFFERS.

12. RUNOFF COEFFICIENT OR PEAK DISCHARGE FLOWS OF THE SITE PRIOR TO AND AFTER CONSTRUCTION ACTIVITIES ARE COMPLETED SHALL STAY THE SAME. THE PROPOSED WORK DOES NOT ALTER THE HYDROLOGY OF THE SITE.

13. WRITTEN JUSTIFICATION AGAINST SEDIMENT BASIN IMPLEMENTATION: THE TOPOGRAPHY OF THE SITE, AS WELL CONSTRUCTION TECHNIQUES, LIMITS THE LAND DISTURBANCE ACTIVITIES TO A NARROW AND NON-CONTINUOUS LINEAR AREAS. THIS ELIMINATES THE OPPORTUNITY TO USE A CENTRALIZED SEDIMENT STORAGE BMP TO ADEQUATELY TREAT SEDIMENT POLLUTION. TO MEET THE GOALS OF LIMITING SEDIMENT POLLUTION, THE SEDIMENT CONTROL PROGRAM WILL BE EXECUTED BY THE CONTRACTOR IN COORDINATION WITH LIMITING LAND DISTURBANCE AS SPECIFIED IN THIS PLAN SET AT ANY GIVEN TIME: BEFORE, DURING, AND AFTER CONSTRUCTION.

REQUIRED ESCP NOTES (CITY OF ATLANTA REQUIRED NOTES INCLUDED AS SHOWN IN BOLD)

1. NON-EXEMPT ACTIVITIES SHALL NOT BE CONDUCTED WITHIN THE 25 OR 50-FOOT UNDISTURBED STREAM BUFFERS AS MEASURED FROM THE POINT OF WRESTED VEGETATION OR WITHIN 25-FEET OF THE COASTAL MARSHLAND BUFFER AS MEASURED FROM THE JURISDICTIONAL DETERMINATION LINE WITHOUT FIRST ACQUIRING THE NECESSARY VARIANCES AND PERMITS.

2. A BUFFER VARIANCE IS REQUIRED FOR THIS PROJECT. ENCROACHMENT AREAS ARE SHOWN ON DRAWINGS CE-02, CE-04, AND CE-05. THESE AREAS ARE AT THE FARTHEST EASTERN AND WESTERN ENDS OF THE PROJECT WHERE CONSTRUCTION ACTIVITIES PRIMARILY INCLUDE REMOVAL AND DIRECT REPLACEMENT OF AERIAL SEWERS ON EXISTING PIERS. REMOVAL OF SEWERS SHALL ARE EXPECTED TO BE COMPLETED VIA CRANE WITH BOOM.

3. SPILL CLEANUP AND CONTROL PRACTICES

- 3.1. LOCAL, STATE AND MANUFACTURER'S RECOMMENDED METHODS FOR SPILL CLEANUP WILL BE CLEARLY POSTED AND PROCEDURES WILL BE MADE TO SITE PERSONNEL.
3.2. MATERIAL AND EQUIPMENT NECESSARY FOR SPILL CLEANUP WILL BE KEPT IN THE MATERIAL STORAGE AREAS. TYPICAL MATERIALS AND EQUIPMENT INCLUDES, BUT IS NOT LIMITED TO, BROOMS, DUSTPANS, MOPS, RAGS, GLOVES, GOGGLES, CAT LITTER, SAND, SAWDUST AND PROPERLY LABELED PLASTIC AND METAL WASTE CONTAINERS.
3.3. SPILL PREVENTION PRACTICES AND PROCEDURES WILL BE REVIEWED AFTER A SPILL AND ADJUSTED AS NECESSARY TO PREVENT FUTURE SPILLS. ALL SPILLS WILL BE CLEANED UP IMMEDIATELY UPON DISCOVERY. ALL SPILLS WILL BE REPORTED AS REQUIRED BY LOCAL, STATE AND FEDERAL REGULATIONS.
3.4. FOR SPILLS THAT IMPACT SURFACE WATER (LEAVE A SHEEN ON SURFACE WATER), THE NATIONAL RESPONSE CENTER (NRC) WILL BE CONTACTED WITHIN 24 HOURS AT 1-800-424-8802.
FOR SPILLS OF AN UNKNOWN AMOUNT, THE NATIONAL CENTER (NRC) WILL BE CONTACTED WITHIN 24 HOURS AT 1-800-424-8802.
FOR SPILLS GREATER THAN 25 GALLONS AND NO SURFACE WATER IMPACTS, THE GEORGIA EPD WILL BE CONTACTED WITHIN 24 HOURS.
FOR SPILLS LESS THAN 25 GALLONS AND NO SURFACE WATER IMPACTS, THE SPILL WILL BE CLEANED UP AND LOCAL AGENCIES WILL BE CONTACTED AS REQUIRED.
3.5. THE CONTRACTOR SHALL NOTIFY THE LICENSED PROFESSIONAL WHO PREPARED THIS PLAN IF MORE THAN 1,320 GALLONS OF PETROLEUM IS STORED ONSITE (THIS INCLUDES CAPACITIES OF EQUIPMENT) OR IF ANY ONE PIECE OF EQUIPMENT HAS A CAPACITY GREATER THAN 660 GALLONS. THE CONTRACTOR WILL NEED A SPILL PREVENTION CONTAINMENT AND COUNTERMEASURES PLAN PREPARED BY THAT LICENSED PROFESSIONAL.

4. THE ESCAPE OF SEDIMENT FROM THE SITE SHALL BE PREVENTED BY THE INSTALLATION OF EROSION AND SEDIMENT CONTROL MEASURES AND PRACTICES PRIOR TO LAND DISTURBING ACTIVITIES.

5. EROSION CONTROL MEASURES WILL BE MAINTAINED AT ALL TIMES. IF FULL IMPLEMENTATION OF THE APPROVED PLAN DOES NOT PROVIDE FOR EFFECTIVE EROSION CONTROL, ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE IMPLEMENTED TO CONTROL OR TREAT THE SEDIMENT SOURCE.

6. ANY DISTURBED AREA LEFT EXPOSED FOR A PERIOD GREATER THAN 14 DAYS SHALL BE STABILIZED WITH MULCH OR TEMPORARY SEEDING. ANY DISTURBED AREAS REMAINING IDLE FOR 30 DAYS SHALL BE STABILIZED WITH PERMANENT VEGETATION.

7. PERIMETER EROSION AND SEDIMENT CONTROL DEVICES AND ORANGE BARRIER FENCE SHALL BE INSTALLED PRIOR TO COMMENCEMENT OF SITE WORK AND REMAIN UNTIL COMPLETION OF WORK. CONTRACTOR IS RESPONSIBLE TO REPAIR OR REPLACE DAMAGED ITEMS. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSPECTED AT LEAST WEEKLY, AFTER EACH RAIN, AND REPAIRED AS NECESSARY. ACCUMULATED SILT SHALL BE REMOVED AS SOON AS PRACTICAL, BUT NO LATER THAN WHEN FENCE IS HALF FULL.

8. ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED IF DETERMINED NECESSARY BY ON-SITE INSPECTION.

9. SILT FENCE SHALL MEET THE REQUIREMENTS OF SECTION 171 - TYPE C TEMPORARY SILT FENCE, OF THE GEORGIA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS, 1993 EDITION, AND BE WIRE REINFORCED.

10. THE PROPERTY OWNER AND CONTRACTOR ARE EQUALLY RESPONSIBLE FOR ALL EROSION CONTROL ACTIVITIES.

11. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO OBTAIN QUALIFIED PROFESSIONAL ADVICE WHEN QUESTIONS ARISE CONCERNING DESIGN AND EFFECTIVENESS OF EROSION CONTROL DEVICES, NOT THE CITY OF ATLANTA.

12. ALL TEMPORARY AND PERMANENT SEEDING MUST BE PERFORMED AT THE APPROPRIATE SEASON. IN SUCH INSTANCES WHERE THE ESTABLISHMENT OF VEGETATION IS INOPPORTUNE DUE TO SEASON OR DROUGHT, DISTURBED AREAS SHALL BE TEMPORARILY STABILIZED USING 2"-4" OF MULCH (DS1). ADDITIONAL PLANTINGS WILL BE NECESSARY IF A SUFFICIENT STAND OF GRASS FAILS TO GROW.

13. THE CITY'S DESIGNEE WILL VERIFY ADEQUATE COVER (100% COVER, 70% DENSITY) OF PERMANENT STABILIZATION (DS3, DS4).

14. SILT FENCES SHALL NOT BE PLACED IN STREAM BUFFER OR FLOODPLAINS, UNLESS UTILIZED FOR THE CONSTRUCTION OF AN EXEMPT ACTIVITY (I.E. ROADWAY DRAINAGE STRUCTURES, SEWER/WATER CROSSINGS, OR DRAINAGE STRUCTURES) PER THE APPROVED PLANS. FOR SUCH DISTURBANCES WITHIN THE BUFFER, THE AREA SHALL BE IMMEDIATELY STABILIZED USING EROSION CONTROL MATTING AND/OR BLANKETS ONCE THE ACTIVITY IS COMPLETE.

15. SUBCONTRACTORS INVOLVED WITH LAND DISTURBANCE ACTIVITIES SHALL MEET THE EDUCATION REQUIREMENTS (LEVEL 1) DESCRIBED IN O.C.G.A 12-7-19.

16. EROSION CONTROL AND TREE PROTECTION MEASURES SHALL BE INSTALLED PRIOR TO ANY OTHER CONSTRUCTION ACTIVITY AND SHALL BE MAINTAINED UNTIL PERMANENT GROUND COVER IS ESTABLISHED.

17. SOIL DISTURBING ACTIVITIES WILL INCLUDE: PLACEMENT OF EROSION AND SEDIMENT CONTROL, DEMOLITION, SITE CLEARING AND GRUBBING, GRADING OPERATIONS, FACILITIES CONSTRUCTION, TRENCH EXCAVATION AND BACKFILL, AND SURFACE RESTORATION.

18. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ALL EROSION CONTROL MEASURES INSTALLED IN GOOD WORKING ORDER FOR THE FULL DURATION OF THIS CONTRACT.

19. EROSION, SEDIMENT AND POLLUTION CONTROL MEASURES SHALL BE PROVIDED AS SHOWN AND ARE THE MINIMUM REQUIRED. ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED IF DETERMINED NECESSARY BY ON-SITE INSPECTION. ADDITIONAL DEVICES MAY BE REQUIRED AS NECESSARY DURING CONSTRUCTION.

20. CONTRACTOR SHALL INSTALL AND ADD TO EROSION CONTROL MEASURES AS DETERMINED BY THE ENGINEER, OWNER OR THE CITY.

21. PROVISIONS TO PREVENT EROSION OF SOIL FROM THE SITE SHALL BE, AT A MINIMUM, IN CONFORMANCE WITH THE REQUIREMENTS OF THE MANUAL FOR EROSION AND SEDIMENT CONTROL IN GEORGIA, CURRENT EDITION. THIS DESIGN SHALL CONFORM TO AND ALL WORK WILL BE PERFORMED IN ACCORDANCE WITH THE STANDARDS AND SPECIFICATIONS OF THIS PUBLICATION.

22. CONSTRUCTION EXITS (Co) SHALL BE REQUIRED AT ALL LOCATIONS USED FOR INGRESS/EGRESS FROM THE CONSTRUCTION AREA. CONSTRUCTION MATERIAL STORAGE AREAS WILL REQUIRE THE INSTALLATION OF A CONSTRUCTION EXIT TO REDUCE OR ELIMINATE THE TRANSPORT OF MUD FROM THE AREA. SILT FENCE SHALL ALSO BE INSTALLED TO PREVENT SEDIMENT FROM LEAVING THE MATERIAL STORAGE AREA. AFTER DEMOBILIZATION, THE MATERIAL STORAGE AREA SHALL BE SEEDED AND MULCHED, AND THE SILT FENCE SHALL REMAIN UNTIL THE AREA IS PERMANENTLY STABILIZED.

23. CONSTRUCTION DEBRIS (INCLUDING CONCRETE WASHOUT) SHALL BE PROPERLY DISPOSED OF OFFSITE IN LICENSED LANDFILLS OR LOCATIONS THAT ARE APPROVED BY FEDERAL, STATE, AND LOCAL AUTHORITIES. WASTE MATERIALS SHALL NOT BE DISCHARGED TO WATERS OF THE STATE, EXCEPT AS AUTHORIZED BY A SECTION 404 PERMIT.

24. NO BURN OR BURY PITS SHALL BE PERMITTED ON THE SITE WITHOUT THE EXPRESS WRITTEN AUTHORIZATION OF THE SITE OWNER AND/OR THE ENGINEER OF RECORD.

25. A TEMPORARY COVER OF HEAVY MULCH OR MULCH WITH TEMPORARY SEEDING SHALL BE PLACED ON ALL AREAS WHERE PERMANENT COVER CAN NOT BE ESTABLISHED IMMEDIATELY DUE TO SEASONAL LIMITATIONS.

26. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE THAT UNDER NO CIRCUMSTANCES ANY SEDIMENT, TRASH, OR DEBRIS BE ALLOWED ONTO ADJACENT PROPERTIES, PUBLIC LANDS, OR OUTSIDE OF THE CONSTRUCTION LIMITS.

27. ALL EROSION CONTROL DEVICES, THAT ARE NOT DIRECTLY SPECIFIED AS TO INSTALLATION AND MATERIALS, SHALL MEET THE REQUIREMENTS OF THE GA. DEPT. OF TRANSPORTATION, SPECIFICATIONS FOR THE CONSTRUCTION OF ROADS AND BRIDGES, CURRENT EDITION, AND LATEST SUPPLEMENT IN EFFECT AT THE TIME OF BID OPENING OR THE MANUAL FOR EROSION AND SEDIMENT CONTROL IN GEORGIA, CURRENT EDITION.

28. ACCEPTANCE AND/OR SUBSEQUENT ACCEPTANCE OF THESE PLANS DOES NOT CONSTITUTE APPROVAL BY COA OF ANY LAND DISTURBING ACTIVITIES WITHIN WETLAND AREAS, JURISDICTIONAL WATERS OF THE STATE, AREAS OF THREATENED/ENDANGERED SPECIES, OR AREAS OF HISTORICAL SIGNIFICANCE. IT IS THE OWNER'S RESPONSIBILITY TO CONTACT THE APPROPRIATE REGULATORY AGENCY FOR ANY REQUIRED APPROVALS.

29. A COPY OF THE APPROVED LAND DISTURBANCE PLAN AND PERMIT SHALL BE PRESENT ON THE SITE AT ALL TIMES.

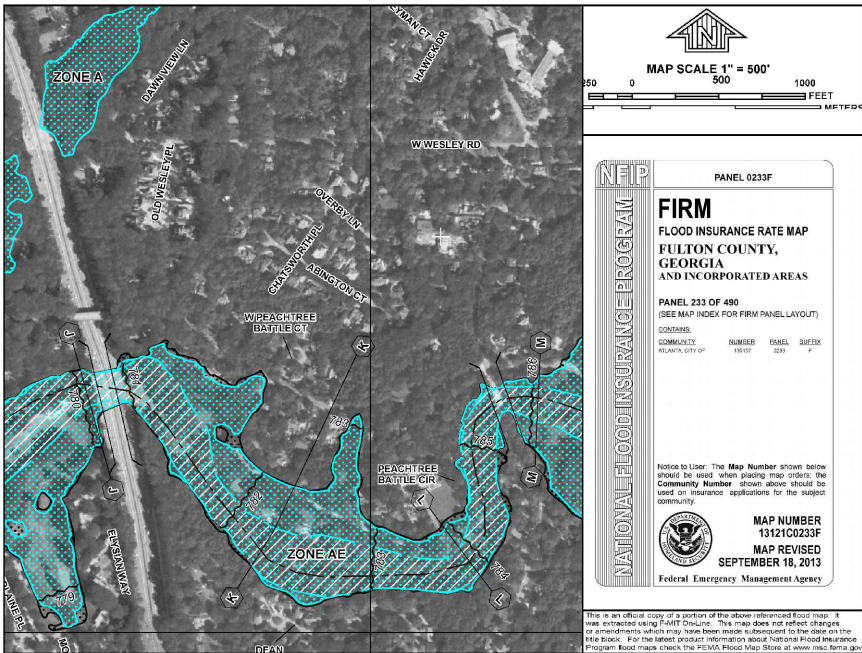
SOIL INFORMATION NOTES

1. SOILS INFORMATION IS FROM THE USDA NATURAL RESOURCES CONSERVATION SERVICE'S WEB SOIL SURVEY. SPATIAL EXTENTS OF SOIL LAYERS ARE SHOWN ON SHEETS CE-02 THROUGH CE-05.
2. SOIL SERIES ARE GROUPINGS OF SIMILAR SOILS THAT WITH THE ALLOWABLE EXCEPTIONS FOR TEXTURE OF SURFACE LAYER OR THE UNDERLYING SUBSTRATUM, HAVE MAJOR HORIZONS THAT ARE SIMILAR IN COMPOSITION, THICKNESS, AND ARRANGEMENT IN THE PROFILE. THE SOIL PROFILE MAPPED IN THE SURVEY ONLY DESCRIBES THE HORIZONS UP TO A DEPTH OF 80-INCHES.

MAP UNIT SYMBOL	MAP UNIT NAME	SLOPE (%)
APC	APPLING-HARD LABOR COMPLEX	6 – 10
CPA	CONGAREE SANDY LOAM, OCCASIONALLY FLOODED	0 – 2
Ub	URBAN LAND	N/A
UTC2	URBAN LAND-CECL COMPLEX, MODERATELY ERODED	2 – 10
UP-E	URBAN LAND-RION COMPLEX	10 – 25
W	WATER	N/A

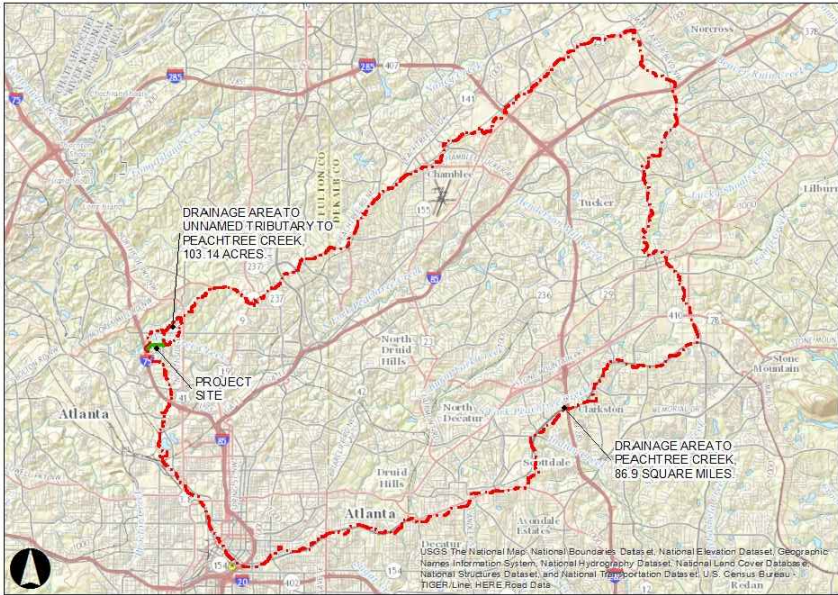
ANTICIPATED CONSTRUCTION SCHEDULE

START: SEPTEMBER 2017						
COMPLETION: FEBRUARY 2017						
ACTIVITY	MONTH					
	1	2	3	4	5	6
INITIAL PHASE BMP'S						
CLEARING & GRUBBING						
TEMPORARY VEGETATION						
INFRASTRUCTURE CONSTRUCTION (INCL. UTILITIES)						
FINE GRADING & LANDSCAPING						
REMOVE TEMP. EROSION CONTROL						
MAINTENANCE OF BMP'S						



FEMA FIRMETTE FLOOD INSURANCE MAP

NOTE: SCALE DEPICTED AS SHOWN DOES NOT REFLECT PRINTED SCALE.



OFFSITE DRAINAGE AREA (USGS TOPO MAP)

NOTE: DRAINAGE AREA DELINEATED USING USGS STREAMSTATS.

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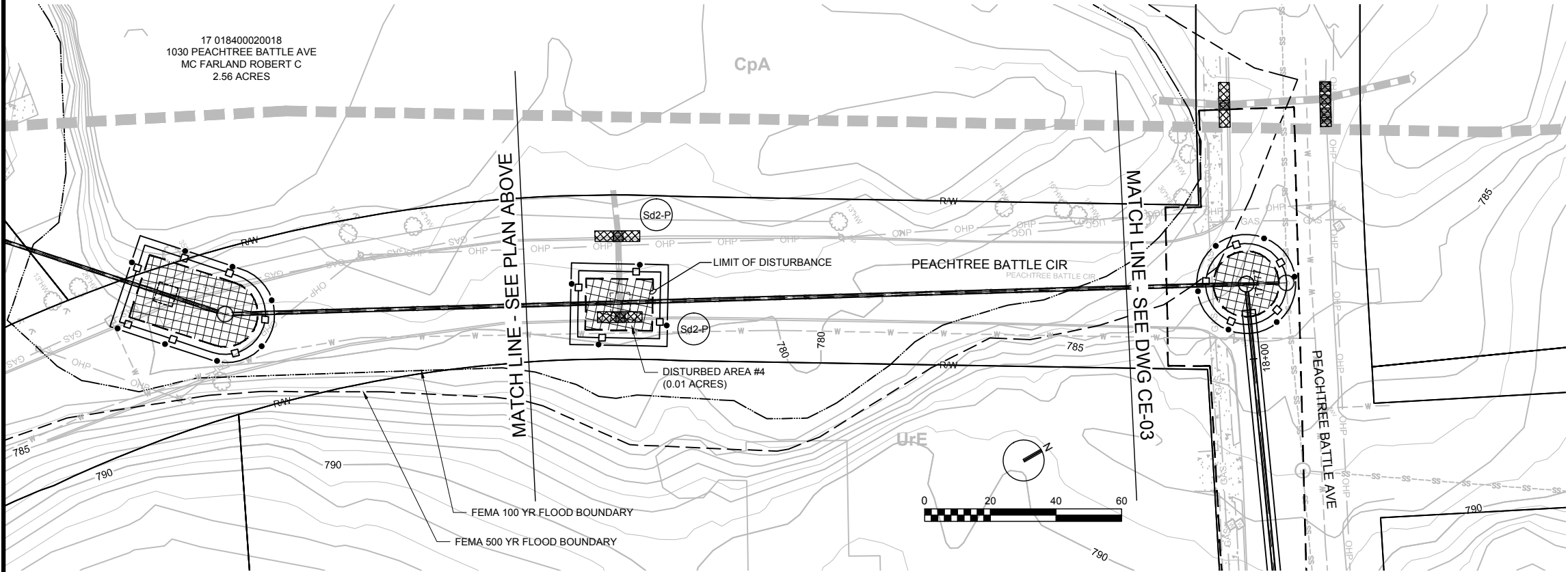
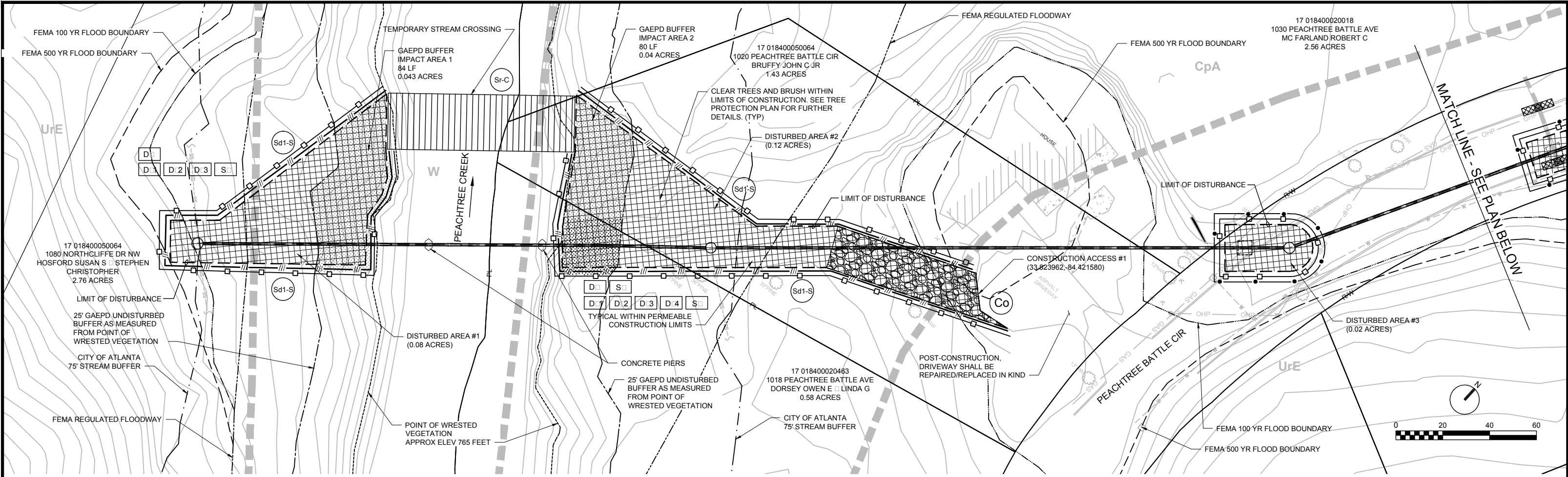
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N.O.	DATE	DESCRIPTION	HOWELL MILL ROAD SEWER IMPROVEMENTS EROSION CONTROL NOTES						
			SURVEYOR	FIELD BOOKS	L.L.	DIST.	COUNTY	SCALE	
							FULTON	NTS	
			DRAWN BY D CORBETT	DESIGNED BY T SMITH	CHECKED BY C HAMBLÉN	APPROVED BY T KELLEY	DATE JUN 2017		
ENGINEER OF RECORD			PROJECT NUMBER:			SHEET OF 29			



NOTES:
1. COMPOST FILTER SOCK AND SILT FENCE LOCATION IS APPROXIMATE AND MAY BE ADJUSTED IN COORDINATION WITH ENGINEER. CONTRACTOR SHALL PROVIDE OPENINGS TO ACCESS WORK AS NECESSARY.



Georgia Soil and Water
Conservation Commission

Christopher Hamblen
Level II Certified Design Professional

Certification Number: 0000069253 Expires: 08-21-2019
Issued: 08-21-2015



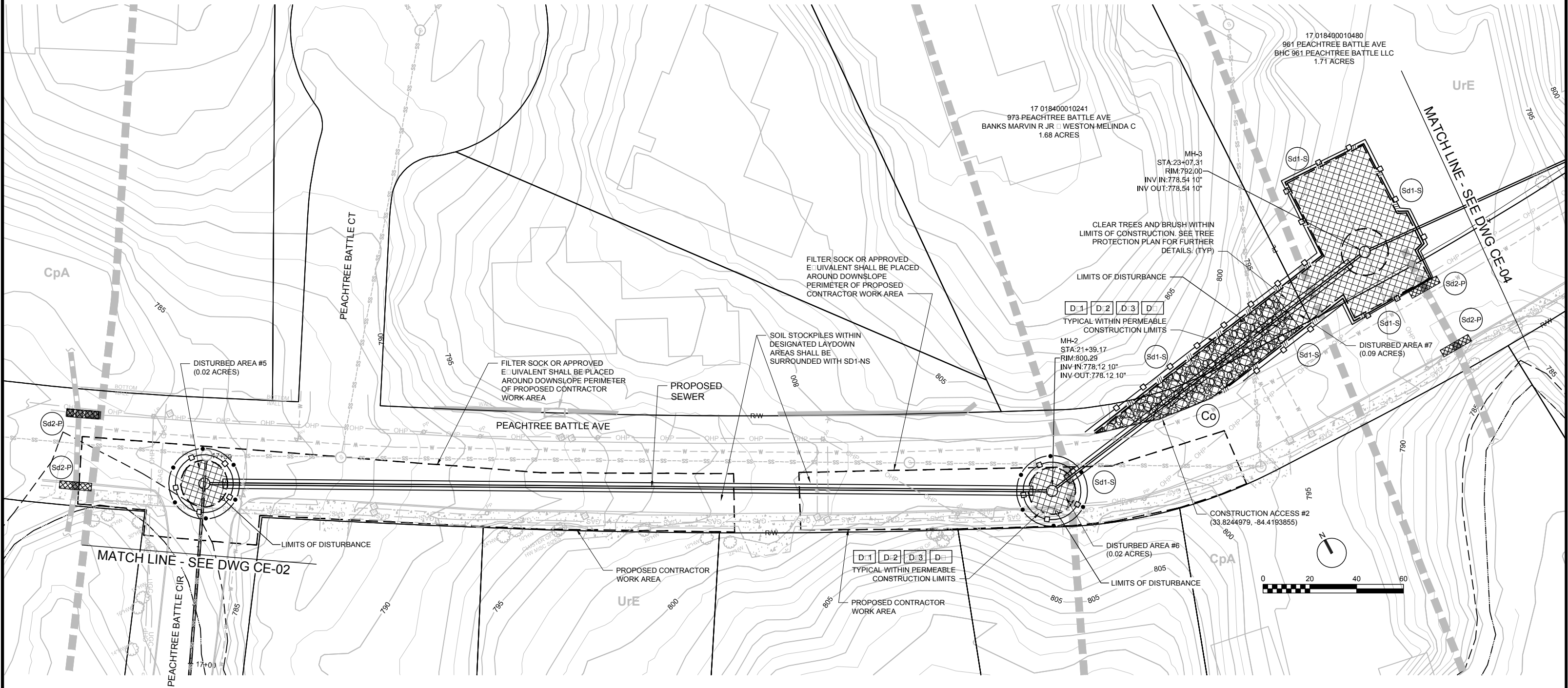
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				SURVEYOR		FIELD	BOOKS	L.L.	DIST.	COUNTY	SCALE
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ENGINEER OF RECORD				PROJECT NUMBER:				13 SHEET OF 29			



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Georgia Soil and Water Conservation Commission

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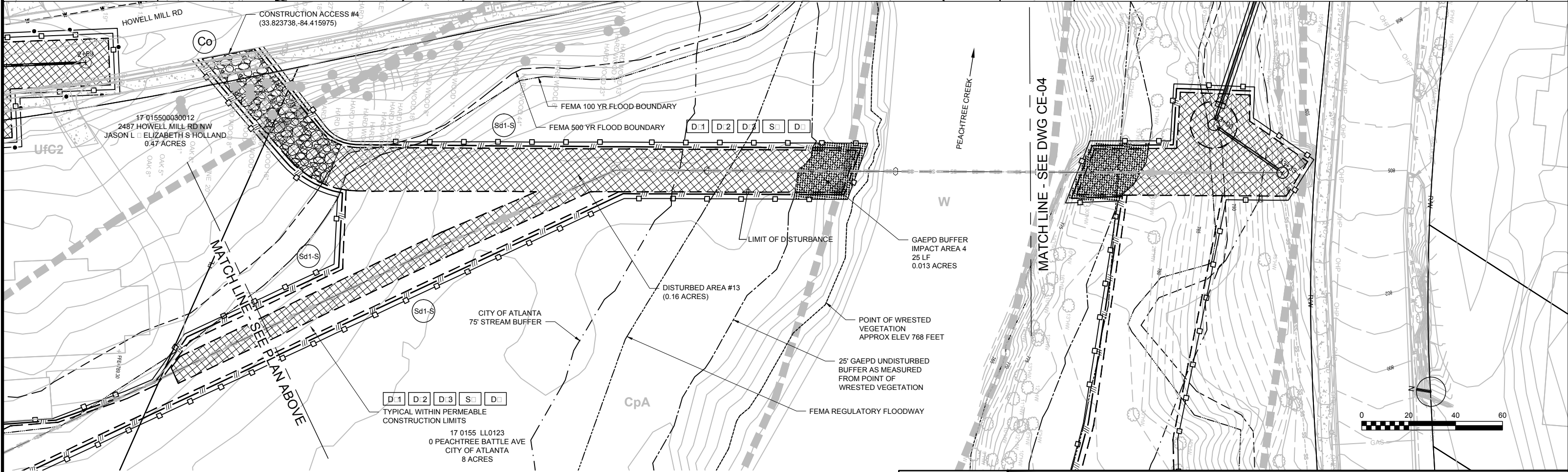
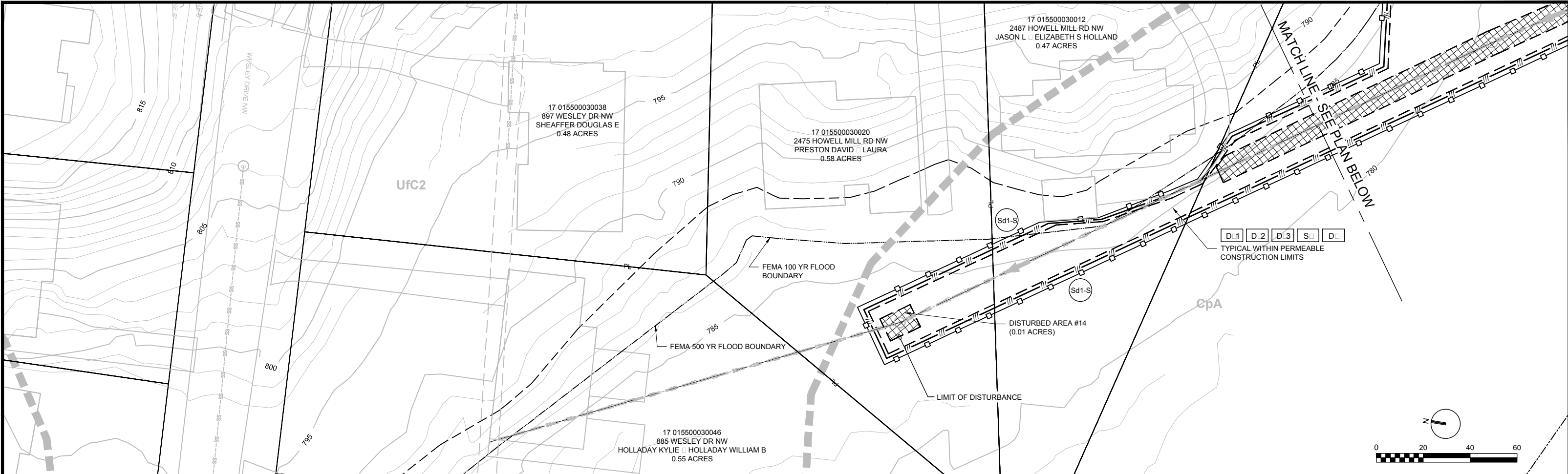
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	NO.	DATE	DESCRIPTION							
				HOWELL MILL ROAD SEWER IMPROVEMENTS EROSION AND SEDIMENT CONTROL PLANS						
	SURVEYOR		FIELD BOOKS		L.L. DIST.		COUNTY		SCALE	
	DRAWN BY D CORBETT		DESIGNED BY T SMITH		CHECKED BY C HAMBLÉN		APPROVED BY T KELLEY		DATE JUN 2017	
ENGINEER OF RECORD			PROJECT NUMBER:				SHEET OF 29			

100% REVIEW DOCUMENTS



NOTES:
1. COMPOST FILTER SOCK AND SILT FENCE LOCATION IS APPROXIMATE AND MAY BE ADJUSTED IN COORDINATION WITH ENGINEER. CONTRACTOR SHALL PROVIDE OPENINGS TO ACCESS WORK AS NECESSARY.



Georgia Soil and Water Conservation Commission

Christopher Hamblen

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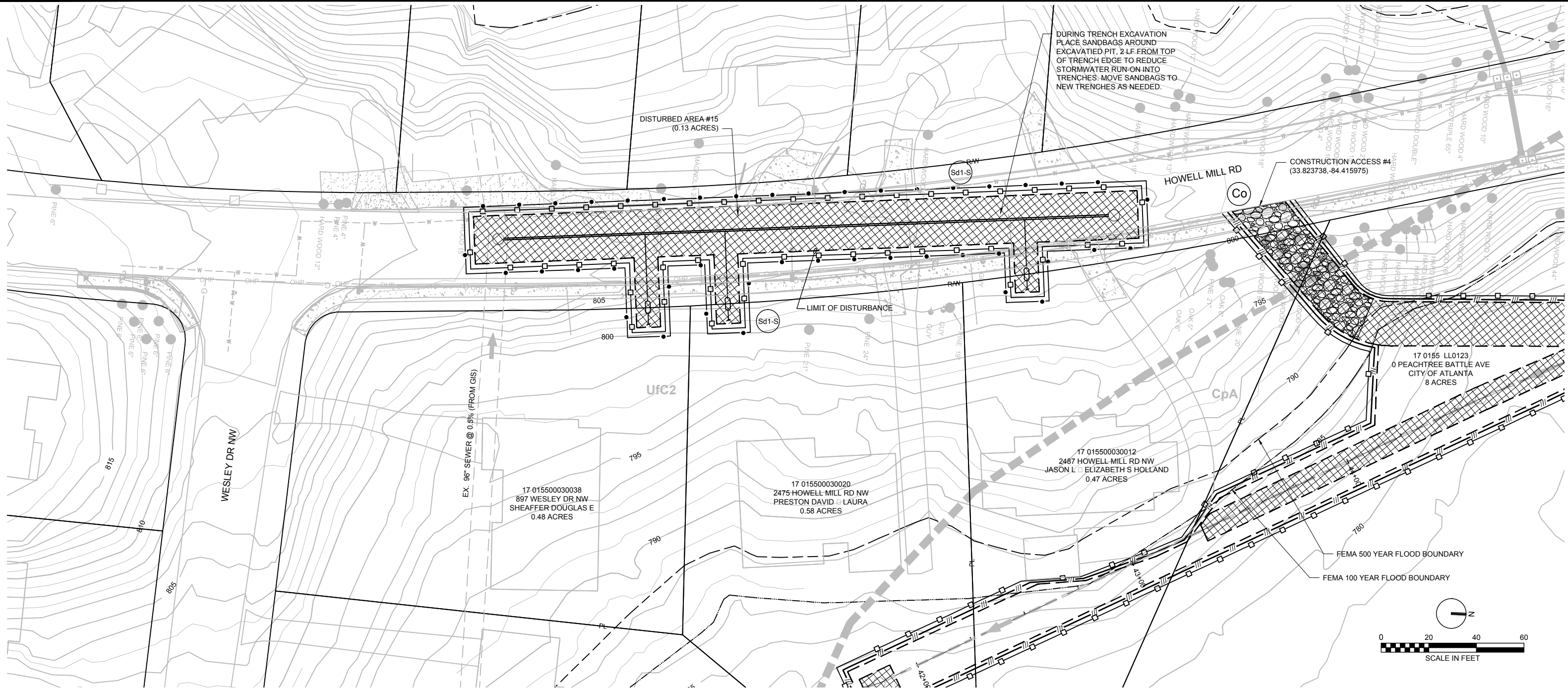
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				HOWELL MILL ROAD SEWER IMPROVEMENTS							
				EROSION AND SEDIMENT CONTROL PLANS							
				SURVEYOR		FIELD BOOKS		L.L. DIST.		COUNTY	SCALE
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HOWELL MILL ROAD SEWER IMPROVEMENTS EROSION AND SEDIMENT CONTROL PLANS									
SURVEYOR		FIELD	BOOKS	L.L.	DIST.	COUNTY		SCALE	
DRAWN BY D CORBETT		DESIGNED BY T SMITH	CHECKED BY C HAMBLÉN	BY		APPROVED BY T KELLEY		DATE JUN 2017	
ENGINEER OF RECORD		PROJECT NUMBER:						SHEET OF	29

GEORGIA
UNIFORM CODING SYSTEM
FOR SOIL EROSION AND SEDIMENT CONTROL PRACTICES
GEORGIA SOIL AND WATER CONSERVATION COMMISSION

STRUCTURAL PRACTICES

CODE	PRACTICE	DETAIL	MAP SYMBOL	DESCRIPTION
Cd	CHIEFDAM			A small temporary barrier or dam constructed across a swale, drainage ditch or area of concentrated flow.
Cs	CHANNEL STABILIZATION			Improving, constructing or stabilizing an open channel, existing stream, or ditch.
Co	CONSTRUCTION EXIT			A crushed stone pad located at the construction site exit to provide a place for removing mud from tires thereby protecting public streets.
Cr	CONSTRUCTION ROAD STABILIZATION			A travelway constructed as part of a construction plan including access roads, subdivision roads, parking areas and other on-site vehicle transportation routes.
D	STREAM DIVERSION CHANNEL			A temporary channel constructed to convey flow around a construction site while a permanent structure is being constructed.
D	DIVERSION			An earth channel or dike located above, below or across a slope to divert runoff. This may be a temporary or permanent structure.
D-1	TEMPORARY CONVEYANCE STRUCTURE			A flexible conduit of heavy-duty fabric or other material designed to safely conduct surface runoff down a slope. This is temporary and inexpensive.
D-2	PERMANENT CONVEYANCE STRUCTURE			A paved chute, pipe, sectional conduit or similar material designed to safely conduct surface runoff down a slope.
Fr	FILTER RING			A temporary stone barrier constructed at storm drain inlets and pond outlets.
G	GABION			Rock filter baskets which are hand-placed into position forming soil stabilizing structures.
Gr	GRADE STABILIZATION STRUCTURE			Permanent structures installed to protect channels or waterways where otherwise the slope would be sufficient for the running water to form gullies.
L	LEVEL SPREADER			A structure to convert concentrated flow of water into less erosive sheet flow. This should be constructed only on undisturbed soils.
Rd	ROCK FILTER DAM			A permanent or temporary stone filter dam installed across small streams or drainageways.
R	RETAINING WALL			A wall installed to stabilize cut and fill slopes where maximum permissible slopes are not obtainable. Each situation will require special design.
R	RETRO FITTING			A device or structure placed in front of a permanent stormwater detention pond outlet structure to serve as a temporary sediment filter.
Sd1	SEDIMENT BARRIER			A barrier to prevent sediment from leaving the construction site. It may be sandbags, bales of straw or hay, brush, logs and poles, gravel, or a silt fence.
Sd2	INLET SEDIMENT TRAP			An impounding area created by excavating around a storm drain drop inlet. The excavated area will be filled and stabilized on completion of construction activities.
Sd3	TEMPORARY SEDIMENT BASIN			A basin created by excavation or a dam across a waterway. The surface water runoff is temporarily stored allowing the bulk of the sediment to drop out.
Sd4	TEMPORARY SEDIMENT TRAP			A small temporary pond that drains a disturbed area so that sediment can settle out. The principle feature distinguishing a temporary sediment trap from a temporary sediment basin is the lack of a pipe or riser.
S	FLOATING SURFACE SKIMMER			A buoyant device that releases/draws water from the surface of sediment ponds, traps, or basins at a controlled rate of flow.
S	SEEP BERM			Linear control device constructed as a diversion perpendicular to the direction of runoff to enhance dissipation and infiltration, while creating multiple sedimentation chambers with the employment of intermediate dikes.

STRUCTURAL PRACTICES

CODE	PRACTICE	DETAIL	MAP SYMBOL	DESCRIPTION
Sr	TEMPORARY STREAM CROSSING			A temporary bridge or culvert-type structure protecting a stream or watercourse from damage by crossing construction equipment.
S	STORMDRAIN OUTLET PROTECTION			A paved or short section of riprap channel at the outlet of a storm drain system preventing erosion from the concentrated runoff.
S	SURFACE ROUGHENING			A rough soil surface with horizontal depressions on a contour or slopes left in a roughened condition after grading.
T	TURBIDITY CURTAIN			A floating or staked barrier installed within the water (it may also be referred to as a floating boom, silt barrier, or silt curtain).
T	TOPSOILING			The practice of stripping off the more fertile soil, storing it, then spreading it over the disturbed area after completion of construction activities.
Tr	TREE PROTECTION			To protect desirable trees from injury during construction activity.
W	VEGETATED WATERWAY OR STORMDRAIN CONVEYANCE CHANNEL			Paved or vegetative water outlets for diversions, terraces, berms, dikes or similar structures.

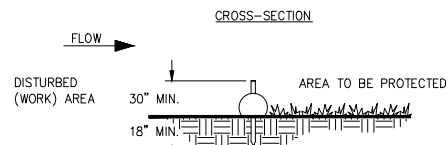
VEGETATIVE PRACTICES

CODE	PRACTICE	DETAIL	MAP SYMBOL	DESCRIPTION
Bf	BUFFER ZONE			Strip of undisturbed original vegetation, enhanced or restored existing vegetation or the reestablishment of vegetation surrounding an area of disturbance or bordering streams.
C	COASTAL DUNE STABILIZATION (WITH VEGETATION)			Planting vegetation on dunes that are denuded artificially constructed, or re-nourished.
D-1	DISTURBED AREA STABILIZATION (WITH MULCHING ONLY)			Establishing temporary protection for disturbed areas where seedlings may not have a suitable growing season to produce an erosion retarding cover.
D-2	DISTURBED AREA STABILIZATION (WITH TEMP. SEEDING)			Establishing a temporary vegetative cover with fast growing seedlings on disturbed areas.
D-3	DISTURBED AREA STABILIZATION (WITH PERM. SEEDING)			Establishing a permanent vegetative cover such as trees, shrubs, vines, grasses, or legumes on disturbed areas.
D-4	DISTURBED AREA STABILIZATION (SOODING)			A permanent vegetative cover using sods on highly erodible or critically eroded lands.
D	DUST CONTROL ON DISTURBED AREAS			Controlling surface and air movement of dust on construction site, roadways and similar sites.
F-Cd	FLOCCULANTS AND COAGULANTS			Substance formulated to assist in the solids/liquid separation of suspended particles in solution.
S	STREAMBANK STABILIZATION (USING PERM. VEGETATION)			The use of readily available native plant materials to maintain and enhance streambanks, or to prevent, or restore and repair small streambank erosion problems.
S	SLOPE STABILIZATION			A protective covering used to prevent erosion and establish temporary or permanent vegetation on steep slopes, shore lines, or channels.
T	TACKLERS AND BINDERS			Substance used to anchor straw or hay mulch by causing the organic material to bind together.

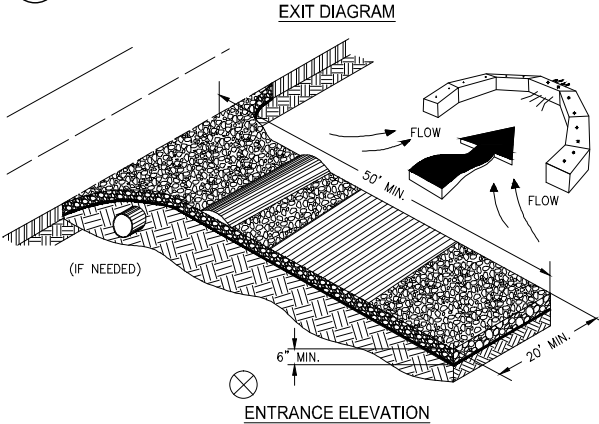
GSWCC (Amended - 2013)

Sd1-NS EROSION AND SEDIMENT CONTROL

COMPOST FILTER SOCK



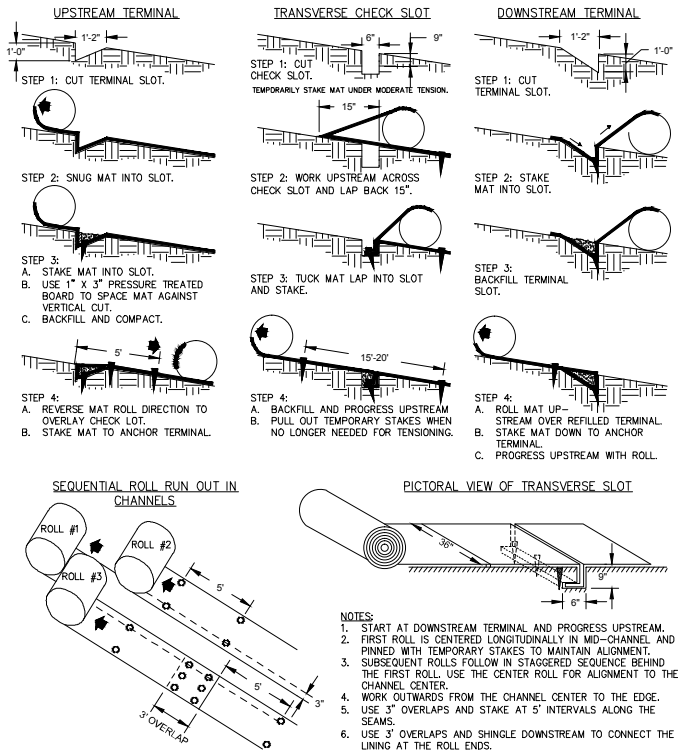
Co CRUSHED STONE CONSTRUCTION EXIT



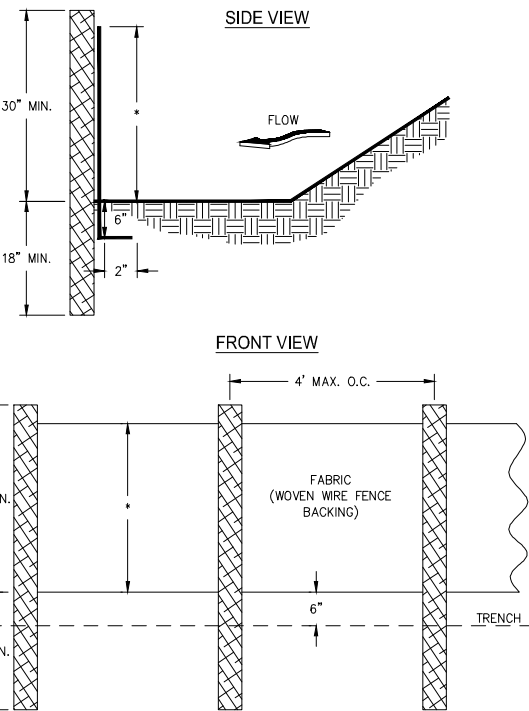
- NOTES:
1. AVOID LOCATING ON STEEP SLOPES OR AT CURVES ON PUBLIC ROADS.
 2. REMOVE ALL VEGETATION AND OTHER UNSUITABLE MATERIAL FROM THE FOUNDATION AREA, GRADE, AND CROWN FOR POSITIVE DRAINAGE.
 3. AGGREGATE SIZE SHALL BE IN ACCORDANCE WITH NATIONAL STONE ASSOCIATION R-2 (1.5"–3.5" STONE).
 4. GRAVEL PAD SHALL HAVE A MINIMUM THICKNESS OF 6".
 5. PAD WIDTH SHALL BE EQUAL FULL WIDTH AT ALL POINTS OF VEHICULAR EGRESS, BUT NO LESS THAN 20'.
 6. A DIVERSION RIDGE SHOULD BE CONSTRUCTED WHEN GRADE TOWARD PAVED AREA IS GREATER THAN 2%.
 7. INSTALL PIPE UNDER THE ENTRANCE IF NEEDED TO MAINTAIN DRAINAGE DITCHES.
 8. WHEN WASHING IS REQUIRED, IT SHOULD BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN (DIVERT ALL SURFACE RUNOFF AND DRAINAGE FROM THE ENTRANCE TO A SEDIMENT CONTROL DEVICE).
 9. WASHRACKS AND/OR TIRE WASHERS MAY BE REQUIRED DEPENDING ON SCALE AND CIRCUMSTANCE. IF NECESSARY, WASHRACK DESIGN MAY CONSIST OF ANY MATERIAL SUITABLE FOR TRUCK TRAFFIC THAT REMOVE MUD AND DIRT.
 10. MAINTAIN AREA IN A WAY THAT PREVENTS TRACKING AND/OR FLOW OF MUD ONTO PUBLIC RIGHTS-OF-WAYS. THIS MAY REQUIRE TOP DRESSING, REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.

TYPICAL INSTALLATION GUIDELINES FOR ROLLED EROSION CONTROL PRODUCTS (RECP)

BLANKET AND MATTING CROSS-SECTIONS



Sd1-S SILT FENCE - TYPE SENSITIVE



- NOTES:
1. USE STEEL OR WOOD POSTS OR AS SPECIFIED BY THE EROSION, SEDIMENTATION, AND POLLUTION CONTROL PLAN.
 2. HEIGHT (*) IS TO BE SHOWN ON THE EROSION, SEDIMENTATION, AND POLLUTION CONTROL PLAN.

GSWCC Georgia Soil and Water Conservation Commission
Christopher Hamblen
Level II Certified Design Professional
Certification Number: 0000069253 Expires: 08-21-2019

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HOWELL MILL ROAD SEWER IMPROVEMENTS
EROSION CONTROL DETAILS

SURVEYOR	FIELD BOOKS	L.L.	DIST.	COUNTY	SCALE
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PROJECT NUMBER:				DATE JUN 2017	

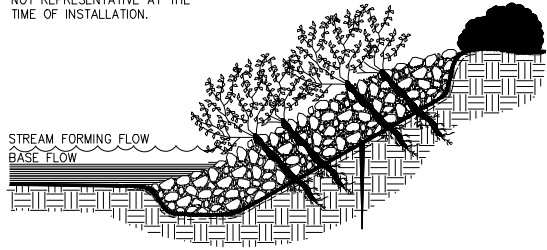
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PROJECT NUMBER:

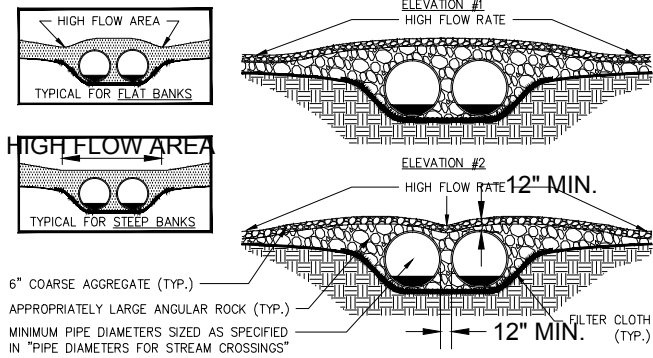
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Sd STREAM STABILIZATION
JOINT PLANTING CROSS SECTION

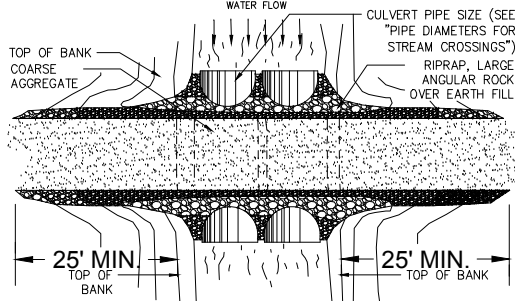
NOTES:
ROOTED/LEAFED CONDITION OF
THE LIVING PLANT MATERIAL IS
NOT REPRESENTATIVE AT THE
TIME OF INSTALLATION.



Sr-C TEMPORARY STREAM CROSSING
CONFIGURATION OF TEMPORARY CULVERT CROSSINGS
(SECTIONS - NOT TO SCALE)



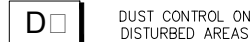
TYPICAL CULVERT CROSSING PLAN (NOT TO SCALE)



NOTES:
1. THIS TYPE OF CROSSING CAN BE INSTALLED IN BOTH A WET OR DRY WEATHER
STREAM CONDITION WHERE THE DRAINAGE AREA EXCEEDS 10 ACRES.
2. REMOVE DURING CLEANUP.

TEMPORARY VEGETATION COVER (Ds2)														
SPECIES	BROADCAST		PLANTING DATES											
	RATES 2/- PLS 3/													
	PER ACRE	PER 1000 SQ.FT.	J	F	M	A	M	J	J	A	S	O	N	D
LOVEGRASS, WEEPING <i>Eragrostis curvula</i>														
ALONE	4 LBS	0.1 LBS												
IN MIXTURES	2 LBS	0.05 LBS												
MILLET, BROWNTOP <i>Panicum fasciculatum</i>														
ALONE	40 LBS	0.9 LBS												
IN MIXTURES	10 LBS	0.2 LBS												
MILLET, PEARL <i>Pennisetum glaucum</i>														
ALONE	50 LBS	1.1 LBS												
RYEGRASS, ANNUAL <i>Lolium temulentum</i>														
ALONE	15 LBS	0.4 LBS												
WHEAT <i>Triticum aestivum</i>														
ALONE	180 LBS*	4.1 LBS												
IN MIXTURES	30 LBS**	0.7 LBS												

* 180 LBS (3 B.)
** 30 LBS (1/2 BU.)
1/ TEMPORARY COVER CROPS ARE VERY COMPETITIVE AND WILL CROWD OUT PERENNIALS IF SEEDED TOO HEAVILY
2/ REDUCE SEEDING RATES BY 50% WHEN DRILLED
3/ PLS IS AN ABBREVIATION FOR PURE LIVE SEED



DEFINITION

CONTROLLING SURFACE AND AIR MOVEMENT OF DUST ON CONSTRUCTION SITES, ROADS, AND DEMOLITION SITES.

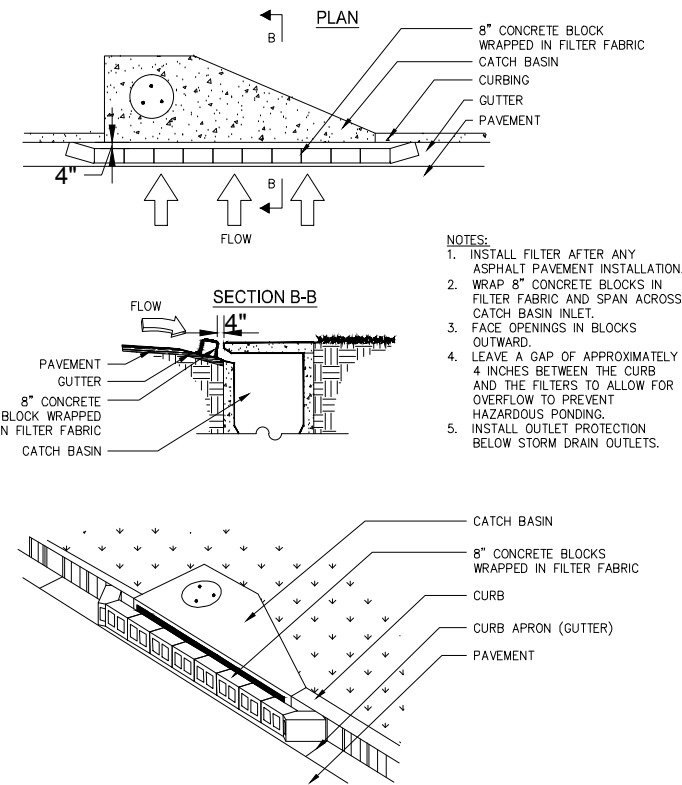
CONDITIONS

THIS PRACTICE IS APPLICABLE TO AREAS SUBJECT TO SURFACE AND AIR MOVEMENT OF DUST WHERE ON AND OFF-SITE DAMAGE MAY OCCUR WITHOUT TREATMENT.

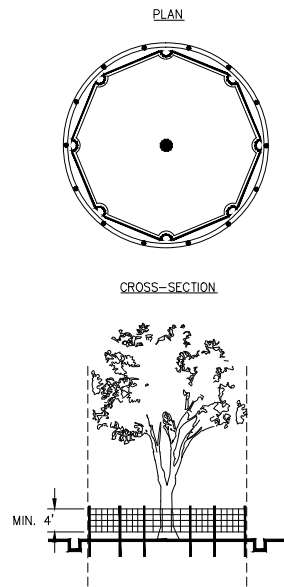
METHOD AND MATERIALS

- A. TEMPORARY METHODS
- MULCHES. SEE STANDARD DS1 - DISTURBED AREA STABILIZATION (WITH MULCHING ONLY). SYNTHETIC RESINS MAY BE USED INSTEAD OF ASPHALT TO BIND MULCH MATERIAL. REFER TO STANDARD TB-TACKIFIERS AND BINDERS. RESINS SUCH AS CURASOL OR TERRATAK SHOULD BE USED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
 - VEGETATIVE COVER. SEE STANDARD DS2 - DISTURBED AREA STABILIZATION (WITH TEMPORARY SEEDING).
 - SPRAY-ON ADHESIVES. THESE ARE USED ON MINERAL SOILS (NOT EFFECTIVE ON MUCK SOILS). KEEP TRAFFIC OFF THESE AREAS. REFER TO STANDARD TB-TACKIFIERS AND BINDERS.
 - TILLAGE. THIS PRACTICE IS DESIGNED TO ROUGHEN AND BRING CLODS TO THE SURFACE. IT IS AN EMERGENCY MEASURE WHICH SHOULD BE USED BEFORE WIND EROSION STARTS. BEGIN PLOWING ON WINDWARD SIDE OF SITE. CHISEL-TYPE PLOWS SPACED ABOUT 12 INCHES APART, SPRING-TOOTHED HARROWS, AND SIMILAR PLOWS ARE EXAMPLES OF EQUIPMENT WHICH MAY PRODUCE THE DESIRED EFFECT.
 - IRRIGATION. THIS IS GENERALLY DONE AS AN EMERGENCY TREATMENT. SITE IS SPRINKLED WITH WATER UNTIL THE SURFACE IS WET. REPEAT AS NEEDED.
 - BARRIERS. SOLID BOARD FENCES, SNOW FENCES, BURLAP FENCES, CRATE WALLS, BALES OF HAY AND SIMILAR MATERIAL CAN BE USED TO CONTROL AIR CURRENTS AND SOIL BLOWING. BARRIERS PLACED AT RIGHT ANGLES TO PREVAILING CURRENTS AT INTERVALS OF ABOUT 15 TIMES THEIR HEIGHT ARE EFFECTIVE IN CONTROLLING WIND EROSION.
 - CALCIUM CHLORIDE. APPLY AT RATE THAT WILL KEEP SURFACE MOIST. MAY NEED RETREATMENT.
- B. PERMANENT METHODS
- PERMANENT VEGETATION: SEE STANDARD DS3 -DISTURBED AREA STABILIZATION (WITH PERMANENT VEGETATION). EXISTING TREES AND LARGE SHRUBS MAY AFFORD VALUABLE PROTECTION IF LEFT IN PLACE.
 - TOPSOILING: THIS ENTAILS COVERING THE SURFACE WITH LESS EROSION SOIL MATERIAL. SEE STANDARD TP - TOPSOILING.
 - STONE: COVER SURFACE WITH CRUSHED STONE OR COARSE GRAVEL. SEE STANDARD CR-CONSTRUCTION ROAD STABILIZATION.

Sd2-P CURB INLET FILTER "PIGS IN BLANKET"



Tr TREE PROTECTION
"SNOW" FENCE



NOTES:
1. USE TRENCHER (I.E. DITCH WHICH) TO CUT A 4"-5" W X 18" D TRENCH ALONG DRIP LINE (LIMIT OF CLEARING) AND BACKFILL WITH SAND AND LIGHTLY COMPACT.
2. SPACE STAKES AT INTERVALS SUFFICIENT TO MAINTAIN ALL FENCING OUT OF DRIP LINE OR AS SHOWN BY ENGINEER (SET STAKES NO GREATER THAN 6 FEET ON CENTER-REBAR IS NOT TO BE USED FOR STAKES).
3. MAINTAIN FENCE BY REPAIRING AND/OR REPLACING DAMAGED FENCE. DO NOT REMOVE FENCING PRIOR TO LANDSCAPING OPERATIONS.
4. DO NOT STORE OR STACK MATERIALS, EQUIPMENT, OR VEHICLES WITHIN FENCED AREA.
5. FENCE SHALL BE ORANGE VINYL "SNOW FENCE" 4' HIGH MINIMUM.

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	NO.	DATE	DESCRIPTION											
				HOWELL MILL ROAD SEWER IMPROVEMENTS EROSION CONTROL DETAILS										
				SURVEYOR		FIELD BOOKS		L.L. DIST.		COUNTY FULTON		SCALE NTS		
			DRAWN BY D CORBETT		DESIGNED BY T SMITH		CHECKED BY C HAMBLÉN		APPROVED BY T KELLEY		DATE JUN 2017			
ENGINEER OF RECORD				PROJECT NUMBER:								19	SHEET OF	29

D1 DISTURBED AREA STABILIZATION (WITH MULCHING ONLY)

DEFINITION

APPLYING PLANT RESIDUES OR OTHER SUITABLE MATERIALS, PRODUCED ON THE SITE IF POSSIBLE, TO THE SOIL SURFACE.

CONDITIONS

MULCH OR TEMPORARY GRASSING SHALL BE APPLIED TO ALL EXPOSED AREAS WITHIN 14 DAYS OF DISTURBANCE. MULCH CAN BE USED AS A SINGULAR EROSION CONTROL DEVICE FOR UP TO SIX MONTHS, BUT IT SHALL BE APPLIED AT THE APPROPRIATE DEPTH, DEPENDING ON THE MATERIAL USED, ANCHORED, AND HAVE A CONTINUOUS 90% COVER OR GREATER OF THE SOIL SURFACE. MAINTENANCE SHALL BE REQUIRED TO MAINTAIN APPROPRIATE DEPTH AND 90% COVER. TEMPORARY VEGETATION MAY BE EMPLOYED INSTEAD OF MULCH IF THE AREA WILL REMAIN UNDISTURBED FOR LESS THAN SIX MONTHS. IF AN AREA WILL REMAIN UNDISTURBED FOR GREATER THAN SIX MONTHS, PERMANENT VEGETATIVE TECHNIQUES SHALL BE EMPLOYED.

SPECIFICATIONS

MULCHING WITHOUT SEEDING

THIS STANDARD APPLIES TO GRADES OR CLEARED AREAS WHERE SEEDINGS MAY NOT HAVE A SUITABLE GROWING SEASON TO PRODUCE AN EROSION RETARDANT COVER, BUT CAN BE STABILIZED WITH A MULCH COVER.

SITE PREPARATION

- 1. GRADE TO PERMIT THE USE OF EQUIPMENT FOR APPLYING AND ANCHORING MULCH.
- 2. INSTALL NEEDED EROSION CONTROL MEASURES AS REQUIRED SUCH AS DIKES, DIVERSIONS, BERMS, TERRACES AND SEDIMENT BARRIERS.
- 3. LOOSEN COMPACT SOIL TO A MINIMUM DEPTH OF 3 INCHES.

MULCHING MATERIALS

SELECT ONE OF THE FOLLOWING MATERIALS AND APPLY AT THE DEPTH INDICATED:

- 1. DRY STRAW OR HAY SHALL BE APPLIED AT A DEPTH OF 2 TO 4 INCHES PROVIDING COMPLETE SOIL COVERAGE. ONE ADVANTAGE OF THIS MATERIAL IS EASY APPLICATION.
- 2. WOOD WASTE (CHIPS, SAWDUST OR BARK) SHALL BE APPLIED AT A DEPTH OF 2 TO 3 INCHES. ORGANIC MATERIAL FROM THE CLEARING STAGE OF DEVELOPMENT SHOULD REMAIN ON SITE, BE CHIPPED, AND APPLIED AS MULCH. THIS METHOD OF MULCHING CAN GREATLY REDUCE EROSION CONTROL COSTS.
- 3. CUTBACK ASPHALT (SLOW CURING) SHALL BE APPLIED AT 1200 GALLONS PER ACRE (OR 1/4 GALLON PER SQ. YD.).
- 4. POLYETHYLENE FILM SHALL BE SECURED OVER BANKS OR STOCKPILED SOIL MATERIAL FOR TEMPORARY PROTECTION. THIS MATERIAL CAN BE SALVAGED AND REUSED.

APPLYING MULCH

WHEN MULCH IS USED WITHOUT SEEDING, MULCH SHALL BE APPLIED TO PROVIDE FULL COVERAGE OF THE EXPOSED AREA.

- 1. DRY STRAW OR HAY MULCH AND WOOD CHIPS SHALL BE APPLIED UNIFORMLY BY HAND OR BY MECHANICAL EQUIPMENT.
- 2. IF THE AREA WILL EVENTUALLY BE COVERED WITH PERENNIAL VEGETATION, 20-30 POUNDS OF NITROGEN PER ACRE IN ADDITION TO THE NORMAL AMOUNT SHALL BE APPLIED TO OFFSET THE UPTAKE OF NITROGEN CAUSED BY THE DECOMPOSITION OF THE ORGANIC MULCHES.
- 3. CUTBACK ASPHALT SHALL BE APPLIED UNIFORMLY. CARE SHOULD BE TAKEN IN AREAS OF PEDESTRIAN TRAFFIC DUE TO PROBLEMS OF "TRACKING IN" OR DAMAGE TO SHOES, CLOTHING, ETC.
- 4. APPLY POLYETHYLENE FILM ON EXPOSED AREAS.

ANCHORING MULCH

- 1. STRAW OR HAY MULCH CAN BE PRESSED INTO THE SOIL WITH A DISK HARROW WITH THE DISK SET STRAIGHT OR WITH A SPECIAL "PACKER DISK." DISKS MAY BE SMOOTH OR SERRATED AND SHOULD BE 20 INCHES OR MORE IN DIAMETER AND 8 TO 12 INCHES APART. THE EDGES OF THE DISK SHOULD BE DULL ENOUGH NOT TO CUT THE MULCH BUT TO PRESS IT INTO THE SOIL LEAVING MUCH OF IT IN AN ERECT POSITION. STRAW OR HAY MULCH SHALL BE ANCHORED IMMEDIATELY AFTER APPLICATION. STRAW OR HAY MULCH SPREAD WITH SPECIAL BLOWER-TYPE EQUIPMENT MAY BE ANCHORED WITH EMULSIFIED ASPHALT (GRADE AE-5 OR SS-1). THE ASPHALT EMULSION SHALL BE SPRAYED ONTO THE MULCH AS IT IS EJECTED FROM THE MACHINE. USE 100 GALLONS OF EMULSIFIED ASPHALT AND 100 GALLONS OF WATER PER TON OF MULCH. TACKIFIERS AND BINDERS CAN BE SUBSTITUTED FOR EMULSIFIED ASPHALT. PLEASE REFER TO SPECIFICATION TB-TACKIFIERS AND BINDERS. PLASTIC MESH OR NETTING WITH MESH NO LARGER THAN ONE INCH BY ONE INCH SHALL BE INSTALLED ACCORDING TO MANUFACTURER'S SPECIFICATIONS.
- 2. NETTING OF THE APPROPRIATE SIZE SHALL BE USED TO ANCHOR WOOD WASTE. OPENINGS OF THE NETTING SHALL NOT BE LARGER THAN THE AVERAGE SIZE OF THE WOOD WASTE CHIPS.
- 3. POLYETHYLENE FILM SHALL BE ANCHOR TRENCHED AT THE TOP AS WELL AS INCREMENTALLY AS NECESSARY.

D2 DISTURBED AREA STABILIZATION (WITH TEMPORARY SEEDING)

DEFINITION

THE ESTABLISHMENT OF TEMPORARY VEGETATIVE COVER WITH FAST GROWING SEEDINGS FOR SEASONAL PROTECTION ON DISTURBED OR DENUDED AREAS.

CONDITIONS

TEMPORARY GRASSING, INSTEAD OF MULCH, CAN BE APPLIED TO ROUGH GRADED AREAS THAT WILL BE EXPOSED FOR LESS THAN SIX MONTHS. TEMPORARY VEGETATIVE MEASURES SHOULD BE COORDINATED WITH PERMANENT MEASURES TO ASSURE ECONOMICAL AND EFFECTIVE STABILIZATION. MOST TYPES OF TEMPORARY VEGETATION ARE IDEAL TO USE AS COMPANION CROPS UNTIL THE PERMANENT VEGETATION IS ESTABLISHED.

SPECIFICATIONS

GRADING AND SHAPING

EXCESSIVE WATER RUN-OFF SHALL BE REDUCED BY PROPERLY DESIGNED AND INSTALLED EROSION CONTROL PRACTICES SUCH AS CLOSED DRAINS, DITCHES, DIKES, DIVERSIONS, SEDIMENT BARRIERS AND OTHERS.

NO SHAPING OR GRADING IS REQUIRED IF SLOPES CAN BE STABILIZED BY HAND-SEEDED VEGETATION OR IF HYDRAULIC SEEDING EQUIPMENT IS TO BE USED.

SEEDBED PREPARATION

WHEN A HYDRAULIC SEEDER IS USED, SEEDBED PREPARATION IS NOT REQUIRED. WHEN USING CONVENTIONAL OR HANDSEEDING, SEEDBED PREPARATION IS NOT REQUIRED IF THE SOIL MATERIAL IS LOOSE AND NOT SEALED BY RAINFALL.

WHEN SOIL HAS BEEN SEALED BY RAINFALL OR CONSISTS OF SMOOTH CUT SLOPES, THE SOIL SHALL BE PITTED, TRENCHED OR OTHERWISE SCARIFIED TO PROVIDE A PLACE FOR SEED TO LODGE AND GERMINATE.

LIME AND FERTILIZER

AGRICULTURAL LIME IS REQUIRED UNLESS SOIL TESTS INDICATE OTHERWISE. APPLY AGRICULTURAL LIME AT A RATE OF ONE TON PER ACRE. GRADED AREAS REQUIRE LIME APPLICATION. SOILS CAN BE TESTED TO DETERMINE IF FERTILIZER IS NEEDED. ON REASONABLY FERTILE SOILS OR SOIL MATERIAL, FERTILIZER IS NOT REQUIRED. FOR SOILS WITH VERY LOW FERTILITY, 500 TO 700 POUNDS OF 10-10-10 FERTILIZER OR THE EQUIVALENT PER ACRE (12-16 LBS./1,000 SQ. FT.) SHALL BE APPLIED. FERTILIZER SHOULD BE APPLIED BEFORE LAND PREPARATION AND INCORPORATED WITH A DISK, RIPPER OR CHISEL.

SEEDING

SELECT A GRASS OR GRASS-LEGUME MIXTURE SUITABLE TO THE AREA AND SEASON OF THE YEAR. SEED SHALL BE APPLIED UNIFORMLY BY HAND, CYCLONE SEEDER, DRILL, CULTIPACKER SEEDER, OR HYDRAULIC SEEDER (SLURRY INCLUDING SEED AND FERTILIZER). DRILL OR CULTIPACKER SEEDERS SHOULD NORMALLY PLACE SEED ONE-QUARTER TO ONE-HALF INCH DEEP. APPROPRIATE DEPTH OF PLANTING IS TEN TIMES THE SEED DIAMETER. SOIL SHOULD BE "RAKED" LIGHTLY TO COVER SEED WITH SOIL IF SEEDED BY HAND.

MULCHING

TEMPORARY VEGETATION CAN, IN MOST CASES, BE ESTABLISHED WITHOUT THE USE OF MULCH. MULCH WITHOUT SEEDING SHOULD BE CONSIDERED FOR SHORT TERM PROTECTION. REFER TO DS1 - DISTURBED AREA STABILIZATION (WITH MULCHING ONLY).

IRRIGATION

DURING TIMES OF DROUGHT, WATER SHALL BE APPLIED AT A RATE NOT CAUSING RUNOFF AND EROSION. THE SOIL SHALL BE THOROUGHLY WETTED TO A DEPTH THAT WILL INSURE GERMINATION OF THE SEED. SUBSEQUENT APPLICATIONS SHOULD BE MADE WHEN NEEDED.

MULCHING RATE		
MATERIAL	RATE	DEPTH
STRAW	2.0 TON/ACRE	2" - 4"
HAY	2.5 TON/ACRE	2" - 4"
WOOD WASTE: CHIPS, SAWDUST, BARK	—	2" - 3"
POLYETHYLENE FILM	SECURE W/ SOIL AND ANCHORS	—

Georgia Soil & Water Conservation Commission

Manual for Erosion and Sediment Control in Georgia (amended 2014)

Table 6-4.1 - Plants, planting rates and planting dates for TEMPORARY COVER or COMPANION CROPS

Major Land Resource Area (MLRA): Southern Piedmont (P), per Figure 6-4.1

Species	Broadcast Rates		Planting Dates*												Remarks
	per acre (lbs.)	per 1000 sq.ft. (lbs.)	J	F	M	A	M	J	J	A	S	O	N	D	
Lovegrass, weeping (Eragrostis curvula)															
alone	4	0.1				-	X	X	-						1,500,000 seed per pound. May last for several years.
in mixtures	2	0.05													Mix with Sericea lespedeza.
Millet, browatop (Panicum fasciculatum)															
alone	40	0.9				-	X	X	-						137,000 seed per pound. Quick dense cover. Will provide too much competition in mixtures if seeded at high rates.
in mixtures	10	0.2													
Millet, pearl (Pennisetum glaucum)															
alone	50	1.1				-	X	X	X	-					88,000 seed per pound. Quick dense cover. May reach 5 feet in height. Not recommended for mixtures.
Ryegrass, annual (Lolium temulentum)															
alone	40	0.9	-	-	-	-				-	X	X	X	X	227,000 seed per pound. Dense cover. Very competitive and is not used in mixtures.

* 'X' are optimum dates; '-' are permissible but marginal dates

D3 DISTURBED AREA STABILIZATION (WITH PERMANENT SEEDING)

DEFINITION

THE PLANTING OF PERENNIAL VEGETATION SUCH AS TREES, SHRUBS, VINES, GRASSES, OR LEGUMES ON EXPOSED AREAS FOR FINAL PERMANENT STABILIZATION. PERMANENT PERENNIAL VEGETATION SHALL BE USED TO ACHIEVE FINAL STABILIZATION..

CONDITIONS

PERMANENT PERENNIAL VEGETATION IS USED TO PROVIDE A PROTECTIVE COVER FOR EXPOSED AREAS INCLUDING CUTS, FILLS, DAMS, AND OTHER DENUDED AREAS.

SPECIFICATIONS

GRADING AND SHAPING

- 1. GRADING AND SHAPING MAY NOT BE REQUIRED WHERE HYDRAULIC SEEDING AND FERTILIZING EQUIPMENT IS TO BE USED. VERTICAL BANKS SHALL BE SLOPED TO ENABLE PLANT ESTABLISHMENT.
- 2. WHEN CONVENTIONAL SEEDING AND FERTILIZING ARE TO BE DONE, GRADE AND SHAPE WHERE FEASIBLE AND PRACTICAL, SO THAT EQUIPMENT CAN BE USED SAFELY AND EFFICIENTLY DURING SEEDBED PREPARATION, SEEDING, MULCHING AND MAINTENANCE OF THE VEGETATION.
- 3. CONCENTRATIONS OF WATER THAT WILL CAUSE EXCESSIVE SOIL EROSION SHALL BE DIVERTED TO A SAFE OUTLET. DIVERSIONS AND OTHER TREATMENT PRACTICES SHALL CONFORM WITH THE APPROPRIATE STANDARDS AND SPECIFICATIONS.

SEEDBED PREPARATION

- SEEDBED PREPARATION MAY NOT BE REQUIRED WHERE HYDRAULIC SEEDING AND FERTILIZING EQUIPMENT IS TO BE USED. WHEN CONVENTIONAL SEEDING IS TO BE USED, SEEDBED PREPARATION WILL BE DONE AS FOLLOWS:

BROADCAST PLANTINGS

- 1. TILLAGE AT A MINIMUM, SHALL ADEQUATELY LOOSEN THE SOIL TO A DEPTH OF 4 TO 6 INCHES; ALLEVIATE COMPACTION; INCORPORATE LIME AND FERTILIZER; SMOOTH AND FIRM THE SOIL; ALLOW FOR THE PROPER PLACEMENT OF SEED, SPRIGS, OR PLANTS; AND ALLOW FOR THE ANCHORING OF STRAW OR HAY MULCH IF A DISK IS TO BE USED.
- 2. TILLAGE MAY BE DONE WITH ANY SUITABLE EQUIPMENT.
- 3. TILLAGE SHOULD BE DONE ON THE CONTOUR WHERE FEASIBLE.
- 4. ON SLOPES TOO STEEP FOR THE SAFE OPERATION OF TILLAGE EQUIPMENT, THE SOIL SURFACE SHALL BE PITTED OR TRENCHED ACROSS THE SLOPE WITH APPROPRIATE HAND TOOLS TO PROVIDE TWO PLACES 6 TO 8 INCHES APART IN WHICH SEED MAY LODGE AND GERMINATE. HYDRAULIC SEEDING MAY ALSO BE USED.

INDIVIDUAL PLANTS

- 1. WHERE INDIVIDUAL PLANTS ARE TO BE SET, THE SOIL SHALL BE PREPARED BY EXCAVATING HOLES, OPENING FURROWS, OR DIBBLE PLANTING.
- 2. FOR NURSERY STOCK PLANTS, HOLES SHALL BE LARGE ENOUGH TO ACCOMMODATE ROOTS WITHOUT CROWDING.
- 3. WHERE PINE SEEDLINGS ARE TO BE PLANTED, SUBSOIL UNDER THE ROW 36 INCHES DEEP ON THE CONTOUR FOUR TO SIX MONTHS PRIOR TO PLANTING. SUBSOILING SHOULD BE DONE WHEN THE SOIL IS DRY, PREFERABLY IN AUGUST OR SEPTEMBER.

PLANTING

1. HYDRAULIC SEEDING

MIX THE SEED (INNOCULATED IF NEEDED), FERTILIZER, AND WOOD CELLULOSE OR WOOD PULP FIBER MULCH WITH WATER AND APPLY IN A SLURRY UNIFORMLY OVER THE AREA TO BE TREATED. APPLY WITHIN ONE HOUR AFTER THE MIXTURE IS MADE.

2. CONVENTIONAL SEEDING

SEEDING WILL BE DONE ON A FRESHLY PREPARED AND FIRMED SEEDBED. FOR BROADCAST PLANTING, USE A CULTIPACKER SEEDER, DRILL, ROTARY SEEDER, OTHER MECHANICAL SEEDER, OR HAND SEEDING TO DISTRIBUTE THE SEED UNIFORMLY OVER THE AREA TO BE TREATED. COVER THE SEED LIGHTLY WITH 1/8 TO 1/4 INCH OF SOIL FOR SMALL SEED AND 1/2 TO 1 INCH FOR LARGE SEED WHEN USING A CULTIPACKER OR OTHER SUITABLE EQUIPMENT.

3. NO-TILL SEEDING

NO-TILL SEEDING IS PERMISSIBLE INTO ANNUAL COVER CROPS WHEN PLANTING IS DONE FOLLOWING MATURITY OF THE COVER CROP OR IF THE TEMPORARY COVER STAND IS SPARSE ENOUGH TO ALLOW ADEQUATE GROWTH OF THE PERMANENT (PERENNIAL) SPECIES. NO-TILL SEEDING SHALL BE DONE WITH APPROPRIATE NO-TILL SEEDING EQUIPMENT. THE SEED MUST BE UNIFORMLY DISTRIBUTED AND PLANTED AT THE PROPER DEPTH.

4. INDIVIDUAL PLANTS

SHRUBS, VINES AND SPRIGS MAY BE PLANTED WITH APPROPRIATE PLANTERS OR HAND TOOLS. PINE TREES SHALL BE PLANTED MANUALLY IN THE SUBSOIL FURROW. EACH PLANT SHALL BE SET IN A MANNER THAT WILL AVOID CROWDING THE ROOTS. NURSERY STOCK PLANTS SHALL BE PLANTED AT THE SAME DEPTH OR SLIGHTLY DEEPER THAN THEY GREW AT THE NURSERY. THE TIPS OF VINES AND SPRIGS MUST BE AT OR SLIGHTLY ABOVE THE GROUND SURFACE. WHERE INDIVIDUAL HOLES ARE DUG, FERTILIZER SHALL BE PLACED IN THE BOTTOM OF THE HOLE, TWO INCHES OF SOIL SHALL BE ADDED AND THE PLANT SHALL BE SET IN THE HOLE.

MULCHING

- 1. MULCH IS REQUIRED FOR ALL PERMANENT VEGETATION APPLICATIONS. MULCH APPLIED TO SEEDED AREAS SHALL ACHIEVE 75% SOIL COVER. SELECT THE MULCHING MATERIAL FROM THE FOLLOWING AND APPLY AS INDICATED:
- 2. DRY STRAW OR DRY HAY OF GOOD QUALITY AND FREE OF WEED SEEDS CAN BE USED. DRY STRAW SHALL BE APPLIED AT THE RATE OF 2 TONS PER ACRE. DRY HAY SHALL BE APPLIED AT A RATE OF 2 1/2 TONS PER ACRE.
- 3. WOOD CELLULOSE MULCH OR WOOD PULP FIBER SHALL BE USED WITH HYDRAULIC SEEDING. IT SHALL BE APPLIED AT THE RATE OF 500 POUNDS PER ACRE. DRY STRAW OR DRY HAY SHALL BE APPLIED (AT THE RATE INDICATED ABOVE) AFTER HYDRAULIC SEEDING.
- 4. ONE THOUSAND POUNDS OF WOOD CELLULOSE OR WOOD PULP FIBER, WHICH INCLUDES A TACKIFIER, SHALL BE USED WITH HYDRAULIC SEEDING ON SLOPES 3/4:1 OR STEEPER.
- 5. SERICEA LESPEDEZA HAY CONTAINING MATURE SEED SHALL BE APPLIED AT A RATE OF THREE TONS PER ACRE.
- 6. PINE STRAW OR PINE BARK SHALL BE APPLIED AT A THICKNESS OF 3 INCHES FOR BEDDING PURPOSES. OTHER SUITABLE MATERIALS IN SUFFICIENT QUANTITY MAY BE USED WHERE ORNAMENTALS OR OTHER GROUND COVERS ARE PLANTED. THIS IS NOT APPROPRIATE FOR SEEDED AREAS.
- 7. WHEN USING TEMPORARY EROSION CONTROL BLANKETS OR BLOCK SOD, MULCH IS NOT REQUIRED.
- 8. BITUMINOUS TREATED ROVING MAY BE APPLIED ON PLANTED AREAS ON SLOPES, IN DITCHES OR DRY WATERWAYS TO PREVENT EROSION. BITUMINOUS TREATED ROVING SHALL BE APPLIED WITHIN 24 HOURS AFTER AN AREA HAS BEEN PLANTED. APPLICATION RATES AND MATERIALS MUST MEET GEORGIA DEPARTMENT OF TRANSPORTATION SPECIFICATIONS.
- 9. WOOD CELLULOSE AND WOOD PULP FIBERS SHALL NOT CONTAIN GERMINATION OR GROWTH INHIBITING FACTORS. THEY SHALL BE EVENLY DISPERSED WHEN AGITATED IN WATER. THE FIBERS SHALL CONTAIN A DYE TO ALLOW VISUAL METERING AND AID IN UNIFORM APPLICATION DURING SEEDING.

APPLYING MULCH

- 1. STRAW OR HAY MULCH WILL BE SPREAD UNIFORMLY WITHIN 24 HOURS AFTER SEEDING AND/OR PLANTING. THE MULCH MAY BE SPREAD BY BLOWER-TYPE SPREADING EQUIPMENT, OTHER SPREADING EQUIPMENT OR BY HAND. MULCH SHALL BE APPLIED TO COVER 75% OF THE SOIL SURFACE.
- 2. WOOD CELLULOSE OR WOOD FIBER MULCH SHALL BE APPLIED UNIFORMLY WITH HYDRAULIC SEEDING EQUIPMENT.

ANCHORING MULCH

- 1. ANCHOR STRAW OR HAY MULCH IMMEDIATELY AFTER APPLICATION BY ONE OF THE FOLLOWING METHODS:
- 2. EMULSIFIED ASPHALT CAN BE (A) SPRAYED UNIFORMLY ONTO THE MULCH AS IT IS EJECTED FROM THE BLOWER MACHINE OR (B) SPRAYED ON THE MULCH IMMEDIATELY FOLLOWING MULCH APPLICATION WHEN STRAW OR HAY IS SPREAD BY METHODS OTHER THAN SPECIAL BLOWER EQUIPMENT.
- 3. THE COMBINATION OF ASPHALT EMULSION AND WATER SHALL CONSIST OF A HOMOGENEOUS MIXTURE SATISFACTORY FOR SPRAYING. THE MIXTURE SHALL CONSIST OF 100 GALLONS OF GRADE SS-1H OR CSS-1H EMULSIFIED ASPHALT AND 100 GALLONS OF WATER PER TON OF MULCH.
- 4. CARE SHALL BE TAKEN AT ALL TIMES TO PROTECT STATE WATERS, THE PUBLIC, ADJACENT PROPERTY, PAVEMENTS, CURBS, SIDEWALKS, AND ALL OTHER STRUCTURES FROM ASPHALT DISCOLORATION.
- 5. HAY AND STRAW MULCH SHALL BE PRESSED INTO THE SOIL IMMEDIATELY AFTER THE MULCH IS SPREAD. A SPECIAL "PACKER DISK" OR DISK HARROW WITH THE DISKS SET STRAIGHT MAY BE USED. THE DISKS MAY BE SMOOTH OR SERRATED AND SHOULD BE 20 INCHES OR MORE IN DIAMETER AND 8 TO 12 INCHES APART. THE EDGES OF THE DISKS SHALL BE DULL ENOUGH TO PRESS THE MULCH INTO THE GROUND WITHOUT CUTTING IT, LEAVING MUCH OF IT IN AN ERECT POSITION. MULCH SHALL NOT BE PLOWED INTO THE SOIL.
- 6. SYNTHETIC TACKIFIERS OR BINDERS APPROVED BY GDOT SHALL BE APPLIED IN CONJUNCTION WITH OR IMMEDIATELY AFTER THE MULCH IS SPREAD. SYNTHETIC TACKIFIERS SHALL BE MIXED AND APPLIED ACCORDING TO MANUFACTURER'S SPECIFICATIONS. REFER TO TB-TACKIFIERS AND BINDERS.
- 7. RYE OR WHEAT CAN BE INCLUDED WITH FALL AND WINTER PLANTINGS TO STABILIZE THE MULCH. THEY SHALL BE APPLIED AT A RATE OF ONE-QUARTER TO ONE HALF BUSHEL PER ACRE.
- 8. PLASTIC MESH OR NETTING WITH MESH NO LARGER THAN ONE INCH BY ONE INCH MAY BE NEEDED TO ANCHOR STRAW OR HAY MULCH ON UNSTABLE SOILS AND CONCENTRATED FLOW AREAS. THESE MATERIALS SHALL BE INSTALLED AND ANCHORED ACCORDING TO MANUFACTURER'S SPECIFICATIONS.

IRRIGATION

- IRRIGATION SHALL BE APPLIED AT A RATE THAT WILL NOT CAUSE RUNOFF.

Line Application for PERMANENT COVER - DS3
Agricultural lime is required at the rate of one to two tons per acre unless soil tests indicate otherwise.

Georgia Soil & Water Conservation Commission															
Manual for Erosion and Sediment Control in Georgia (amended 2000)															
Table 6-5.2 - Plants, planting rates and planting dates for PERMANENT COVER															
Major Land Resource Area (MLRA): Southern Piedmont (P), per Figure 6-4.1															
Species	Broadcast Rates		Planting Dates*												Remarks
	per acre (lbs.)	per 1000 sq.ft. (lbs.)	J	F	M	A	M	J	J	A	S	O	N	D	
Bermuda, common (Cynodon dactylon) - Mulled															
alone	10	0.2						-	X	X	-				1,787,000 seed per pound. Quick cover. Low growing and sod forming. Full sun. Good for athletic fields.
with other perennials	6	0.1													
Bermuda, common (Cynodon dactylon) - Unmulled															
alone	10	0.2	X	X							X	X	X		Plant with winter annuals.
with other perennials	6	0.1									X	X	X		Plant with fall forage.
Pennis, tall (Pennisetum americanum)															
alone	50	1.1								-	X	X			227,000 seed per pound. Use alone only on better sites. Not for droughty soils. Mix with perennial lespedeza or clover. Apply topdressing in spring following fall plantings. Not for heavy use areas or athletic fields.
with other perennials	30	0.7													
Lovegrass, weeping (Eragrostis curvula)															
alone	4	0.1						-	X	X	-				1,500,000 seed per pound. May last for several years. Grows well with Sericea lespedeza on roadbanks.
in mixtures	2	0.05													

* 'X' are optimum dates; '-' are permissible but marginal dates



Georgia Soil and Water Conservation Commission

Christopher Hamblen

Level II Certified Design Professional

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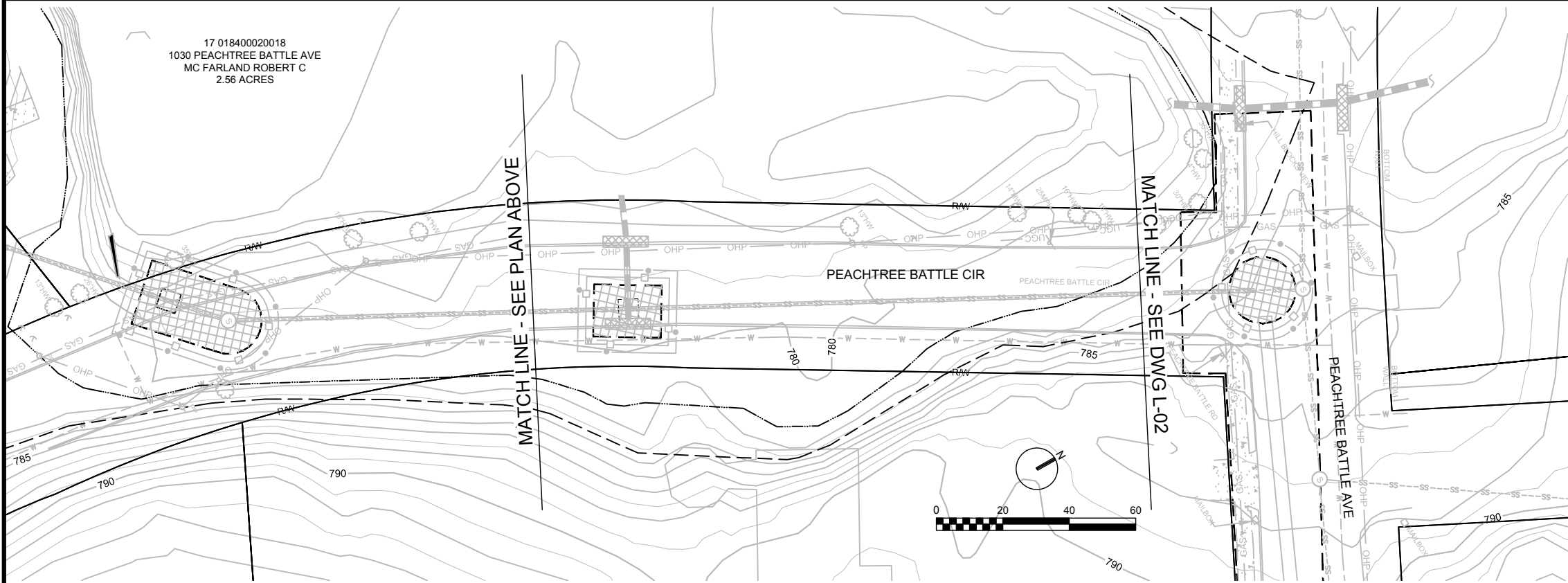
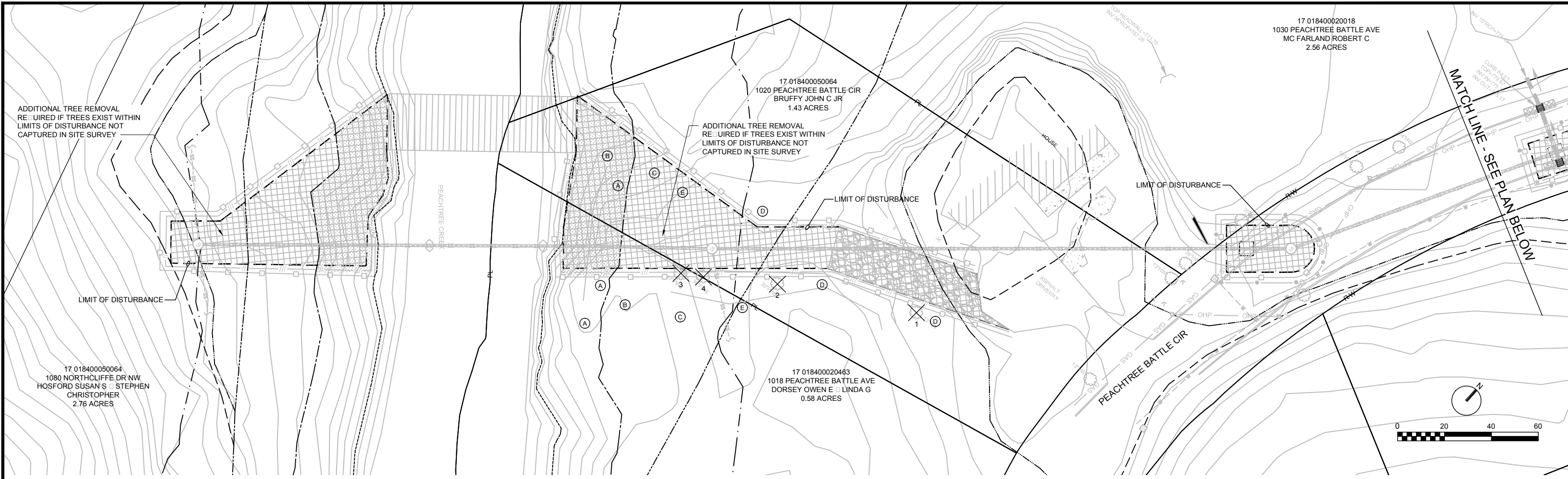
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			DEPARTMENT OF WATERSHED MANAGEMENT							
			OFFICE OF ENGINEERING SERVICES							
			HOWELL MILL ROAD SEWER IMPROVEMENTS							
			EROSION CONTROL DETAILS							
			SURVEYOR		FIELD	BOOKS	L.L.	DIST.	COUNTY	SCALE
			DRAWN BY D CORBETT		DESIGNED BY T SMITH		CHECKED BY C HAMBLEN		APPROVED BY T KELLEY	DATE JUN 2017
			ENGINEER OF RECORD				PROJECT NUMBER:			



- NOTES:
1. ALL SURVEY FOR THIS PROJECT, INCLUDING TREE LOCATION, WAS PROVIDED BY CITY OF ATLANTA.
 2. IT IS ANTICIPATED THAT ALL TREES INSIDE THE LIMITS OF DISTURBANCE WILL BE REMOVED AS PART OF NORMAL CONSTRUCTION ACTIVITIES. CONTRACTOR SHALL CONSERVE TREES INSIDE THE LIMITS OF DISTURBANCE IF POSSIBLE. TREES ANTICIPATED FOR REMOVAL ARE LISTED IN THE TREE REMOVAL TABLE.
 3. CONTRACTOR SHALL INSTALL 4-FT ORANGE TREE PROTECTION FENCE OUTSIDE OF THE SILT FENCE ALONG THE ENTIRE LENGTH OF THE LIMITS OF CLEARING.
 4. CONTRACTOR SHALL PROVIDE AND INSTALL REPLACEMENT TREES SHOWN ON THE REPLACEMENT TREE PLANTING SCHEDULE, AND SHALL PLANT TREES ACCORDING TO THE TREE PLANTING DETAIL. REPLACEMENT TREES SHALL BE PLANTED AFTER COMPLETION OF ALL CONSTRUCTION ACTIVITIES.
 5. LOCATION OF REPLACEMENT TREES SHALL GENERALLY BE AS SHOWN ON THIS PLAN. FINAL LOCATION OF REPLACEMENT TREES MAY BE ADJUSTED IN THE FIELD BY THE OWNER TO MATCH FIELD CONDITIONS AND TREE SPACING REQUIREMENTS. CONTRACTOR SHALL NOTIFY OWNER PRIOR TO PLANTING REPLACEMENT TREES TO OBTAIN OWNER INPUT.
 6. REPLACEMENT TREES SHALL BE PLANTED APPROXIMATELY 20 FEET FROM THE GRAVITY SEWER LINE AND SHALL NOT BE PLANTED CLOSER THAN 20 FEET OF THE GRAVITY SEWER LINE.
 7. TREES SHALL BE PLANTED IN ACCORDANCE WITH THE (1) STANDARD CONSTRUCTION DETAILS AND (2) PLANTING SCHEDULE PROVIDED ON SHEET L-06.
 8. TREES SHALL BE REMOVED IN ACCORDANCE WITH THE TREE REMOVAL TABLE PROVIDED ON SHEET L-06.

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Christopher Hamblen
Level II Certified Design Professional

Certification Number: 0000069253 Expires: 08-21-2019

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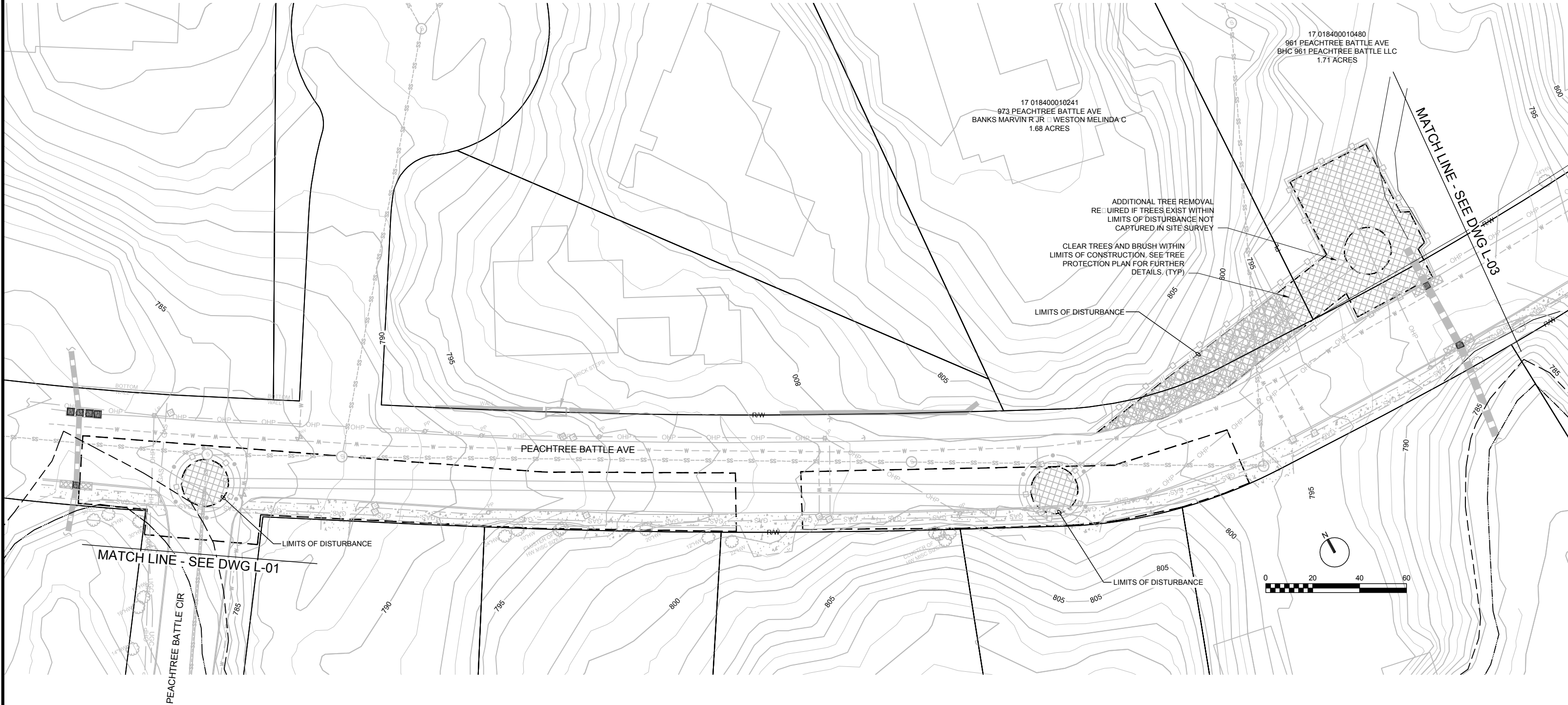
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	N.O.	DATE	DESCRIPTION						
				HOWELL MILL ROAD SEWER IMPROVEMENTS TREE PROTECTION, REMOVAL AND REPLACEMENT					
				SURVEYOR		FIELD BOOKS	L.L. DIST.	COUNTY	SCALE
				DRAWN BY D CORBETT		DESIGNED BY T SMITH	CHECKED BY C HAMBLÉN	APPROVED BY T KELLEY	DATE JUN 2017
	ENGINEER OF RECORD			PROJECT NUMBER:				21 SHEET OF 29	



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Issued: 08-21-2015

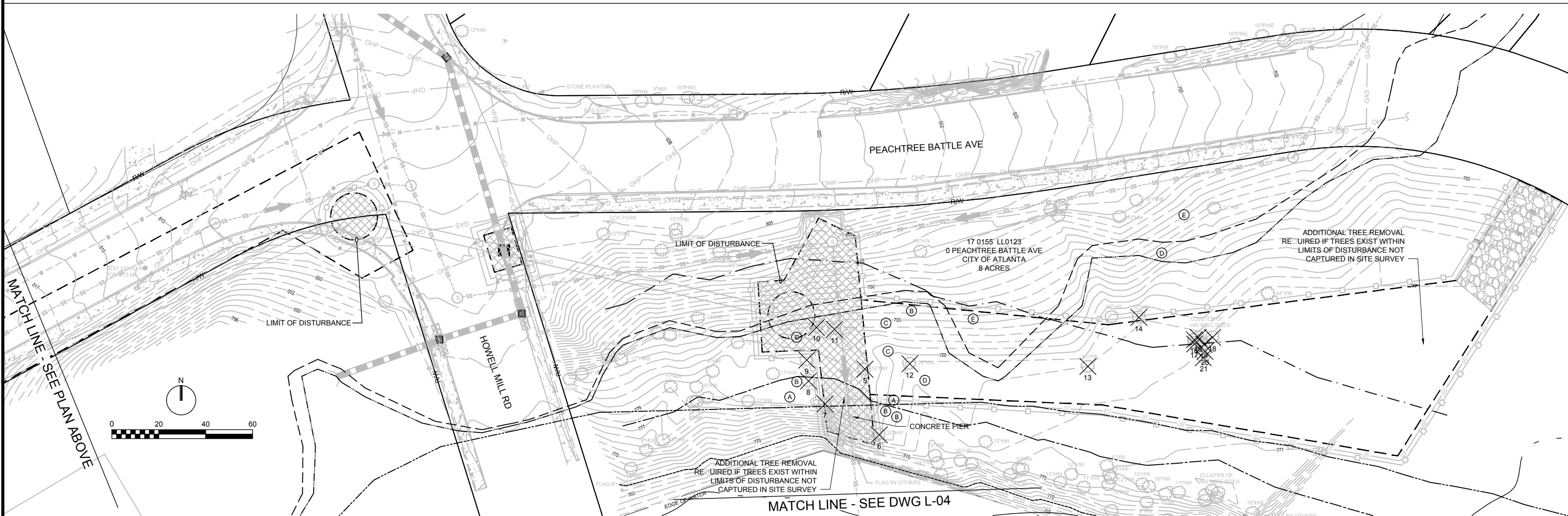
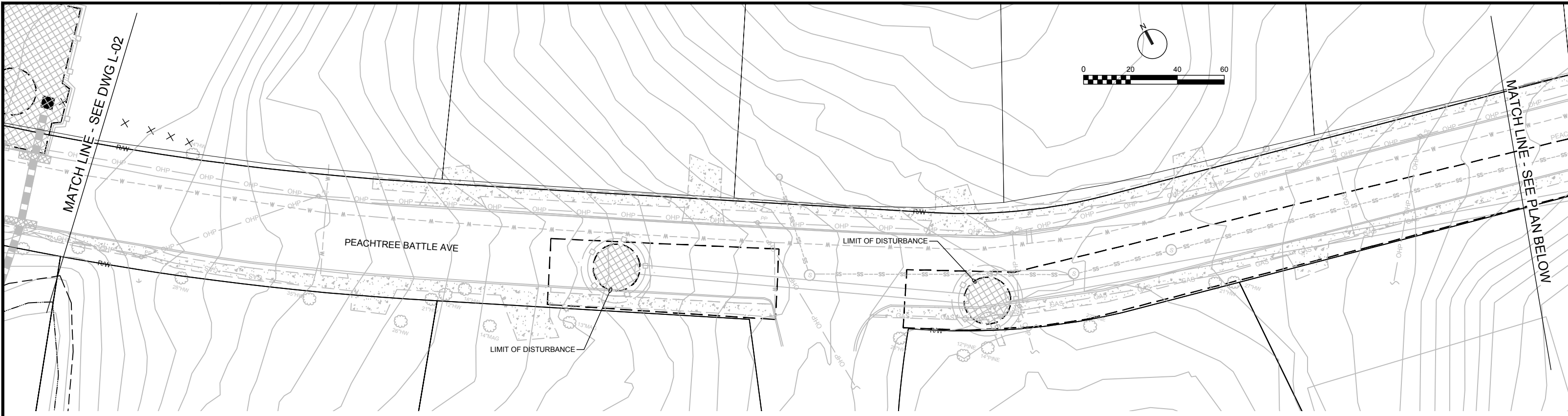
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	NO.	DATE	DESCRIPTION							
				HOWELL MILL ROAD SEWER IMPROVEMENTS TREE PROTECTION, REMOVAL AND REPLACEMENT						
				SURVEYOR	FIELD	BOOKS	L.L.	DIST.	COUNTY	SCALE
				DRAWN BY D CORBETT	DESIGNED BY T SMITH	CHECKED BY C HAMBLÉN	APPROVED BY T KELLEY	DATE JUN 2017		
ENGINEER OF RECORD				PROJECT NUMBER:			22 SHEET OF 29			



- NOTES:
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 2. IT IS ANTICIPATED THAT ALL TREES INSIDE THE LIMITS OF DISTURBANCE WILL BE REMOVED AS PART OF NORMAL CONSTRUCTION ACTIVITIES. CONTRACTOR SHALL CONSERVE TREES INSIDE THE LIMITS OF DISTURBANCE IF POSSIBLE. TREES ANTICIPATED FOR REMOVAL ARE LISTED IN THE TREE REMOVAL TABLE.
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 4. CONTRACTOR SHALL PROVIDE AND INSTALL REPLACEMENT TREES SHOWN ON THE REPLACEMENT TREE PLANTING SCHEDULE, AND SHALL PLANT TREES ACCORDING TO THE TREE PLANTING DETAIL. REPLACEMENT TREES SHALL BE PLANTED AFTER COMPLETION OF ALL CONSTRUCTION ACTIVITIES.
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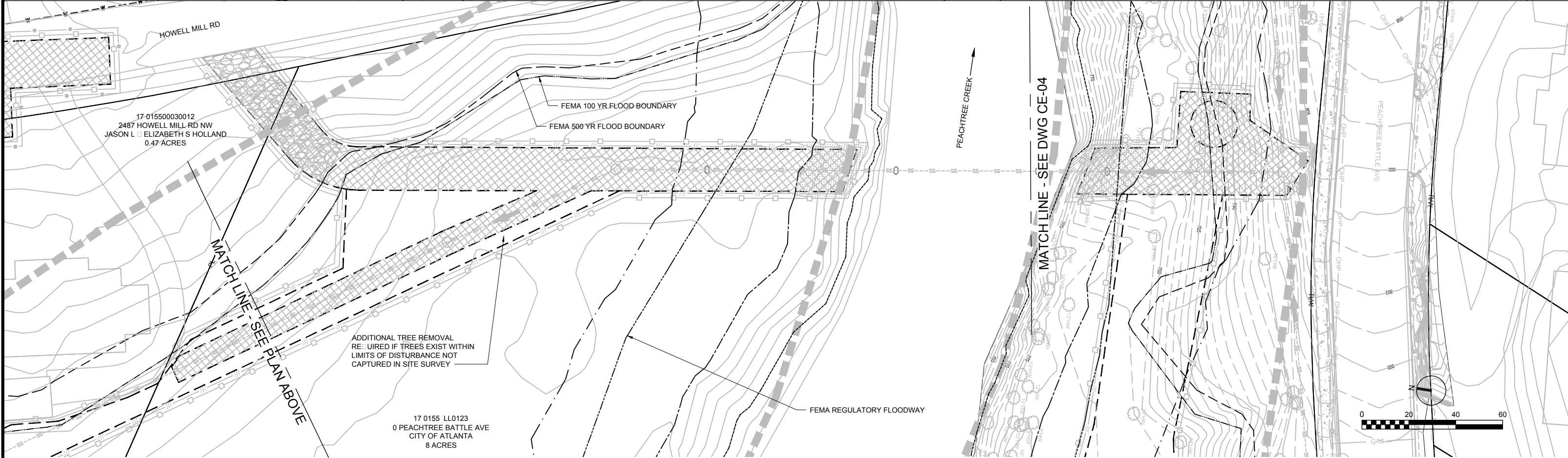
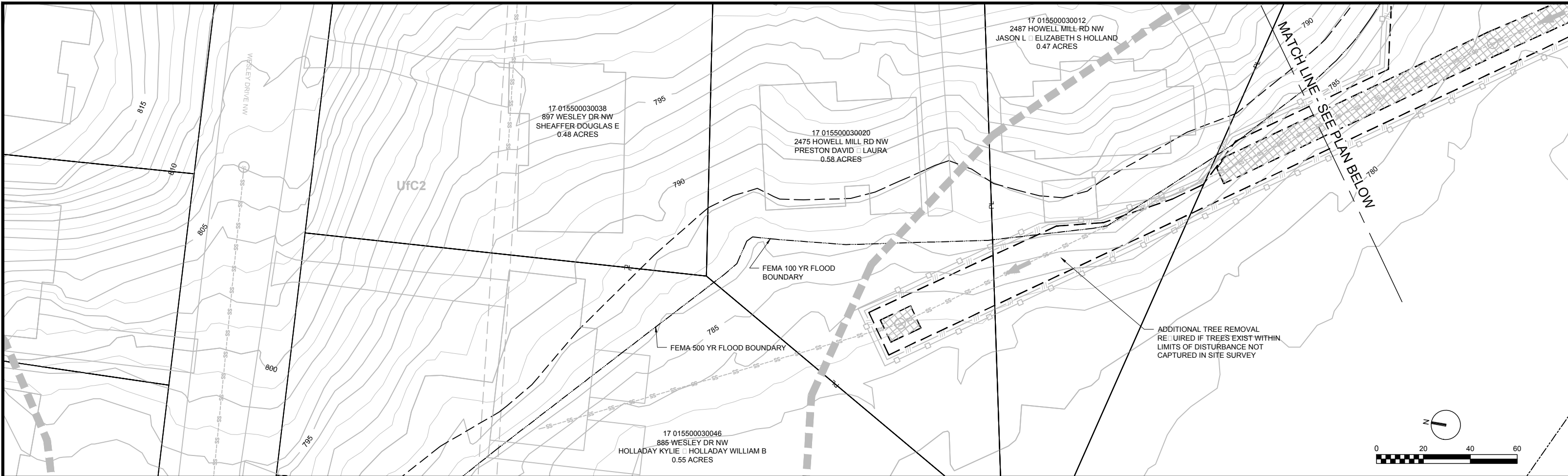
L-03



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REVISIONS			CITY OF ATLANTA DEPARTMENT OF WATERSHED MANAGEMENT OFFICE OF ENGINEERING SERVICES						
NO.	DATE	DESCRIPTION	HOWELL MILL ROAD SEWER IMPROVEMENTS TREE PROTECTION, REMOVAL AND REPLACEMENT						
			SURVEYOR	FIELD	BOOKS	L.L.	DIST.	COUNTY	SCALE
			DRAWN BY D CORBETT	DESIGNED BY T SMITH	CHECKED BY C HAMBLÉN	APPROVED BY T KELLEY	DATE JUN 2017		
ENGINEER OF RECORD			PROJECT NUMBER:			SHEET 23 OF 29			

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- NOTES:
1. ALL SURVEY FOR THIS PROJECT, INCLUDING TREE LOCATION, WAS PROVIDED BY CITY OF ATLANTA.
 2. IT IS ANTICIPATED THAT ALL TREES INSIDE THE LIMITS OF DISTURBANCE WILL BE REMOVED AS PART OF NORMAL CONSTRUCTION ACTIVITIES. CONTRACTOR SHALL CONSERVE TREES INSIDE THE LIMITS OF DISTURBANCE IF POSSIBLE. TREES ANTICIPATED FOR REMOVAL ARE LISTED IN THE TREE REMOVAL TABLE.
 3. CONTRACTOR SHALL INSTALL 4-FT ORANGE TREE PROTECTION FENCE OUTSIDE OF THE SILT FENCE ALONG THE ENTIRE LENGTH OF THE LIMITS OF CLEARING.
 4. CONTRACTOR SHALL PROVIDE AND INSTALL REPLACEMENT TREES SHOWN ON THE REPLACEMENT TREE PLANTING SCHEDULE, AND SHALL PLANT TREES ACCORDING TO THE TREE PLANTING DETAIL. REPLACEMENT TREES SHALL BE PLANTED AFTER COMPLETION OF ALL CONSTRUCTION ACTIVITIES.
 5. LOCATION OF REPLACEMENT TREES SHALL GENERALLY BE AS SHOWN ON THIS PLAN. FINAL LOCATION OF REPLACEMENT TREES MAY BE ADJUSTED IN THE FIELD BY THE OWNER TO MATCH FIELD CONDITIONS AND TREE SPACING REQUIREMENTS. CONTRACTOR SHALL NOTIFY OWNER PRIOR TO PLANTING REPLACEMENT TREES TO OBTAIN OWNER INPUT.
 6. REPLACEMENT TREES SHALL BE PLANTED APPROXIMATELY 20 FEET FROM THE GRAVITY SEWER LINE AND SHALL NOT BE PLANTED CLOSER THAN 20 FEET OF THE GRAVITY SEWER LINE.
 7. TREES SHALL BE PLANTED IN ACCORDANCE WITH THE (1) STANDARD CONSTRUCTION DETAILS AND (2) PLANTING SCHEDULE PROVIDED ON SHEET L-06.
 8. TREES SHALL BE REMOVED IN ACCORDANCE WITH THE TREE REMOVAL TABLE PROVIDED ON SHEET L-06.

GSWCC Georgia Soil and Water Conservation Commission

Christopher Hamblen
Level II Certified Design Professional

Certification Number: 0000069253 Expires: 08-21-2019
Issued: 08-21-2015

ch2m|ROH&D|FOX

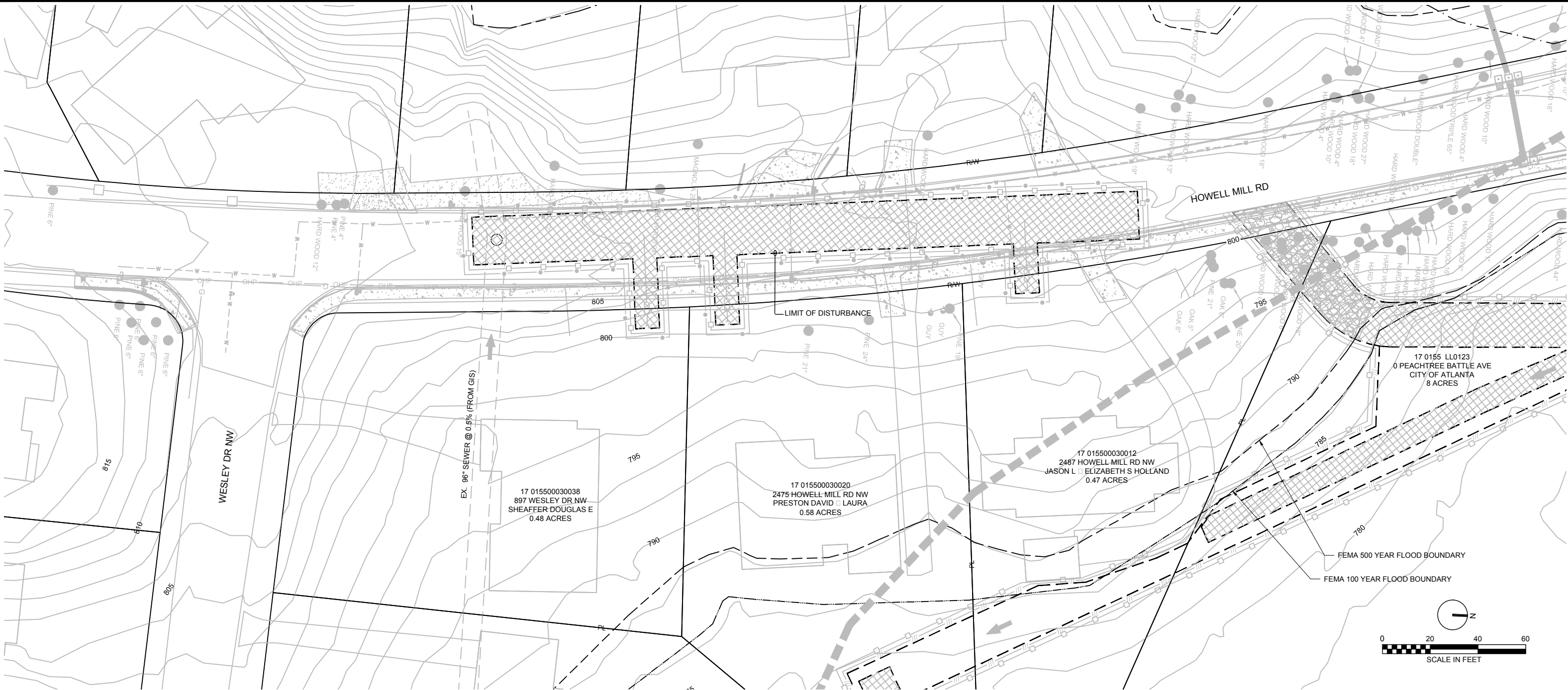
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L-04

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REVISIONS				CITY OF ATLANTA DEPARTMENT OF WATERSHED MANAGEMENT OFFICE OF ENGINEERING SERVICES					
NO.	DATE	DESCRIPTION		HOWELL MILL ROAD SEWER IMPROVEMENTS TREE PROTECTION, REMOVAL AND REPLACEMENT					
				SURVEYOR	FIELD	BOOKS	L.L.	DIST.	COUNTY
				DRAWN BY	DESIGNED BY	CHECKED BY	BY	APPROVED BY	DATE
				D CORBETT	T SMITH	C HAMBLÉN		T KELLEY	JUN 2017
ENGINEER OF RECORD				PROJECT NUMBER:				SHEET 24 OF 29	

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- NOTES:
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Georgia Soil and Water
Conservation Commission

Christopher Hamblen
Level II Certified Design Professional

Certification Number: 0000069253 Expires: 08-21-2019
Issued: 08-21-2015



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L-05



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REVISIONS	
NO.	DATE DESCRIPTION

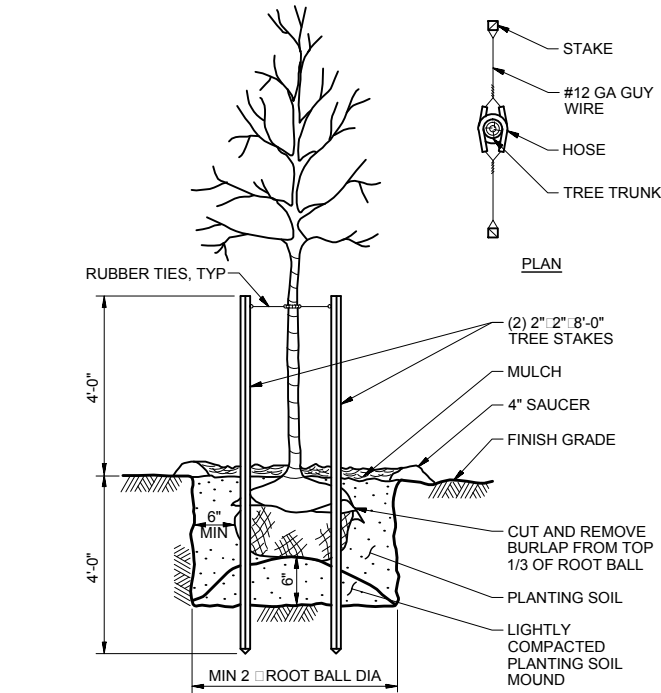
CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT
OFFICE OF ENGINEERING SERVICES

HOWELL MILL ROAD SEWER IMPROVEMENTS
TREE PROTECTION, REMOVAL AND REPLACEMENT

SURVEYOR	FIELD	BOOKS	L.L.	DIST.	COUNTY	SCALE
DRAWN BY D CORBETT	DESIGNED BY T SMITH	CHECKED BY C HAMBLÉN	APPROVED BY T KELLEY	DATE JUN 2017	PROJECT NUMBER:	

ENGINEER OF RECORD

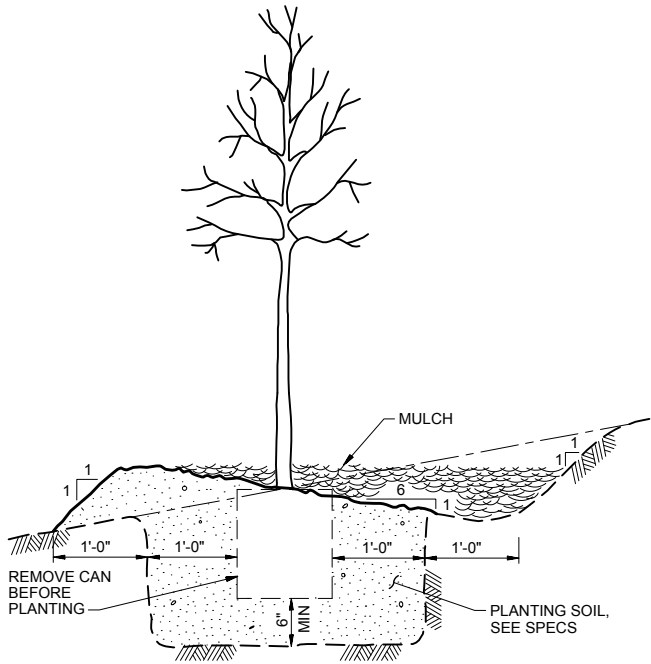
SHEET 25 OF 29



NOTE:
TREE SHALL BEAR SAME RELATION TO FINISH GRADE AS IT BORE TO PREVIOUS GRADE.

SMALL TREE PLANTING

NTS



TREE PLANTING ON SLOPE

NTS

TREE REMOVAL TABLE*			
TREE NUMBER	APPROXIMATE NORTHING	APPROXIMATE EASTING	DESCRIPTION
1	1391080.76	2219142.33	13" HW
2	1391052.95	2219088.61	30" PINE
3	1391030.30	2219053.76	13" PINE
4	1391035.37	2219062.09	36" PINE
5	1391438.06	2220877.86	10" HW"
6	1391410.32	2220884.11	30" HW
7	1391423.26	2220861.13	10" HW
8	1391433.08	2220853.97	13" HW
9	1391442.02	2220853.23	7" HW
10	1391455.94	2220857.48	15" HW
11	1391455.13	2220865.10	15" HW
12	1391440.46	2220897.08	28" HW
13	1391439.21	2220973.17	30" HW
14	1391460.31	2220995.00	12" HW
15	1391451.59	2221020.13	12" HW
16	1391450.75	2221018.57	7" HW
17	1391449.28	2221018.68	12" HW
18	1391451.68	2221026.37	17" HW
19	1391448.63	2221022.35	14" HW
20	1391445.67	2221022.95	10" HW
21	1391443.26	2221022.43	12" HW

*Table does not include tree removal in areas with incomplete survey, as indicated in the plan set.

Howell Mill Road Sewer Improvements Replacement Tree Planting Schedule				
Tree Plan Symbol	Common Name	Scientific Name	Minimum Size Required, in.	Quantity Required
(A)	American Sycamore	<i>Platanus occidentalis</i>	2	5
(B)	Water Oak	<i>Quercus nigra</i>	2	5
(C)	River Birch	<i>Betula nigra</i>	2	5
(D)	Red Maple	<i>Acer rubrum</i>	2	5
(E)	American Linden	<i>Tilia americana</i>	2	5

Total No. of Trees Replaced: 25
Total Caliper Inches Replaced: 50.00

Howell Mill Road Sewer Improvements Infrastructure Recompense	
Disturbed Acreage	0.69
Recompense per Disturbed Acre	\$5,000
Recompense Cost	\$3,450
Recompense Credit	
No. of Trees Replaced	25
Credit per Tree Replaced	\$100
Caliper Inches Replaced	50.00
Credit per Caliper Inch Replaced	\$30
Total Recompense Credit	\$4,000
Total Recompense Cost:	\$0



Georgia Soil and Water
Conservation Commission

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Level II Certified Design Professional

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Issued: 08-21-2015

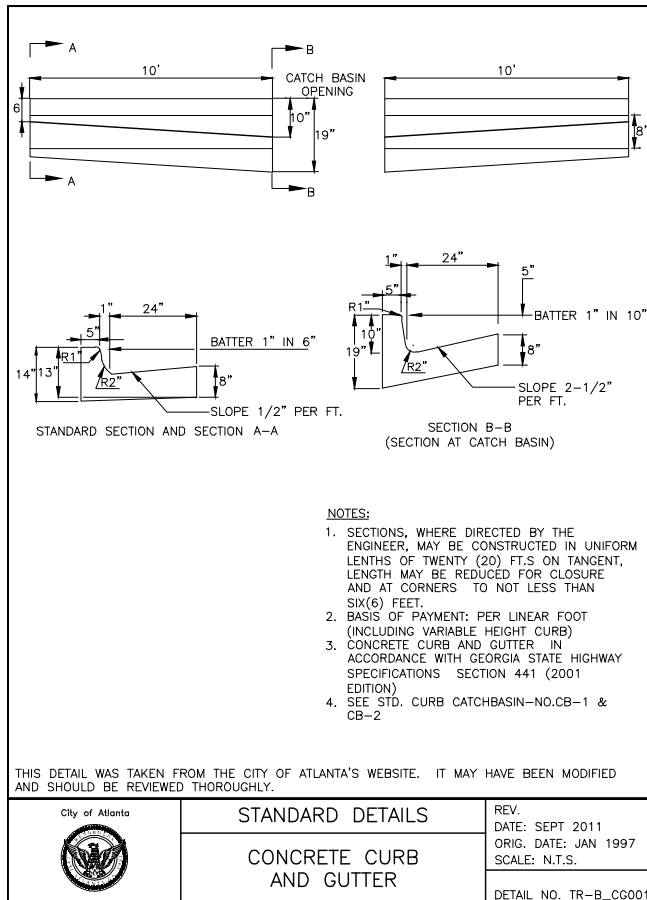
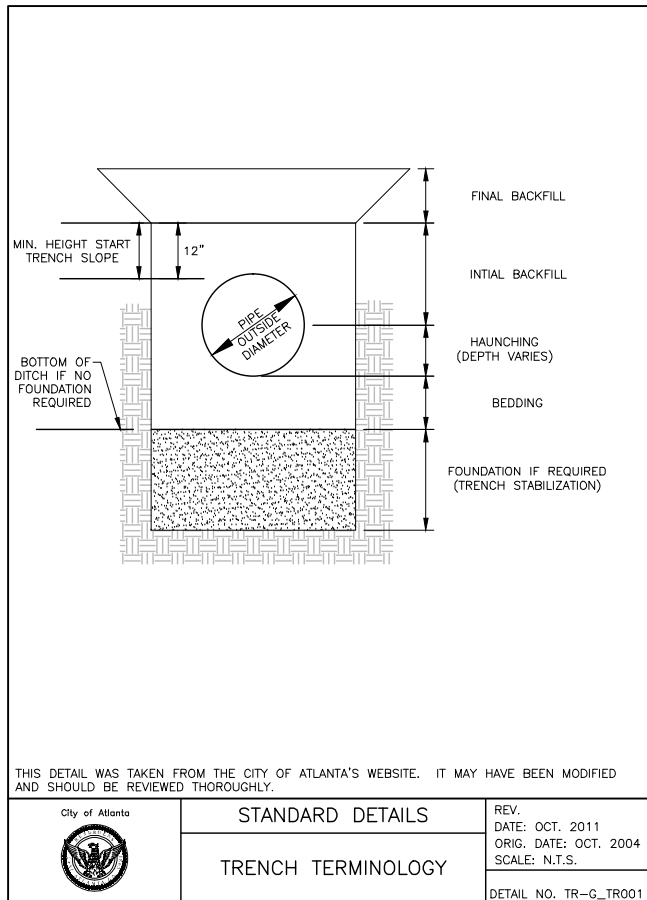
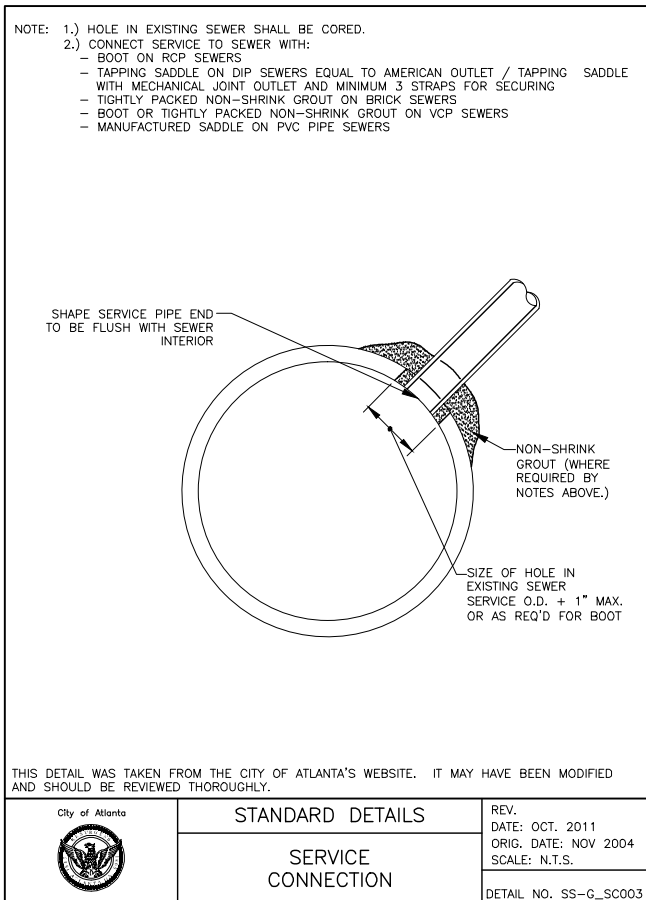
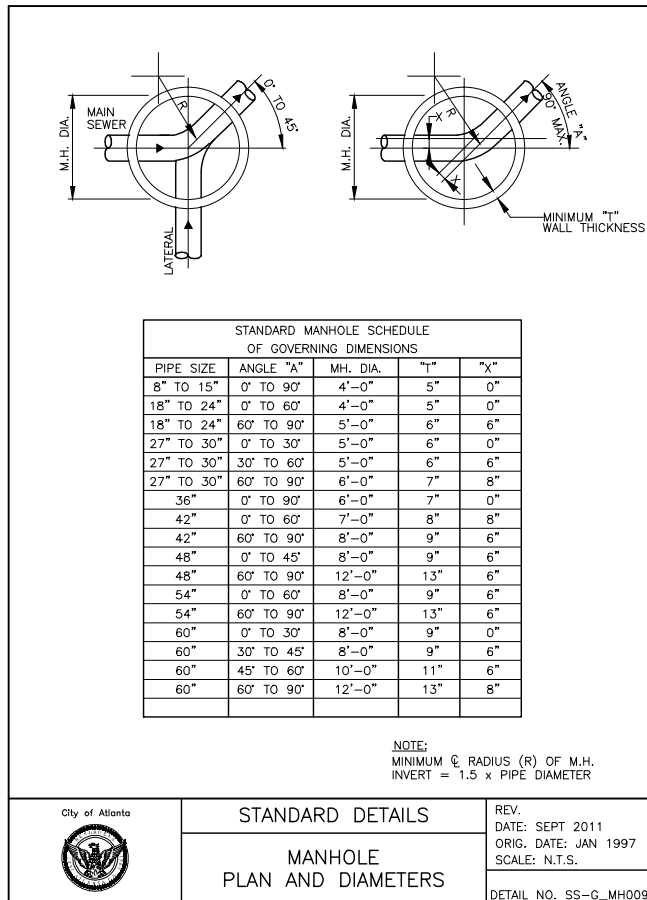
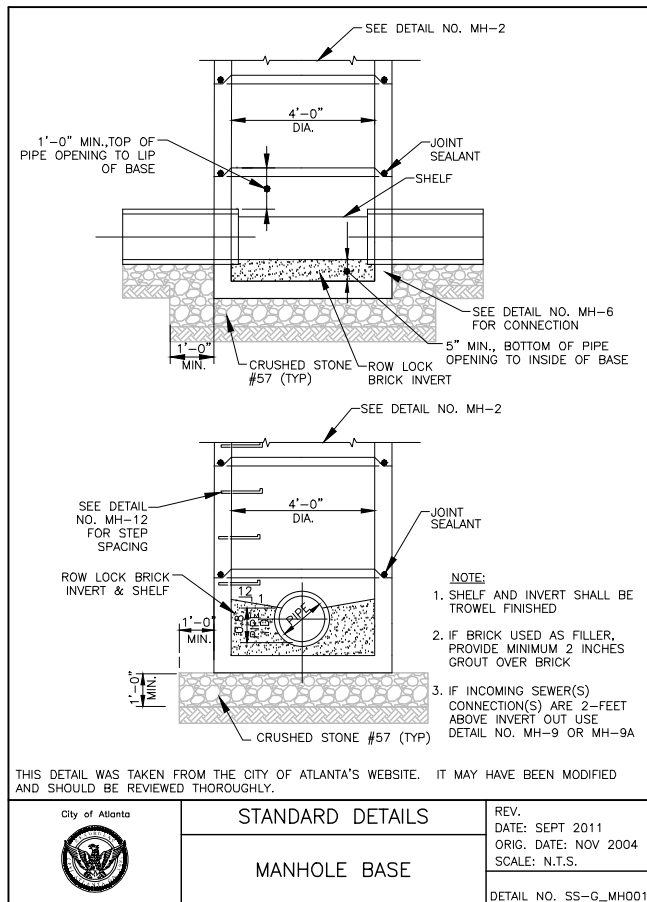
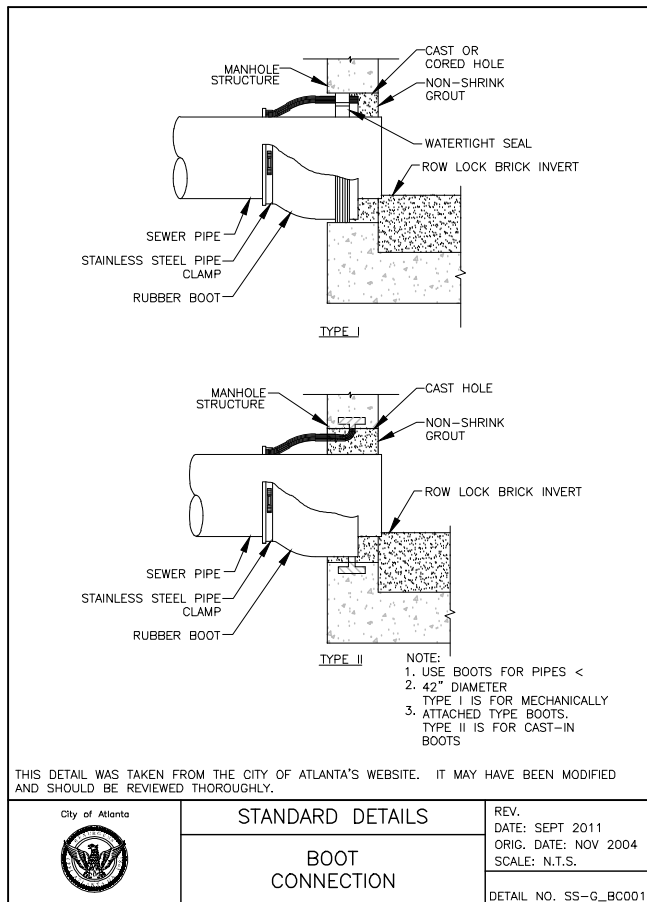
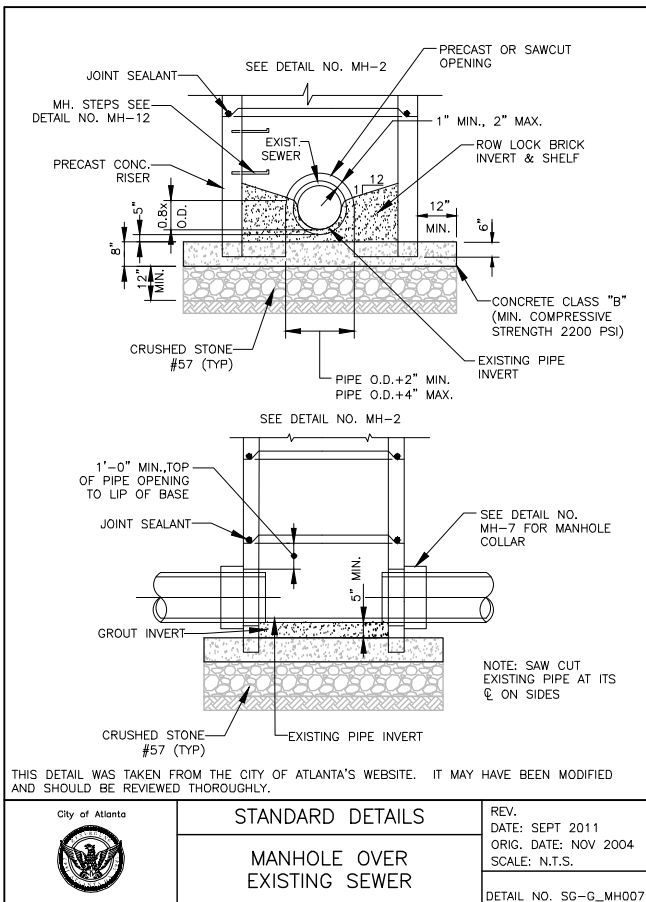
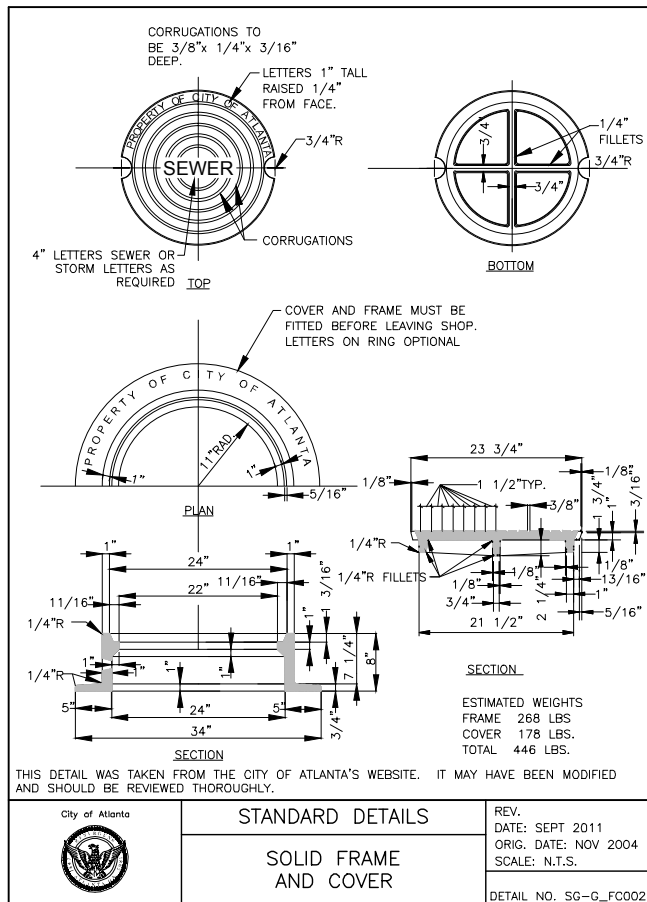


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NO.	DATE	DESCRIPTION	HOWELL MILL ROAD SEWER IMPROVEMENTS TREE PROTECTION, REMOVAL AND REPLACEMENT		
			SURVEYOR	FIELD BOOKS	L.L. DIST. COUNTY SCALE
			DRAWN BY D CORBETT	DESIGNED BY T SMITH	CHECKED BY C HAMBLÉN
			APPROVED BY T KELLEY	DATE JUN 2017	
ENGINEER OF RECORD			PROJECT NUMBER:		SHEET 26 OF 29



ch2m|hill|roland|fox

676886

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SD-01

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REVISIONS		
NO.	DATE	DESCRIPTION

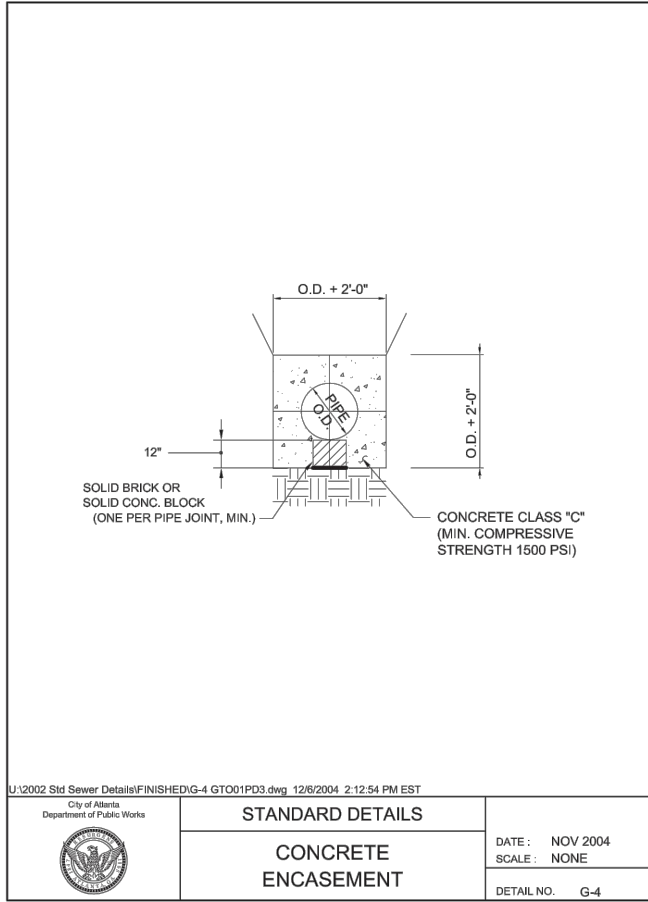
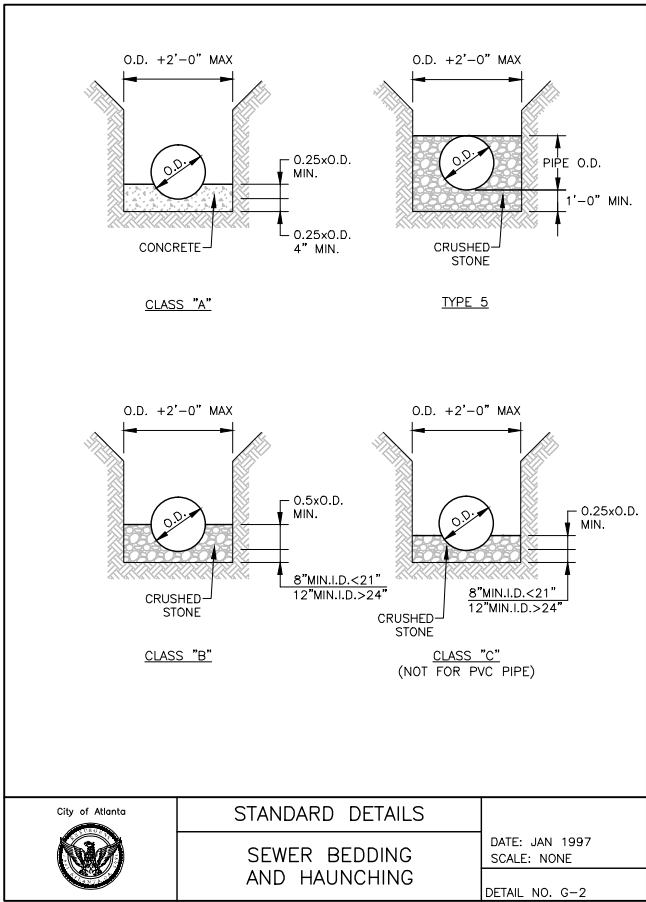
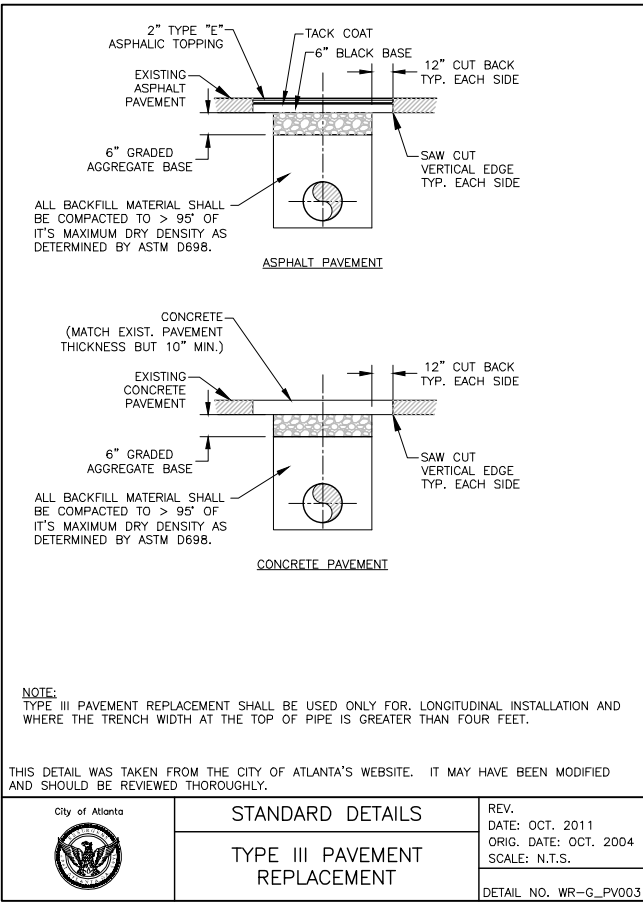
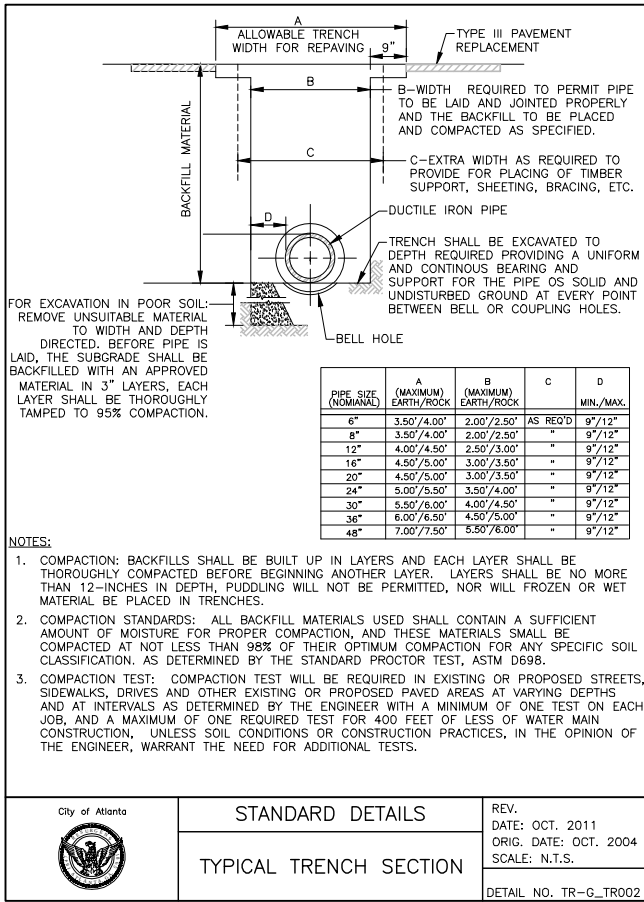
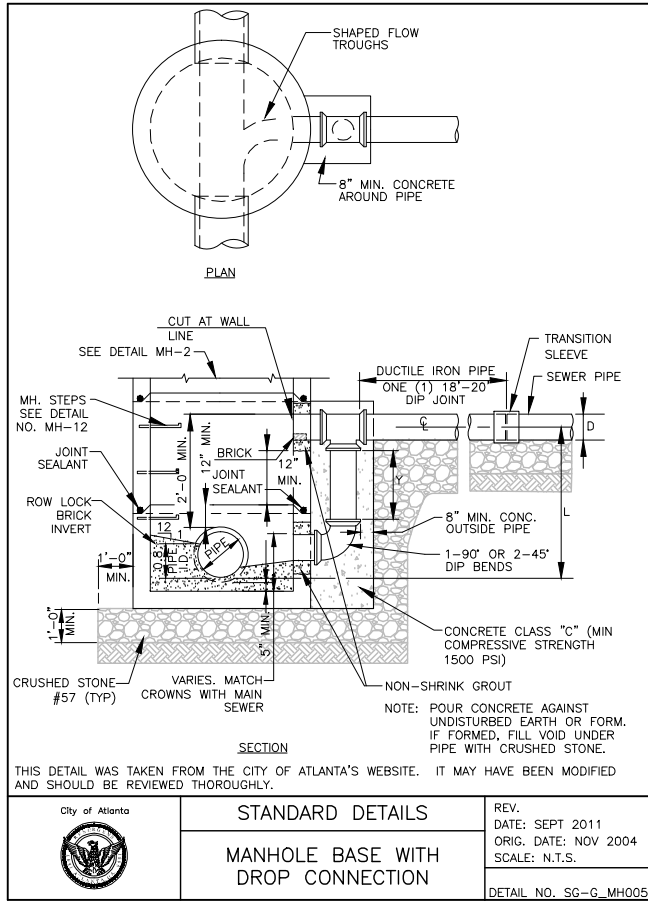
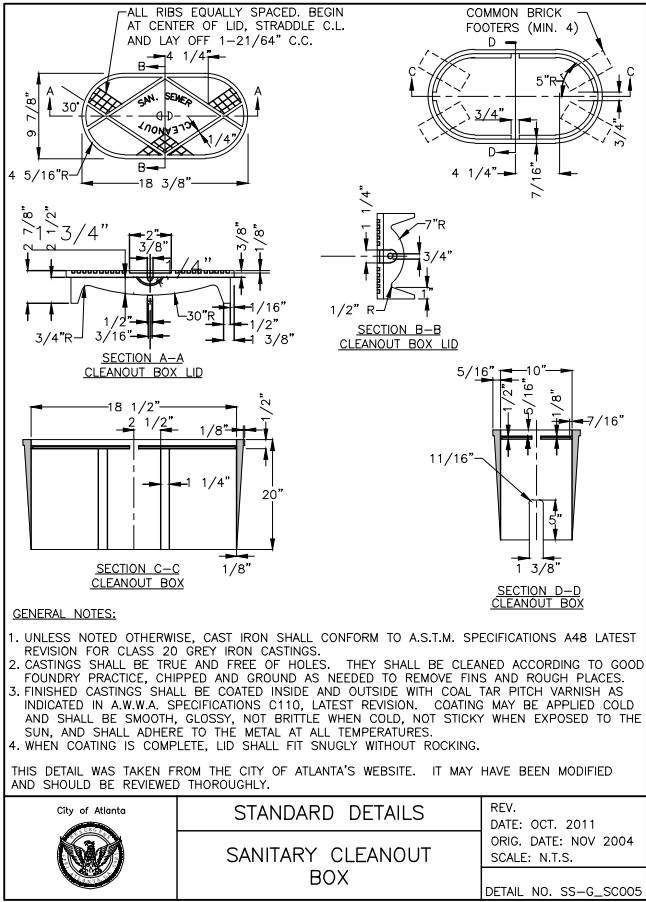
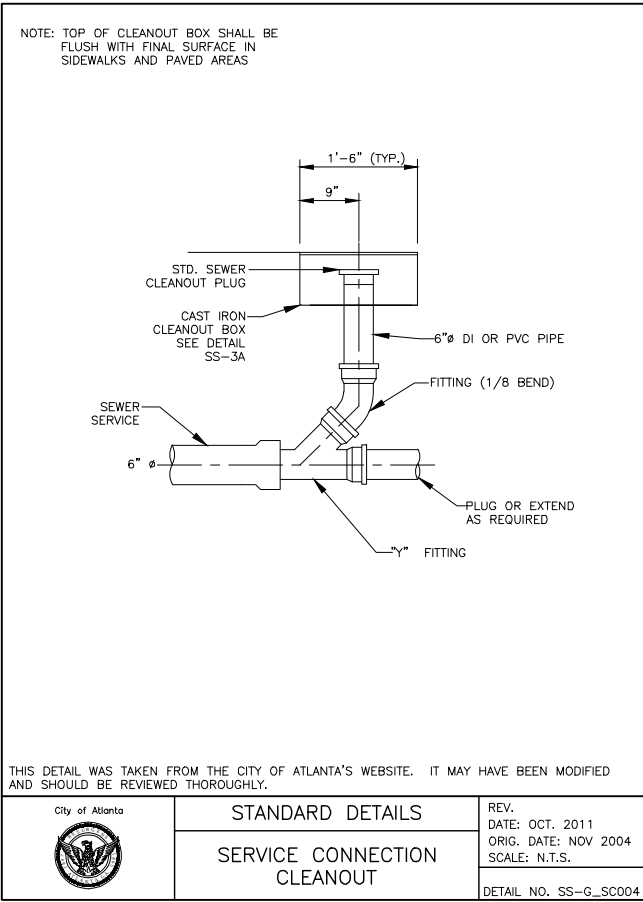
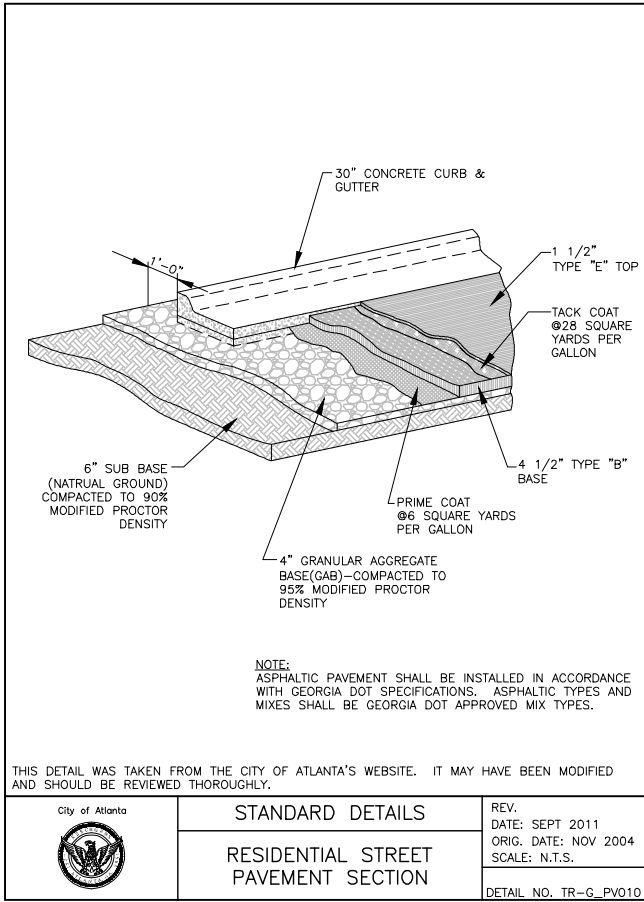
CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT
OFFICE OF ENGINEERING SERVICES

HOWELL MILL ROAD SEWER IMPROVEMENTS
STANDARD DETAILS

SURVEYOR	FIELD BOOKS	L.L.	DIST.	COUNTY	SCALE
DRAWN BY D CORBETT	DESIGNED BY J BURTON	CHECKED BY D JENKINS	APPROVED BY T KELLEY	FULTON	NTS

PROJECT NUMBER:	DATE JUN 2017	SHEET 27 OF 29
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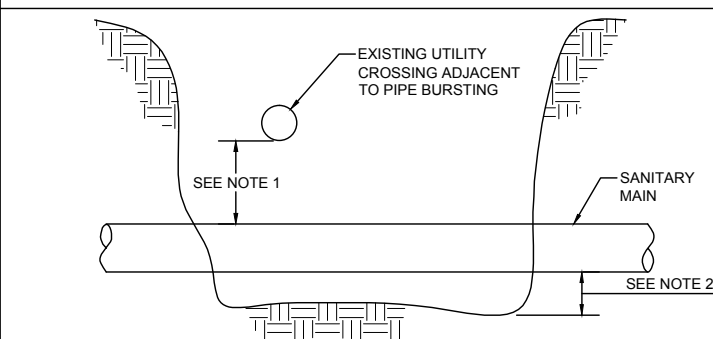
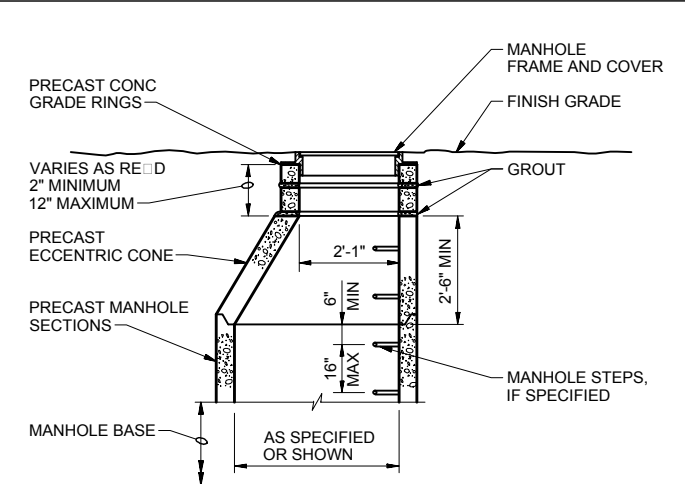
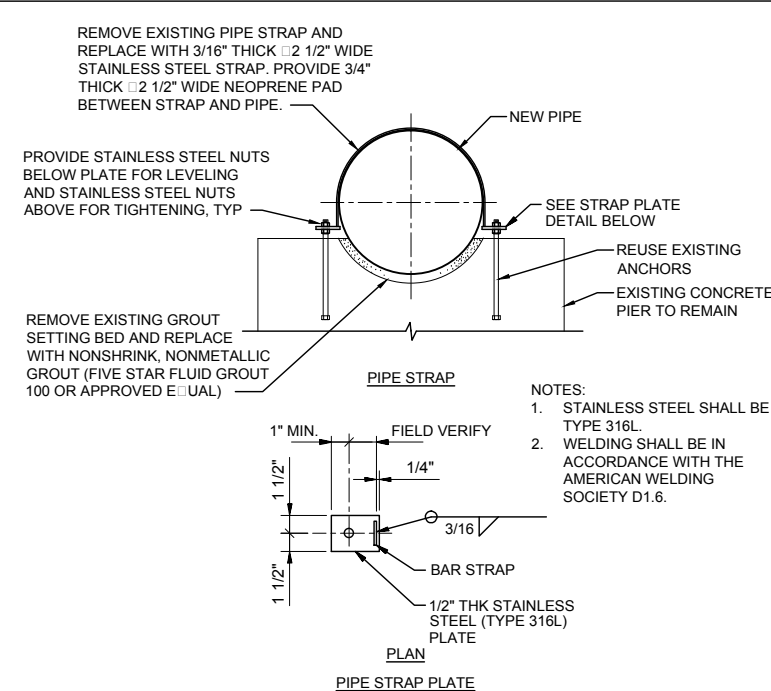
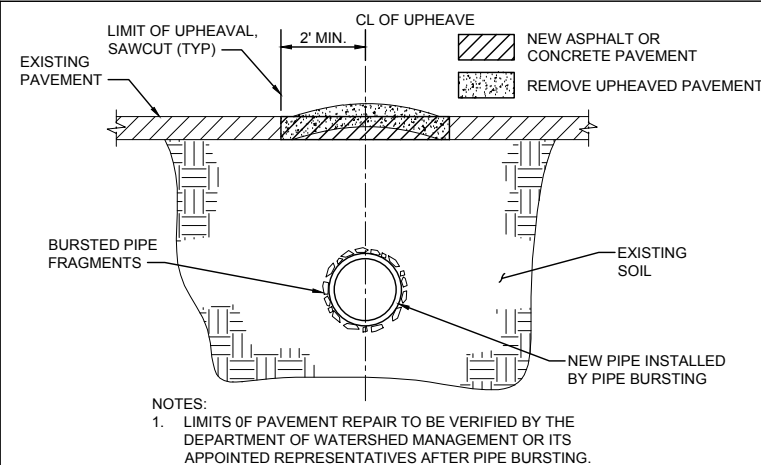
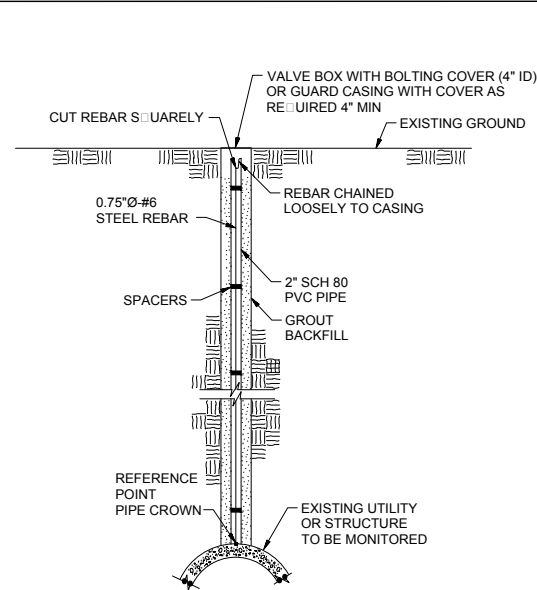
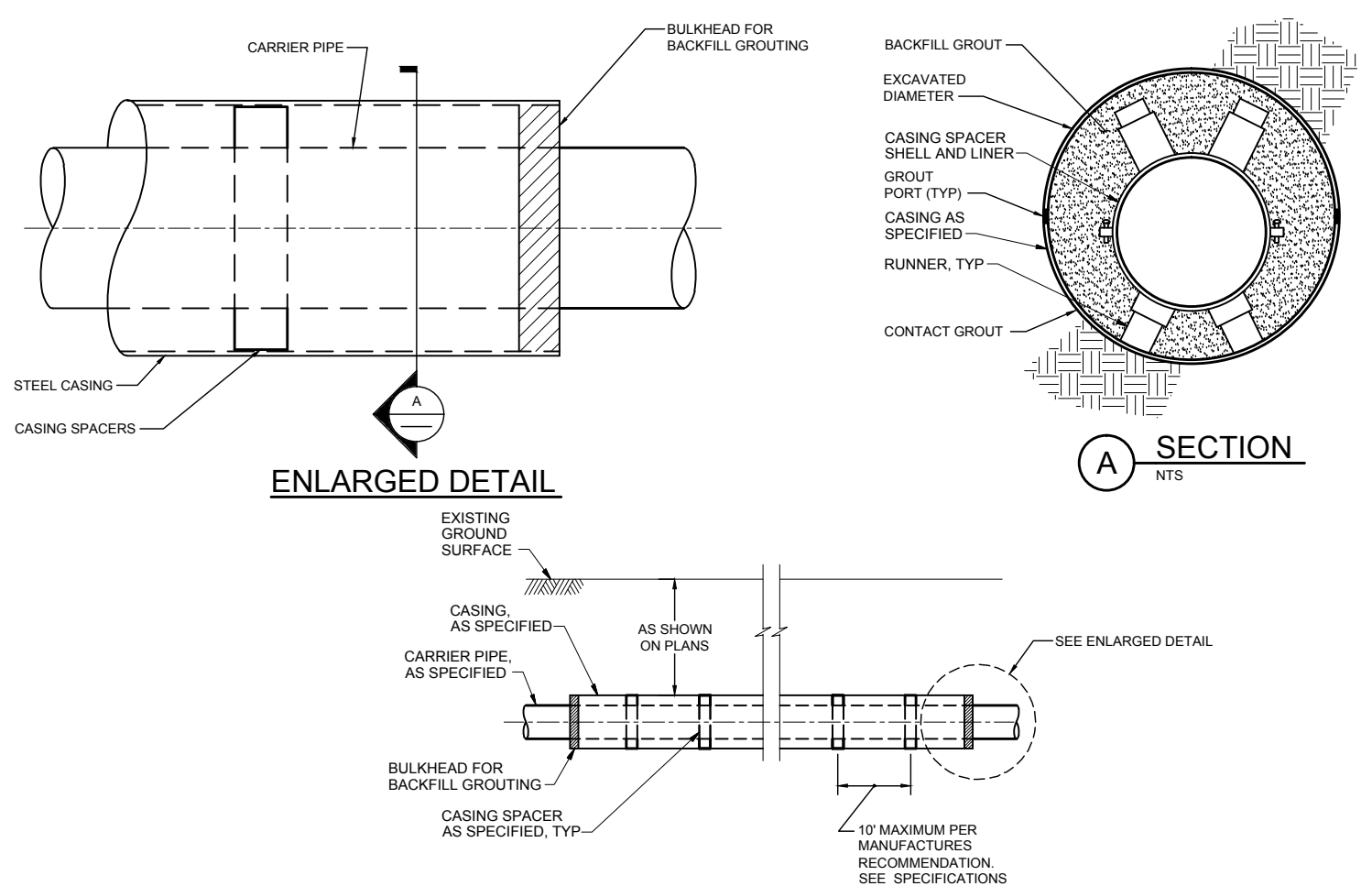
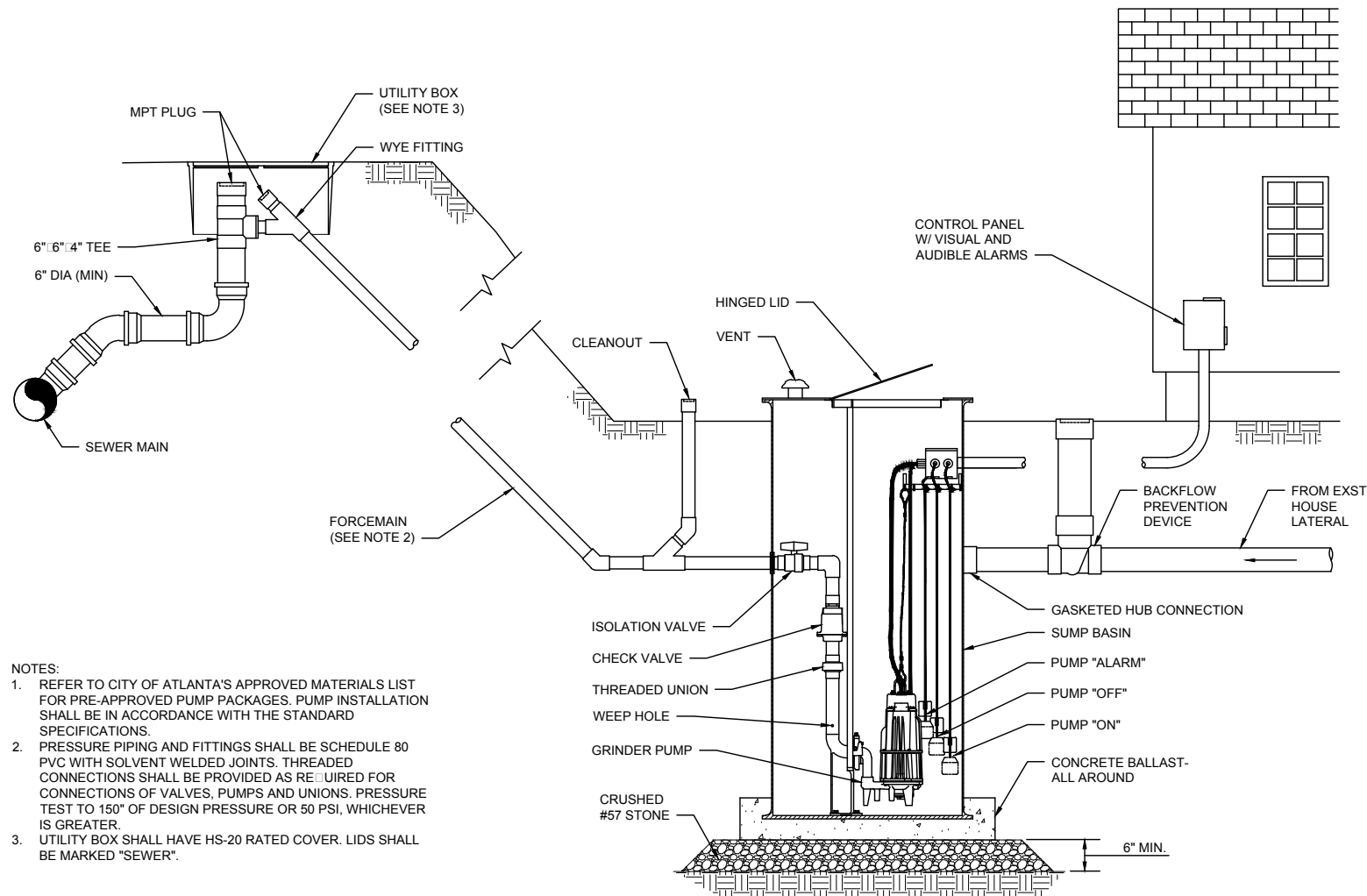
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NO.	DATE	DESCRIPTION		HOWELL MILL ROAD SEWER IMPROVEMENTS STANDARD DETAILS					
				SURVEYOR	FIELD	BOOKS	L.L.	DIST.	COUNTY
									FULTON
				SCALE					NTS
				DRAWN BY	DESIGNED BY	CHECKED BY	APPROVED BY	DATE	
				D CORBETT	J BURTON	D JENKINS	T KELLEY	JUN 2017	
ENGINEER OF RECORD				PROJECT NUMBER:				SHEET 28 OF 29	



CH2M HILL ROH&F FOX
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	NO.	DATE	DESCRIPTION						
	HOWELL MILL ROAD SEWER IMPROVEMENTS STANDARD DETAILS								
	SURVEYOR		FIELD BOOKS		L.L. DIST.		COUNTY FULTON		SCALE NTS
	DRAWN BY D CORBETT		DESIGNED BY J BURTON		CHECKED BY D JENKINS		APPROVED BY T KELLEY		DATE JUN 2017
ENGINEER OF RECORD			PROJECT NUMBER:						29 SHEET OF 29

GEOTECHNICAL TESTING REPORTS



EXPLORATION PROCEDURES

Eight (8) SPT borings (designated HM-1 to HM-8) and two auger borings (HM-9 and HM-10) were performed at the approximate locations indicated on the attached Boring Location Plan (Figure 1). The SPT borings were performed in general accordance with ASTM D 1586. Soil samples obtained during testing were visually evaluated by the Project Engineer and classified according to the visual-manual procedure described in ASTM D 2488. A narrative of field operations is included in The Appendix.

The test locations were determined by our field engineer using a master plan provided by client and a Trimble GeoXH, rated as a sub-foot unit (horizontal accuracy) GPS Unit with a +/- 3 ft accuracy. These locations are shown on the attached Boring Location Plan (Figure 1) and should be considered approximate. The elevations shown on the test logs were obtained also using the GeoXH GPS Unit but should be considered very approximate. The provided elevation should not be relied upon during the design.

Boring and Rock Core Logs

GENERAL NOTES

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

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

LEGEND



Split Spoon Sample obtained during Standard Penetration Testing



Relatively Undisturbed Shelby Tube Sample



Groundwater Level at Time of Boring Completion



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

w

Natural Moisture Content

LL

Liquid Limit

PL

Plastic Limit

Atterberg Limits

PI

Plasticity Index

PF

Percent Fines (Percent Passing #200 Sieve)

γ_d

Dry Unit Weight (Pounds per Cubic Foot or PCF)

γ_m

Moist or In-Situ Unit Weight (PCF)

γ_{sat}

Saturated Unit Weight (PCF)

BORING LOG DATA AND NARRATIVE OF DRILLING OPERATIONS

The test borings were made by mechanically advancing helical hollow stem augers into the ground. Samples were covered at regular intervals in each of the borings following established procedures for performing the Standard Penetration Test in accordance with ASTM Specification D-1586. Soil samples were obtained with a standard 1.4" I.D. x 2.0" O.D. split barrel sampler. The sampler is first seated 6" to penetrate any loose cuttings and then driven an additional foot with the blows of a 140 pound hammer freely falling a distance of 30". The number of blows required to drive the sampler each six inches is recorded on the Boring Logs. The total number of blows required to drive the sampler the final foot is designated the "standard penetration resistance." This driving resistance, known as the "N" value, is a measure of the relative density of granular soils and is an indication of the consistency of cohesive deposits.

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

	"N"	Consistency
Clay and Silt	0-2	Very Soft
	3-4	Soft
	5-8	Firm
	9-15	Stiff
	16-30	Very Stiff
	Over 31	Hard
	"N"	Relative Density
Sand	0-4	Very Loose
	5-10	Loose
	11-19	Firm
	20-29	Medium Dense
	30-49	Dense
	50+	Very Dense



BORING LOG

Boring ID : HM-1

Sheet 1 of 1

CLIENT: CH2M HILL	SITE LOCATION: Howell Mill Rd & Peachtree Battle Avenue NW	
PROJECT NAME: Howell Mill Sewer Outfall	WATER LEVEL - IMMEDIATE: Not Encountered	
PROJECT NUMBER: 2016.5764.01	DRILLING METHOD/TYPE: SPT Hollow Stem Augers	BORING DEPTH: 20 Feet
LOGGED BY: Andrew Raysin	DATE DRILLED: 9/6/2016	CORING DEPTH: N/A
Drilling Company/Drill Rig Kilman Bros Inc / CME 550	X COORDINATE/LAT (ft): 12289224.07	Y COORDINATE/LONG (ft): 2424729.43

DEPTH BELOW (Ft)	WATER LEVEL	LITHOLOGIC SYMBOL	LITHOLOGY GEOLOGIC DESCRIPTION OF SOIL AND ROCK STRATA	SPT					NOTES
				ELEVATION (Ft)	RECOVERY (in. or %)	Blows/6"	N-VALUE (bpf)	N-value (bpf)	
0			Silt-sandy, trace clay stiff; tan-red (Residual)(ML)	819					
				818	20	6-7-8-8	15		
				817					
				816	18	3-4-6-7	10		
			-firm; tan	815					
5				814	18	2-2-3-3	5		
			-some clay; soft; tan-red	813					
				812	18	2-2-2-2	4		
			-firm	811					
				810	18	2-3-3-3	6		
10				809					
				808	20	3-3-3-3	6		
			-trace rock fragments; stiff	807					
				806	12	4-5-6-6	11		
			-firm	805					
15				804	16	3-4-3-5	7		
			Sand-some silt, trace clay and mica; loose; red-brown (SM)	803					
				802	14	4-4-4-4	8		
			-trace rock fragments	801					
				800	16	2-3-3-3	6		
20			BORING TERMINATED AT 20 FEET	799	16		6		
				798					

Plastic Limit=Non Plastic;
Liquid Limit = No Value; Plasticity
Index=Non Plastic

Slightly damp soil

No groundwater encountered at time of
drilling

Notes :

SPT = Standard Penetration Testing
BGS = Below Ground Surface
TOD = Time of Drilling
H:Strater Boring Logs/



BORING LOG

Boring ID : HM-2

Sheet 1 of 1

CLIENT: CH2M HILL	SITE LOCATION: Howell Mill Rd & Peachtree Battle Avenue NW	
PROJECT NAME: Howell Mill Sewer Outfall	WATER LEVEL - IMMEDIATE: Not Encountered	
PROJECT NUMBER: 2016.5901.01	DRILLING METHOD/TYPE: SPT Hollow Stem Augers	BORING DEPTH: 16 Feet
LOGGED BY: Andrew Raysin	DATE DRILLED: 9/2/2016	CORING DEPTH: N/A
Drilling Company/Drill Rig Kilman Bros Inc / CME 550	X COORDINATE/LAT (ft): 12289112.47	Y COORDINATE/LONG (ft): 2424529.55

DEPTH BELOW (Ft)	WATER LEVEL	LITHOLOGIC SYMBOL	LITHOLOGY GEOLOGIC DESCRIPTION OF SOIL AND ROCK STRATA	SPT				NOTES
				ELEVATION (Ft)	RECOVERY (in. or %)	Blows/6"	N-value (bpf)	
0			Clay-some silt and sand; stiff; red (Fill)(CL)	839				
			Silt-sandy, trace clay and mica; very stiff; tan-brown (Residual)(ML)	838	24	3-9-10-10	19	
				837				
			-trace rock fragments	836	20	6-7-10-17	17	
				835				
5			-stiff	834	22	9-10-10-13	20	
				833				
				832	20	4-4-6-7	10	
				831				
			Sand-some silt, trace clay and rock fragments; medium dense; brown-tan (SM)	830	24	8-11-12-15	23	
10			-firm	829				
				828	24	5-7-7-8	14	
				827				
			Partially weathered rock sampled as sand-some rock fragments, trace silt, clay and mica; grey	826	7	12-15-50/3	100	
			Sand-trace clay, silt and rock fragments; medium dense; grey (SW)	825				
15				824	24	18-15-13-11	28	
			AUGER REFUSAL AT 16 FEET	823			28	No groundwater encountered at time of drilling
				822				

Notes :

SPT = Standard Penetration Testing
BGS = Below Ground Surface
TOD = Time of Drilling
H:Strater Boring Logs/



UNITED
CONSULTING

BORING LOG

Boring ID : HM-3

Sheet 1 of 1

CLIENT: CH2M HILL	SITE LOCATION: Howell Mill Rd & Peachtree Battle Avenue NW	
PROJECT NAME: Howell Mill Sewer Outfall	WATER LEVEL - IMMEDIATE: Not Encountered	
PROJECT NUMBER: 2016.5764.01	DRILLING METHOD/TYPE: SPT Hollow Stem Augers	BORING DEPTH: 30 Feet
LOGGED BY: Andrew Raysin	DATE DRILLED: 9/2/2016	CORING DEPTH: N/A
Drilling Company/Drill Rig Kilman Bros Inc / CME 550	X COORDINATE/LAT (ft): 12289068.67	Y COORDINATE/LONG (ft): 2424400.73

DEPTH BELOW (Ft)	WATER LEVEL	LITHOLOGIC SYMBOL	LITHOLOGY	SPT				NOTES
			GEOLOGIC DESCRIPTION OF SOIL AND ROCK STRATA	ELEVATION (Ft)	RECOVERY (in. or %)	Blows/6"	N-value (bpf)	
0			Silt-sandy, trace clay; very stiff; brown-tan (Residual)(ML)	828	20	4-7-9-15	16	
				826	18	8-13-16-18	29	
				824				
5				822	20	12-12-10-10	22	
				820	24	9-11-12-15	23	
			-stiff	818				
				816	20	5-6-7-7	13	
10				814	24	3-4-10-12	14	
			-very stiff	812				
				810	24	10-13-15-18	28	
				808	20	8-11-14-17	25	
			-stiff	806	24	4-5-5-7	10	
				804	24	6-9-9-10	18	
15			-very stiff; white-tan	802				
				800	24	7-8-8-9	16	
			-tan-brown	798	24	6-9-11-17	20	Plastic Limit = Non Plastic; Liquid Limit = No Value; Plasticity Index = Non Plastic No groundwater encountered at time of drilling
20				796	24	9-11-11-15	22	
					24	10-15-19-22	34	
					24	13-16-19-25	30	
					24		30	
25			Clay-silty, some sand; very stiff; light tan (CL)					
			-hard					
30			BORING TERMINATED AT 30 FEET					

Notes :

SPT = Standard Penetration Testing
BGS = Below Ground Surface
TOD = Time of Drilling
H:/Strater Boring Logs/



UNITED
CONSULTING

BORING LOG

Boring ID : HM-4

Sheet 1 of 1

CLIENT: CH2M HILL	SITE LOCATION: Howell Mill Rd & Peachtree Battle Avenue NW	
PROJECT NAME: Howell Mill Sewer Outfall	WATER LEVEL - IMMEDIATE: 25 Feet	
PROJECT NUMBER: 2016.5764.01	DRILLING METHOD/TYPE: SPT Hollow Stem Augers	BORING DEPTH: 30 Feet
LOGGED BY: Andrew Raysin	DATE DRILLED: 9/2/2016	CORING DEPTH: N/A
Drilling Company/Drill Rig Kilman Bros Inc / CME 550	X COORDINATE/LAT (ft): 12289043.87	Y COORDINATE/LONG (ft): 2424195.54

DEPTH BELOW (Ft)	WATER LEVEL	LITHOLOGY		SPT				NOTES
		LITHOLOGIC SYMBOL	GEOLOGIC DESCRIPTION OF SOIL AND ROCK STRATA	ELEVATION (Ft)	RECOVERY (in. or %)	Blows/6"	N-value (bpf)	
0			Clay-some sand and silt; stiff; red (Fill)(CL)	820	24	3-5-7-7	12	Damp soil
			Silt-some clay and sand, trace rock fragments; stiff; tan-orange (Residual)(ML)	818	24	4-5-6-7	11	
				816				
5				814	24	6-7-8-9	15	
				812	24	5-5-6-7	11	
			-firm	810	20	4-4-4-5	8	
10			-stiff	808	24	4-5-5-5	10	
				806	24	5-6-6-6	12	
15			-very stiff	804	24	6-7-9-11	16	
				802	24	6-8-8-7	16	
20			-sandy, trace clay; very stiff; white-tan	800	20	5-7-10-12	17	
			-tan-brown	798	22	6-10-16-18	26	
25			Clay-silty, some sand; very stiff; light tan (CL)	796	24	12-10-10-12	20	Plastic Limit = 25%; Liquid Limit = 40%; Plasticity Index = 15% Groundwater encountered at 25 feet
			-hard	794	20	8-8-10-11	18	
				792	24	6-9-11-17	20	
30			BORING TERMINATED AT 30 FEET	790	24		20	
				788				

Notes :

SPT = Standard Penetration Testing
BGS = Below Ground Surface
TOD = Time of Drilling
H:/Strater Boring Logs/



UNITED
CONSULTING

BORING LOG

Boring ID : HM-5

Sheet 1 of 1

CLIENT: CH2M HILL	SITE LOCATION: Howell Mill Rd & Peachtree Battle Avenue NW	
PROJECT NAME: Howell Mill Sewer Outfall	WATER LEVEL - IMMEDIATE: 25 Feet	
PROJECT NUMBER: 2016.5764.01	DRILLING METHOD/TYPE: SPT Hollow Stem Augers	BORING DEPTH: 35 Feet
LOGGED BY: Andrew Raysin	DATE DRILLED: 9/1/2016	CORING DEPTH: N/A
Kilman Bros Inc. CME 550 Kilman Bros Inc / CME 550	X COORDINATE/LAT (ft): 12289010.25	Y COORDINATE/LONG (ft): 2423975.13

DEPTH BELOW (Ft)	WATER LEVEL LITHOLOGIC SYMBOL	LITHOLOGY	SPT				NOTES
		GEOLOGIC DESCRIPTION OF SOIL AND ROCK STRATA	ELEVATION (Ft)	RECOVERY (in. or %)	Blows/6"	N-value (bpf)	
0		Silt-sandy, trace clay; stiff; white-tan (Residual)(ML)	818	24	4-5-6-7	11	Damp soil Plastic Index= 28%; Liquid Limit = 35; Plasticity Index = 7%
			816	18	4-5-7-8	12	
5		-firm; tan	814	20	3-4-4-6	8	
			812	20	3-3-4-5	7	
		-stiff	810	22	3-5-5-6	10	
10		-firm	808	24	2-2-3-4	5	
			806	22	3-4-4-5	8	
15			804	24	3-3-5-5	8	
			802	24	3-4-4-4	8	
		-stiff	800	16	10-7-8-7	15	
20		-firm; light tan	798	24	3-4-4-4	8	
		-stiff	796	24	4-5-10-12	15	
25		-very stiff	794	20	6-6-10-11	16	
			792	5	4-100	100	
		Partially weathered rock sampled as sand-trace silt and clay; very dense; white-brown	790			100	Groundwater encountered at 25 feet
30		AUGER REFUSAL AT 27 FEET	788				

Notes :

SPT = Standard Penetration Testing
BGS = Below Ground Surface
TOD = Time of Drilling
H:/Strater Boring Logs/

HOWELL MILL SEWER OUTFALL



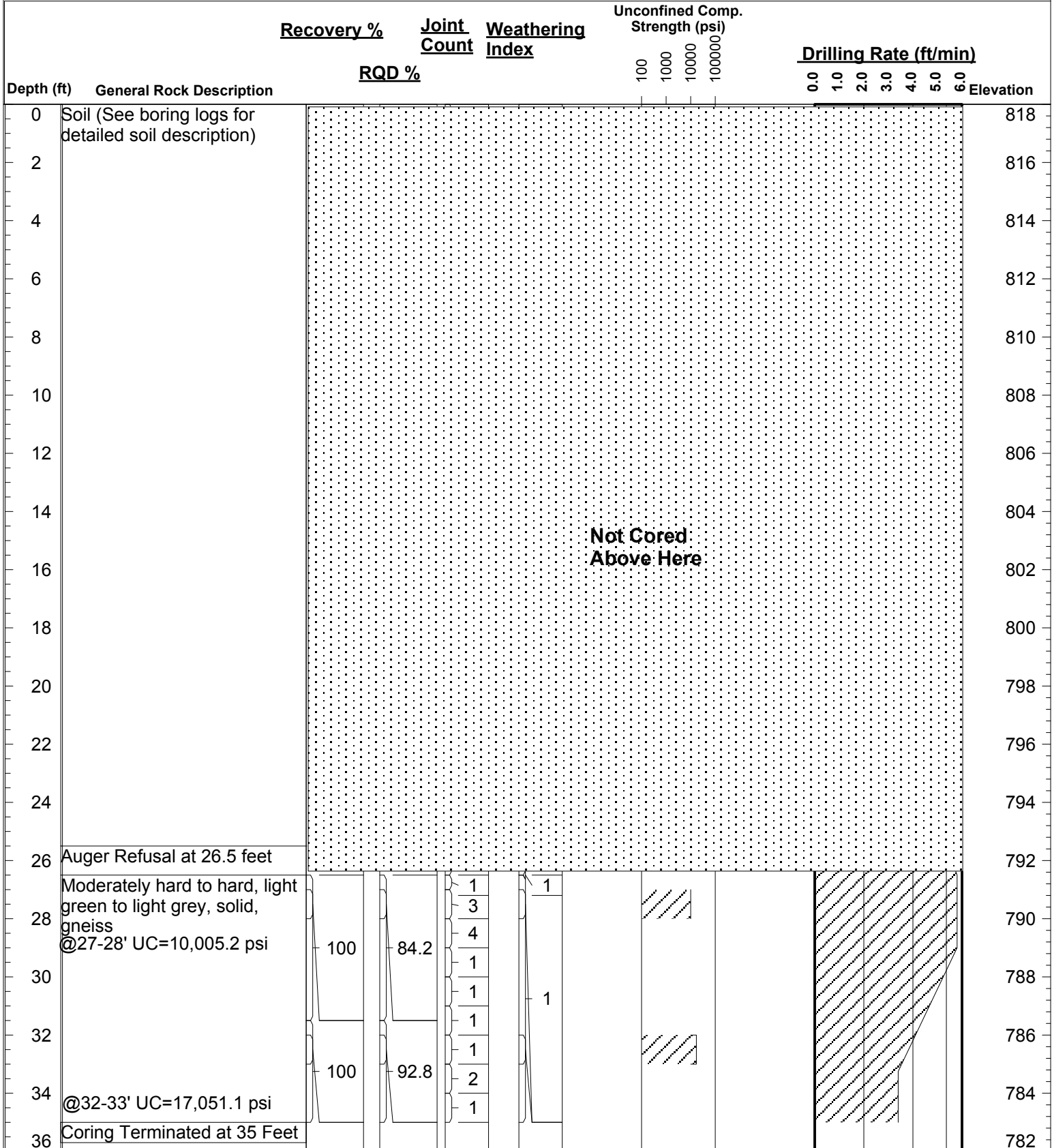
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(in feet)	Depth	Elev.
Ground Level	0	818
Bottom of Casing	26.5	791.5
Invert level.	-	-
Bottom of Hole	35	791.5
Water Level	-	-

Station & Offset:	-	HM-5
Dates Drilled:	9/6/16	to 9/6/16
Angle & Bearing:	-	-
Method:	NQ coring (double tube)	
Version:	Oct-4-16	

HM-5

1





UNITED
CONSULTING

BORING LOG

Boring ID : HM-6

Sheet 1 of 1

CLIENT: CH2M HILL	SITE LOCATION: Howell Mill Rd & Peachtree Battle Avenue NW	
PROJECT NAME: Howell Mill Sewer Outfall	WATER LEVEL - IMMEDIATE: 17 Feet	
PROJECT NUMBER: 2016.5764.01	DRILLING METHOD/TYPE: SPT Hollow Stem Augers	BORING DEPTH: 30 Feet
LOGGED BY: Andrew Raysin	DATE DRILLED: 8/31/16	CORING DEPTH: N/A
Drilling Company/ Drill Rig Kilman Bros Inc / CME 550	X COORDINATE/LAT (ft): 12289076.66	Y COORDINATE/LONG (ft): 2423790.55

DEPTH BELOW (Ft)	WATER LEVEL	LITHOLOGIC SYMBOL	LITHOLOGY GEOLOGIC DESCRIPTION OF SOIL AND ROCK STRATA	SPT				NOTES
				ELEVATION (Ft)	RECOVERY (in. or %)	Blows/6"	N-VALUE (bpf)	
0			Silt-some sand, clay and gravel; stiff; tan-orange (Fill)(ML)	805				
				804	20	3-5-6-8	11	
				803				
				802	24	7-7-8-8	15	
				801				
5			very stiff	800	24	7-11-11-12	22	
				799				
			Partially weathered rock as sand-trace silt, clay and rock fragments; very dense; white	798	18	20-27-100	100	
				797				
			Silt-sandy, trace clay; stiff; white (ML)	796	16	10-5-5-6	10	
10				795				
			Partially weathered rock as sand-some rock fragments, trace silt and clay; white-brown	794	14	5 - 5-100	100	
				793				
			grey	792	14	5-6-6-100	100	
				791				
15				790	5	100-	100	
				789				
			Sand-some silt and gravel, trace clay; firm; tan (SM)	788	24	3-8-10-10	18	
				787				
			Partially weathered rock as sand-some silt and rock fragments, trace clay; very dense; grey-brown	786	15	9 -15-100	100	
20				785				
			AUGER REFUSAL AT 20 FEET	784				

Notes :

SPT = Standard Penetration Testing
BGS = Below Ground Surface
TOD = Time of Drilling
H:/Strater Boring Logs/

Plastic Limit = Non Plastic; Liquid Limit
= No Value; Plasticity Index = Non
Plastic

Stabilized groundwater encountered at
17 feet

HOWELL MILL SEWER OUTFALL



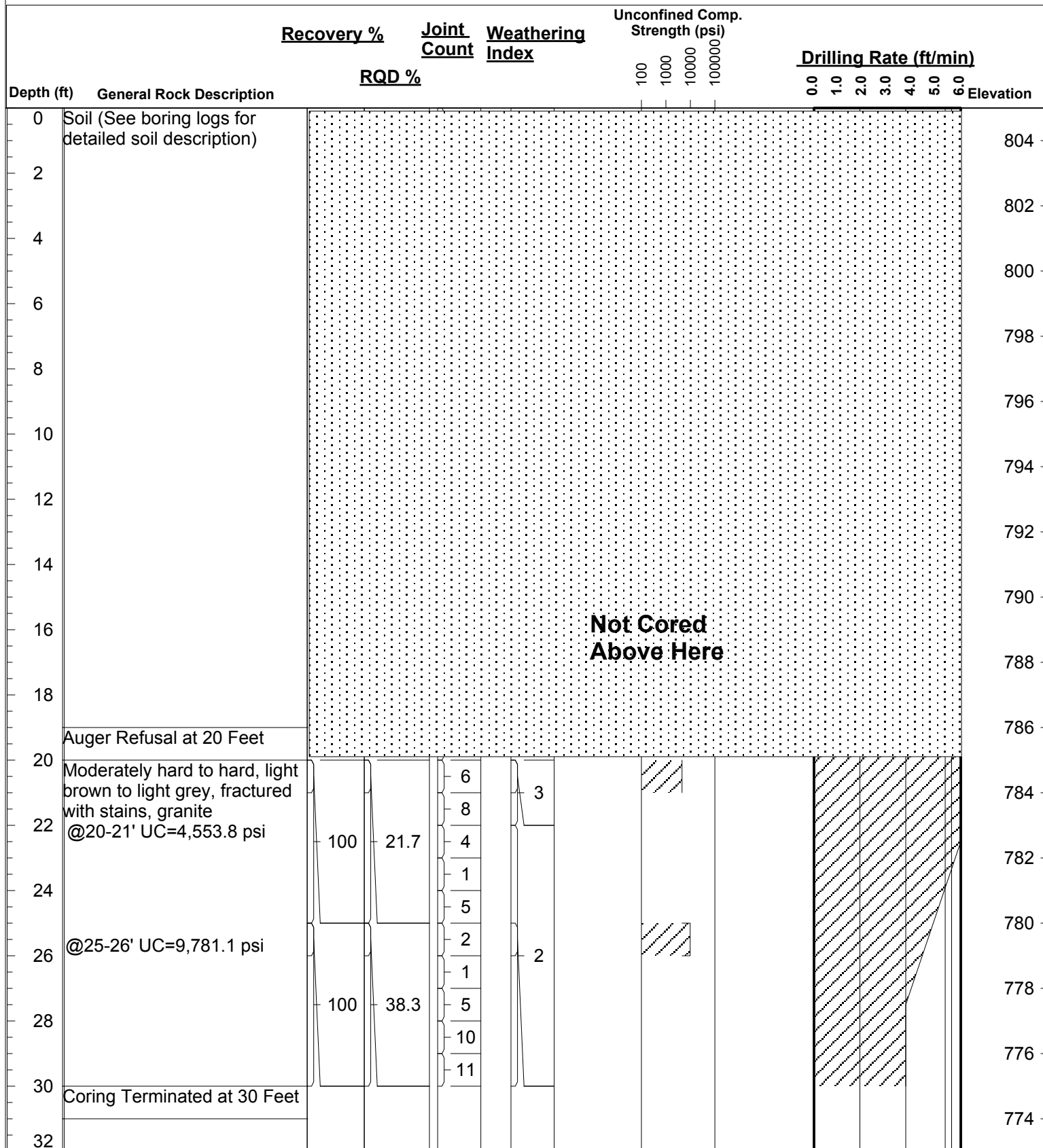
UNITED CONSULTING
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(in feet)	Depth	Elev.
Ground Level	0	805
Bottom of Casing	30	775
Invert level.	-	-
Bottom of Hole	30	775
Water Level	-	-

Station & Offset: - HM-6
 Dates Drilled: 9/6/16 to 9/6/16
 Angle & Bearing: - -
 Method: NQ coring (double tube)
 Version: Oct-4-16

HM-6

1





UNITED
CONSULTING

BORING LOG

Boring ID : HM-7

Sheet 1 of 1

CLIENT: CH2M HILL	SITE LOCATION: Howell Mill Rd & Peachtree Battle Avenue NW	
PROJECT NAME: Howell Mill Sewer Outfall	WATER LEVEL - IMMEDIATE: 18 Feet	
PROJECT NUMBER: 2016.5764.01	DRILLING METHOD/TYPE: SPT Hollow Stem Augers	BORING DEPTH: 20 Feet
LOGGED BY: Andrew Raysin	DATE DRILLED: 9/1/2016	CORING DEPTH: N/A
Drilling Company/ Drill Rig Kilman Bros Inc / CME 550	X COORDINATE/LAT (ft): 12289192.94	Y COORDINATE/LONG (ft): 2423554.82

DEPTH BELOW (Ft)	WATER LEVEL	LITHOLOGIC SYMBOL	LITHOLOGY	SPT				NOTES
			GEOLOGIC DESCRIPTION OF SOIL AND ROCK STRATA	ELEVATION (Ft)	RECOVERY (in. or %)	Blows/6"	N-value (bpf)	
0			Silt-sandy, trace clay; firm; white (Residual)(ML)	784				
			-tan	782	19	3-3-4-6	7	
			-trace root fragments; tan-brown	780	18	3-3-3-3	6	
5			-no roots; grey	778	16	3-3-3-3	6	
			-stiff	776	20	3-3-4-4	7	
10			-trace rock fragments; very stiff	774	14	5-5-6-7	11	Stabilized groundwater measured at 10 feet
			-no rocks; firm; green-white	772	18	7-8-9-6	17	Plastic Limit=35%; Liquid Limit =43%; Plasticity Index=8%
			-tan-yellow	770	24	2-2-3-3	5	Damp soil
15				768	24	2-3-5-5	8	
			Sand-some silt and rock fragments, trace clay; loose tan (SM)	766	24	2-4-5-6	9	Groundwater encountered at 18 feet at time of drilling Saturated soil
20				764	24	3-4-4-10	8	
			BORING TERMINATED AT 20 FEET	762				

Notes :

SPT = Standard Penetration Testing
BGS = Below Ground Surface
TOD = Time of Drilling
H:Strater Boring Logs/



UNITED
CONSULTING

BORING LOG

Boring ID : HM-8

Sheet 1 of 1

CLIENT: CH2M HILL	SITE LOCATION: Howell Mill Rd & Peachtree Battle Avenue NW	
PROJECT NAME: Howell Mill Sewer Outfall	WATER LEVEL - IMMEDIATE: Not Encountered	
PROJECT NUMBER: 2016.5764.01	DRILLING METHOD/TYPE: SPT Hollow Stem Augers	BORING DEPTH: 15 Feet
LOGGED BY: Andrew Raysin	DATE DRILLED: 8/31/2016	CORING DEPTH: N/A
Drilling Company/ Drill Rig Kilman Bros Inc / CME 550	X COORDINATE/LAT (ft): 12288919.65	Y COORDINATE/LONG (ft): 2423420.62

DEPTH BELOW (Ft)	WATER LEVEL	LITHOLOGIC SYMBOL	LITHOLOGY	SPT					NOTES
			GEOLOGIC DESCRIPTION OF SOIL AND ROCK STRATA	ELEVATION (Ft)	RECOVERY (in. or %)	Blows/6"	N-VALUE (bpf)	N-value (bpf)	
0			Asphalt/GAB	779	12		0		0 to 1 feet considered existing groundcover
			Silt-clayey, some sand; firm; tan-red (Fill)(ML)	778					
				777	20	3-4-4-6	8		
			Silt-some sand, clay and gravel; firm; tan-white-red (Residual)(ML)	776					
				775	24	3-3-4-6	7		Plastic Limit = 32%; Liquid Limit=47%; Plasticity Index=15%
5			-trace clay; tan-orange	774					
				773	20	3-3-4-5	7		
			-orange-brown	772					
				771	24	3-4-4-5	8		
			-stiff; white-red	770					
10				769	24	3-5-7-7	12		
			-firm; grey-brown	768					Damp soil
				767	24	3-3-4-4	7		
			-stiff	766					
				765	24	4-7-7-8	14		
15			BORING TERMINATED AT 15 FEET	764			14		No groundwater encountered at time of drilling
				763					
				762					

Notes :

SPT = Standard Penetration Testing
BGS = Below Ground Surface
TOD = Time of Drilling
H:Strater Boring Logs/



UNITED
CONSULTING

BORING LOG

Boring ID : HM-9

Sheet 1 of 1

CLIENT: CH2M HILL	SITE LOCATION: Howell Mill Rd & Peachtree Battle Avenue NW	
PROJECT NAME: Howell Mill Sewer Outfall	WATER LEVEL - IMMEDIATE: Not Encountered	
PROJECT NUMBER: 2016.5764.01	DRILLING METHOD/TYPE: SPT Hollow Stem Augers	BORING DEPTH:
LOGGED BY: Andrew Raysin	DATE DRILLED: 9/6/2016	CORING DEPTH: N/A
Drilling Company/ Drill Rig Kilman Bros Inc / CME 550	X COORDINATE/LAT (ft): 12289104.53	Y COORDINATE/LONG (ft): 2424510.57

DEPTH BELOW (Ft)	WATER LEVEL	LITHOLOGY		SPT				NOTES
		LITHOLOGIC SYMBOL	GEOLOGIC DESCRIPTION OF SOIL AND ROCK STRATA	ELEVATION (Ft)	RECOVERY (in. or %)	Blows/6"	N-VALUE (bpf)	
0			Sand-silty (Residual)	826				Straight auger boring
				824				
				822				
5				820				
				818				
				816				
10				814				
				812				
15				810	N/A	N/A	N/A	
				808				
20				806				
				804				
				802				
25				800				
				798				
30			AUGER REFUSAL AT 30 FEET	796				No groundwater encountered at time of drilling
				794				

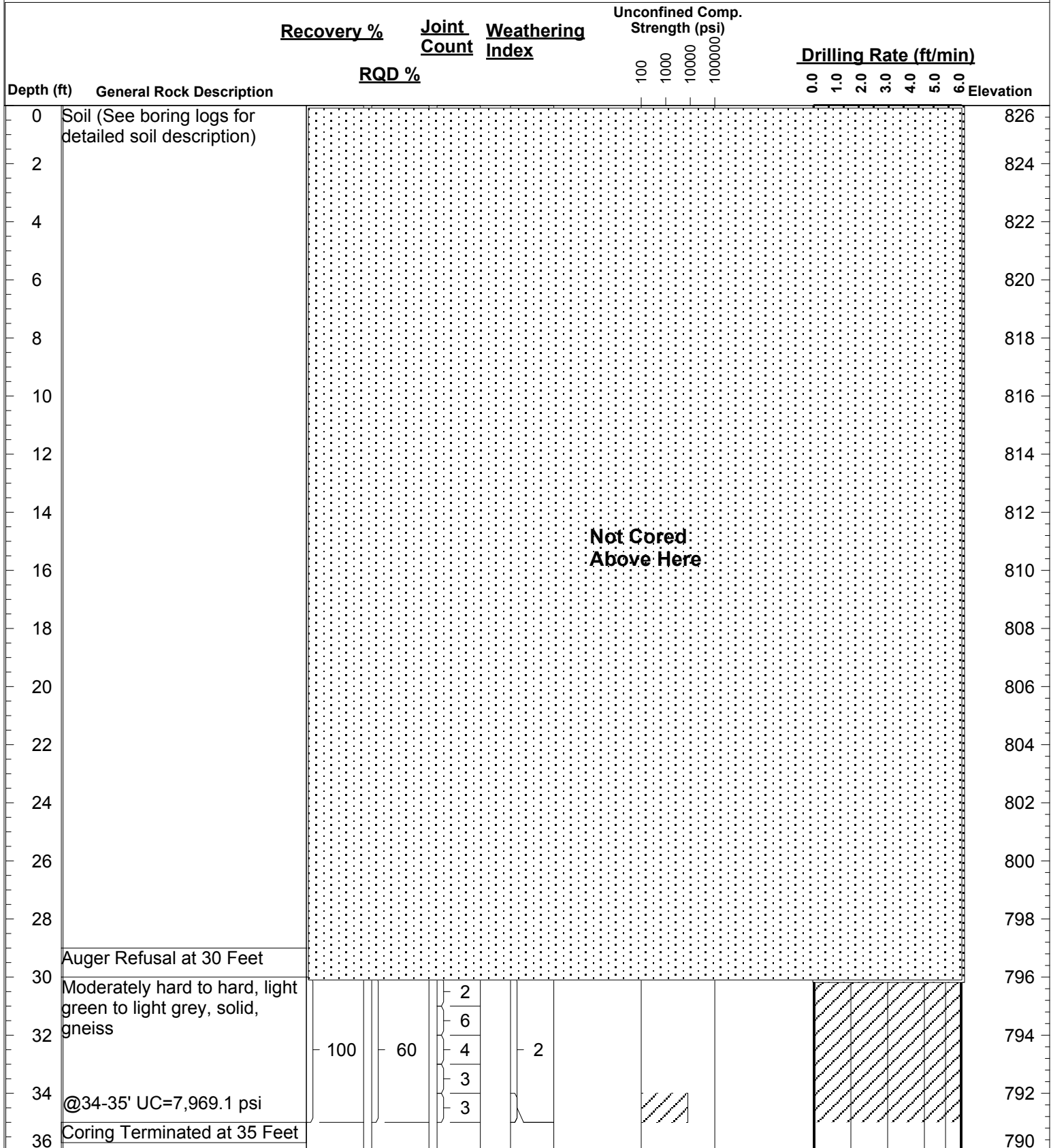
Notes :

SPT = Standard Penetration Testing
BGS = Below Ground Surface
TOD = Time of Drilling
H:Strater Boring Logs/

(in feet)	Depth	Elev.
Ground Level	0	826
Bottom of Casing	30	35
Invert level.	-	-
Bottom of Hole	35	791
Water Level	-	-

HM-9

1





UNITED
CONSULTING

BORING LOG

Boring ID : HM-10

Sheet 1 of 1

CLIENT: CH2M HILL	SITE LOCATION: Howell Mill Rd & Peachtree Battle Avenue NW	
PROJECT NAME: Howell Mill Sewer Outfall	WATER LEVEL - IMMEDIATE: Not Encountered	
PROJECT NUMBER: 2016.5764.01	DRILLING METHOD/TYPE: SPT Hollow Stem Augers	BORING DEPTH: 21 Feet
LOGGED BY: Andrew Raysin	DATE DRILLED: 9/6/2016	CORING DEPTH: N/A
Drilling Company/ Drill Rig Kilman Bros Inc / CME 550	X COORDINATE/LAT (ft): 12289123.65	Y COORDINATE/LONG (ft): 2424552.82

DEPTH BELOW (Ft)	WATER LEVEL	LITHOLOGIC SYMBOL	LITHOLOGY	SPT				NOTES
			GEOLOGIC DESCRIPTION OF SOIL AND ROCK STRATA	ELEVATION (Ft)	RECOVERY (in. or %)	Blows/6"	N-VALUE (bpf)	
0			Sand-silty (Residual)					Straight auger boring
				820				
				818				
5				816				
				814				
				812				
10				810		N/A		
				808				
15				806	N/A		N/A	
				804				
				802				No groundwater encountered at time of drilling
20			Partially weathered rock	800				
			AUGER REFUSAL AT 21 FEET					

Notes :

SPT = Standard Penetration Testing
BGS = Below Ground Surface
TOD = Time of Drilling
H:/Strater Boring Logs/

Piezometer Installation Logs



We're here for you

UNITED CONSULTING

TEMPORARY WELL LOG

PROPOSED ID:

HM-4

WELL ID:

HM-4

CLIENT: CH2M HILL	DRILLING CONTRACTOR: Kilman Bros Inc	GROUND SURFACE ELEV.: 820
PROJECT: Howell Mill Sewer Outfall	DRILLING EQUIPMENT: CME-550	TOC ELEVATION: -
PROJECT NUMBER: 2016.5764.01	DRILLING METHOD: Hollow Stem Auger	DEPTH TO WATER: 17
LOGGED BY: Andrew Raysin	SAMPLING METHOD: 2-foot continuous split spoon sampler	LOCATION: Atlanta, Georgia

Depth (feet)	USCS	Graphic Log	Description	Samples			Sketch	Well Construction Details	
				% REC	# Blows	OVM			
0	CL		Clay, some sand and silt; red (Fill)	24	3-5-7-7	-		Riser Height from Ground Surface:	-
2			Silt-some to trace sand and clay; brown-grey-tan (Residual)	24	4-5-6-7	-		Annular Fill:	-
4				24	6-7-8-9	-		Annular Sealant:	Bentonite
6				24	5-5-6-7	-		Filter:	Sand
8				20	4-4-4-5	-		PVC Well Diameter	2 Inch
10				24	4-5-5-5	-		Bore Hole Diameter:	6.00 Inches
12				24	5-6-6-6	-		Top of Screen:	20
14				24	6-7-9-11	-		Screen Length:	10 Feet
16	ML			24	6-8-8-7	-		Screen Slot Size:	0.010 Inch
18				24	4-4-8-9	-		Bottom of Screen:	30 Feet
20				20	5-7-10-12	-		Bottom of Well:	30 Feet
22				22	6-10-16-18	-		Total Depth:	30
24				24	12-10-10-12	-		Completion:	Flush Mount
26				20	8-8-10-11	-		Easting:	2424195.54
28				24	6-9-11-17	-		Northing:	12289043.87
30			Boring Terminated					Date Completed:	9/2/2016
32								Date Started:	9/2/2016
34								Legend Title Solid riser Manhole cover Fill Bentonite seal Screen Filter pack end cap Soil Cap Slough	
36									
38									
40									
42								24-Hour Groundwater Level:	18.35
44								Groundwater Level After Development:	17.55
46								Groundwater Level At Time of Drilling:	25
48									

NOTES:

Graphic Fill = Bentonite/Cement Grout



We're here for you

UNITED CONSULTING

TEMPORARY WELL LOG

PROPOSED ID:

HM-7

WELL ID:

HM-7

CLIENT: CH2M HILL	DRILLING CONTRACTOR: Kilman Bros Inc	GROUND SURFACE ELEV.: 784
PROJECT: Howell Mill Sewer Outfall	DRILLING EQUIPMENT: CME-550	TOC ELEVATION: -
PROJECT NUMBER: 2016.5764.01	DRILLING METHOD: Hollow Stem Auger	DEPTH TO WATER: 10
LOGGED BY: Andrew Raysin	SAMPLING METHOD: 2-foot continuous split spoon sampler	LOCATION: Atlanta, Georgia

Depth (feet)	USCS	Graphic Log	Description	Samples			Sketch	Well Construction Details	
				% REC	# Blows	OVM			
0	SM		Sand, trace to silty, trace clay; white-tan (Residual)	19	3-3-4-6	-		Riser Height from Ground Surface:	-
2			18	3-3-3-3	-	Annular Fill:		-	
4			16	3-3-3-3	-	Annular Sealant:		Bentonite	
6			20	3-3-4-4	-	Filter:		Sand	
8			14	5-5-6-7	-	PVC Well Diameter		2 Inch	
10			18	7-8-9-6	-	Bore Hole Diameter:		6.00 Inches	
12			24	2-2-3-3	-	Top of Screen:		10	
14			24	2-3-5-5	-	Screen Length:		10 Feet	
16	ML		Silt, some sand, trace clay; brown	24	2-4-5-6	-		Screen Slot Size:	0.010 Inch
18			24	3-4-4-10	-	Bottom of Screen:		20 Feet	
20			Boring Terminated					Bottom of Well:	20 Feet
22								Total Depth:	20
24					Completion:	Flush Mount			
26					Easting:	2423554.82			
28					Northing:	12289192.94			
30					Date Completed:	9/2/2016			
32					Date Started:	9/1/2016			
34					Legend Title Solid riser Manhole Cover Fill Bentonite seal Screen Filter pack end cap Soil Cap Slough				
36									
38									
40									
42					24-Hour Groundwater Level: 11.25				
44					Groundwater Level After Development: 10.7				
46					Groundwater Level At Time of Drilling: 18.5				
48									

NOTES:

Graphic Fill = Bentonite/Cement Grout

Rock Core Photos



Rock Core from HM-5 (26.5' - 35.0')
Run 1: REC= 100% RQD = 84.2%
Run 2: REC= 100% RQD = 92.8%



Rock Core from HM-6 (20.0' - 30.0')
Run 1: REC=100% RQD =21.7%
Run 2: REC=100% RQD =38.3%



Rock Core from HM-9 (30.0' – 35.0')
Run 1 : REC=100% RQD=60%

United Consulting – Lab Test Results

HOWELL MILL SEWER OUTFALL SUMMARY OF SOIL DATA

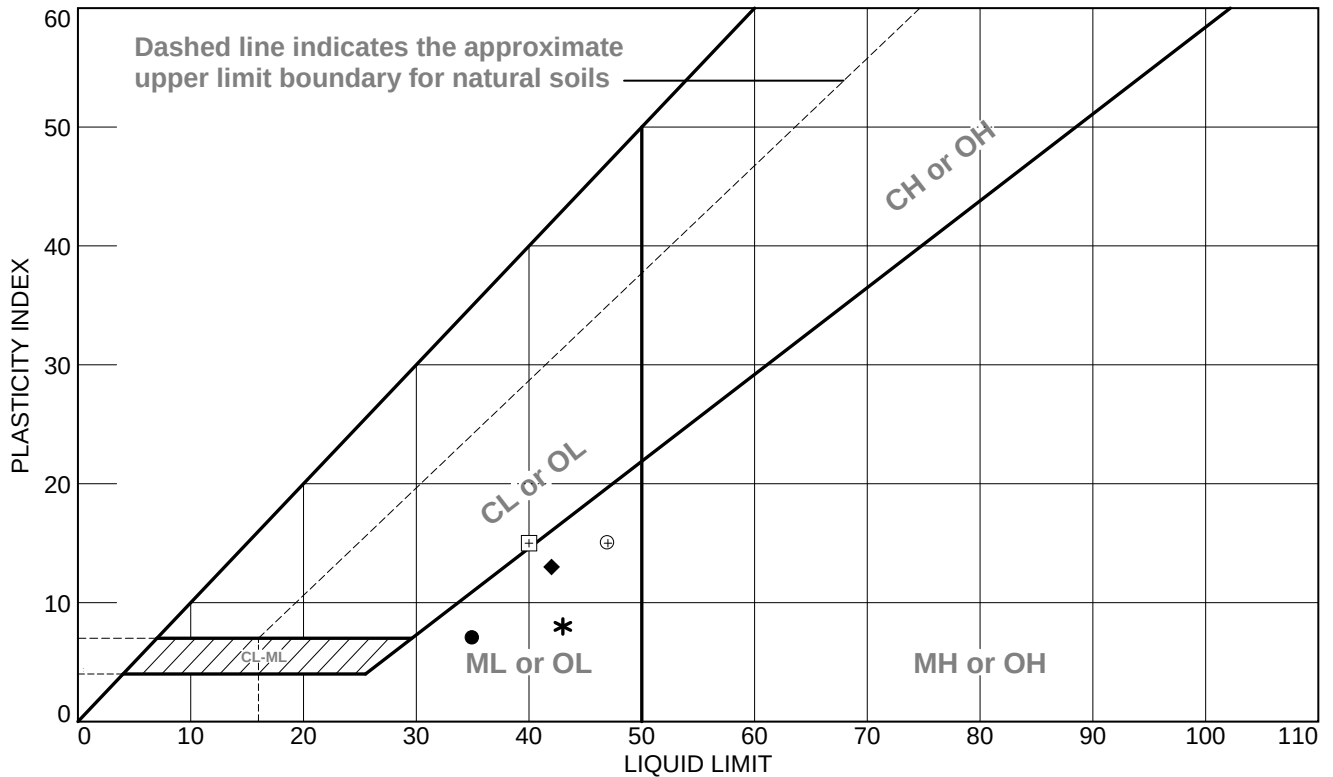
Sample Identification		Sample Type	Sample Depth	Soil Classification	AsR'cd Moisture %	Atterberg Limits				Grain Size Distribution			Compaction		Gs	Organic Contant %	Unit Weight		Permeability (cm/sec)	Additional Tests Conducted (See Notes)
										% Finer No. 4 Sieve	% Finer No. 200 Sieve	% Finer .005 mm	Maximum Dry Density (lb/cuft)	Optimum Moisture %			Moisture %	Dry (lb/cuft)		
Borehole Number	Sample ID					L.L.	P.L.	P.I.	L.I.											
HM-1	3	BAG	4-6	ML	8.6	NV	NP	NP	-	99.7	50.6	9.5	-	-	-	-	-	-	-	-
HM-2	5	BAG	8-10	SM	11.9	NV	NP	NP	-	97.0	31.9	5.2	-	-	-	-	-	-	-	-
HM-3	6	BAG	10-12	(ML)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P, R
HM-3	9	BAG	18-20	ML	17.5	29	42	13	-	99.5	55.1	6.6	-	-	-	-	-	-	-	-
HM-4	12	BAG	24-26	CL	24.1	25	40	15	-	99.5	62.1	5.0	-	-	-	-	-	-	-	-
HM-5	8	BAG	16-18	ML	31.8	28	35	7	-	98.6	55.4	4.0	-	-	-	-	-	-	-	-
HM-6	7	BAG	14-16	SM	9.6	NV	NP	NP	-	94.9	36.6	3.7	-	-	-	-	-	-	-	-
HM-7	5	BAG	8-10	(ML)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P, R
HM-7	6	BAG	12-14	ML	35.1	35	43	8	-	99.8	58.4	5.6	-	-	-	-	-	-	-	-
HM-8	3	BAG	4-6	ML	25.7	32	47	15	-	89.9	59.2	31.6	-	-	-	-	-	-	-	-

ABBREVIATIONS: LIQUID LIMIT (LL)
PLASTIC LIMIT (PL)
PLASTICITY INDEX (PI)
LIQUIDITY INDEX (LI)
SPECIFIC GRAVITY (G_s)
MOISTURE (M_c)

NOTES: T = TRIAXIAL TEST
U = UNCONFINED COMPRESSION TEST
C = CONSOLIDATION TEST
DS = DIRECT SHEAR TEST

O = ORGANIC CONTENT
P = pH
R = SOIL RESISTIVITY
V_c = VOLUME/SHRINKAGE CHANGE

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA								
	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●		HM-5	16.0-18.0 ft	31.8	28	35	7	ML
■		HM-6	14.0-16.0 ft	9.6	NP	NV	NP	SM
▲		HM-2	8.0-10.0 ft	11.9	NP	NV	NP	SM
◆		HM-3	18.0-20.0 ft	17.5	29	42	13	ML
▼		HM-1	4.0-6.0 ft	8.6	NP	NV	NP	ML
*		HM-7	12.0-14.0 ft	35.1	35	43	8	ML
⊕		HM-8	4.0-6.0 ft	25.7	32	47	15	ML
⊕		HM-4	24.0-26.0 ft	24.1	25	40	15	CL

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Norcross, Georgia

Client: CH2M HILL

Project: HOWELL MILL RD OUTFALL SEWER

Project No.: 2016.5764.01

Figure

Corrosivity Series

ASTM G51, G57 / AASHTO T289, T288 / UC SOP L6, L40

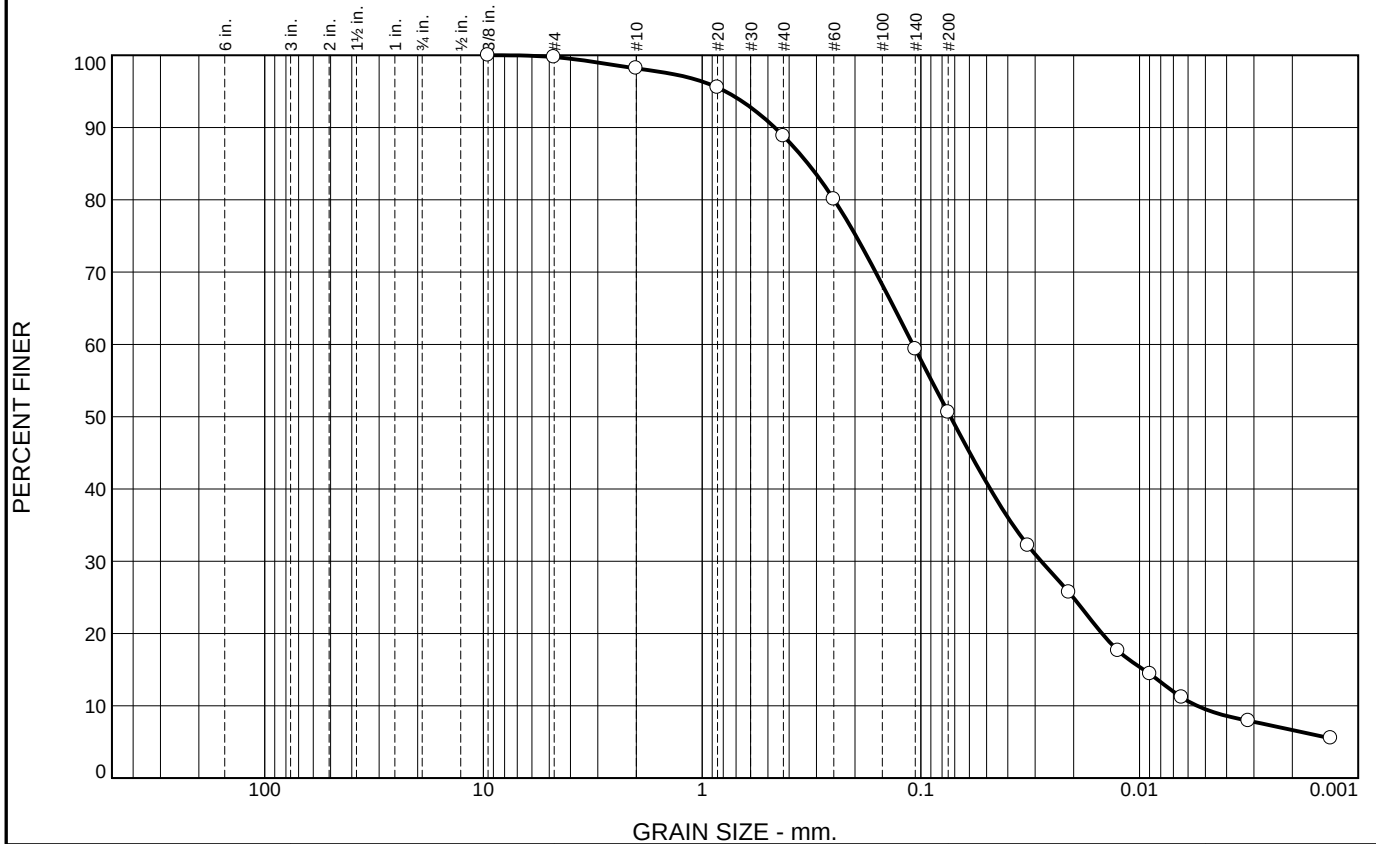
PROJECT: HOWELL MILL RD OUTFALL SEWER

PROJECT No.: 2016.5764.01

TESTING DATE: 10/3/2016

Sample ID	Soil pH s.u.	Soil Resistivity (Ω -cm)
1. HM-3@10.0-12.0'	4.55	72,000
2. HM-7@8.0-10.0'	4.22	15,000
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

Particle Size Distribution Report



% +3"	% Gravel	% Sand	% Silt	% Clay
0.0	0.3	49.1	41.1	9.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375	100.0		
#4	99.7		
#10	98.2		
#20	95.5		
#40	88.8		
#60	80.1		
#140	59.3		
#200	50.6		

* (no specification provided)

Material Description
 Silt-sandy, trace clay and gravel, tan

Atterberg Limits
 PL= NP LL= NV PI= NP

Coefficients
 D₉₀= 0.4656 D₈₅= 0.3279 D₆₀= 0.1087
 D₅₀= 0.0732 D₃₀= 0.0282 D₁₅= 0.0096
 D₁₀= 0.0055 C_u= 19.95 C_c= 1.34

Classification
 USCS= ML AASHTO= A-4(0)

Remarks

Sample Number: HM-1 Depth: 4.0-6.0 ft

Date: 9/12/16

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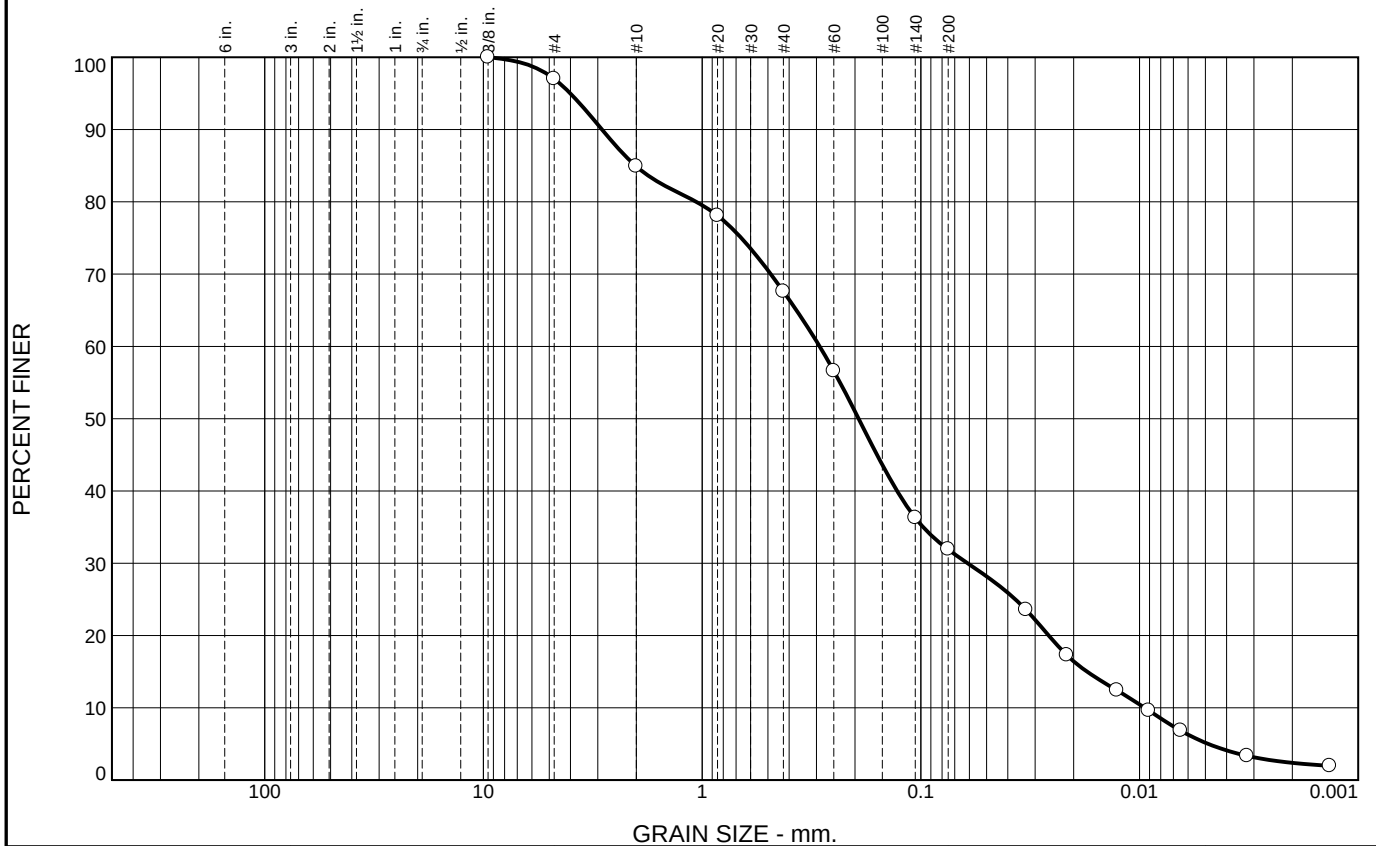
Client: CH2M HILL

Project: HOWELL MILL RD OUTFALL SEWER

Project No: 2016.5764.01

Figure

Particle Size Distribution Report



% +3"	% Gravel	% Sand	% Silt	% Clay
0.0	3.0	65.1	26.7	5.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375	100.0		
#4	97.0		
#10	84.9		
#20	78.1		
#40	67.6		
#60	56.6		
#140	36.3		
#200	31.9		

* (no specification provided)

<u>Material Description</u>		
Sand, some silt, trace clay and gravel, dark tan		
<u>Atterberg Limits</u>		
PL= NP	LL= NV	PI= NP
<u>Coefficients</u>		
D ₉₀ = 2.8715	D ₈₅ = 2.0181	D ₆₀ = 0.2902
D ₅₀ = 0.1925	D ₃₀ = 0.0611	D ₁₅ = 0.0174
D ₁₀ = 0.0095	C _u = 30.67	C _c = 1.36
<u>Classification</u>		
USCS= SM	AASHTO= A-2-4(0)	
<u>Remarks</u>		

Sample Number: HM-2

Depth: 8.0-10.0 ft

Date: 9/12/16

United Consulting

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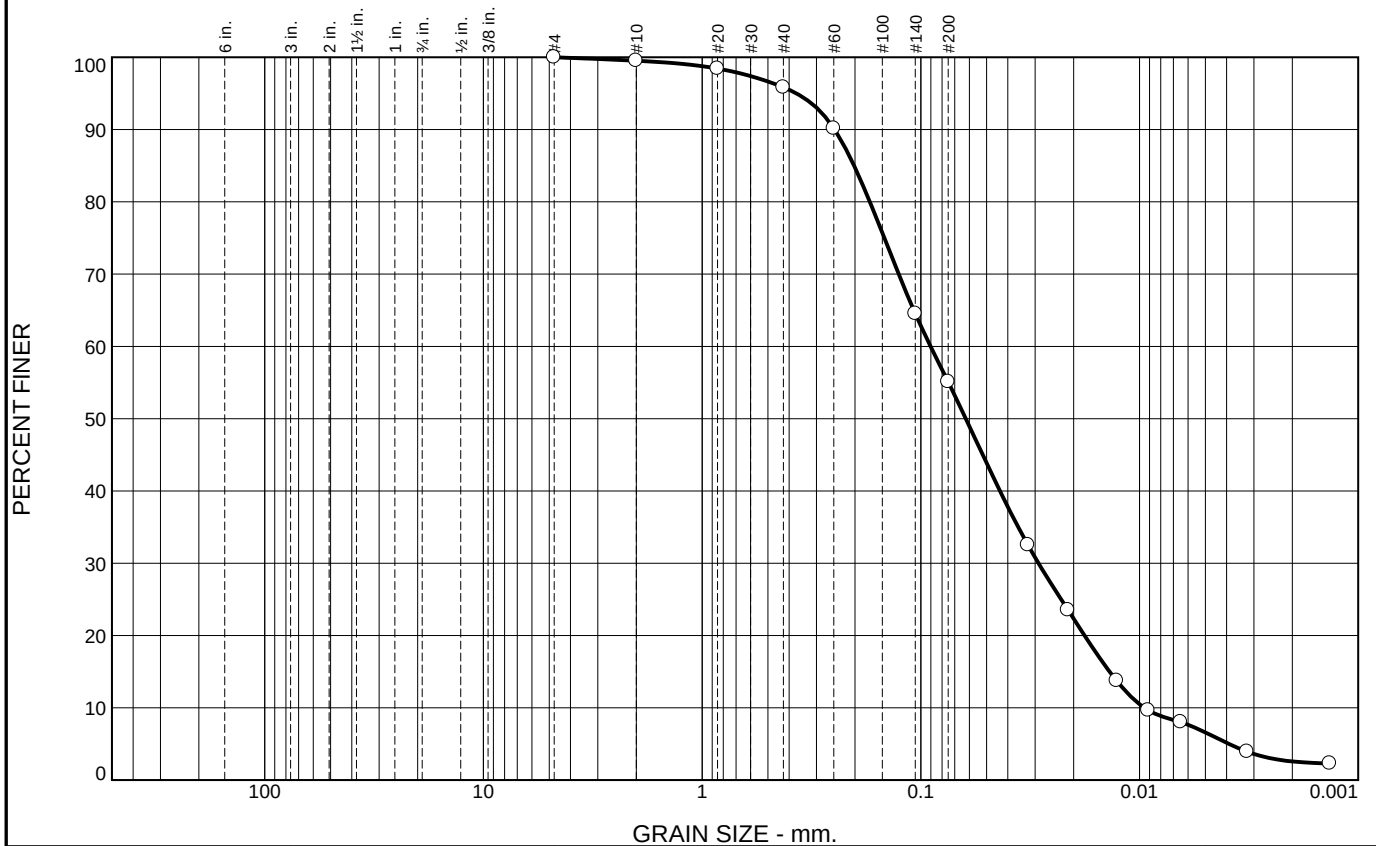
Client: CH2M HILL

Project: HOWELL MILL RD OUTFALL SEWER

Project No: 2016.5764.01

Figure

Particle Size Distribution Report



% +3"	% Gravel	% Sand	% Silt	% Clay
0.0	0.0	44.9	48.5	6.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.5		
#20	98.4		
#40	95.8		
#60	90.2		
#140	64.5		
#200	55.1		

* (no specification provided)

Material Description
 Silt-sandy, trace clay, light tan

Atterberg Limits
 PL= 29 LL= 42 PI= 13

Coefficients
 D₉₀= 0.2481 D₈₅= 0.2020 D₆₀= 0.0902
 D₅₀= 0.0623 D₃₀= 0.0290 D₁₅= 0.0137
 D₁₀= 0.0095 C_u= 9.49 C_c= 0.98

Classification
 USCS= ML AASHTO= A-7-6(5)

Remarks

Sample Number: HM-3

Depth: 18.0-20.0 ft

Date: 9/12/16

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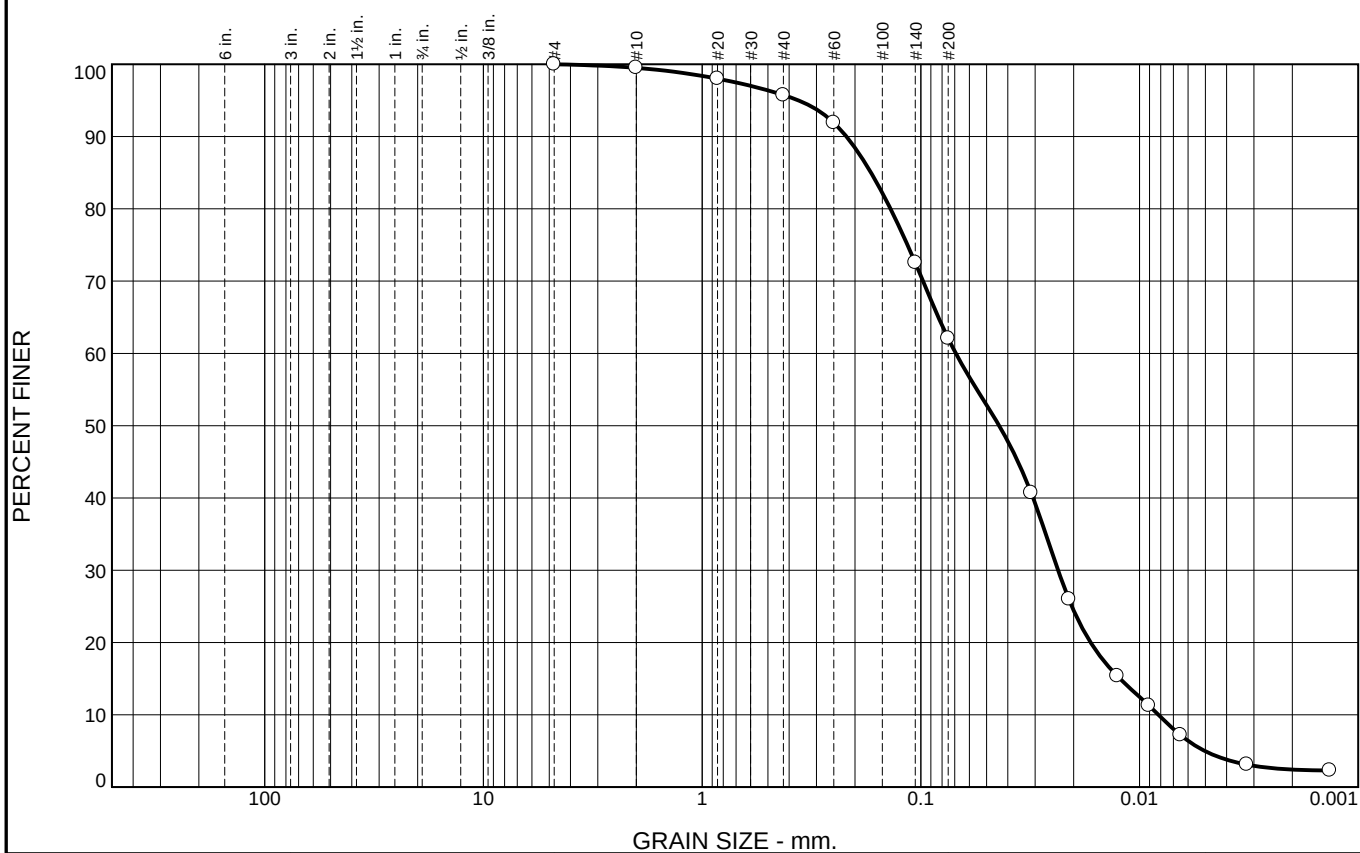
Client: CH2M HILL

Project: HOWELL MILL RD OUTFALL SEWER

Project No: 2016.5764.01

Figure

Particle Size Distribution Report



% +3"	% Gravel	% Sand	% Silt	% Clay
0.0	0.0	37.9	57.1	5.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.5		
#20	98.0		
#40	95.7		
#60	91.9		
#140	72.5		
#200	62.1		

* (no specification provided)

Material Description
 Clay-silty, some sand, trace clay, light tan

Atterberg Limits
 PL= 25 LL= 40 PI= 15

Coefficients
 D₉₀= 0.2189 D₈₅= 0.1689 D₆₀= 0.0692
 D₅₀= 0.0438 D₃₀= 0.0236 D₁₅= 0.0123
 D₁₀= 0.0082 C_u= 8.45 C_c= 0.98

Classification
 USCS= CL AASHTO= A-6(8)

Remarks

Sample Number: HM-4 Depth: 24.0-26.0 ft

Date: 9/12/16

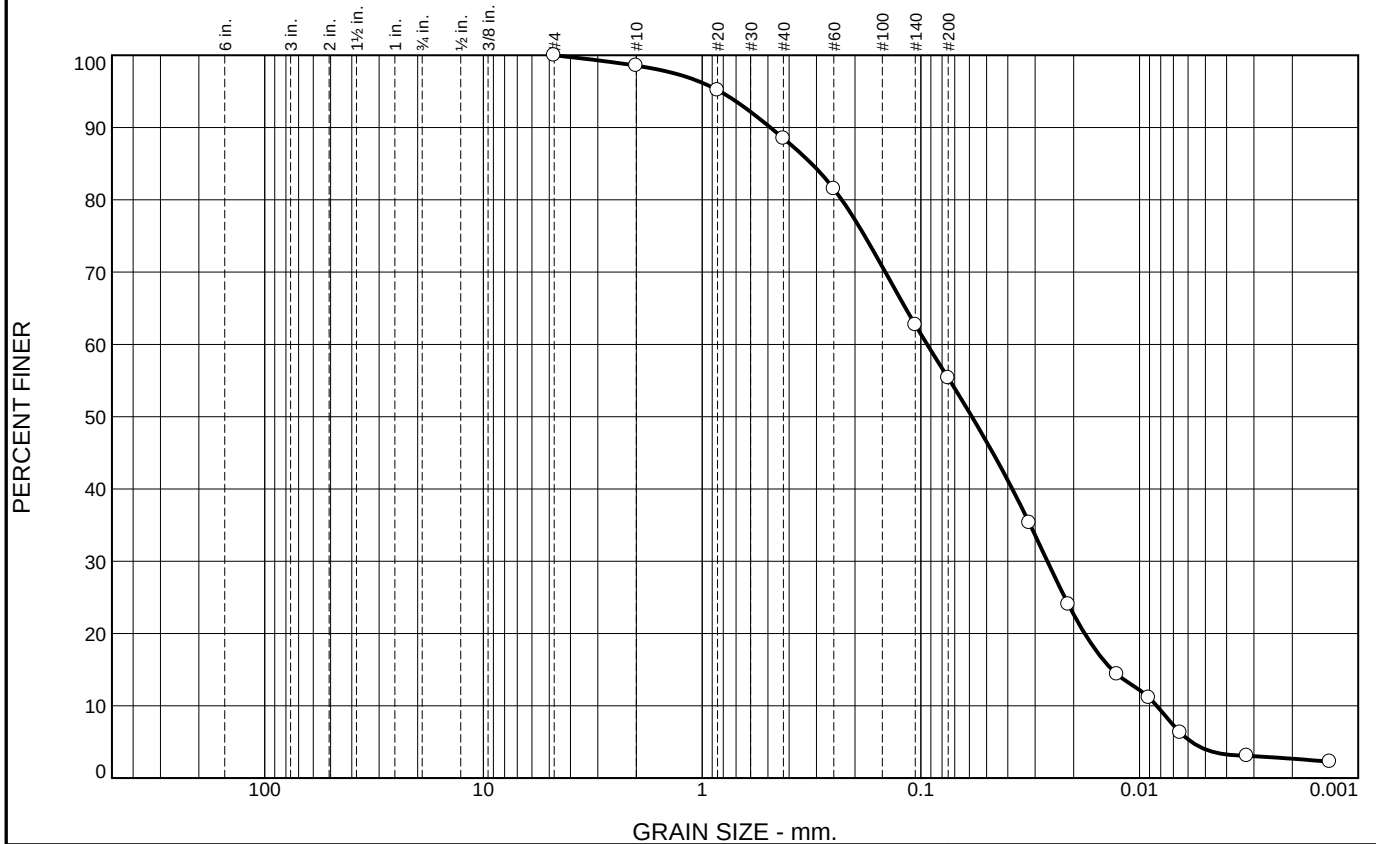
United Consulting
Norcross, Georgia

Client: CH2M HILL
Project: HOWELL MILL RD OUTFALL SEWER

Project No: 2016.5764.01

Figure

Particle Size Distribution Report



% +3"	% Gravel	% Sand	% Silt	% Clay
0.0	0.0	44.6	51.4	4.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	98.6		
#20	95.2		
#40	88.5		
#60	81.5		
#140	62.7		
#200	55.4		

* (no specification provided)

<u>Material Description</u>		
Silt-sandy, trace clay, light tan		
<u>Atterberg Limits</u>		
PL= 28	LL= 35	PI= 7
<u>Coefficients</u>		
D ₉₀ = 0.4871	D ₈₅ = 0.3158	D ₆₀ = 0.0935
D ₅₀ = 0.0584	D ₃₀ = 0.0264	D ₁₅ = 0.0134
D ₁₀ = 0.0083	C _u = 11.22	C _c = 0.89
<u>Classification</u>		
USCS= ML	AASHTO= A-4(2)	
<u>Remarks</u>		

Sample Number: HM-5

Depth: 16.0-18.0 ft

Date: 9/12/16

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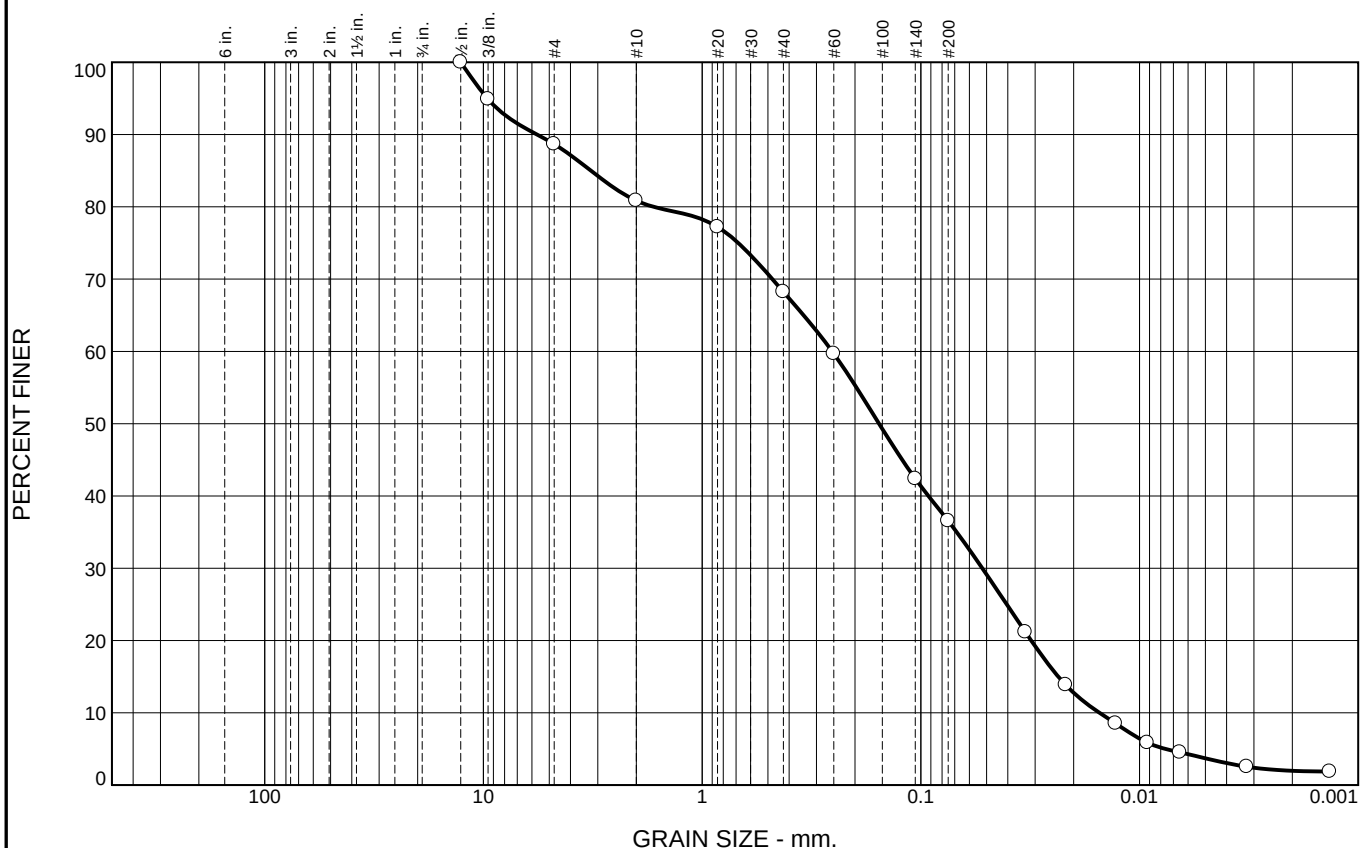
Client: CH2M HILL

Project: HOWELL MILL RD OUTFALL SEWER

Project No: 2016.5764.01

Figure

Particle Size Distribution Report



% +3"	% Gravel	% Sand	% Silt	% Clay
0.0	11.3	52.1	32.9	3.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.5	100.0		
0.375	94.9		
#4	88.7		
#10	80.9		
#20	77.2		
#40	68.2		
#60	59.7		
#140	42.4		
#200	36.6		

* (no specification provided)

Material Description

Sand, some silt and gravel, trace clay, tan

Atterberg Limits

PL= NP

LL= NV

PI= NP

Coefficients

D₉₀= 5.6822

D₈₅= 3.2251

D₆₀= 0.2543

D₅₀= 0.1553

D₃₀= 0.0523

D₁₅= 0.0235

D₁₀= 0.0152

C_u= 16.69

C_c= 0.71

Classification

USCS= SM

AASHTO= A-4(0)

Remarks

Sample Number: HM-6

Depth: 14.0-16.0 ft

Date: 9/12/16

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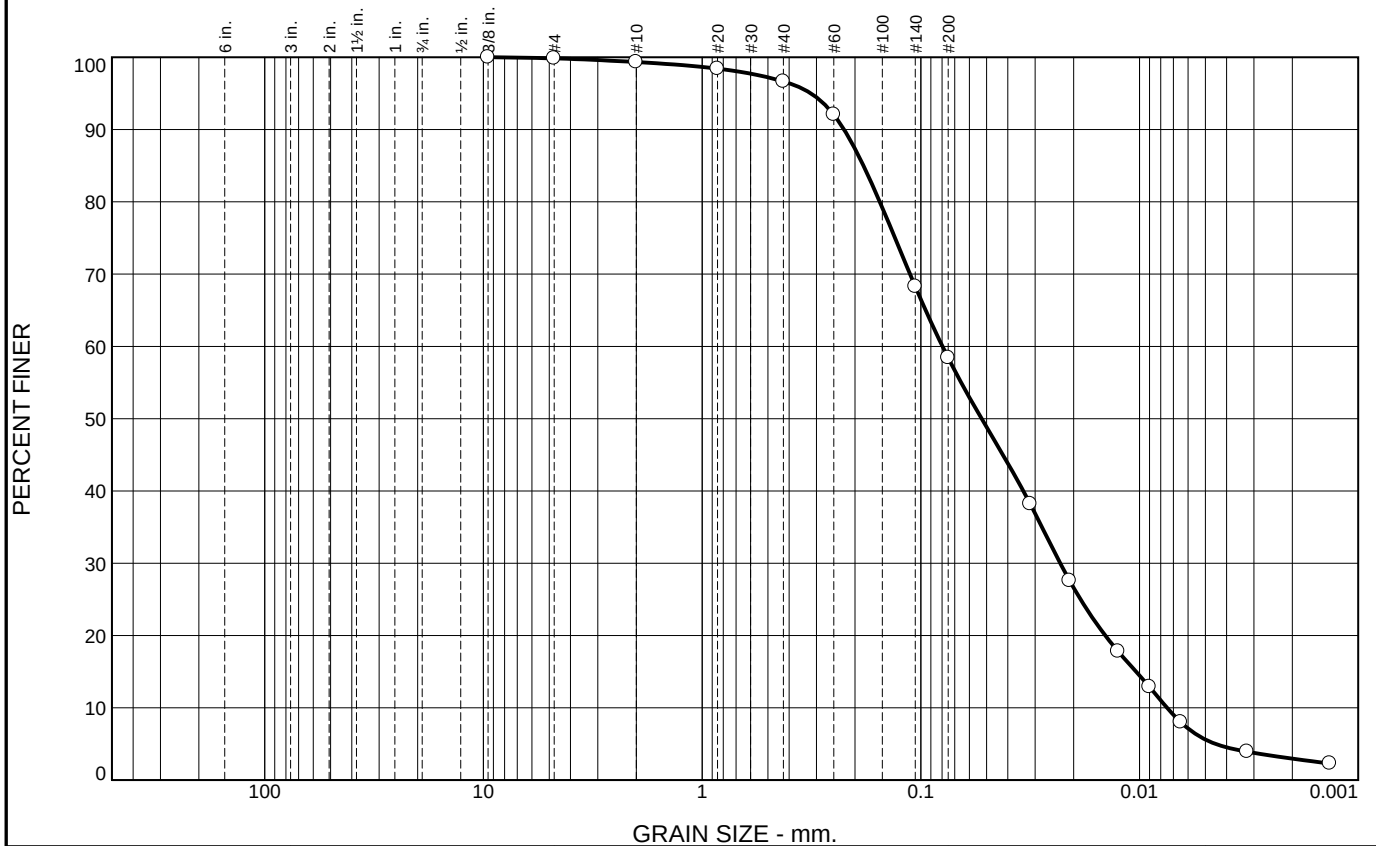
Client: CH2M HILL

Project: HOWELL MILL RD OUTFALL SEWER

Project No: 2016.5764.01

Figure

Particle Size Distribution Report



% +3"	% Gravel	% Sand	% Silt	% Clay
0.0	0.2	41.4	52.8	5.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375	100.0		
#4	99.8		
#10	99.3		
#20	98.4		
#40	96.6		
#60	92.1		
#140	68.3		
#200	58.4		

* (no specification provided)

<u>Material Description</u>		
Silt-sandy, trace clay and gravel, tan		
<u>Atterberg Limits</u>		
PL= 35	LL= 43	PI= 8
<u>Coefficients</u>		
D ₉₀ = 0.2244	D ₈₅ = 0.1830	D ₆₀ = 0.0796
D ₅₀ = 0.0527	D ₃₀ = 0.0230	D ₁₅ = 0.0104
D ₁₀ = 0.0075	C _u = 10.65	C _c = 0.89
<u>Classification</u>		
USCS= ML	AASHTO= A-5(4)	
<u>Remarks</u>		

Sample Number: HM-7

Depth: 12.0-14.0 ft

Date: 91/12/16

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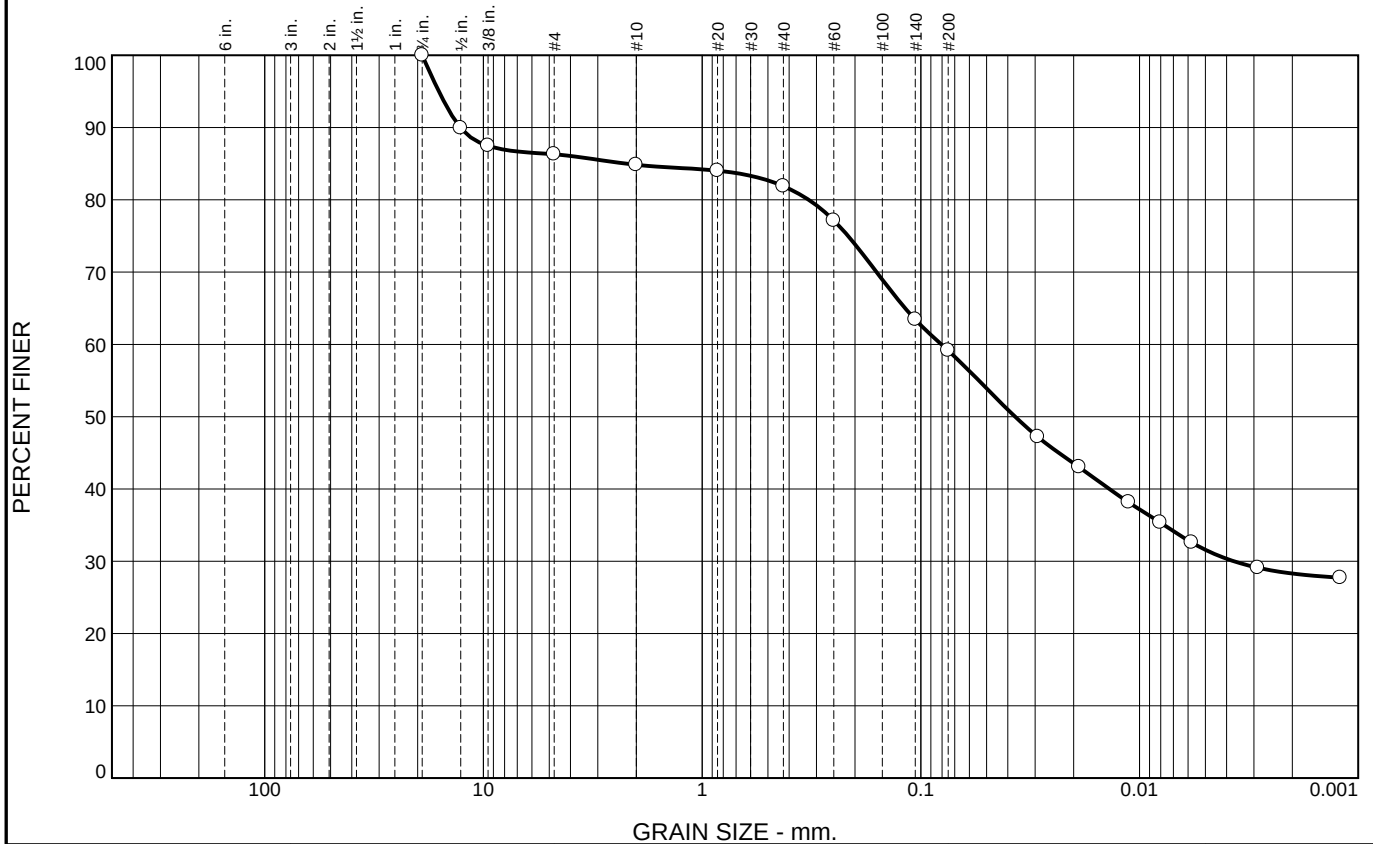
Client: CH2M HILL

Project: HOWELL MILL RD OUTFALL SEWER

Project No: 2016.5764.01

Figure

Particle Size Distribution Report



% +3"	% Gravel	% Sand	% Silt	% Clay
0.0	13.7	27.1	27.6	31.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75	100.0		
0.5	89.9		
0.375	87.5		
#4	86.3		
#10	84.8		
#20	84.0		
#40	81.9		
#60	77.1		
#140	63.4		
#200	59.2		

* (no specification provided)

Material Description
Silt, some clay, sand and gravel, yellow tan

Atterberg Limits
PL= 32 LL= 47 PI= 15

Coefficients
D₉₀= 12.7527 D₈₅= 2.2208 D₆₀= 0.0805
D₅₀= 0.0371 D₃₀= 0.0037 D₁₅=
D₁₀= C_u= C_c=

Classification
USCS= ML AASHTO= A-7-5(8)

Remarks

Sample Number: HM-8

Depth: 4.0-6.0 ft

Date: 9/12/16

United Consulting

Norcross, Georgia

Client: CH2M HILL

Project: HOWELL MILL RD OUTFALL SEWER

Project No: 2016.5764.01

Figure

UNCONFINED COMPRESSION TEST OF ROCK

ASTM D2938 / AASHTO T226 / UC SOP L9

PROJECT: HOWELL MILL RD OUTFALL SEWER

PROJECT No.: 2016.5764.01

SAMPLE No.: [HM-5@27-28](#)

TESTING DATE: 9/15/2016

TESTED BY: MS

SPECIMEN CONDITIONS / TEST RESULTS		
1. DIAMETER	1.87	in.
2. HEIGHT	4.01	in.
3. MAXIMUM LOAD	27,420	lb.
4. CROSS SECTIONAL AREA	2.74	in²
5. CORRECTION FACTOR	1.00	
6. UNCONFINED COMPRESSIVE STRENGTH	10,005.2	psi

UNCONFINED COMPRESSION TEST OF ROCK

ASTM D2938 / AASHTO T226 / UC SOP L9

PROJECT: HOWELL MILL RD OUTFALL SEWER

PROJECT No.: 2016.5764.01

SAMPLE No.: [HM-5@32-33](#)

TESTING DATE: 9/15/2016

TESTED BY: DM

SPECIMEN CONDITIONS / TEST RESULTS		
1. DIAMETER	1.87	in.
2. HEIGHT	4.17	in.
3. MAXIMUM LOAD	46,680	lb.
4. CROSS SECTIONAL AREA	2.74	in²
5. CORRECTION FACTOR	1.00	
6. UNCONFINED COMPRESSIVE STRENGTH	17,051.1	psi

UNCONFINED COMPRESSION TEST OF ROCK

ASTM D2938 / AASHTO T226 / UC SOP L9

PROJECT: HOWELL MILL RD OUTFALL SEWER

PROJECT No.: 2016.5764.01

SAMPLE No.: [HM-6@20-21](#)

TESTING DATE: 9/15/2016

TESTED BY: MS

SPECIMEN CONDITIONS / TEST RESULTS		
1. DIAMETER	1.87	in.
2. HEIGHT	3.89	in.
3. MAXIMUM LOAD	12,440	lb.
4. CROSS SECTIONAL AREA	2.73	in ²
5. CORRECTION FACTOR	1.00	
6. UNCONFINED COMPRESSIVE STRENGTH	4,553.8	psi

UNCONFINED COMPRESSION TEST OF ROCK

ASTM D2938 / AASHTO T226 / UC SOP L9

PROJECT: **HOWELL MILL RD OUTFALL SEWER**

PROJECT No.: **2016.5764.01**

SAMPLE No.: [HM-6@25-26](#)

TESTING DATE **9/15/2016**

TESTED BY: **DM**

SPECIMEN CONDITIONS / TEST RESULTS		
1. DIAMETER	1.87	in.
2. HEIGHT	3.46	in.
3. MAXIMUM LOAD	26,720	lb.
4. CROSS SECTIONAL AREA	2.73	in²
5. CORRECTION FACTOR	1.00	
6. UNCONFINED COMPRESSIVE STRENGTH	9,781.1	psi

FTS – Lab Test Results

Analytical Report
A6I0073

Project
Howell Mill Sewer Outfall

Project Number
2016.5764.01



September 19, 2016
United Consulting -Norcross
625 Holcomb Bridge Road
Norcross, GA 30071



Minority Women Business Enterprise
Small Disadvantaged Business Enterprise



Minority Women Business Enterprise
Small Disadvantaged Business Enterprise

6017 Financial Dr.
Norcross, GA 30071

Phone #: 770-449-8800
Website: www.ftsanalytical.com

September 19, 2016

Aaron Epstein
United Consulting -Norcross
625 Holcomb Bridge Road
Norcross, GA 30071

RE: Howell Mill Sewer Outfall

We are reporting the results of the analyses performed on the samples received on 9/12/2016 under the project name referenced above and identified as the lab Work Order A6I0073. All results being reported under this Report apply to the samples analyzed and properly identified with a Laboratory ID number. Subcontracted analyses are identified in this report with either the NELAC certification number of the subcontracted lab, or the complete subcontracted report attached to this report.

Unless otherwise noted in a Case Narrative, all data reported in this Analytical Report are in compliance with NELAC standards. The uncertainty of measurement associated with the results of analysis reported is available upon request. Should insufficient sample be provided to the laboratory to meet the method and NELAC Matrix Duplicate and Matrix Spike requirements, then the data will be analyzed, evaluated and reporting using all other available quality control methods.

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by FTS Analytical Laboratories. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise agreed upon. The samples received, and described as recorded in Work Order A6I0073 will be filed for 60 days, and after that time they will be properly disposed without further notice, unless otherwise agreed upon. We reserve the right to return to you any unused samples, extracts, or solutions if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding standard practices, controlled/regulated substances, etc.)

We thank you for selecting FTS Analytical to serve your analytical needs. If you have any questions concerning this report, please do not hesitate to contact us at any time. We will be happy to help.

Sincerely,

A handwritten signature in blue ink, appearing to read "J. Derek Rounsley", is written over a light blue rectangular background.

J. Derek Rounsley
Project Manager



MWBE SDBE
NELAC DoD Accredited

United Consulting -Norcross
625 Holcomb Bridge Road
Norcross, GA 30071

Project: Howell Mill Sewer Outfall
Project Number: 2016.5764.01
Project Manager: Aaron Epstein

Reported:
09/19/2016 15:17

Samples in this Report

Lab ID	Sample	Matrix	Date Sampled	Date Received
A610073-01	HM-3	Solid	12-Sep-2016 00:00	12-Sep-2016 12:15
A610073-02	HM-7	Solid	12-Sep-2016 00:00	12-Sep-2016 12:15



MWBE SDBE
NELAC DoD Accredited

United Consulting -Norcross
625 Holcomb Bridge Road
Norcross, GA 30071

Project: Howell Mill Sewer Outfall
Project Number: 2016.5764.01
Project Manager: Aaron Epstein

Reported:
09/19/2016 15:17

Hits Summary

(Not Including Subcontracted Analysis)

Sample: HM-3

Lab ID: A6I0073-01

Analyte	Result	RL	Units	Dil	Date Analyzed	Qual	CAS #	Method
pH	4.55	0.0100	SU	1	9/13/16 11:20			EPA 9040/1311
% Solids	86.4	0.100	%	1	9/13/16 7:15			SM 2540G
Percent Moisture	13.6	0.100	%	1	9/13/16 7:15			SM 2540G

Sample: HM-7

Lab ID: A6I0073-02

Analyte	Result	RL	Units	Dil	Date Analyzed	Qual	CAS #	Method
pH	4.56	0.0100	SU	1	9/13/16 11:20			EPA 9040/1311
% Solids	83.3	0.100	%	1	9/13/16 7:15			SM 2540G
Percent Moisture	14.7	0.100	%	1	9/13/16 7:15			SM 2540G

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Norcross, GA 30071

Project: Howell Mill Sewer Outfall
Project Number: 2016.5764.01
Project Manager: Aaron Epstein

Reported:
09/19/2016 15:17

Sample Results

Client Sample ID: HM-3
Lab Sample ID: A6I0073-01 (Solid)

Sampled:
9/12/16 0:00

Analyte	Result	RL	Units	Dil	Date Prepared	Date Analyzed	Qual	CAS #
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Anions by Method 9056

Chloride	ND	116	mg/Kg dry	10	9/16/16 9:33	9/16/16 21:49	U	16887-00-6
Sulfate	ND	116	mg/Kg dry	10	9/16/16 9:33	9/16/16 21:49	U	14808-79-8

Percent Moisture by Method 2540G

% Solids	86.4	0.100	%	1	9/12/16 7:30	9/13/16 7:15		
Percent Moisture	13.6	0.100	%	1	9/12/16 7:30	9/13/16 7:15		

pH S by Method 9045D

pH	4.55	0.0100	SU	1	9/13/16 10:30	9/13/16 11:20		
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United Consulting -Norcross
625 Holcomb Bridge Road
Norcross, GA 30071

Project: Howell Mill Sewer Outfall
Project Number: 2016.5764.01
Project Manager: Aaron Epstein

Reported:
09/19/2016 15:17

Sample Results (Continued)

Client Sample ID: HM-7
Lab Sample ID: A6I0073-02 (Solid)

Sampled:
9/12/16 0:00

Analyte	Result	RL	Units	Dil	Date Prepared	Date Analyzed	Qual	CAS #
---------	--------	----	-------	-----	---------------	---------------	------	-------

Anions by Method 9056

Chloride	ND	120	mg/Kg dry	10	9/16/16 9:33	9/16/16 22:08	U	16887-00-6
Sulfate	ND	120	mg/Kg dry	10	9/16/16 9:33	9/16/16 22:08	U	14808-79-8

Percent Moisture by Method 2540G

% Solids	83.3	0.100	%	1	9/12/16 7:30	9/13/16 7:15		
Percent Moisture	14.7	0.100	%	1	9/12/16 7:30	9/13/16 7:15		

pH S by Method 9045D

pH	4.56	0.0100	SU	1	9/13/16 10:30	9/13/16 11:20		
----	-------------	--------	----	---	---------------	---------------	--	--

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625 Holcomb Bridge Road
Norcross, GA 30071

Project: Howell Mill Sewer Outfall
Project Number: 2016.5764.01
Project Manager: Aaron Epstein

Reported:
09/19/2016 15:17

Quality Control

Anions by Method 9056

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
---------	--------	------	-----------------	-------	-------------	---------------	------	-------------	-----	-----------

Batch: B6I0393

Blank (B6I0393-BLK1)

Prepared & Analyzed: 9/16/2016

Chloride	ND	U	20.0	mg/Kg wet						
Sulfate	ND	U	20.0	mg/Kg wet						

LCS (B6I0393-BS1)

Prepared & Analyzed: 9/16/2016

Chloride	200		20.0	mg/Kg wet	200		100	80-120		
Sulfate	189		20.0	mg/Kg wet	200		94	90-110		

LCS Dup (B6I0393-BSD1)

Prepared & Analyzed: 9/16/2016

Chloride	199		20.0	mg/Kg wet	200		99	80-120	0.7	15
Sulfate	200		20.0	mg/Kg wet	200		100	90-110	6	20

Duplicate (B6I0393-DUP1)

Source: L6I0094-03

Prepared & Analyzed: 9/16/2016

Chloride	ND	U	24.1	mg/Kg dry		ND				15
Sulfate	35.7		24.1	mg/Kg dry		35.5			0.8	15

Matrix Spike (B6I0393-MS1)

Source: L6I0094-03

Prepared & Analyzed: 9/16/2016

Chloride	250		24.1	mg/Kg dry	241	ND	104	75-125		
Sulfate	298		24.1	mg/Kg dry	241	35.5	109	75-125		

Matrix Spike Dup (B6I0393-MSD1)

Source: L6I0094-03

Prepared & Analyzed: 9/16/2016

Chloride	242		24.1	mg/Kg dry	241	ND	101	75-125	3	20
Sulfate	293		24.1	mg/Kg dry	241	35.5	107	75-125	1	20



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NELAC DoD Accredited

United Consulting -Norcross
625 Holcomb Bridge Road
Norcross, GA 30071

Project: Howell Mill Sewer Outfall
Project Number: 2016.5764.01
Project Manager: Aaron Epstein

Reported:
09/19/2016 15:17

Quality Control (Continued)

Percent Moisture by Method 2540G

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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Batch: B6I0236

Duplicate (B6I0236-DUP1)

Source: A6I0064-01

Prepared: 9/12/2016 Analyzed: 9/13/2016

% Solids	93.3		0.100	%		93.4			0.1	20
Percent Moisture	6.71		0.100	%		6.62			1	20



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United Consulting -Norcross
625 Holcomb Bridge Road
Norcross, GA 30071

Project: Howell Mill Sewer Outfall
Project Number: 2016.5764.01
Project Manager: Aaron Epstein

Reported:
09/19/2016 15:17

Quality Control (Continued)

pH S by Method 9045D

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
---------	--------	------	--------------------	-------	----------------	------------------	------	----------------	-----	--------------

Batch: B6I0253

Duplicate (B6I0253-DUP1)

Source: A6I0073-01

Prepared & Analyzed: 9/13/2016

pH	4.52		0.0100	SU		4.55			0.7	20
----	------	--	--------	----	--	------	--	--	-----	----

United Consulting -Norcross
625 Holcomb Bridge Road
Norcross, GA 30071

Project: Howell Mill Sewer Outfall
Project Number: 2016.5764.01
Project Manager: Aaron Epstein

Reported:
09/19/2016 15:17

List of Certifications

Number	Description	Code	Facility	Expires
04176	LA CERTIFICATE	LANELAC	FTSA	06/30/2016
483	NC CERTIFICATE	ANC	FTSA	12/31/2016
85	KENTUKY CERTIFICATE	KENTUKY	FTSA	
98015	SC CERTIFICATE	ASC	FTSA	06/30/2017
E84098	FL NELAC CERTIFICATE	LFLNELAC	FTSL	06/30/2017
E87429	FL NELAC CERTIFICATE	AFLNELAC	FTSA	06/30/2017
LI0-135	DoD CERTIFICATE	DOD	FTSA	06/30/2016
P330-07-00105	USDA CERTIFICATE	USDA	FTSA	

Notes and Definitions

Item	Definition
Dry	Sample results reported on a dry weight basis.
U or ND	Analyte NOT DETECTED at or above the reporting limit.
A	Suspected adol-condensation product
B	Analyte detected in the method blank
C	Confirmed by GC/MS analysis
E	Concentration exceeds calibration range
K	Hold Time exceeded
J	Estimated Value
N	Tentatively Identified Compound
P	>25% difference between primary and secondary columns
S	Quantitation based on single-point calibration
X	QC Failure see Case Narrative
RPD	Relative Percent Difference
%REC	Percent Recovery
Source	Sample that was matrix spiked or duplicated.

Project # 2016.5764.01

Page 11 of 11

Analytical Report
A6I0073

Project
Howell Mill Sewer Outfall

Project Number
2016.5764.01



September 30, 2016
United Consulting -Norcross
625 Holcomb Bridge Road
Norcross, GA 30071



Minority Women Business Enterprise
Small Disadvantaged Business Enterprise



Minority Women Business Enterprise
Small Disadvantaged Business Enterprise

6017 Financial Dr.
Norcross, GA 30071

Phone #: 770-449-8800
Website: www.ftsanalytical.com

September 30, 2016

Aaron Epstein
United Consulting -Norcross
625 Holcomb Bridge Road
Norcross, GA 30071

RE: Howell Mill Sewer Outfall

We are reporting the results of the analyses performed on the samples received on 9/12/2016 under the project name referenced above and identified as the lab Work Order A6I0073. All results being reported under this Report apply to the samples analyzed and properly identified with a Laboratory ID number. Subcontracted analyses are identified in this report with either the NELAC certification number of the subcontracted lab, or the complete subcontracted report attached to this report.

Unless otherwise noted in a Case Narrative, all data reported in this Analytical Report are in compliance with NELAC standards. The uncertainty of measurement associated with the results of analysis reported is available upon request. Should insufficient sample be provided to the laboratory to meet the method and NELAC Matrix Duplicate and Matrix Spike requirements, then the data will be analyzed, evaluated and reported using all other available quality control methods.

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by FTS Analytical Laboratories. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise agreed upon. The samples received, and described as recorded in Work Order A6I0073 will be filed for 60 days, and after that time they will be properly disposed without further notice, unless otherwise agreed upon. We reserve the right to return to you any unused samples, extracts, or solutions if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding standard practices, controlled/regulated substances, etc.)

We thank you for selecting FTS Analytical to serve your analytical needs. If you have any questions concerning this report, please do not hesitate to contact us at any time. We will be happy to help.

Sincerely,

A handwritten signature in blue ink, reading "J. Derek Rounsley", is written over a light blue rectangular background.

J. Derek Rounsley
Project Manager



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NELAC DoD Accredited

United Consulting -Norcross
625 Holcomb Bridge Road
Norcross, GA 30071

Project: Howell Mill Sewer Outfall
Project Number: 2016.5764.01
Project Manager: Aaron Epstein

Reported:
09/30/2016 13:55

Samples in this Report

Lab ID	Sample	Matrix	Date Sampled	Date Received
A610073-01	HM-3	Solid	12-Sep-2016 00:00	12-Sep-2016 12:15
A610073-02	HM-7	Solid	12-Sep-2016 00:00	12-Sep-2016 12:15

United Consulting -Norcross
625 Holcomb Bridge Road
Norcross, GA 30071

Project: Howell Mill Sewer Outfall
Project Number: 2016.5764.01
Project Manager: Aaron Epstein

Reported:
09/30/2016 13:55

Hits Summary

(Not Including Subcontracted Analysis)

Sample: HM-3

Lab ID: A6I0073-01

Analyte	Result	RL	Units	Dil	Date Analyzed	Qual	CAS #	Method
pH	4.55	0.0100	SU	1	9/13/16 11:20			EPA 9040/1311
Resistivity	64100		mg/L	1	9/22/16 9:57			SM 2540C
% Solids	86.4	0.100	%	1	9/13/16 7:15			SM 2540G
Percent Moisture	13.6	0.100	%	1	9/13/16 7:15			SM 2540G

Sample: HM-7

Lab ID: A6I0073-02

Analyte	Result	RL	Units	Dil	Date Analyzed	Qual	CAS #	Method
pH	4.56	0.0100	SU	1	9/13/16 11:20			EPA 9040/1311
Resistivity	39500		mg/L	1	9/22/16 9:57			SM 2540C
% Solids	83.3	0.100	%	1	9/13/16 7:15			SM 2540G
Percent Moisture	14.7	0.100	%	1	9/13/16 7:15			SM 2540G



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United Consulting -Norcross
625 Holcomb Bridge Road
Norcross, GA 30071

Project: Howell Mill Sewer Outfall
Project Number: 2016.5764.01
Project Manager: Aaron Epstein

Reported:
09/30/2016 13:55

Sample Results

Client Sample ID: HM-3
Lab Sample ID: A6I0073-01 (Solid)

Sampled:
9/12/16 0:00

Analyte	Result	RL	Units	Dil	Date Prepared	Date Analyzed	Qual	CAS #
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Anions by Method 9056

Chloride	ND	116	mg/Kg dry	10	9/16/16 9:33	9/16/16 21:49	U	16887-00-6
Sulfate	ND	116	mg/Kg dry	10	9/16/16 9:33	9/16/16 21:49	U	14808-79-8

Percent Moisture by Method 2540G

% Solids	86.4	0.100	%	1	9/12/16 7:30	9/13/16 7:15		
Percent Moisture	13.6	0.100	%	1	9/12/16 7:30	9/13/16 7:15		

pH S by Method 9045D

pH	4.55	0.0100	SU	1	9/13/16 10:30	9/13/16 11:20		
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TDS by Method 2540C

Resistivity	64100		mg/L	1	9/22/16 9:57	9/22/16 9:57		
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625 Holcomb Bridge Road
Norcross, GA 30071

Project: Howell Mill Sewer Outfall
Project Number: 2016.5764.01
Project Manager: Aaron Epstein

Reported:
09/30/2016 13:55

Sample Results (Continued)

Client Sample ID: HM-7
Lab Sample ID: A6I0073-02 (Solid)

Sampled:
9/12/16 0:00

Analyte	Result	RL	Units	Dil	Date Prepared	Date Analyzed	Qual	CAS #
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Anions by Method 9056

Chloride	ND	120	mg/Kg dry	10	9/16/16 9:33	9/16/16 22:08	U	16887-00-6
Sulfate	ND	120	mg/Kg dry	10	9/16/16 9:33	9/16/16 22:08	U	14808-79-8

Percent Moisture by Method 2540G

% Solids	83.3	0.100	%	1	9/12/16 7:30	9/13/16 7:15		
Percent Moisture	14.7	0.100	%	1	9/12/16 7:30	9/13/16 7:15		

pH S by Method 9045D

pH	4.56	0.0100	SU	1	9/13/16 10:30	9/13/16 11:20		
----	-------------	--------	----	---	---------------	---------------	--	--

TDS by Method 2540C

Resistivity	39500		mg/L	1	9/22/16 9:57	9/22/16 9:57		
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United Consulting -Norcross
625 Holcomb Bridge Road
Norcross, GA 30071

Project: Howell Mill Sewer Outfall
Project Number: 2016.5764.01
Project Manager: Aaron Epstein

Reported:
09/30/2016 13:55

Quality Control

Anions by Method 9056

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
---------	--------	------	-----------------	-------	-------------	---------------	------	-------------	-----	-----------

Batch: B6I0393

Blank (B6I0393-BLK1)

Prepared & Analyzed: 9/16/2016

Chloride	ND	U	20.0	mg/Kg wet						
Sulfate	ND	U	20.0	mg/Kg wet						

LCS (B6I0393-BS1)

Prepared & Analyzed: 9/16/2016

Chloride	200		20.0	mg/Kg wet	200		100	80-120		
Sulfate	189		20.0	mg/Kg wet	200		94	90-110		

LCS Dup (B6I0393-BSD1)

Prepared & Analyzed: 9/16/2016

Chloride	199		20.0	mg/Kg wet	200		99	80-120	0.7	15
Sulfate	200		20.0	mg/Kg wet	200		100	90-110	6	20

Duplicate (B6I0393-DUP1)

Source: L6I0094-03

Prepared & Analyzed: 9/16/2016

Chloride	ND	U	24.1	mg/Kg dry		ND				15
Sulfate	35.7		24.1	mg/Kg dry		35.5			0.8	15

Matrix Spike (B6I0393-MS1)

Source: L6I0094-03

Prepared & Analyzed: 9/16/2016

Chloride	250		24.1	mg/Kg dry	241	ND	104	75-125		
Sulfate	298		24.1	mg/Kg dry	241	35.5	109	75-125		

Matrix Spike Dup (B6I0393-MSD1)

Source: L6I0094-03

Prepared & Analyzed: 9/16/2016

Chloride	242		24.1	mg/Kg dry	241	ND	101	75-125	3	20
Sulfate	293		24.1	mg/Kg dry	241	35.5	107	75-125	1	20



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625 Holcomb Bridge Road
Norcross, GA 30071

Project: Howell Mill Sewer Outfall
Project Number: 2016.5764.01
Project Manager: Aaron Epstein

Reported:
09/30/2016 13:55

Quality Control (Continued)

TDS by Method 2540C

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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Batch: B6I0497

Duplicate (B6I0497-DUP1)

Source: A6I0073-01

Prepared & Analyzed: 9/22/2016

Resistivity	64100			mg/L		64100			0	20
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United Consulting -Norcross
625 Holcomb Bridge Road
Norcross, GA 30071

Project: Howell Mill Sewer Outfall
Project Number: 2016.5764.01
Project Manager: Aaron Epstein

Reported:
09/30/2016 13:55

Quality Control (Continued)

Percent Moisture by Method 2540G

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
---------	--------	------	--------------------	-------	----------------	------------------	------	----------------	-----	--------------

Batch: B6I0236

Duplicate (B6I0236-DUP1)

Source: A6I0064-01

Prepared: 9/12/2016 Analyzed: 9/13/2016

% Solids	93.3		0.100	%		93.4			0.1	20
Percent Moisture	6.71		0.100	%		6.62			1	20



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625 Holcomb Bridge Road
Norcross, GA 30071

Project: Howell Mill Sewer Outfall
Project Number: 2016.5764.01
Project Manager: Aaron Epstein

Reported:
09/30/2016 13:55

Quality Control (Continued)

pH S by Method 9045D

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
---------	--------	------	--------------------	-------	----------------	------------------	------	----------------	-----	--------------

Batch: B6I0253

Duplicate (B6I0253-DUP1)

Source: A6I0073-01

Prepared & Analyzed: 9/13/2016

pH	4.52		0.0100	SU		4.55			0.7	20
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United Consulting -Norcross
625 Holcomb Bridge Road
Norcross, GA 30071

Project: Howell Mill Sewer Outfall
Project Number: 2016.5764.01
Project Manager: Aaron Epstein

Reported:
09/30/2016 13:55

List of Certifications

Number	Description	Code	Facility	Expires
04176	LA CERTIFICATE	LANELAC	FTSA	06/30/2016
483	NC CERTIFICATE	ANC	FTSA	12/31/2016
85	KENTUKY CERTIFICATE	KENTUKY	FTSA	
98015	SC CERTIFICATE	ASC	FTSA	06/30/2017
E84098	FL NELAC CERTIFICATE	LFLNELAC	FTSL	06/30/2017
E87429	FL NELAC CERTIFICATE	AFLNELAC	FTSA	06/30/2017
LI0-135	DoD CERTIFICATE	DOD	FTSA	06/30/2016
P330-07-00105	USDA CERTIFICATE	USDA	FTSA	

Notes and Definitions

Item	Definition
Dry	Sample results reported on a dry weight basis.
U or ND	Analyte NOT DETECTED at or above the reporting limit.
A	Suspected adol-condensation product
B	Analyte detected in the method blank
C	Confirmed by GC/MS analysis
E	Concentration exceeds calibration range
K	Hold Time exceeded
J	Estimated Value
N	Tentatively Identified Compound
P	>25% difference between primary and secondary columns
S	Quantitation based on single-point calibration
X	QC Failure see Case Narrative
RPD	Relative Percent Difference
%REC	Percent Recovery
Source	Sample that was matrix spiked or duplicated.

1000

Page 12 of 12

APPENDIX F

GeoTesting – Lab Test Results



Technologies to manage risk
for infrastructure

Boston
Atlanta
Chicago
Los Angeles
New York

www.geotesting.com

Transmittal

TO:

Mahvand Saleki

United Consulting Group

625 Holcomb Bridge Road

Norcross, GA 30071

DATE: 9/21/2016

GTX NO: 305340

RE: Howell Mill Sewer Outfall

COPIES	DATE	DESCRIPTION
	9/21/2016	September 2016 Laboratory Test Report

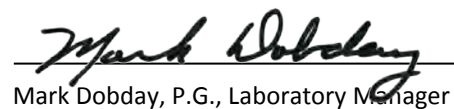
REMARKS:

CC:

SIGNED:


Jonathan Campbell, Assistant Laboratory Manager

APPROVED BY:


Mark Dobday, P.G., Laboratory Manager

September 21, 2016

Mahvand Saleki
United Consulting Group
625 Holcomb Bridge Road
Norcross, GA 30071

RE: Howell Mill Sewer Outfall, Atlanta, GA (GTX-305340)

Dear Mahvand Saleki:

Enclosed are the test results you requested for the above referenced project. GeoTesting Express, Inc. (GTX) received three samples from you on 9/19/2016. These samples were labeled as follows:

Boring Number	Sample Number	Depth
1	HM-5	27-28 ft
2	HM-6	25-26 ft
3	HM-9	34-35 ft

GTX performed the following tests on these samples:

3 ASTM D7625 -CERCHAR Abrasivity Index (CAI)

A copy of your test request is attached.

The results presented in this report apply only to the items tested. This report shall not be reproduced except in full, without written approval from GeoTesting Express. The remainder of these samples will be retained for a period of sixty (60) days and will then be discarded unless otherwise notified by you. Please call me if you have any questions or require additional information. Thank you for allowing GeoTesting Express the opportunity of providing you with testing services. We look forward to working with you again in the future.

Respectfully yours,



Jonathan Campbell
Assistant Laboratory Manager



*Technologies to manage risk
for infrastructure*

Boston
Atlanta
Chicago
Los Angeles
New York

www.geotesting.com

Geotechnical Test Report

9/21/2016

GTX-305340

Howell Mill Sewer Outfall

Atlanta, GA

Client Project No.: 2016-5764-01

Prepared for:

United Consulting Group



Client:	United Consulting Group			Project No:	GTX-305340
Project:	Howell Mill Sewer Outfall				
Location:	Atlanta GA				
Boring ID:	1	Sample Type:	cylinder	Tested By:	daa
Sample ID:	HM-5	Test Date:	09/19/16	Checked By:	jsc
Depth :	27-28 ft	Test Id:	391329		
Test Comment:	---				
Visual Description:	---				
Sample Comment:	---				

Abrasiveness of Rock Using the Cerchar Method by ASTM D7625

Boring ID	Sample ID	Depth	Stylus No	Reading 1	Reading 2	Average	Comments
1	HM-5	27-28 ft	1	3.5	3.8	3.65	
			2	3.4	3.7	3.55	
			3	3.9	3.8	3.85	
			4	3.3	3.2	3.25	
			5	4.2	3.8	4.00	
			Average CAIs			3.66	
			Average CAI *			4.10	
CERCHAR Abrasiveness Index Classification					Extreme abrasiveness		

Notes

Test Surface: Saw Cut
 Moisture Condition: As Received
 Apparatus Type: Original CERCHAR
 Stylus Hardness: Rockwell Hardness 54/56 HRC
 Stylus Displacement Relative to Rock Fabric:
 Styli 1-3: Normal; Styli 4-5: Parallel
 * CAI = (0.99 * CAIs) + 0.48
 CAIs = CERCHAR index for smooth (saw cut) surface
 CAI = CERCHAR index for natural surface
 Comments:





Client:	United Consulting Group			Project No:	GTX-305340
Project:	Howell Mill Sewer Outfall				
Location:	Atlanta, GA				
Boring ID:	2	Sample Type:	cylinder	Tested By:	daa
Sample ID:	HM-6	Test Date:	09/19/16	Checked By:	jsc
Depth :	25-26 ft	Test Id:	391330		
Test Comment:	---				
Visual Description:	---				
Sample Comment:	---				

Abrasiveness of Rock Using the Cerchar Method by ASTM D7625

Boring ID	Sample ID	Depth	Stylus No	Reading 1	Reading 2	Average	Comments
2	HM-6	25-26 ft	1	3.8	3.4	3.60	
			2	4.3	4.8	4.55	
			3	3.0	3.5	3.25	
			4	4.1	3.7	3.90	
			5	3.3	3.8	3.55	
			Average CAIs			3.77	
			Average CAI *			4.21	
CERCHAR Abrasiveness Index Classification					Extreme abrasiveness		

Notes

Test Surface: Saw Cut
 Moisture Condition: As Received
 Apparatus Type: Original CERCHAR
 Stylus Hardness: Rockwell Hardness 54/56 HRC
 Stylus Displacement Relative to Rock Fabric:
 Styli 1-3: Normal; Styli 4-5: Parallel
 * CAI = (0.99 * CAIs) + 0.48
 CAIs = CERCHAR index for smooth (saw cut) surface
 CAI = CERCHAR index for natural surface
 Comments:





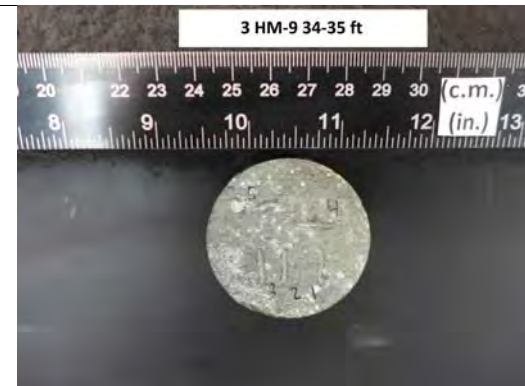
Client:	United Consulting Group			Project No:	GTX-305340
Project:	Howell Mill Sewer Outfall				
Location:	Atlanta, GA				
Boring ID:	3	Sample Type:	cylinder	Tested By:	daa
Sample ID:	HM-9	Test Date:	09/19/16	Checked By:	jsc
Depth :	34-35 ft	Test Id:	391331		
Test Comment:	---				
Visual Description:	---				
Sample Comment:	---				

Abrasiveness of Rock Using the Cerchar Method by ASTM D7625

Boring ID	Sample ID	Depth	Stylus No	Reading 1	Reading 2	Average	Comments
3	HM-9	34-35 ft	1	0.4	0.6	0.50	
			2	0.8	0.5	0.65	
			3	1.5	1.2	1.35	
			4	0.4	0.3	0.35	
			5	1.2	1.4	1.30	
			Average CAIs			0.83	
			Average CAI *			1.30	
CERCHAR Abrasiveness Index Classification					Medium abrasiveness		

Notes

Test Surface: Saw Cut
 Moisture Condition: As Received
 Apparatus Type: Original CERCHAR
 Stylus Hardness: Rockwell Hardness 54/56 HRC
 Stylus Displacement Relative to Rock Fabric:
 Styli 1-3: Normal; Styli 4-5: Parallel
 * CAI = (0.99 * CAIs) + 0.48
 CAIs = CERCHAR index for smooth (saw cut) surface
 CAI = CERCHAR index for natural surface
 Comments:



WARRANTY and LIABILITY

GeoTesting Express (GTX) warrants that all tests it performs are run in general accordance with the specified test procedures and accepted industry practice. GTX will correct or repeat any test that does not comply with this warranty. GTX has no specific knowledge as to conditioning, origin, sampling procedure or intended use of the material.

GTX may report engineering parameters that require us to interpret the test data. Such parameters are determined using accepted engineering procedures. However, GTX does not warrant that these parameters accurately reflect the true engineering properties of the *in situ* material. Responsibility for interpretation and use of the test data and these parameters for engineering and/or construction purposes rests solely with the user and not with GTX or any of its employees.

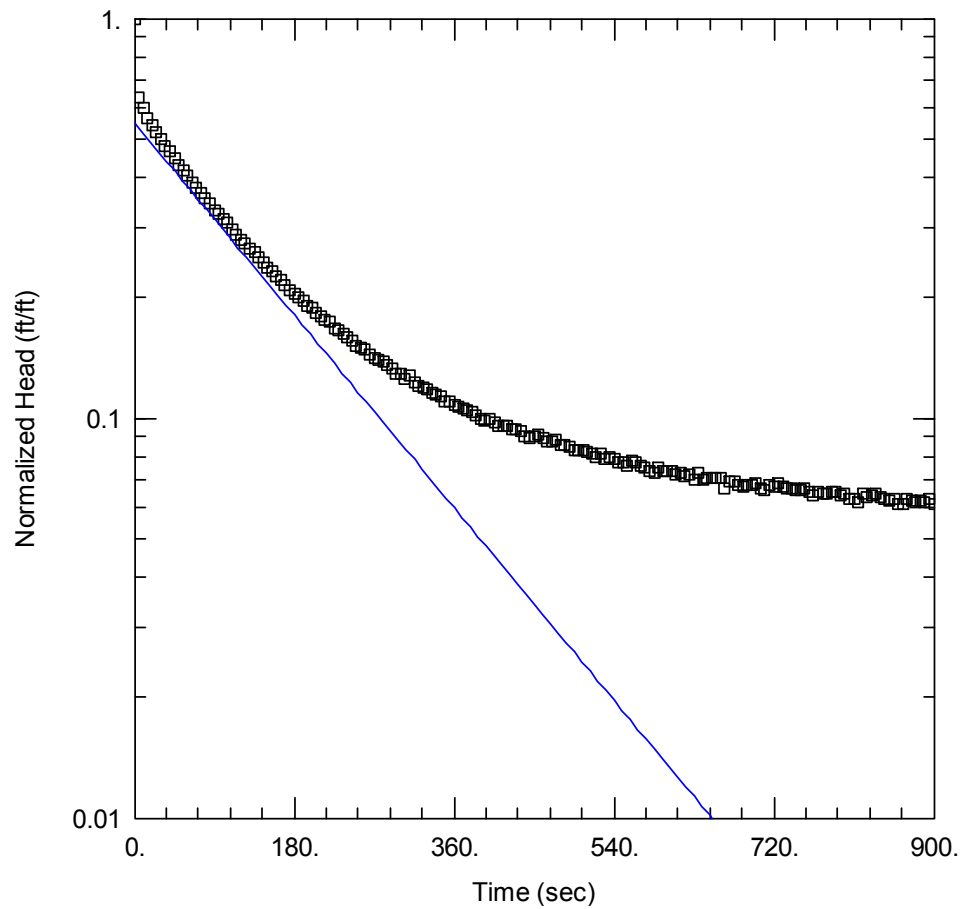
GTX's liability will be limited to correcting or repeating a test which fails our warranty. GTX's liability for damages to the Purchaser of testing services for any cause whatsoever shall be limited to the amount GTX received for the testing services. GTX will not be liable for any damages, or for any lost benefits or other consequential damages resulting from the use of these test results, even if GTX has been advised of the possibility of such damages. GTX will not be responsible for any liability of the Purchaser to any third party.

Commonly Used Symbols

A	pore pressure parameter for $\Delta\sigma_1 - \Delta\sigma_3$	S_r	Post cyclic undrained shear strength
B	pore pressure parameter for $\Delta\sigma_3$	T	temperature
CAI	CERCHAR Abrasiveness Index	t	time
CIU	isotropically consolidated undrained triaxial shear test	U, UC	unconfined compression test
CR	compression ratio for one dimensional consolidation	UU, Q	unconsolidated undrained triaxial test
CSR	cyclic stress ratio	u_a	pore gas pressure
C_c	coefficient of curvature, $(D_{30})^2 / (D_{10} \times D_{60})$	u_e	excess pore water pressure
C_u	coefficient of uniformity, D_{60}/D_{10}	u, u_w	pore water pressure
C_c	compression index for one dimensional consolidation	V	total volume
C_α	coefficient of secondary compression	V_g	volume of gas
c_v	coefficient of consolidation	V_s	volume of solids
c	cohesion intercept for total stresses	V_s	shear wave velocity
c'	cohesion intercept for effective stresses	V_v	volume of voids
D	diameter of specimen	V_w	volume of water
D	damping ratio	V_o	initial volume
D_{10}	diameter at which 10% of soil is finer	v	velocity
D_{15}	diameter at which 15% of soil is finer	W	total weight
D_{30}	diameter at which 30% of soil is finer	W_s	weight of solids
D_{50}	diameter at which 50% of soil is finer	W_w	weight of water
D_{60}	diameter at which 60% of soil is finer	w	water content
D_{85}	diameter at which 85% of soil is finer	w_c	water content at consolidation
d_{50}	displacement for 50% consolidation	w_f	final water content
d_{90}	displacement for 90% consolidation	w_l	liquid limit
d_{100}	displacement for 100% consolidation	w_n	natural water content
E	Young's modulus	w_p	plastic limit
e	void ratio	w_s	shrinkage limit
e_c	void ratio after consolidation	w_o, w_i	initial water content
e_o	initial void ratio	α	slope of q_f versus p_f
G	shear modulus	α'	slope of q_f versus p_f'
G_s	specific gravity of soil particles	γ_t	total unit weight
H	height of specimen	γ_d	dry unit weight
H_R	Rebound Hardness number	γ_s	unit weight of solids
i	gradient	γ_w	unit weight of water
I_s	Uncorrected point load strength	ϵ	strain
$I_{s(50)}$	Size corrected point load strength index	ϵ_{vol}	volume strain
H_A	Modified Taber Abrasion	ϵ_h, ϵ_v	horizontal strain, vertical strain
H_T	Total hardness	μ	Poisson's ratio, also viscosity
K_o	lateral stress ratio for one dimensional strain	σ	normal stress
k	permeability	σ'	effective normal stress
LI	Liquidity Index	σ_c, σ'_c	consolidation stress in isotropic stress system
m_v	coefficient of volume change	σ_h, σ'_h	horizontal normal stress
n	porosity	σ_v, σ'_v	vertical normal stress
PI	plasticity index	σ'_{vc}	Effective vertical consolidation stress
P_c	preconsolidation pressure	σ_1	major principal stress
p	$(\sigma_1 + \sigma_3) / 2, (\sigma_v + \sigma_h) / 2$	σ_2	intermediate principal stress
p'	$(\sigma'_1 + \sigma'_3) / 2, (\sigma'_v + \sigma'_h) / 2$	σ_3	minor principal stress
p'_c	p' at consolidation	τ	shear stress
Q	quantity of flow	ϕ	friction angle based on total stresses
q	$(\sigma_1 - \sigma_3) / 2$	ϕ'	friction angle based on effective stresses
q_f	q at failure	ϕ'_r	residual friction angle
q_o, q_i	initial q	ϕ_{ult}	ϕ for ultimate strength
q_c	q at consolidation		

Slug Test Results

HM-4 RUN 1 SOLUTIONS



Obs. Wells

□ HM-4

Aquifer Model

Unconfined

Solution

Bouwer-Rice

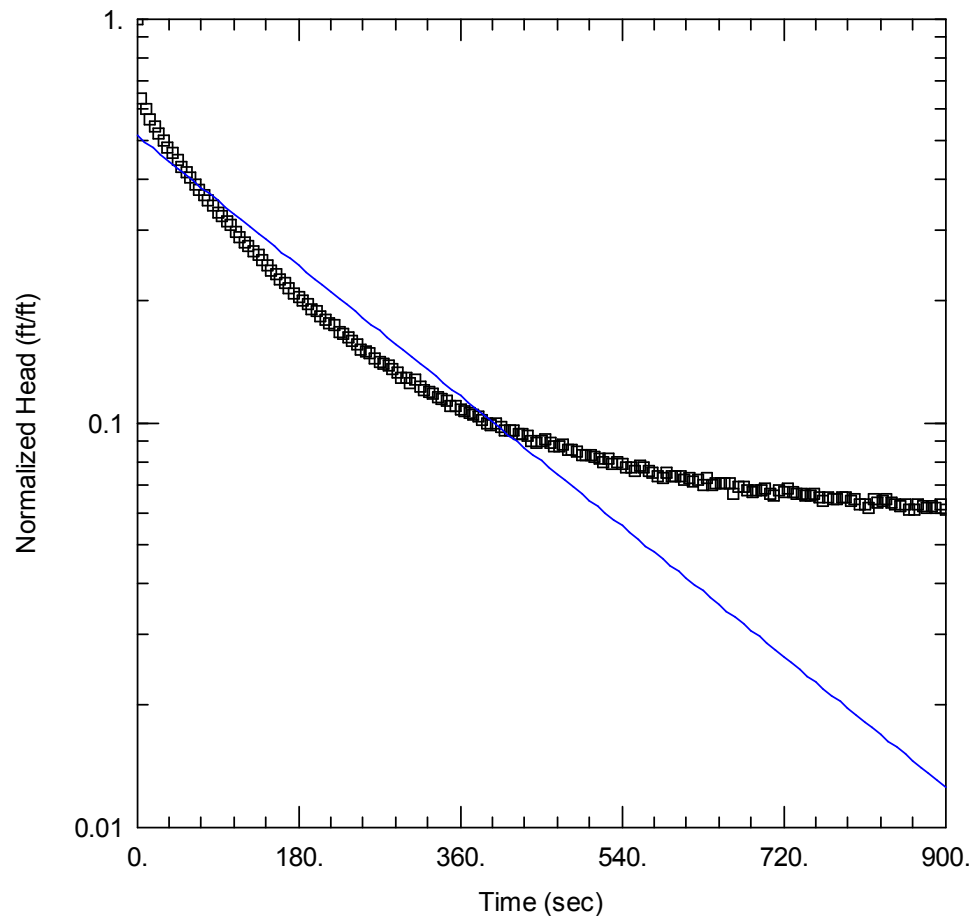
Parameters

$K = 7.057\text{E-}6 \text{ ft/sec}$

$y_0 = 1.198 \text{ ft}$

- HM-4 Slug In Run 1 – High Solution

Howell Mill Sewer Outfall
2016.5764.01
Slug Test Results



Obs. Wells

□ HM-4

Aquifer Model

Unconfined

Solution

Bouwer-Rice

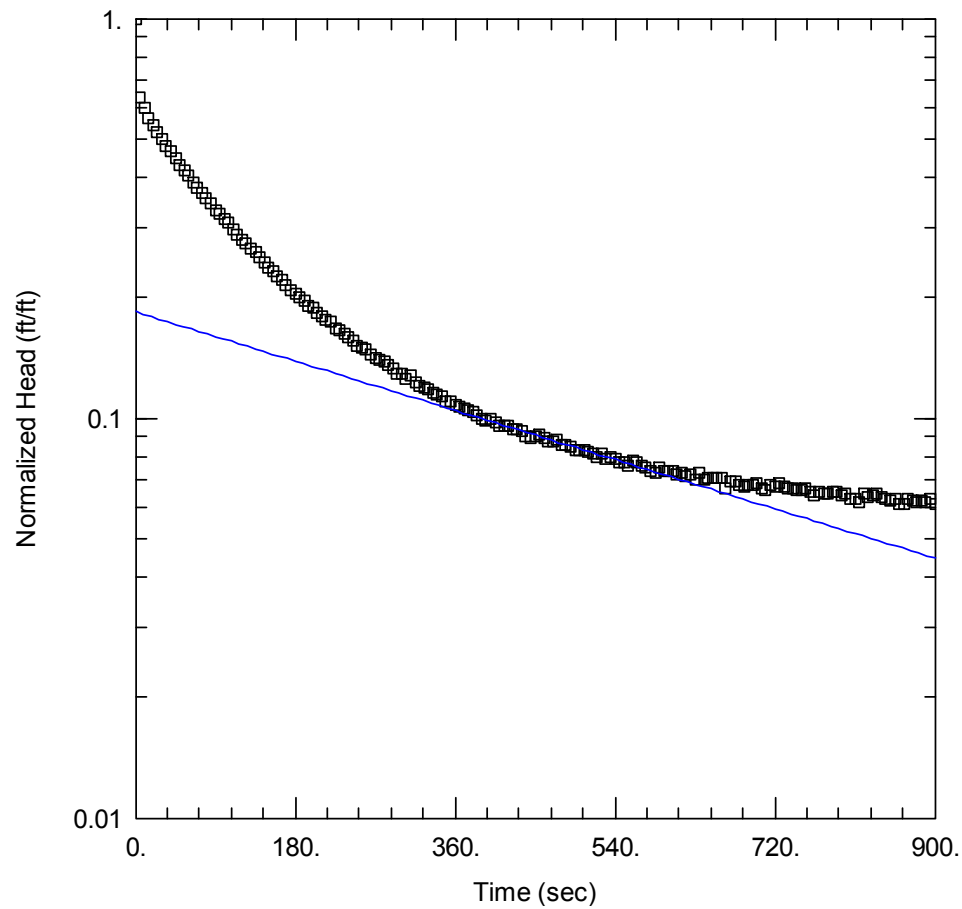
Parameters

$K = 4.72\text{E-}6 \text{ ft/sec}$

$y_0 = 1.122 \text{ ft}$

- HM-4 Slug In Run 1 – **Automatic** Solution

Howell Mill Sewer Outfall
2016.5764.01
Slug Test Results



Obs. Wells

□ HM-4

Aquifer Model

Unconfined

Solution

Bouwer-Rice

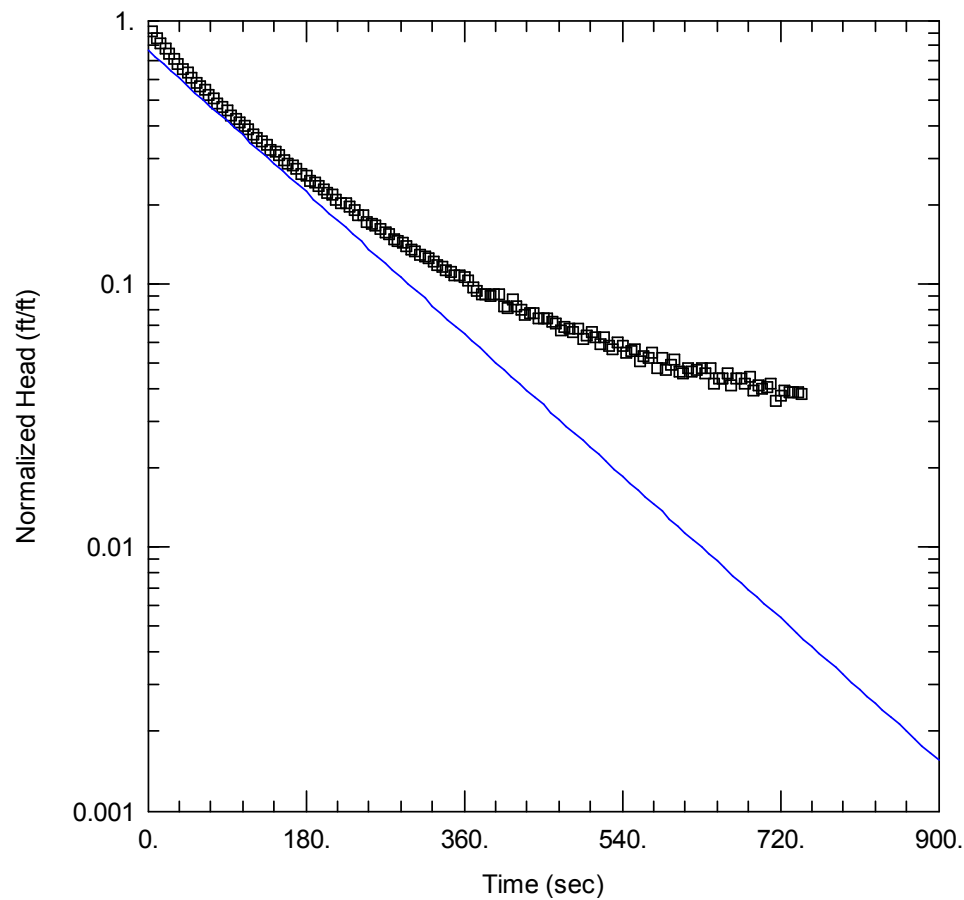
Parameters

$K = 1.804\text{E-}6$ ft/sec

$y_0 = 0.4024$ ft

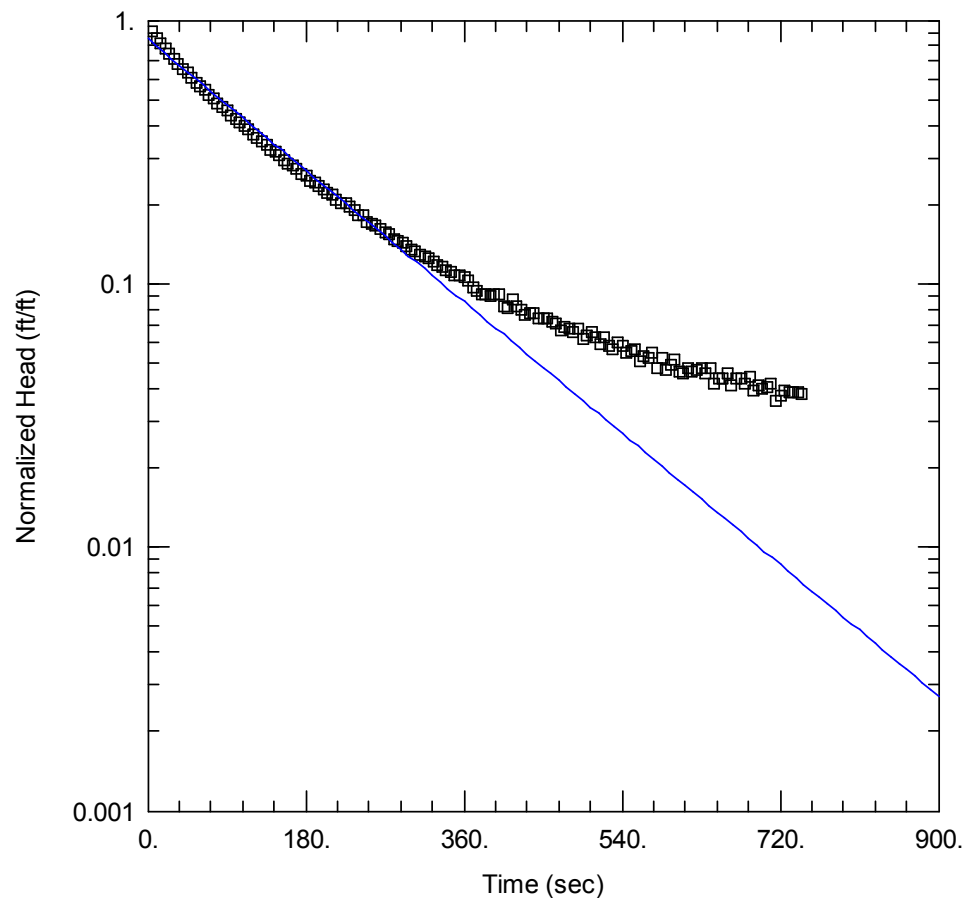
- HM-4 Slug In Run 1 – Low Solution

Howell Mill Sewer Outfall
2016.5764.01
Slug Test Results



- HM-4 Slug Out Run 1 – High Solution

Howell Mill Sewer Outfall
2016.5764.01
Slug Test Results



Obs. Wells

□ HM-4

Aquifer Model

Unconfined

Solution

Bouwer-Rice

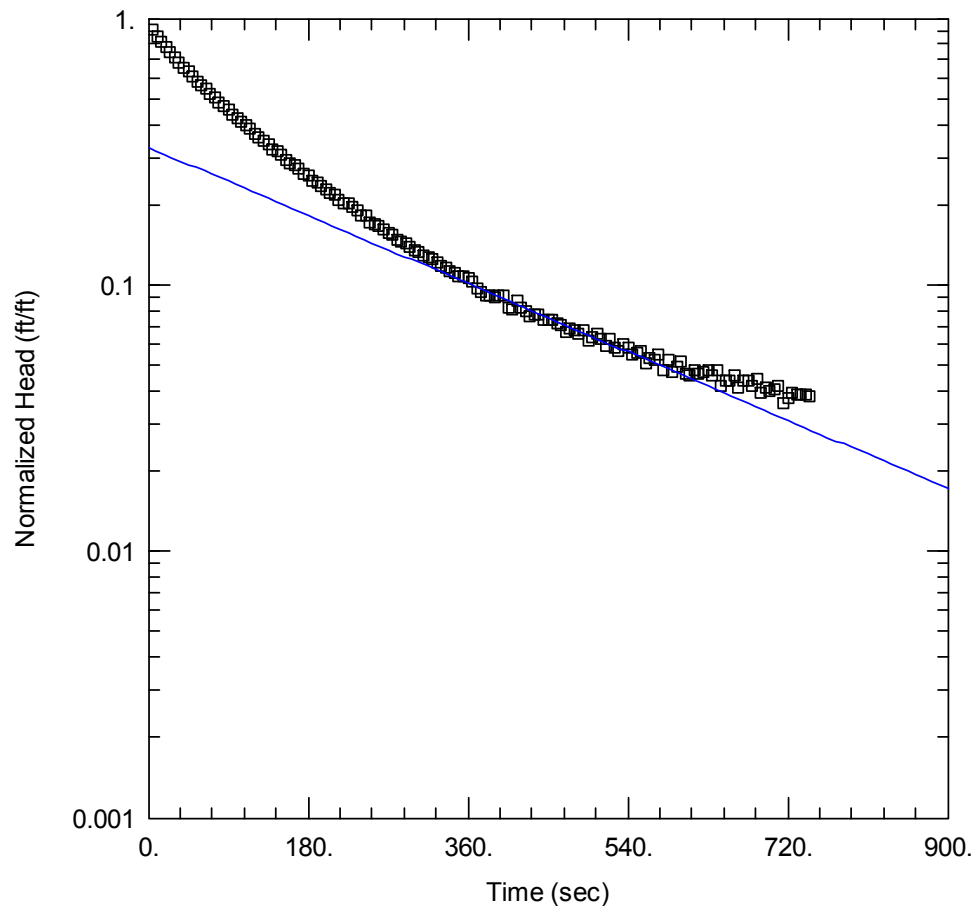
Parameters

$K = 7.303\text{E-}6$ ft/sec

$y_0 = -1.172$ ft

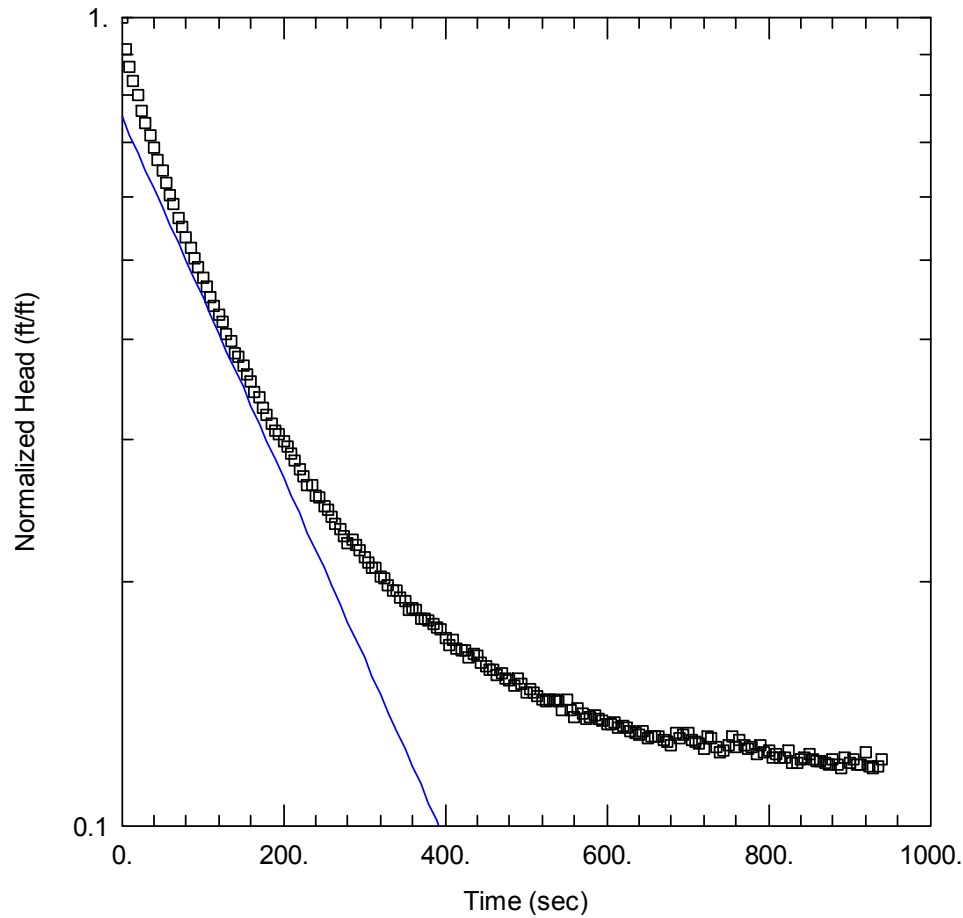
- HM-4 Slug Out Run 1 – **Automatic** Solution

Howell Mill Sewer Outfall
2016.5764.01
Slug Test Results



- HM-4 Slug Out Run 1 – Low Solution

HM-4 RUN 2 SOLUTIONS



Obs. Wells

□ HM-4

Aquifer Model

Unconfined

Solution

Bouwer-Rice

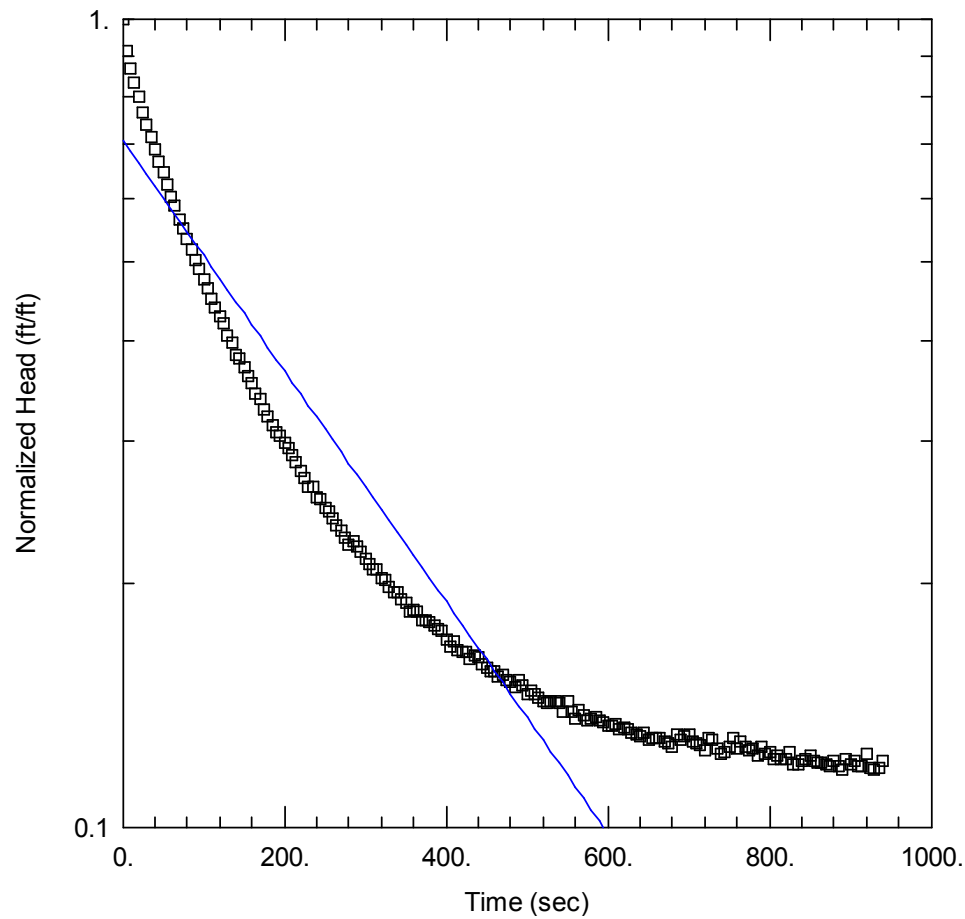
Parameters

$K = 5.888\text{E-}6$ ft/sec

$y_0 = 1.157$ ft

- HM-4 Slug In Run 2 – **High** Solution

Howell Mill Sewer Outfall
2016.5764.01
Slug Test Results



Obs. Wells

□ HM-4

Aquifer Model

Unconfined

Solution

Bouwer-Rice

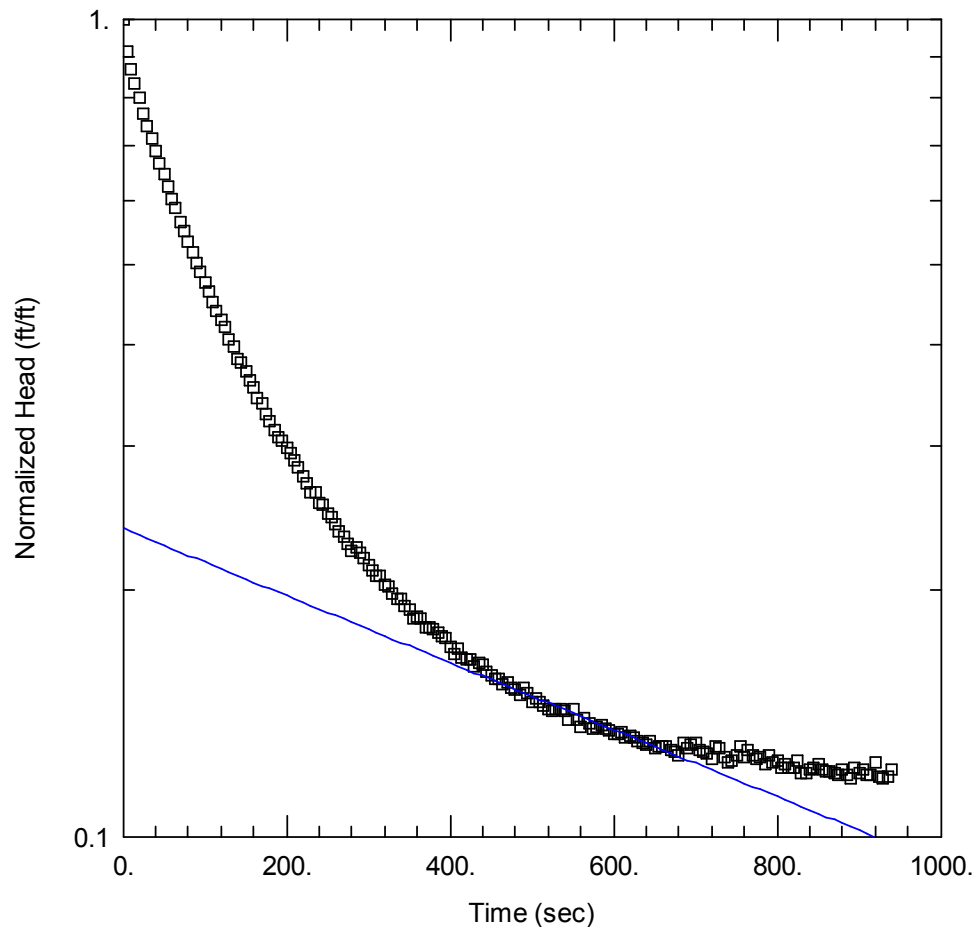
Parameters

$K = 3.765E-6$ ft/sec

$y_0 = 1.087$ ft

- HM-4 Slug In Run 2 – **Automated** Solution

Howell Mill Sewer Outfall
2016.5764.01
Slug Test Results



Obs. Wells

□ HM-4

Aquifer Model

Unconfined

Solution

Bouwer-Rice

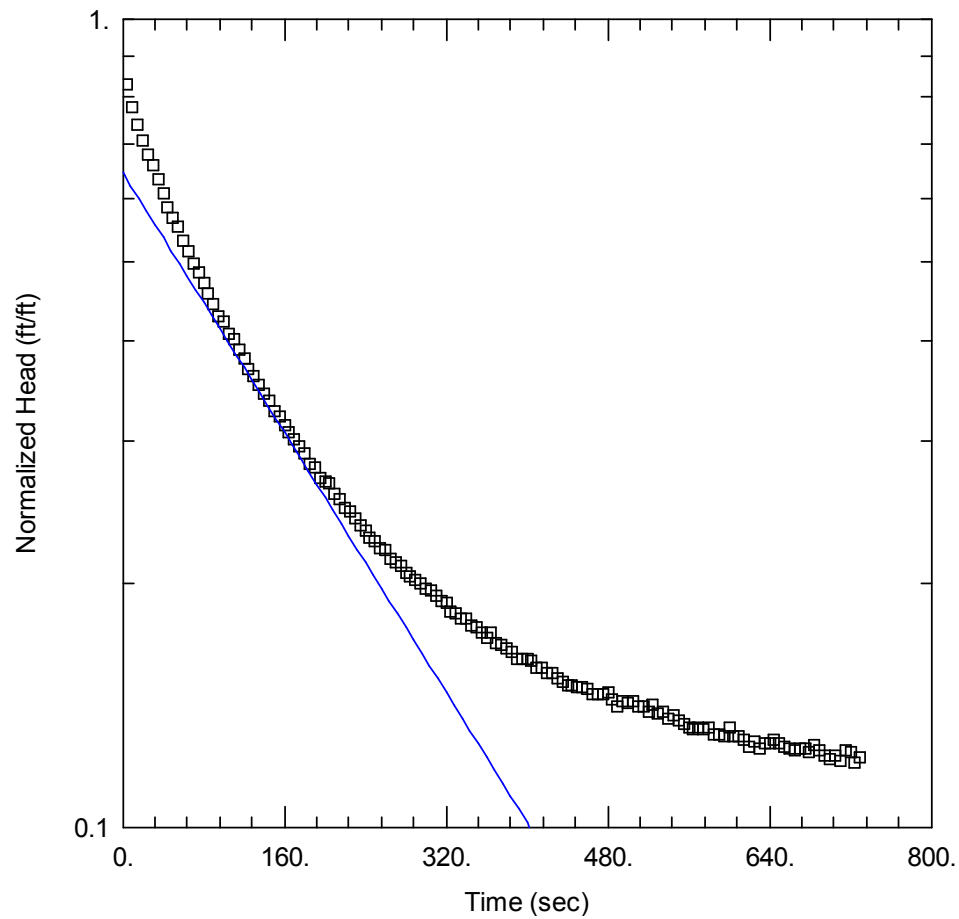
Parameters

$K = 1.08\text{E-}6 \text{ ft/sec}$

$y_0 = 0.3654 \text{ ft}$

- HM-4 Slug In Run 2 – Low Solution

Howell Mill Sewer Outfall
2016.5764.01
Slug Test Results



Obs. Wells

□ HM-4

Aquifer Model

Unconfined

Solution

Bouwer-Rice

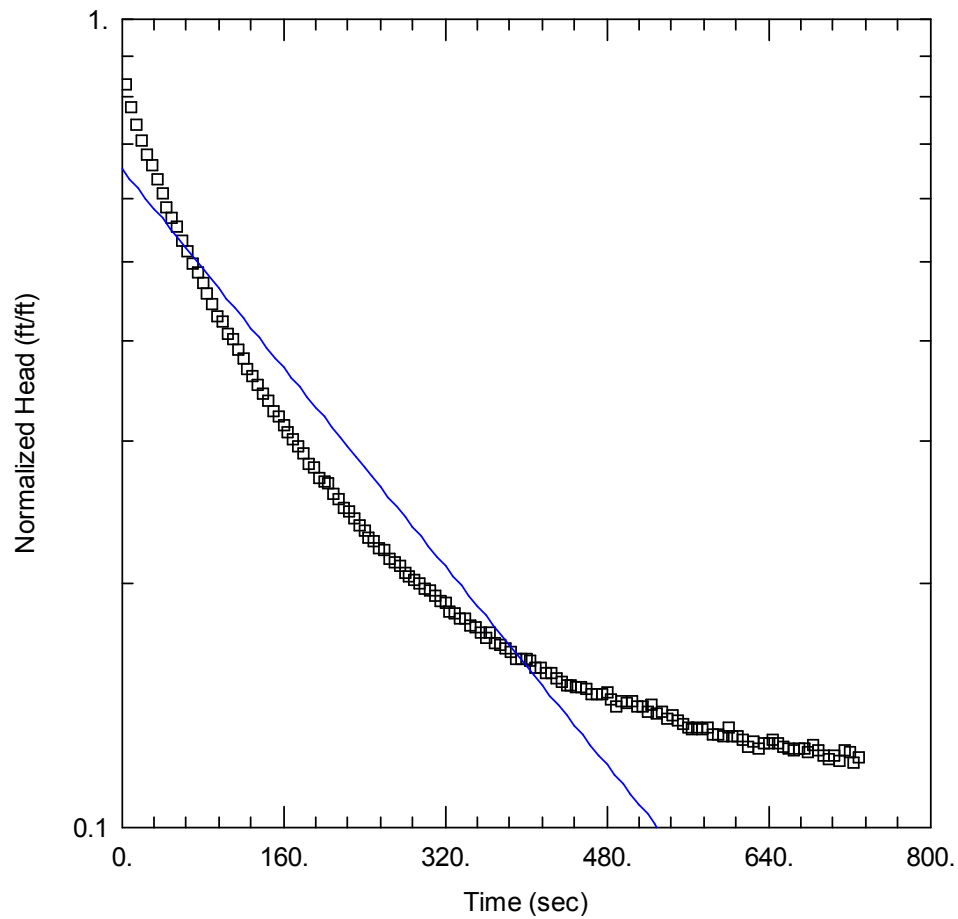
Parameters

$K = 5.295\text{E-}6$ ft/sec

$y_0 = -1.008$ ft

- HM-4 Slug Out Run 2 – **High** Solution

Howell Mill Sewer Outfall
2016.5764.01
Slug Test Results



Obs. Wells

□ HM-4

Aquifer Model

Unconfined

Solution

Bouwer-Rice

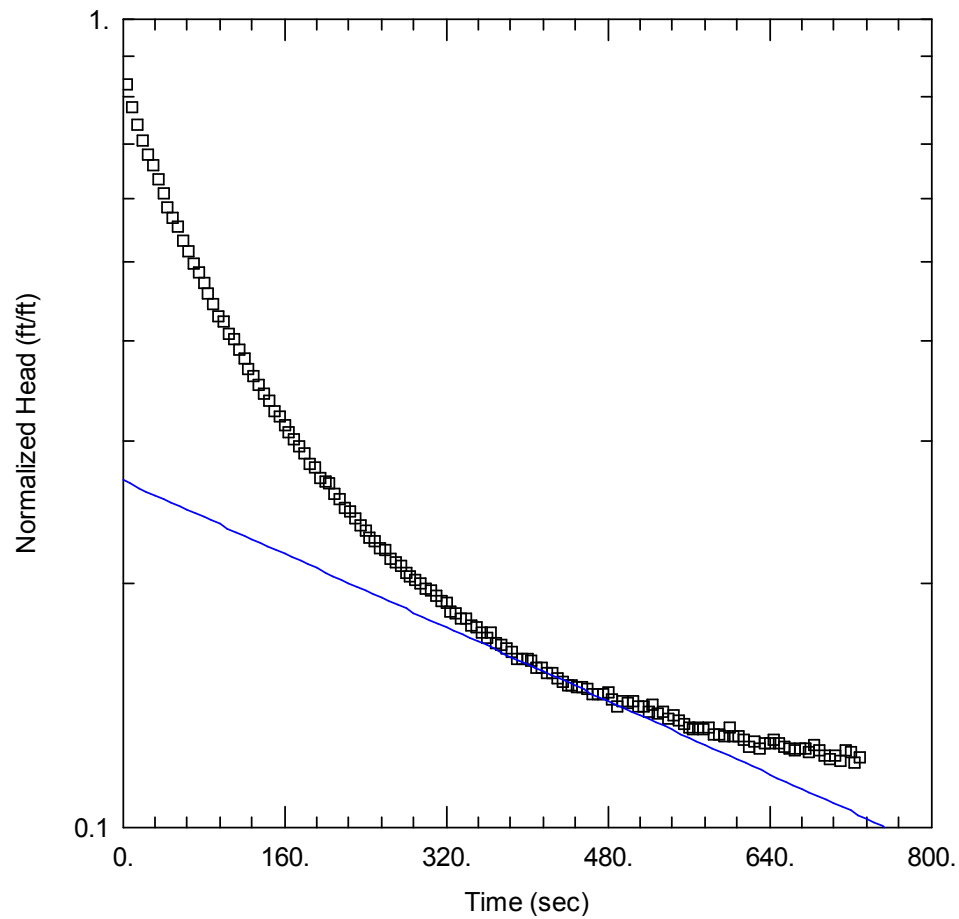
Parameters

$K = 4.048\text{E-}6 \text{ ft/sec}$

$y_0 = -1.018 \text{ ft}$

- HM-4 Slug Out Run 2 – **Automated** Solution

Howell Mill Sewer Outfall
2016.5764.01
Slug Test Results



Obs. Wells

□ HM-4

Aquifer Model

Unconfined

Solution

Bouwer-Rice

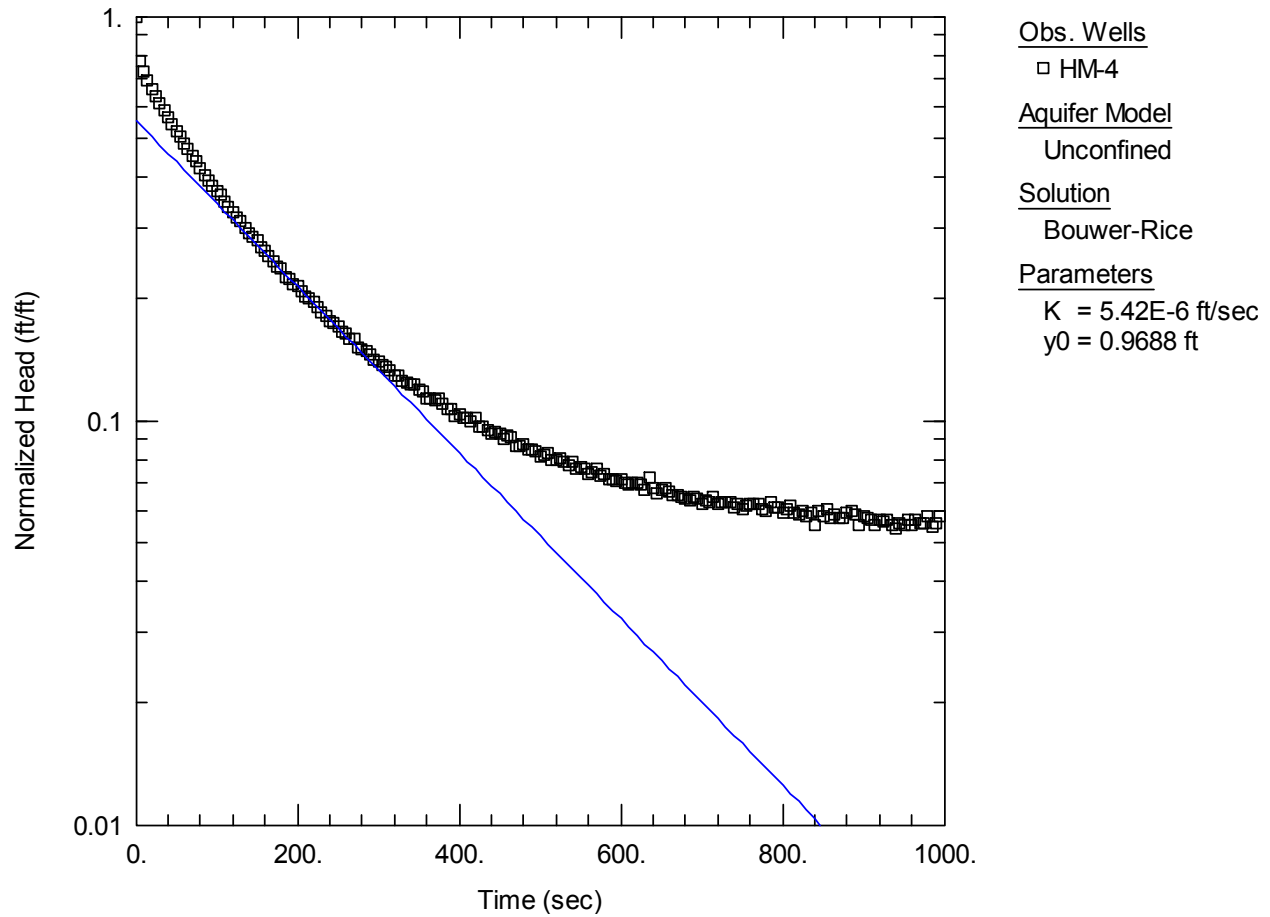
Parameters

$K = 1.497\text{E-}6 \text{ ft/sec}$

$y_0 = -0.4196 \text{ ft}$

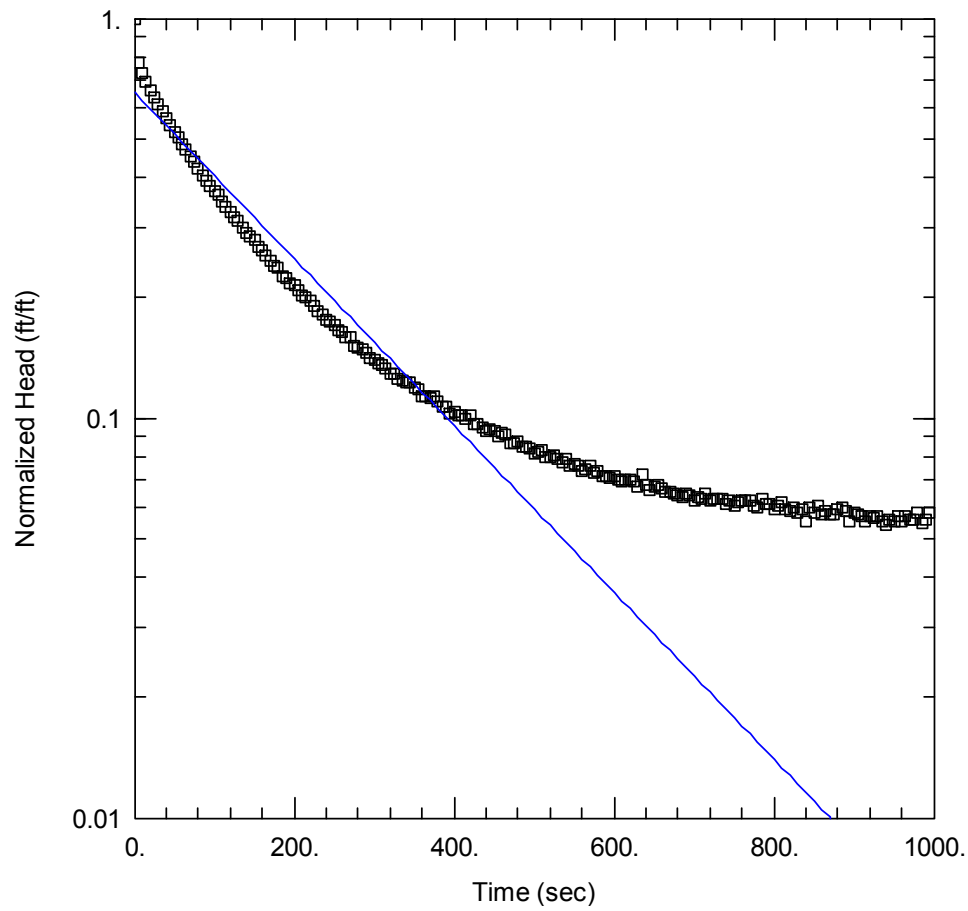
- HM-4 Slug Out Run 2 – Low Solution

HM-4 RUN 3 SOLUTIONS



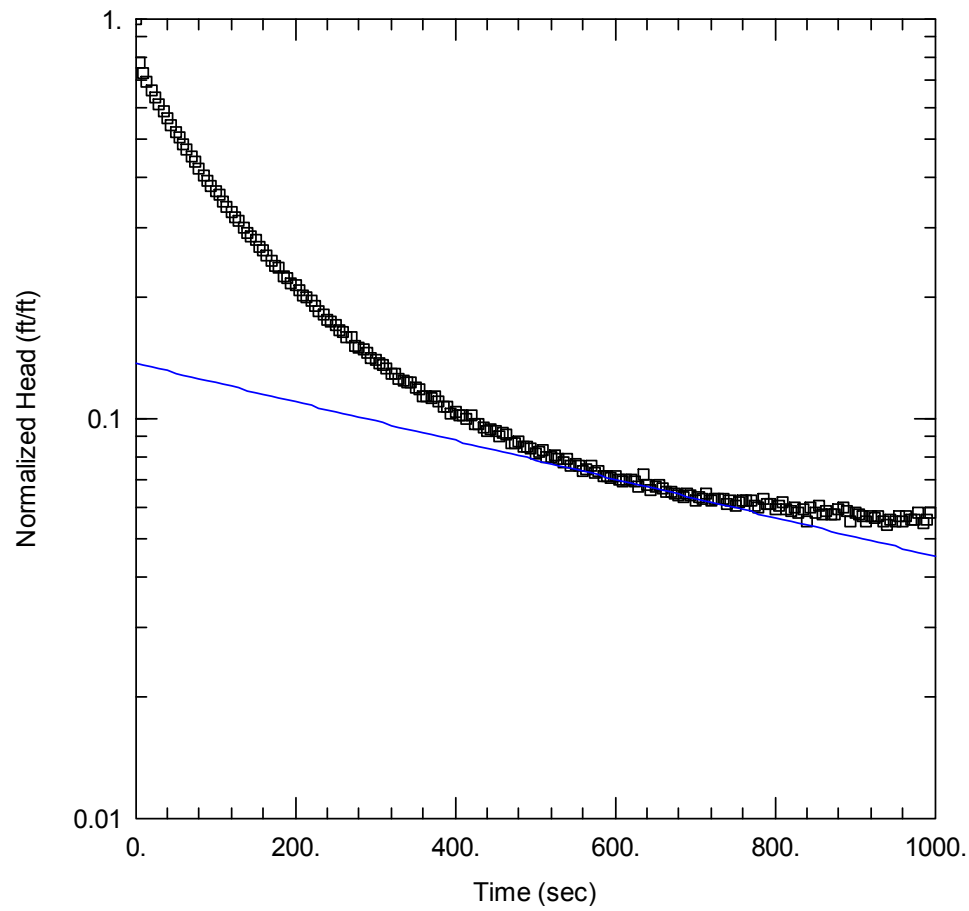
- HM-4 Slug In Run 3 – High Solution

Howell Mill Sewer Outfall
2016.5764.01
Slug Test Results



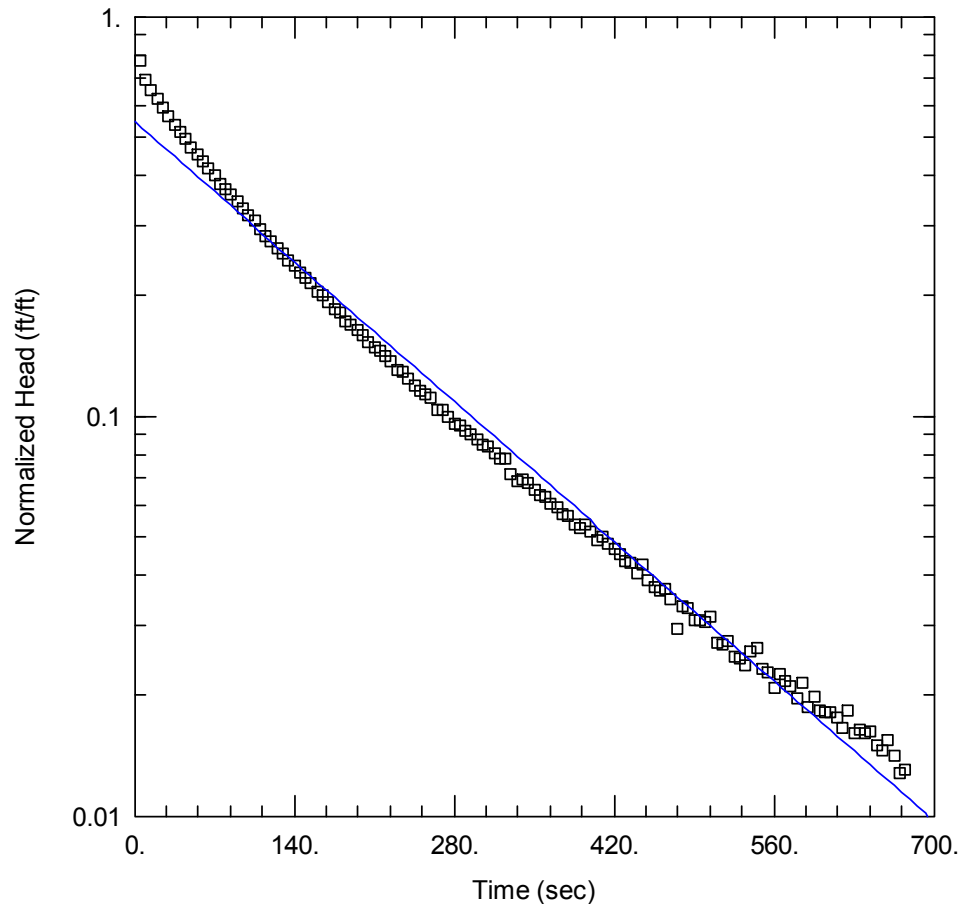
- HM-4 Slug In Run 3 – **Automated** Solution

Howell Mill Sewer Outfall
2016.5764.01
Slug Test Results



- HM-4 Slug In Run 3 – Low Solution

Howell Mill Sewer Outfall
2016.5764.01
Slug Test Results



Obs. Wells

□ New Well

Aquifer Model

Unconfined

Solution

Bouwer-Rice

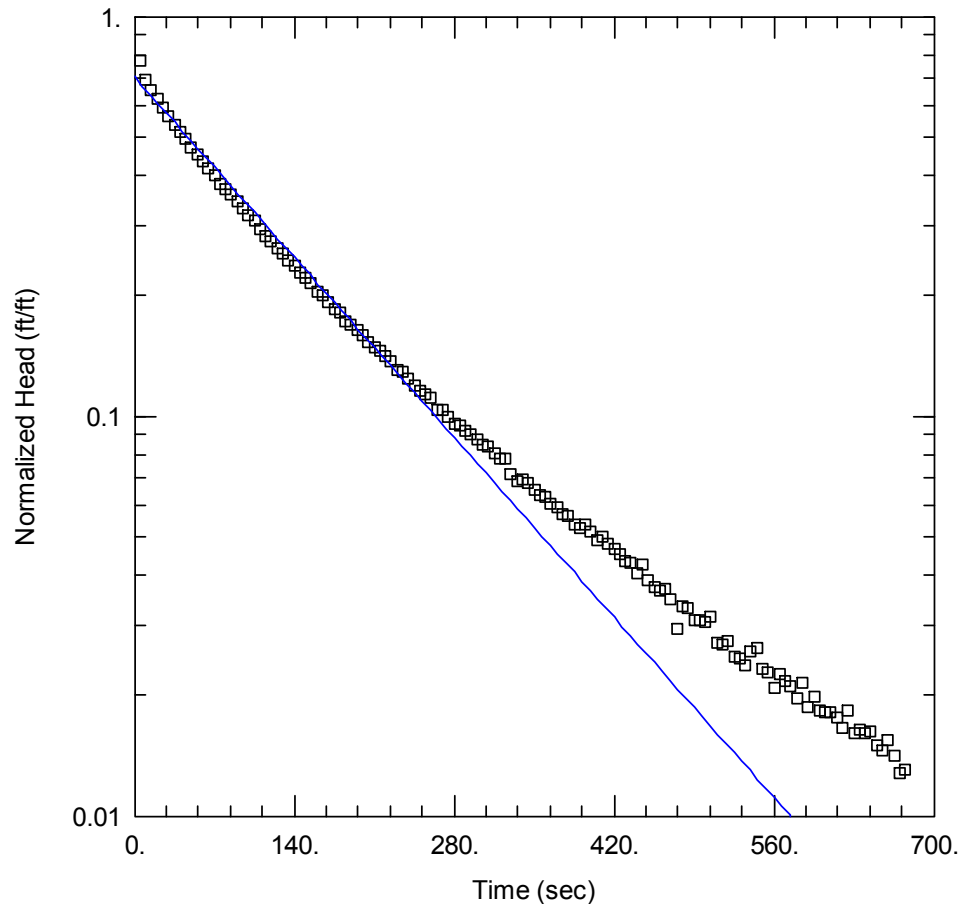
Parameters

$K = 6.588\text{E-}6$ ft/sec

$y_0 = -0.9333$ ft

- HM-4 Slug Out Run 3 – High Solution

Howell Mill Sewer Outfall
2016.5764.01
Slug Test Results



Obs. Wells

□ New Well

Aquifer Model

Unconfined

Solution

Bouwer-Rice

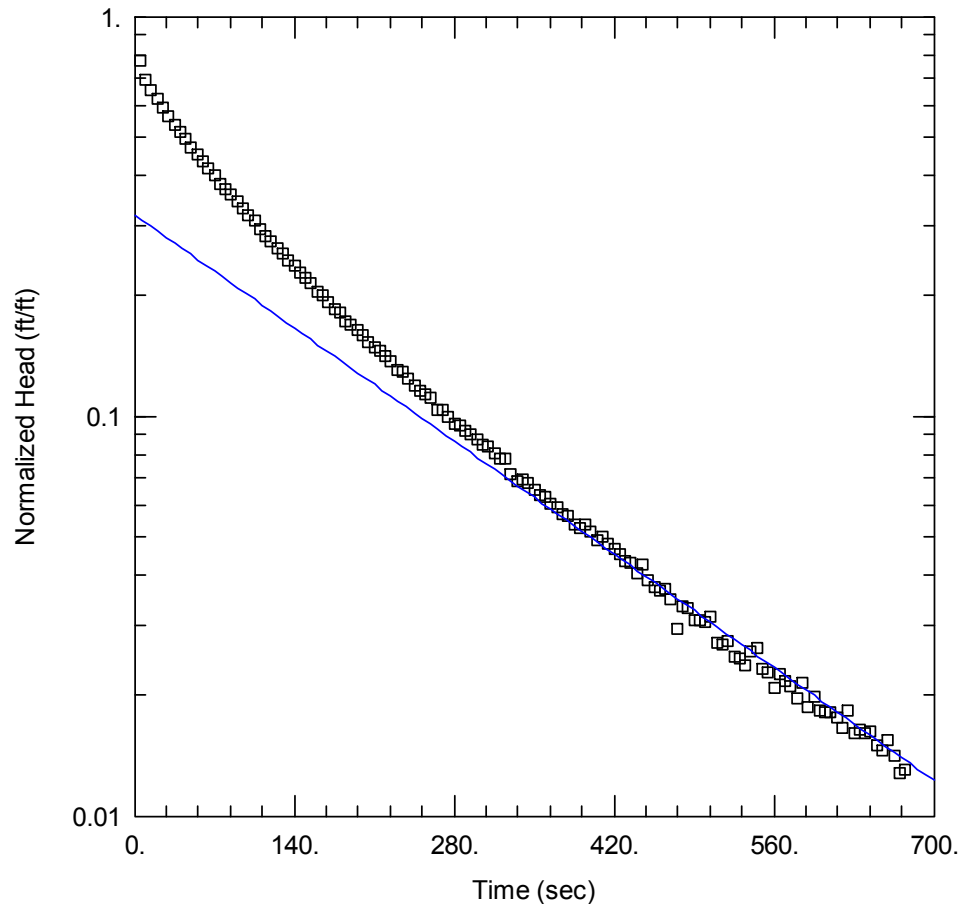
Parameters

$K = 8.487\text{E-}6$ ft/sec

$y_0 = -1.208$ ft

- HM-4 Slug Out Run 3 – **Automated** Solution

Howell Mill Sewer Outfall
2016.5764.01
Slug Test Results



Obs. Wells

□ New Well

Aquifer Model

Unconfined

Solution

Bouwer-Rice

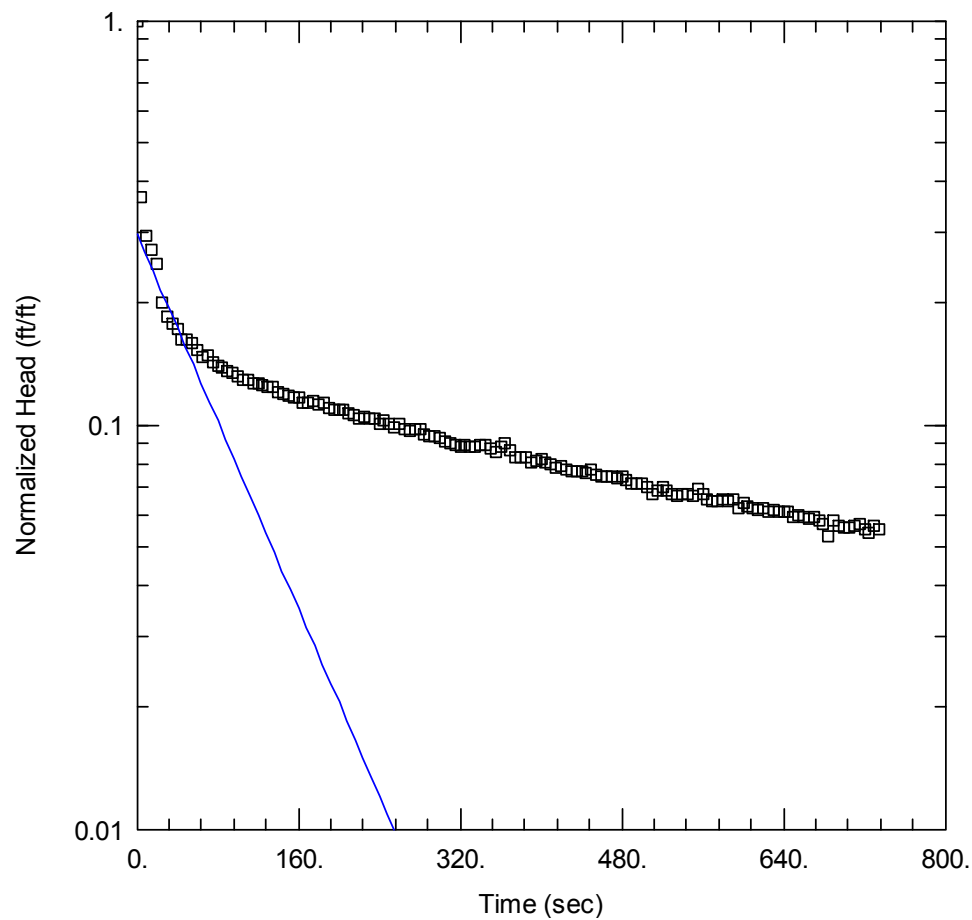
Parameters

$K = 5.329\text{E-}6 \text{ ft/sec}$

$y_0 = -0.5463 \text{ ft}$

- HM-4 Slug Out Run 3 – Low Solution

HM-7 RUN 1 SOLUTIONS



Obs. Wells

□ HM-7

Aquifer Model

Unconfined

Solution

Bouwer-Rice

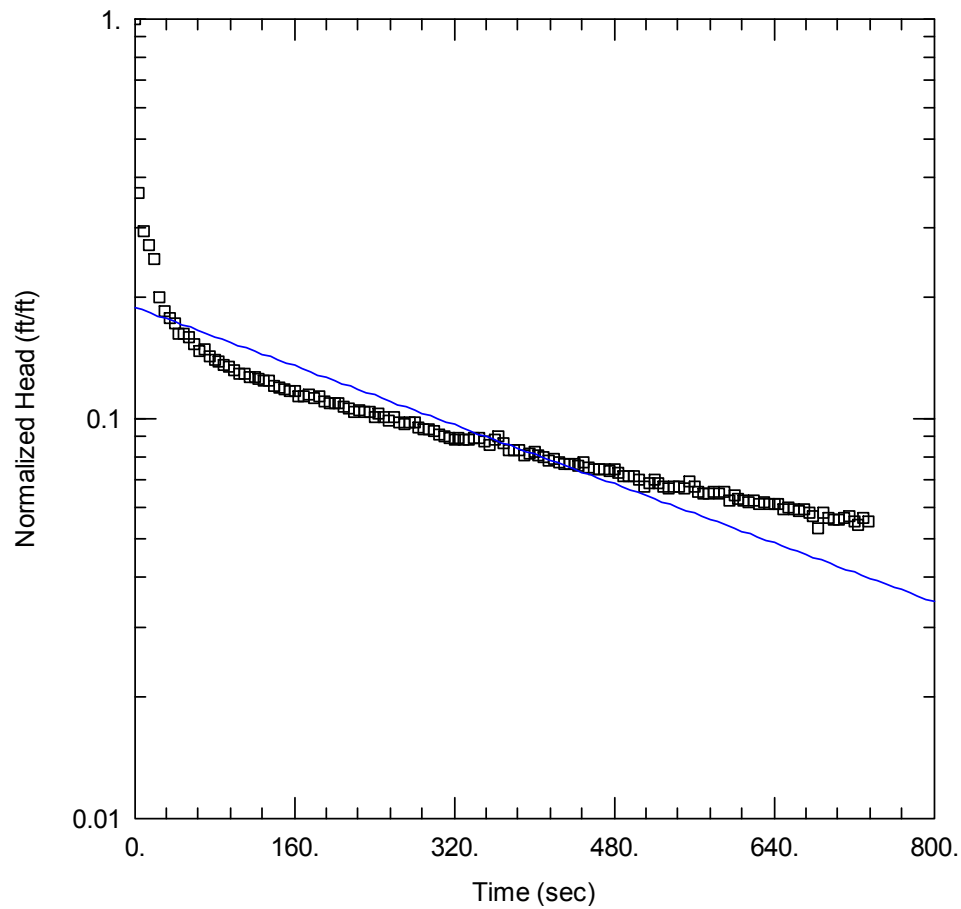
Parameters

$K = 1.52E-5$ ft/sec

$y_0 = 0.6465$ ft

- HM-7 Slug In Run 1 – High Solution

Howell Mill Sewer Outfall
2016.5764.01
Slug Test Results



Obs. Wells

□ HM-7

Aquifer Model

Unconfined

Solution

Bouwer-Rice

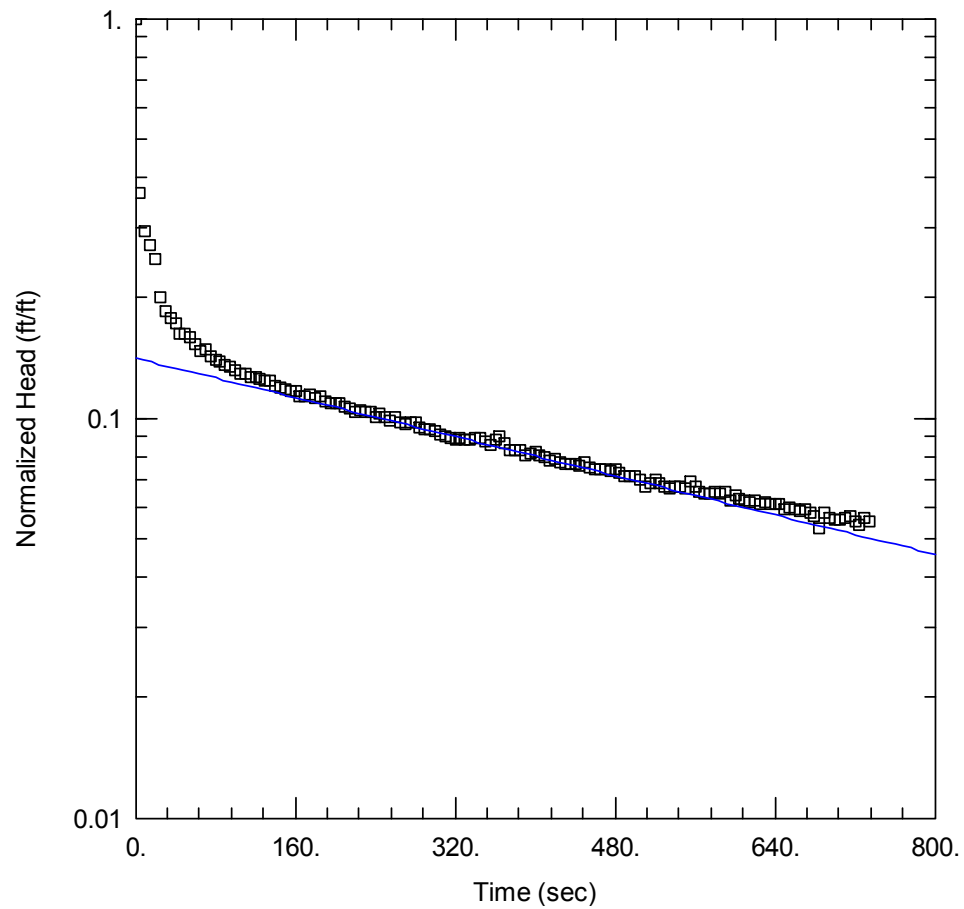
Parameters

$K = 2.418\text{E-}6$ ft/sec

$y_0 = 0.412$ ft

- HM-7 Slug In Run 1 – Automatic Solution

Howell Mill Sewer Outfall
2016.5764.01
Slug Test Results



Obs. Wells

□ HM-7

Aquifer Model

Unconfined

Solution

Bouwer-Rice

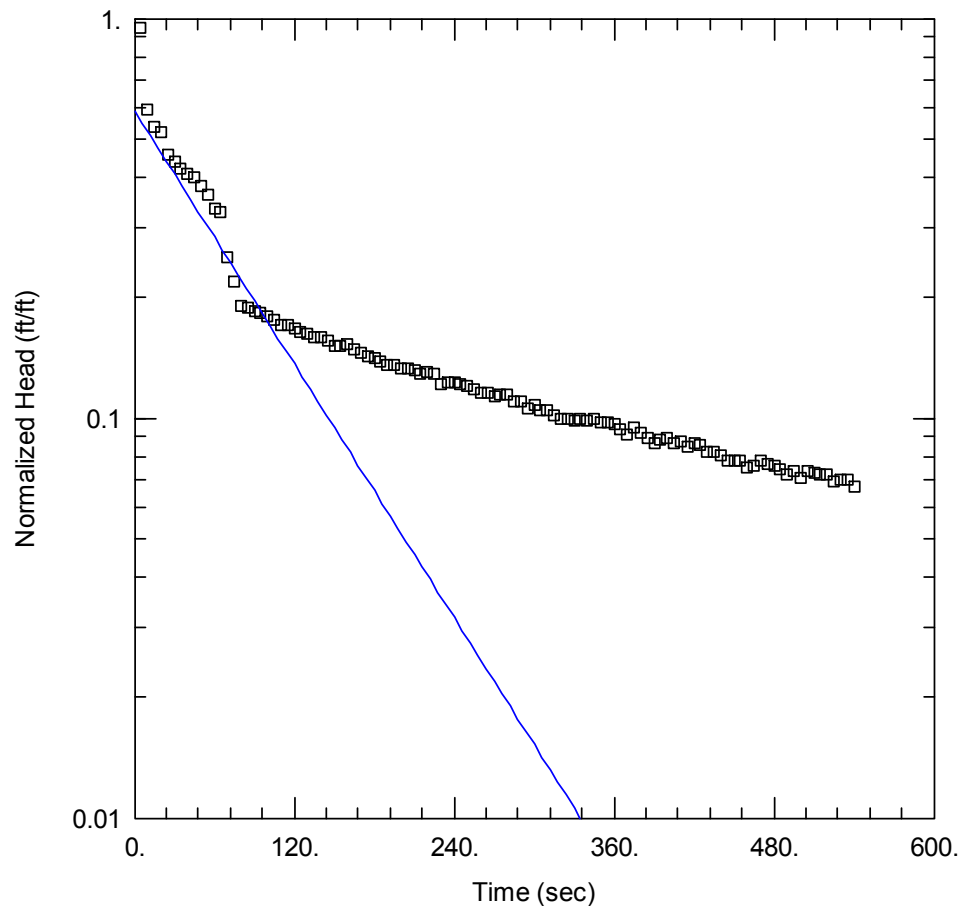
Parameters

$K = 1.605E-6$ ft/sec

$y_0 = 0.3064$ ft

- HM-7 Slug In Run 1 – Low Solution

Howell Mill Sewer Outfall
2016.5764.01
Slug Test Results



Obs. Wells

□ HM-7

Aquifer Model

Unconfined

Solution

Bouwer-Rice

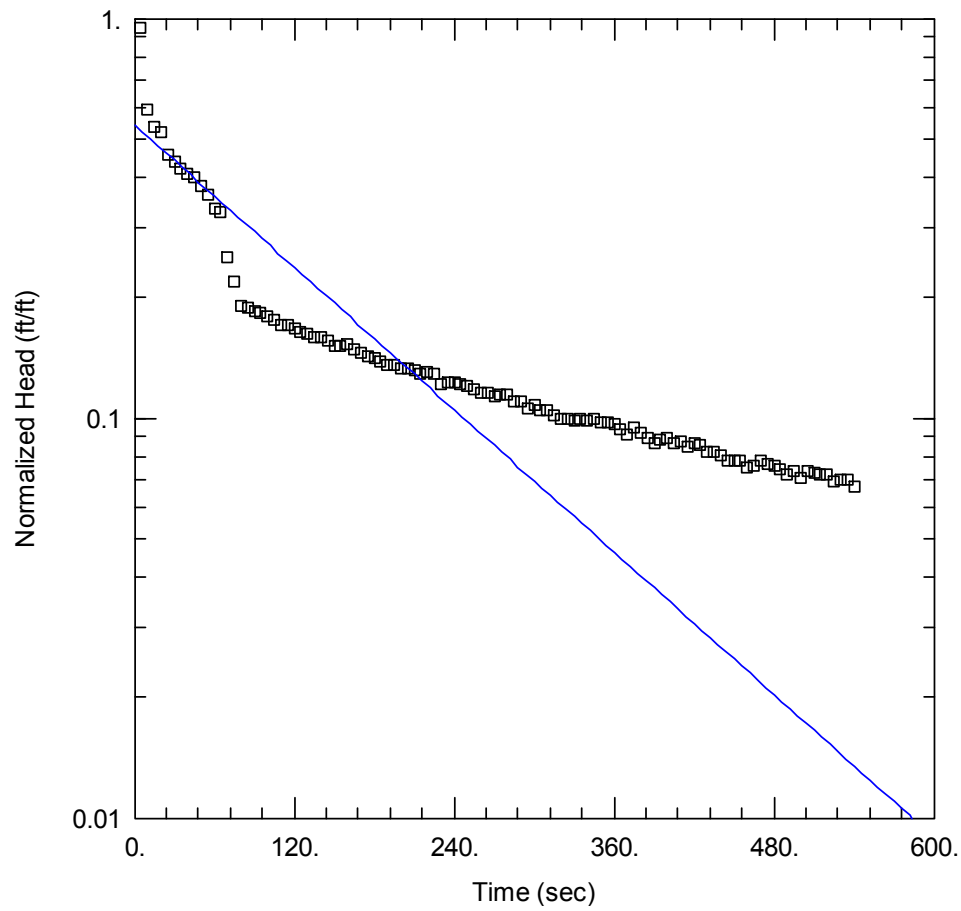
Parameters

$K = 1.386\text{E-}5$ ft/sec

$y_0 = -0.7654$ ft

- HM-7 Slug Out Run 1 – High Solution

Howell Mill Sewer Outfall
2016.5764.01
Slug Test Results



Obs. Wells

□ HM-7

Aquifer Model

Unconfined

Solution

Bouwer-Rice

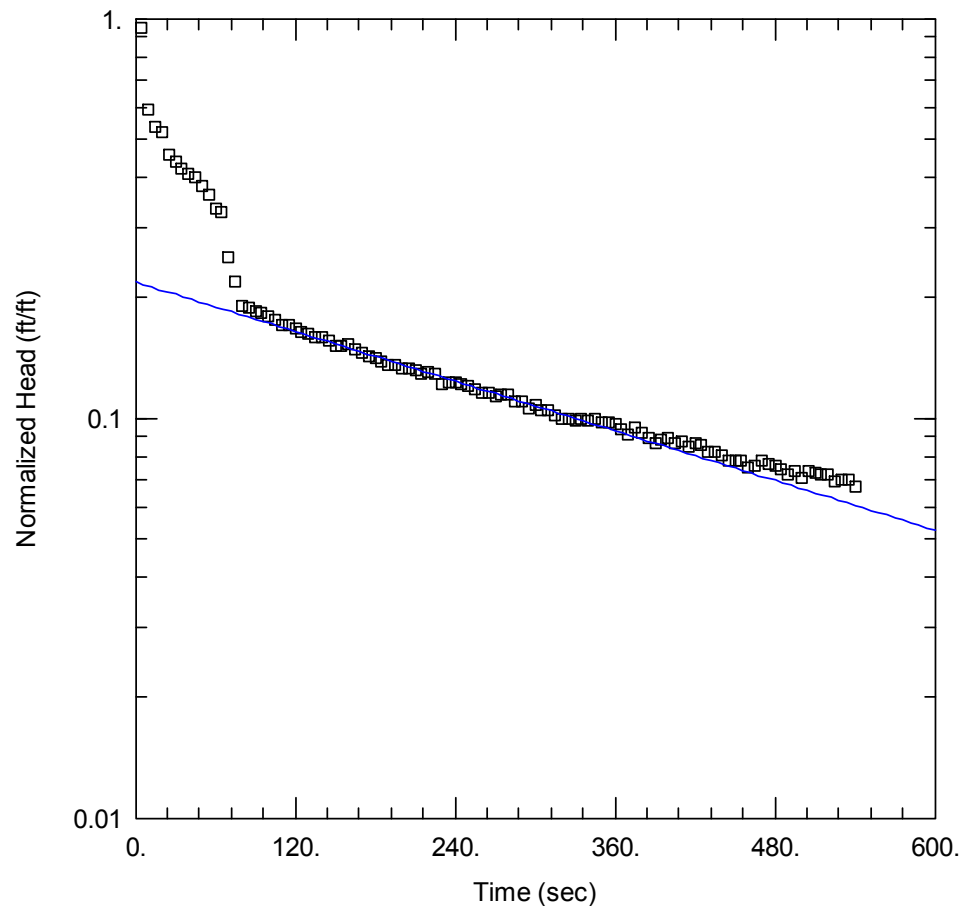
Parameters

$K = 7.787\text{E-}6$ ft/sec

$y_0 = -0.7047$ ft

- HM-7 Slug Out Run 1 – Automatic Solution

Howell Mill Sewer Outfall
2016.5764.01
Slug Test Results



Obs. Wells

□ HM-7

Aquifer Model

Unconfined

Solution

Bouwer-Rice

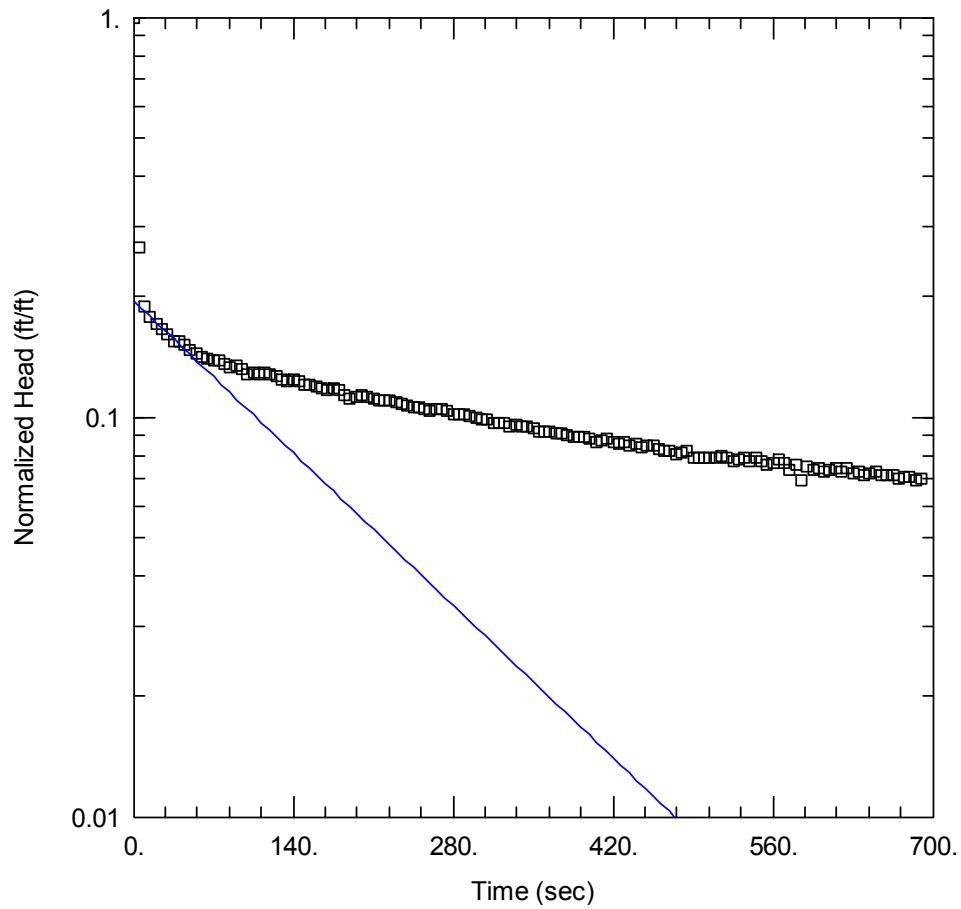
Parameters

$K = 2.713E-6$ ft/sec

$y_0 = -0.2849$ ft

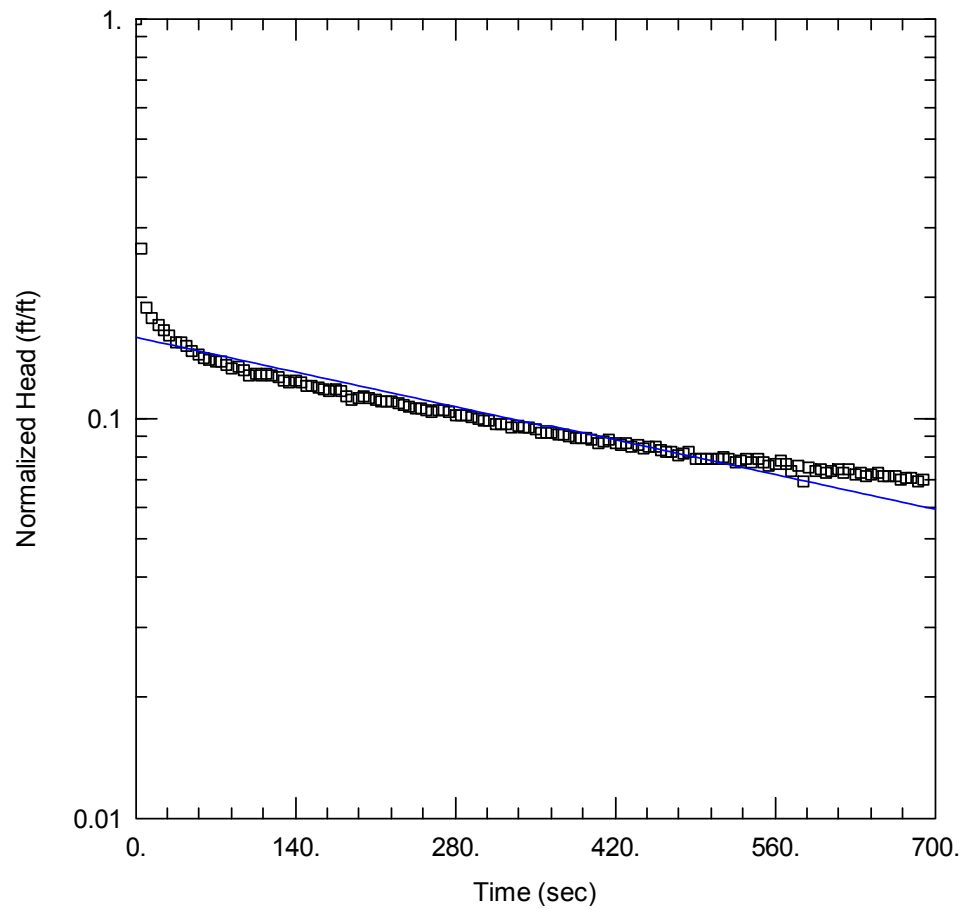
- HM-7 Slug Out Run 1 – Low Solution

HM-7 RUN 2 SOLUTIONS



- HM-7 Slug In Run 2 – High Solution

Howell Mill Sewer Outfall
2016.5764.01
Slug Test Results



Obs. Wells

□ HM7

Aquifer Model

Unconfined

Solution

Bouwer-Rice

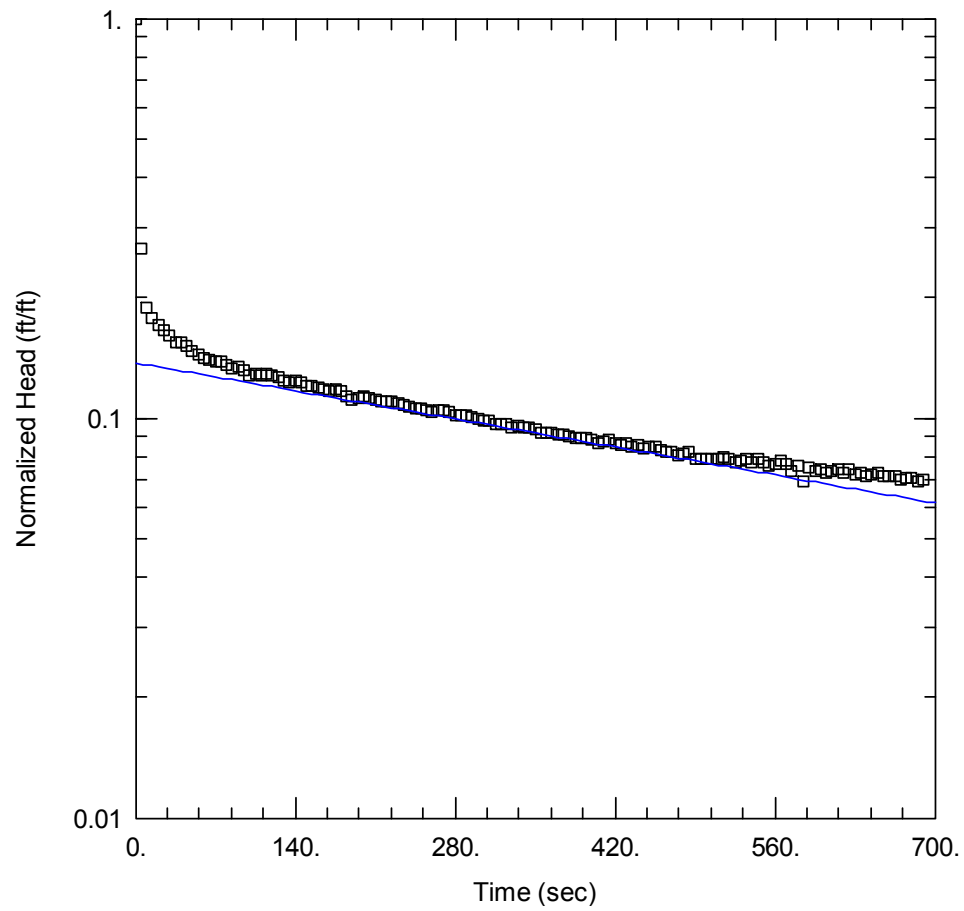
Parameters

$K = 1.597\text{E-}6 \text{ ft/sec}$

$y_0 = 0.3672 \text{ ft}$

- HM-7 Slug In Run 2 – **Automated** Solution

Howell Mill Sewer Outfall
2016.5764.01
Slug Test Results



Obs. Wells

□ HM7

Aquifer Model

Unconfined

Solution

Bouwer-Rice

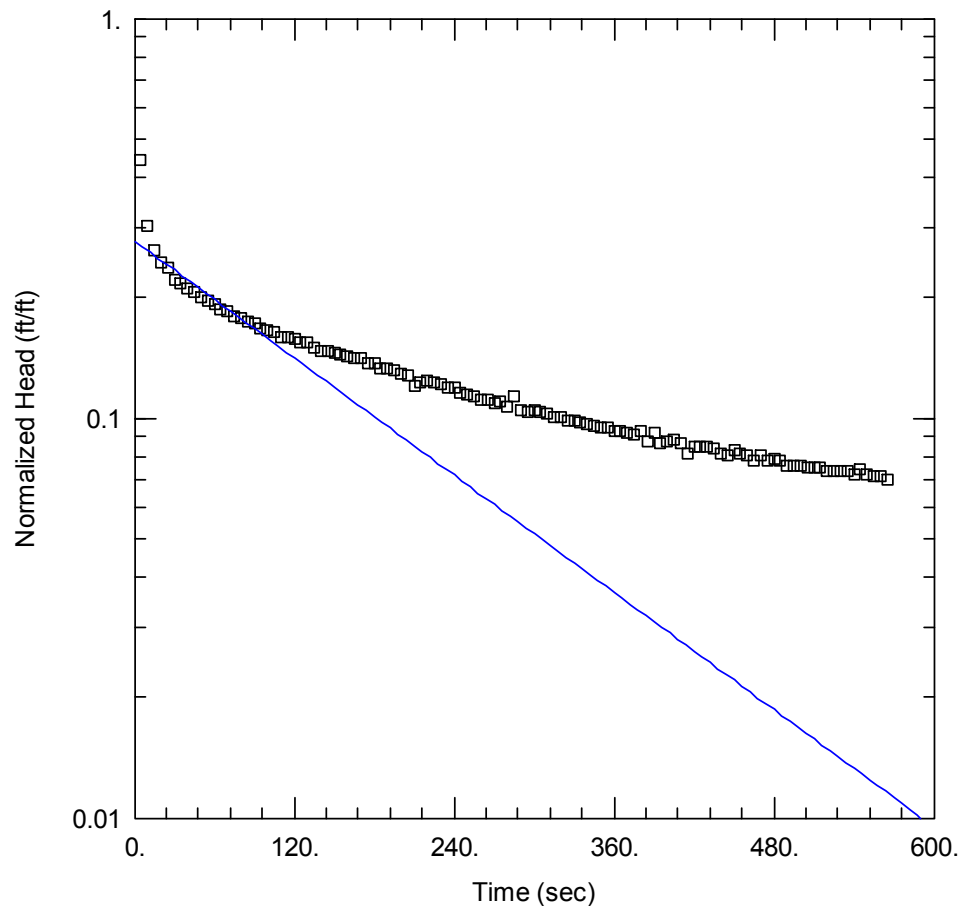
Parameters

$K = 1.314\text{E-}6 \text{ ft/sec}$

$y_0 = 0.3183 \text{ ft}$

- HM-7 Slug In Run 2 – Low Solution

Howell Mill Sewer Outfall
2016.5764.01
Slug Test Results



Obs. Wells

□ HM-7

Aquifer Model

Unconfined

Solution

Bouwer-Rice

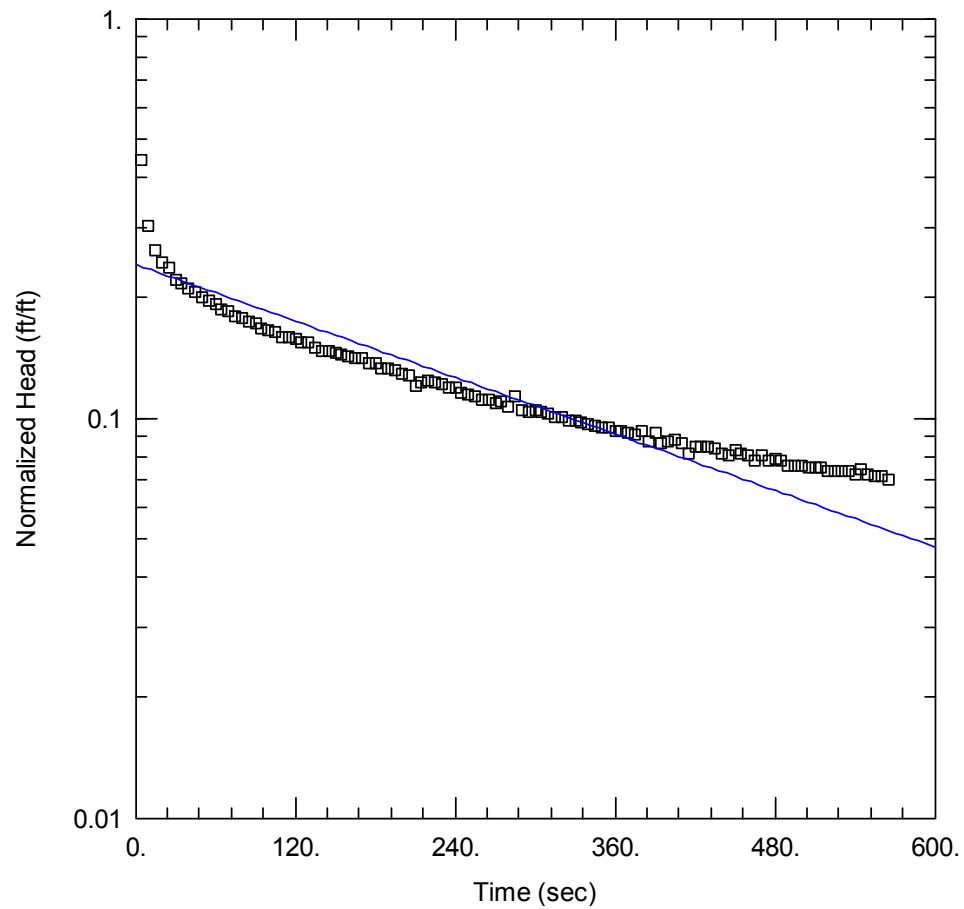
Parameters

$K = 6.406E-6$ ft/sec

$y_0 = -0.4384$ ft

- HM-7 Slug Out Run 2 – High Solution

Howell Mill Sewer Outfall
2016.5764.01
Slug Test Results



Obs. Wells

□ HM-7

Aquifer Model

Unconfined

Solution

Bouwer-Rice

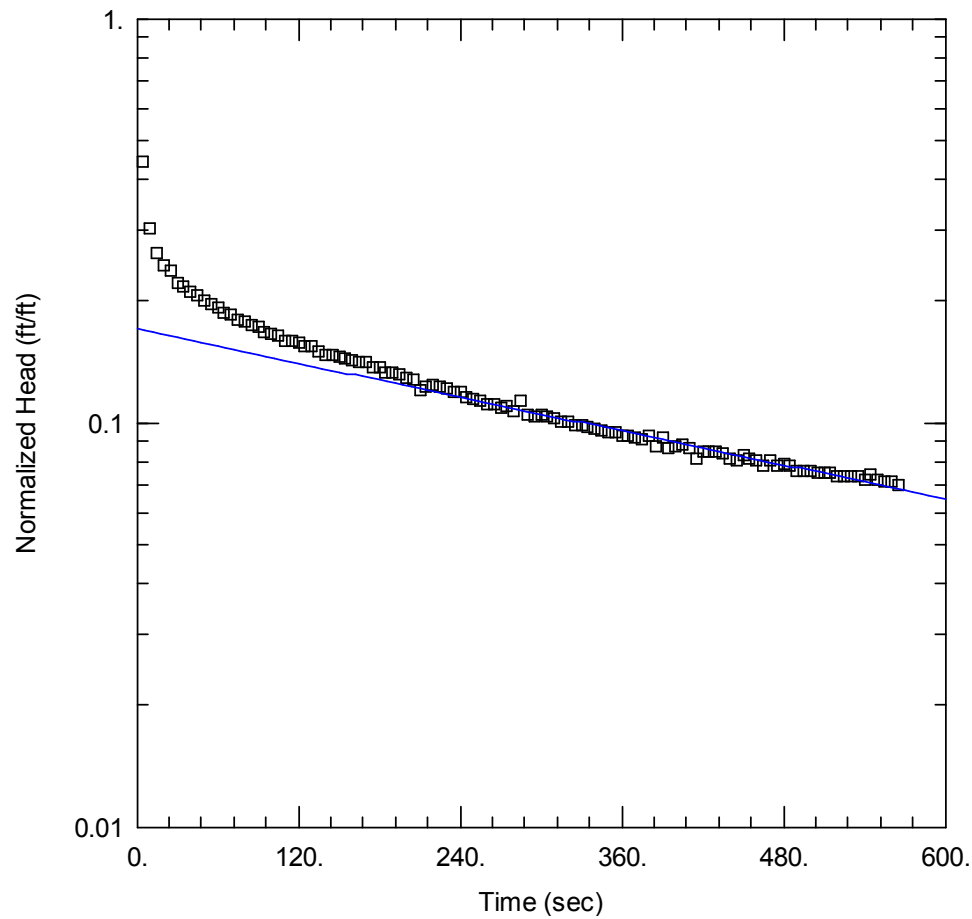
Parameters

$K = 3.087\text{E-}6$ ft/sec

$y_0 = -0.3821$ ft

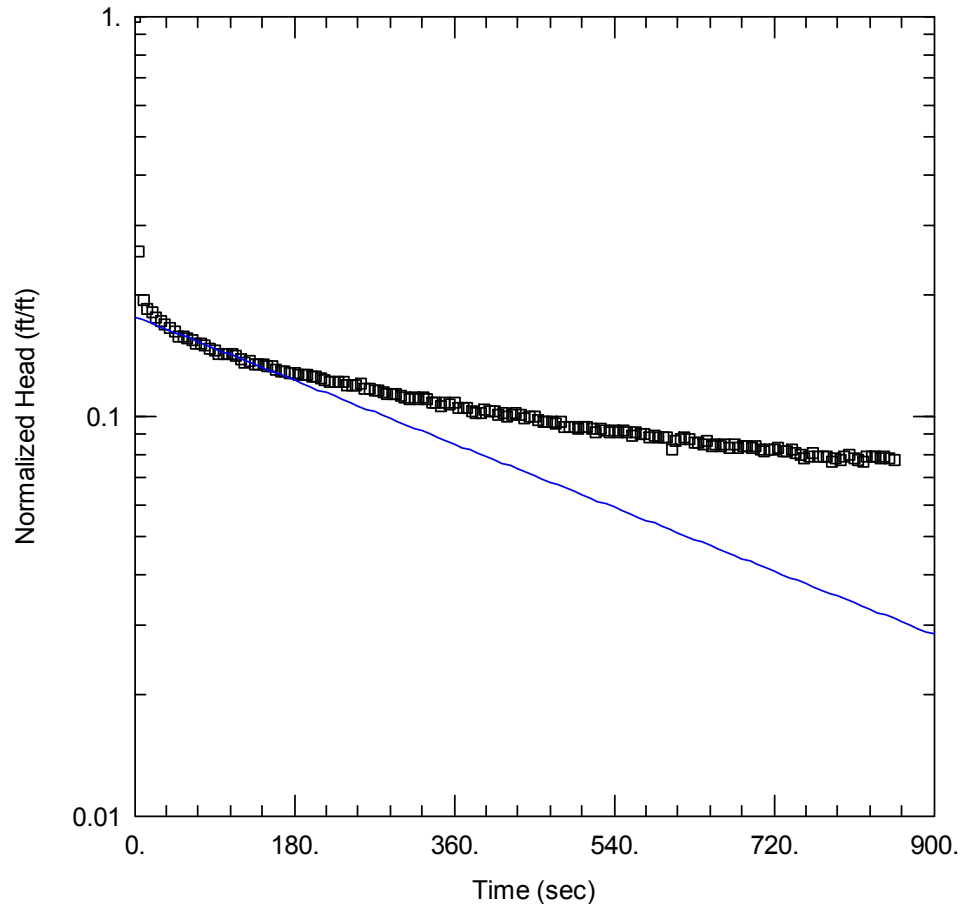
- HM-7 Slug Out Run 2 – **Automated** Solution

Howell Mill Sewer Outfall
2016.5764.01
Slug Test Results



- HM-7 Slug Out Run 2 – Low Solution

HM-7 RUN 3 SOLUTIONS



Obs. Wells

□ HM7

Aquifer Model

Unconfined

Solution

Bouwer-Rice

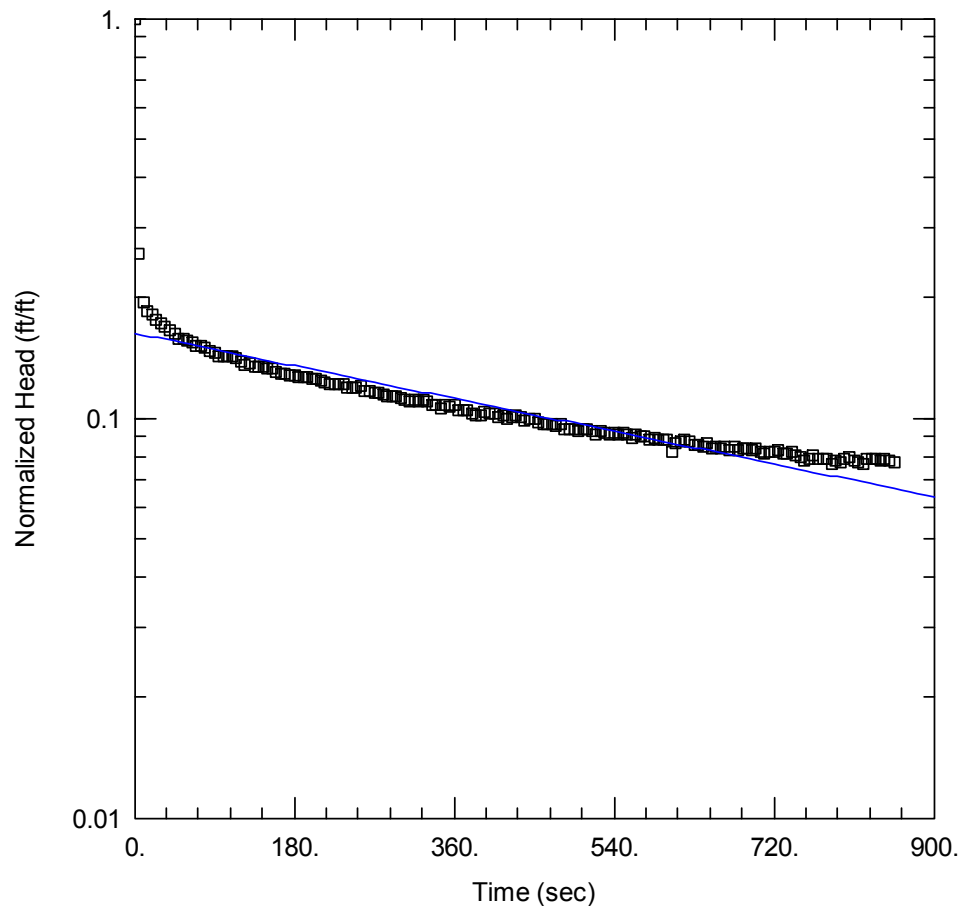
Parameters

$K = 2.317\text{E-}6 \text{ ft/sec}$

$y_0 = 0.4099 \text{ ft}$

- HM-7 Slug In Run 3 – High Solution

Howell Mill Sewer Outfall
2016.5764.01
Slug Test Results



Obs. Wells

□ HM7

Aquifer Model

Unconfined

Solution

Bouwer-Rice

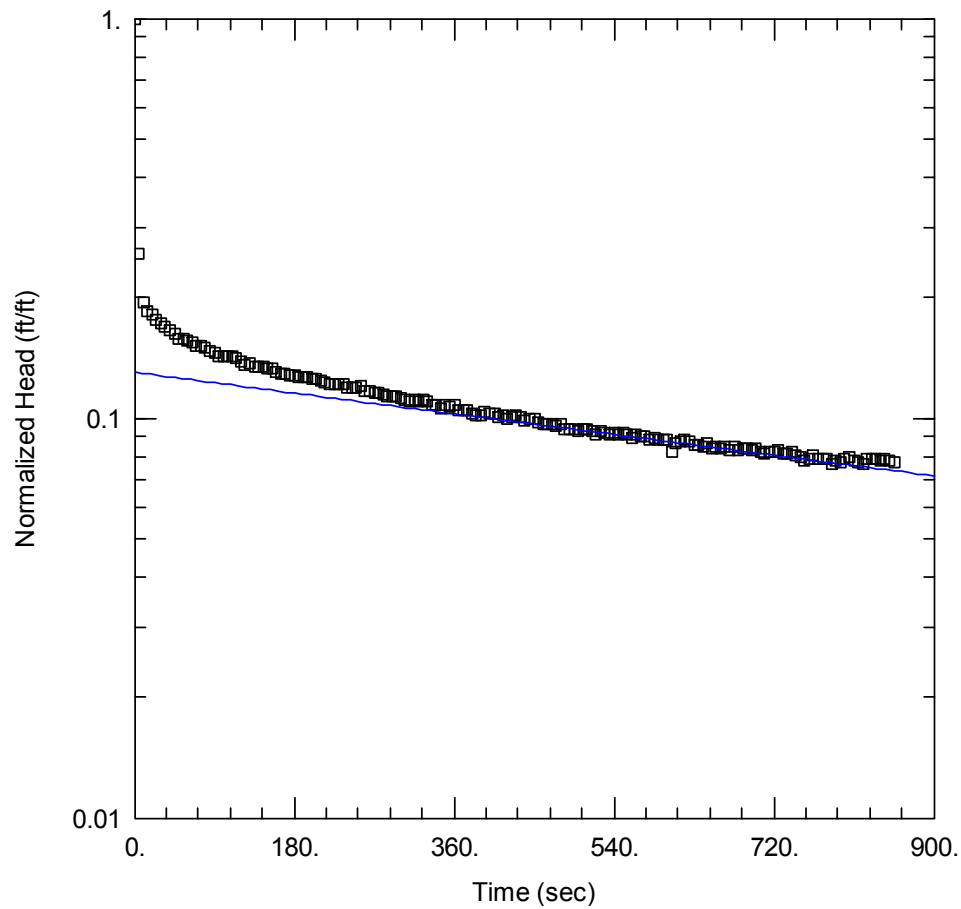
Parameters

$K = 1.192\text{E-}6 \text{ ft/sec}$

$y_0 = 0.3777 \text{ ft}$

- HM-7 Slug In Run 3 – **Automated** Solution

Howell Mill Sewer Outfall
2016.5764.01
Slug Test Results



Obs. Wells

□ HM7

Aquifer Model

Unconfined

Solution

Bouwer-Rice

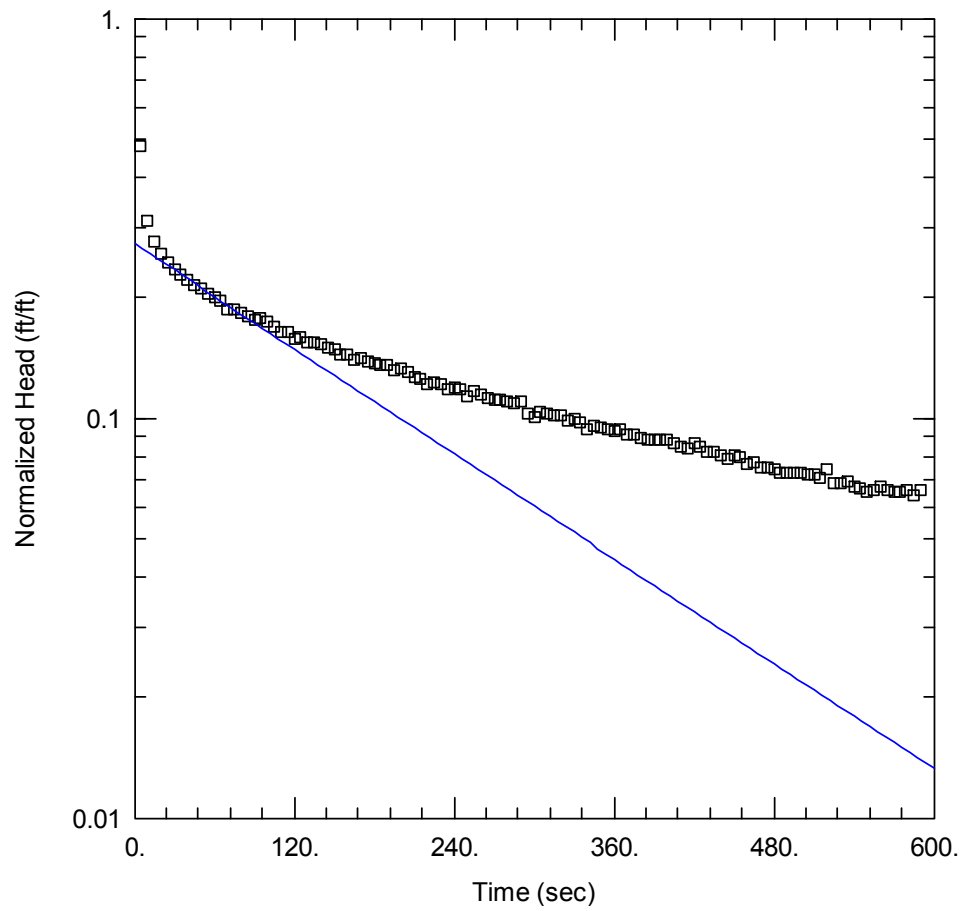
Parameters

$K = 7.548E-7$ ft/sec

$y_0 = 0.3012$ ft

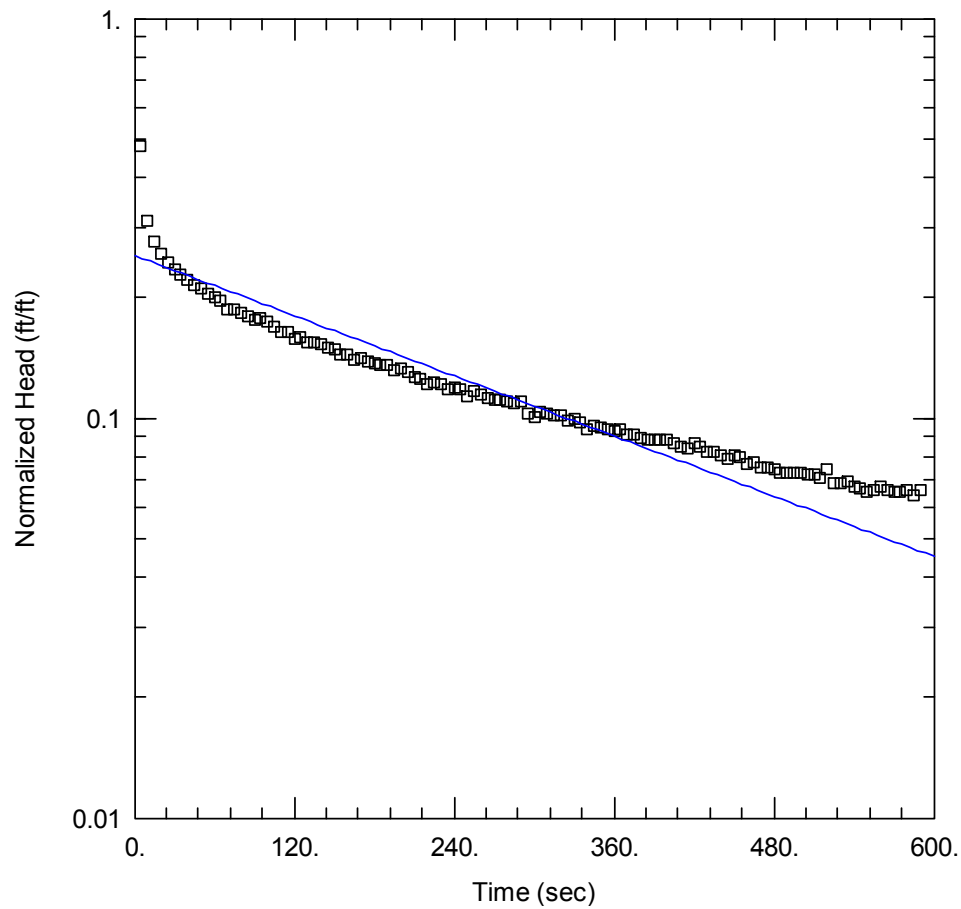
- HM-7 Slug In Run 3 – Low Solution

Howell Mill Sewer Outfall
2016.5764.01
Slug Test Results



- HM-7 Slug Out Run 3 – High Solution

Howell Mill Sewer Outfall
2016.5764.01
Slug Test Results



Obs. Wells

□ HM-7

Aquifer Model

Unconfined

Solution

Bouwer-Rice

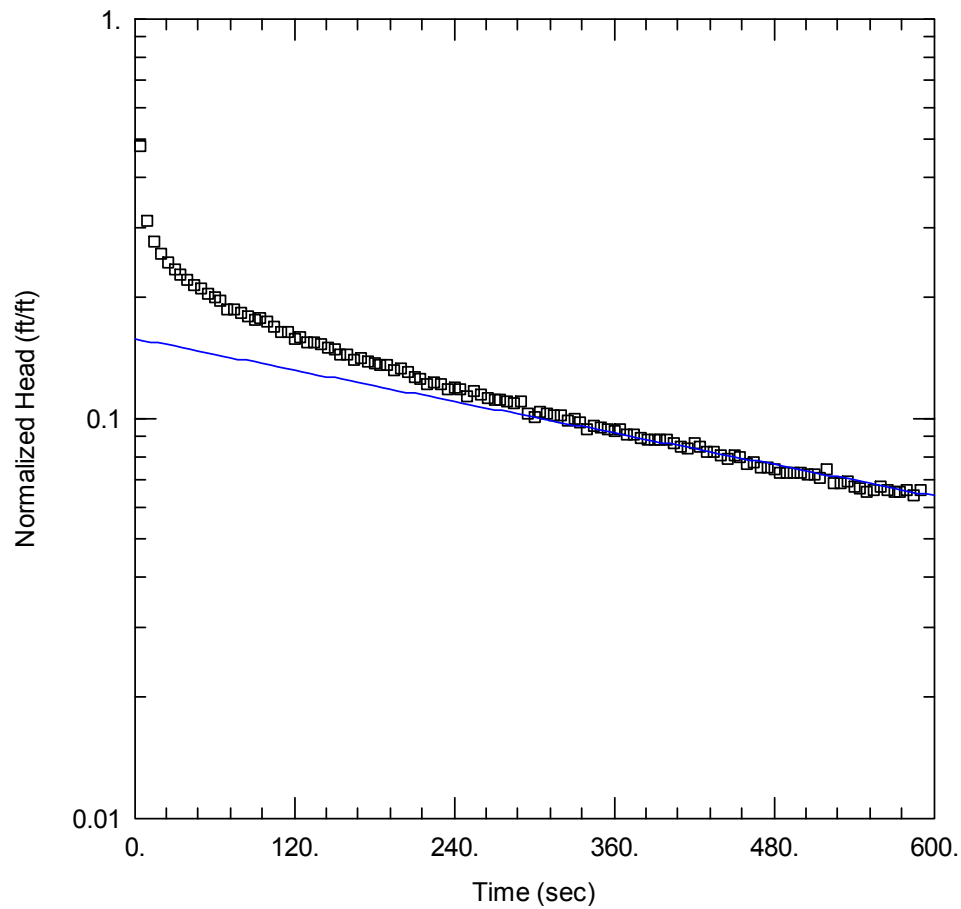
Parameters

$K = 3.292\text{E-}6$ ft/sec

$y_0 = -0.3812$ ft

- HM-7 Slug Out Run 3 – **Automated** Solution

Howell Mill Sewer Outfall
2016.5764.01
Slug Test Results



- HM-7 Slug Out Run 3 – Low Solution

Important Information About Your Geotechnical Engineering Report

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

The following information is provided to help you manage your risks.

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

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

Read the Full Report

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

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

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

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

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

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,

- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

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

Subsurface Conditions Can Change

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

Most Geotechnical Findings Are Professional Opinions

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

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final*, because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual

subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

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

Give Contractors a Complete Report and Guidance

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

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that

have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

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

Obtain Professional Assistance To Deal with Mold

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

Rely on Your ASFE-Member Geotechnical Engineer for Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with your ASFE-member geotechnical engineer for more information.



8811 Colesville Road/Suite G106, Silver Spring, MD 20910

Telephone: 301/565-2733 Facsimile: 301/589-2017

e-mail: info@asfe.org www.asfe.org

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GENERAL CONDITIONS

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PROJECT NO. FC-XXXX

PROJECT TITLE: Howell Mill Outfall Sewer Improvements

GENERAL CONDITIONS

GC-1 AGREEMENT AND AGREEMENT DOCUMENTS

The General Conditions, Special Conditions, Technical Provisions, Drawings, Changes, and all other parts of the Agreement Documents are complementary, and a requirement occurring in one shall be as binding as though occurring in all. The parts of the Agreement are complementary and describe and provide for completion of the Work. The table of contents, titles, headings, running headlines and marginal notes contained herein and in said documents are solely to facilitate reference to various provisions of the Agreement Documents and in no way affect, and shall not be considered in the interpretation of the provisions to which they refer.

Execution of the Agreement by Contractor is a representation that Contractor has visited the Site, become familiar with the local conditions under which the Work is to be performed, and has correlated personal observations with the requirements of the Agreement Documents.

The intent of the Agreement Documents is to include all items necessary for the proper execution and completion of the Work. Work not specifically covered in the Agreement Documents shall be required if it is consistent therewith and reasonably inferable therefrom as being necessary to produce the intended results. Words and abbreviations that have well-known technical or trade meanings are used in the Agreement Documents in accordance with such recognized meanings.

If and to the extent of any inconsistency, ambiguity, conflict, discrepancy or error in the Agreement Documents (a “discrepancy”), Contractor shall immediately notify the Owner in writing and seek clarification from the Owner (within 24 hours of discovery). In the event that the Owner fails to clarify such discrepancy within a reasonable time under the circumstances, Contractor shall proceed with the Work and give precedence to the Agreement Documents in the following order of priority:

- (1) Written modifications (including without limitation Change Orders and Change Directives) issued after execution of the Agreement;
- (2) Addenda issued in writing prior to the execution of the Agreement;
- (3) the Agreement;
- (4) Addendum, if any, to the General Conditions and Special Conditions;

- (5) Special Conditions;
- (6) the General Conditions;
- (7) the Specifications; and
- (8) the Plans and Drawings.

If the application of the foregoing procedure fails to resolve the discrepancy, then unless Contractor sought and obtained the clarification of the discrepancy prior to entering into this Agreement, then the discrepancy shall be resolved by construing the provision in favor of the Owner and in such a manner as will further the Owner's best interests and which may impose the more expensive or greater obligation upon Contractor. When Contractor fails to provide this notice and seek clarification, Contractor assumes full responsibility to correct or adjust work performed pursuant to Agreement Documents known, or which should have been known, to contain such a discrepancy.

GC-2 ADDITIONAL INSTRUCTIONS AND DETAIL DRAWINGS

During the progress of the Work, the Engineer may issue additional instructions and Drawings supplemental to those listed in the Special Conditions showing additional details required for the performance of the Work, and may issue revised Drawings pursuant to Change Orders or Change Directives, or for correction of errors in the Plans. The additional instructions and Drawings thus supplied will become a part of the Agreement Documents. Contractor shall carry out the Work in accordance with the additional instructions and Drawings.

GC-3 DEFINITIONS

The following terms as used in this Agreement are respectively defined, as follows:

Abandonment - Shall mean the permanent termination of the use of, or of service from in or on, a facility.

Approved, Directed, Ordered, Or Their Derivatives - Approved, as directed, or ordered by the Engineer or the City, unless otherwise clearly indicated.

Acceptance - The formal written acceptance by the City of the fully and finally completed Work.

Addenda - Revisions to the Proposal Documents issued by the City prior to opening of the Bid.

Agreement - The written agreement for the performance of and payment for the Work, which includes by reference and is a part of the Agreement Documents, executed on behalf of the City and the Contractor, also called City-Contractor Agreement.

Agreement Documents - The Agreement Documents are defined in other portions of the Agreement, but include, at least, the following, if applicable to this Project:

- This City-Contractor Agreement;
- General Conditions (Part I);
- Special Conditions (Part II);
- Scope of Service (Part III);
- Equal Business Opportunity Program (Appendix A);
- Insurance and Bonding Requirements (Appendix B);
- LOCAL Bidder Preference Program (Appendix C);
- Georgia Security and Immigration Compliance Act of 2006 (Appendix D);
- Supplemental General Conditions for Federally Assisted SRF (Appendix E);
- Bid Form (Exhibit A);
- Required Submittals (Exhibit B);
- Addendum (Exhibit C);
- Legislation (Exhibit D); and
- Performance and Payment Bonds

The Agreement Documents may also be referred to from time to time as the “Contract Documents.”

Agreement Price - The price or prices for the Work or items of Work set forth in the Bid.

Agreement Time - The number of calendar days stated in the Agreement Documents for the Substantial Completion of the Work or Final Completion of the Work, or the achievement of a specific interim milestone, as the context may require.

Applicant - Shall mean any person, company or corporation who intends or plans to request for water services for a new development.

Application for Payment - The form approved by the City that is to be used by Contractor in requesting progress payments or final payment, together with such supporting documentation as is required in the Agreement Documents. The Application for Payment may also be called Payment Application or Progress Payment.

Bid - The offer or bid of the Bidder submitted in the prescribed manner on the prescribed form setting forth the prices for the Work to be performed together with supplemental information as required by the Agreement Documents.

Bidder - Any person, firm, partnership, corporation or any combination thereof submitting a Bid for the Work.

Bonds - Bid, Performance Bonds, Payment Bonds, and other instruments of security furnished by Contractor and its surety in accordance with the Agreement Documents.

Bond means a written instrument of surety approved by the City with a valid Certificate of Authority issued by the United States Department of Treasury under Sections 9304 to 9308 of Title One of the United States Code as security to the City, on behalf of a Bidder or the Contractor, to guaranty faithful performance of acts, duties or obligations under the Contract Documents and includes the following.

- Bid Bond means the security instrument furnished with a Bid to guaranty that, if the Bidder is awarded the Contract, the Bidder will execute the Agreement within the time specified in the Bidding Documents.
- Maintenance Bond, if required on the Project, means the security instrument furnished by the Contractor and its surety on the approved form as a guaranty, in addition to other warranties and guaranties, to remedy any defects in the Work of the Contractor which may develop during the warranty period after Completion of the Contract.
- Payment Bond means the security instrument furnished by the Contractor and its surety on the Payment Bond Form as a guaranty that Contractor will pay in full all bills and accounts for materials and labor used in the Work.
- Performance Bond means the security instrument furnished by the Contractor and its surety on the Performance Bond Form as a guaranty that the Contractor will complete the Work in accordance with the terms of the Contract.

Change - Any change in the Work authorized by the Engineer, including Field Changes, Work Authorizations or Change Orders.

Change Directive – A written order prepared by the Owner and signed by the Owner directing a Change in the Work prior to or absent an agreement or adjustment, if any, in the Agreement Price or Agreement Time, or both.

Change Order - A written agreement signed by the Owner and Contractor, stating their agreement upon all of the following: (1) change in the Work that includes the addition or reduction of Work; (2) the amount of the adjustment, if any, in the Agreement Price; and (3) the extent of the adjustment, if any, in the Agreement Time and includes at least one of the above Changes. A Change Order does not include a Field Change, Work Authorization or Change Directive.

City - Shall mean the City of Atlanta, Georgia, and shall include all agencies, establishments or officials of the government of the City. The City may also be referred to from time to time as the “Owner.”

City-Contractor Agreement - The written agreement for the performance of and payment for the Work executed on behalf of the City and the Contractor, which is both a part of the Agreement

Documents and includes all Agreement Documents by reference. The City-Contractor Agreement may also be called "Agreement."

City's Contractor - Shall mean the legally authorized representative of the City, a private contractor, or other concerned agency performing Work under a direct Agreement with the City.

Construction - Shall mean the actual site preparation, building and all related Work, including facility relocation and adjustments.

Construction Easement/Temporary Easement - Any space or area dedicated to the City or other entity for the purpose of utilities or location of utilities for a specific period of time.

Construction Equipment - Equipment used in the performance of the Work but not incorporated therein.

Contract Documents - The Agreement Documents referenced above.

Contractor - Any firm, partnership, corporation, joint venture, LLC or any combination thereof who enters into a contractual Agreement with the City. This excludes Subcontractors/Sub-consultants.

CPM Schedule - A logic tied computerized network schedule incorporating all elements of the Work, prepared and updated in accordance with the requirements of the Special Conditions, subject to approval of the City.

Day - A calendar day of twenty-four (24) hours lasting from midnight one day to midnight the next day.

Department - Shall mean the Department of Watershed Management.

Designer - Shall refer to the firm licensed to practice engineering in the State of Georgia that seals the plans and specifications prior to bid.

Drawings - That part of the Agreement Documents which show the shape, outlines, dimensions, characteristics, scope of and other similar requirements governing the Work, or portions thereof, prepared by the Designer and including revisions thereto. The term is used interchangeably with the word "Plans" and includes without limitation Standard Details and Drawings.

Engineer - City of Atlanta or duly authorized representative assigned to administer the technical aspects of the Agreement. The terms Resident Engineer, Contract Administrator, or Contract Manager may be used interchangeably to denote the person designated expressly by the City with authority to administer the Agreement.

Equipment - Equipment incorporated or to be incorporated in the Work.

Field Change – A Change in Work that includes changes or adjustments to quantities or budget items but does not include a Change in the overall Agreement Price, overall Agreement Time or use of allowance items, which is required as a result of field conditions that require such adjustments. A Field Change does not include a Work Authorization, a Change Order or a Change Directive and is agreed upon and executed by an authorized City representative and the Contractor.

Force Account - A method of payment, other than lump sum or unit price, for Work ordered by Change Order and paid for in accordance with force account procedures indicated in “Force Account” Section of the General Conditions.

General Conditions - The General Conditions of the Agreement for construction that govern the rights, duties, and obligations of the parties.

GDOT - The Georgia Department of Transportation.

Inspector - The authorized representative of the Engineer or the City assigned to make detailed inspection of any or all portions of the Work or Materials thereof.

MARTA - Shall mean the Metropolitan Atlanta Rapid Transit Authority, or its designated legal representatives.

Materials - Materials incorporated or to be incorporated in the Work unless otherwise clearly indicated.

Modifications – Binding changes, addenda, revisions, or the like, to the Work or the Agreement Documents, including Changes to Work made by Change Order, Work Authorization, Field Change or Change Directive as required by GC-41.

Notice of Intent or Letter of Intent to Award - The written notice of the acceptance of the Bid from the City to a Bidder.

Notice to Proceed - (“NTP”) Written communication issued by the City to Contractor authorizing it to proceed with the Work and establishing the date of commencement of the Agreement time and on which Contractor shall start to perform its obligations in accordance with the Agreement Documents.

Owner - Same as “City” above.

Permanent Easement - Any space or area dedicated to the City or other entity for the purpose of constructing and/or maintain existing or future utilities.

Plans - That portion of the Agreement Documents describing in drawings, the shapes, outlines, dimensions, characteristics, scope and other similar requirements governing the Work, or portions thereof, prepared by the Designer and including revisions thereto. The term is used

interchangeably with the word "Drawings" and includes without limitation Standard Details and Drawings.

Project - The Project is identified in the City-Contractor Agreement and is the total construction of which the Work performed under the Agreement Documents is a part.

Public Space/Public Right-of-Way - Shall mean the area between private property lines under the jurisdiction of the City, county, state or federal government, including, but not limited to, an alley, roadway, median, sidewalk, public way, or any combination thereof.

Punch List - Shall mean the lists prepared by the City's Representative or Design Consultant prior to Substantial Completion and through Final Completion indicating items of Work not in accordance with the requirements of the Contract Documents and which must be performed, corrected and accomplished prior to acceptance of the Work.

Replacement Facility - Shall mean that facility, meeting the Department's current standards, which will be constructed or provided, as a consequence of the rearrangement of an existing facility or portion thereof.

Resident Engineer - The City's Engineer who is assigned to the Site or any part thereof.

Responsive Bid - A Bid which is accurate and complete with respect to Bid schedules and information submitted relative to the technical qualifications and financial responsibility and is able to comply with Equal Opportunity and other requirements of the Agreement Documents.

Samples - Shall mean physical examples furnished by Contractor, which illustrate materials, equipment or workmanship. Approved Samples in conformance with the Contract Documents establish the standards of the Work.

Shop Drawings - Shall mean drawings, diagrams, illustrations, schedules or other data illustrating the Work, and all illustrations, brochures, standard schedules, performance charts, specifications, instructions, diagrams, and other information prepared by a Subcontractor, Supplier, vendor or manufacturer and submitted by Contractor as required in the Contract Documents.

Scope of Services - See "Work."

Sidewalk Area - Shall mean that portion of a street between the curb lines and the adjacent property lines intended primarily for the use of pedestrians whether paved or in use.

Site - The areas required for the performance of the Work.

Special Conditions - Terms which supplement items covered in General Conditions.

Specifications, Technical Specifications - Shall mean those portions of the Contract Documents consisting of written technical descriptions, provisions or requirements of the Work to be

performed under the Contract Documents, including, but not limited to, the quantities or quality of materials, equipment, construction systems or applications. Standards for specifying materials or testing that are cited in the Specifications are part of the Contract Documents.

Standards - Shall mean those current Standards of Engineering analysis and design, including Installation and Material Specifications, which the City utilizes in the design and construction of its own projects.

State - The State of Georgia.

Subcontractor - An individual, firm, corporation or any combination thereof having a direct contract with Contractor for the performance of a part of the Work at the site.

Substantial Completion - The date certified by the Engineer when all or a part of the Work, identified in the Engineer's certification, is sufficiently completed in accordance with the requirements of the Agreement Documents so that the identified portion of the Work can be utilized for the purposes for which it is intended.

Supplier - Any individual, firm, or corporation who supplies Material or Equipment for the Work (including that fabricated to a special design) but who does not perform or provide significant labor at the Site.

Temporary Facility - Shall mean a facility constructed for whatever purpose and not intended to be permanent.

Utility - Shall mean and include all public, private, or cooperatively owned lines, facilities and systems for producing, transmitting or distributing communications, power, electricity, heat, gas, oil, crude products, water, steam, waste, storm water, and other similar commodities, such as public owned fire and police signal systems, which directly or indirectly serve the public or any part thereof.

Work - All the services specified, indicated, shown, or contemplated by the Agreement Documents and the furnishing by Contractor of all Materials, Equipment, labor, methods, processes, construction and manufacturing materials and equipment, tools, plants, supplies, power, water, transportation and other things necessary to complete such services in accordance with the Agreement Documents and that will ensure a functional and complete facility.

Work Authorization – A Change in Work that adds, changes or removes scope of work from the Agreement but does not include a change in Agreement Time or Agreement Price; or the utilization of an allowance or contingency item, as permitted and defined by the Agreement documents. A Work Authorization does not include a Change Order, a Field Change or a Change Directive and is agreed upon and executed by an authorized City representative and the Contractor.

Working Days - Generally, Monday, Tuesday, Wednesday, Thursday, and Friday; however, on some projects, Saturday and/or Sunday may be considered working days, if specified as working days by the City or Engineer. Holidays are not considered Working Days.

Written Notice - A written statement transmitted from one party to an authorized representative of another party

GC-4 APPLICABLE CODES, SPECIFICATIONS, AND STANDARDS

GC-4.1 General

All codes, Specifications, regulations, laws, ordinances, and standards referred to in the Agreement Documents shall mean, and are intended to be, the latest editions, amendment, and revisions of such reference standard in effect as of the date of the Invitation to bid for this Agreement, and as may be updated or amended to be applicable to the Project.

GC-4.2 Standards

Reference to a technical society, institution, association, or governmental authority, or pronoun in place of them, is made in the Agreement Documents in accordance with the following abbreviations:

ANSI	American National Standards Institute;
ASTM	American Society for Testing and Materials;
AWS	American Welding Society;
AASHTO	American Association of State Highway and Transportation Officials;
ACI	American Concrete Institute;
AFBMA	Anti-Friction Bearing Manufacturer's Association;
AI	Asphalt Institute;
AISI	American Iron and Steel Institute;
AISC	American Institute of Steel Construction;
AMCA	Air Moving and Conditioning Association;
API	American Petroleum Institute;
ASME	American Society of Mechanical Engineers;
ASTM	American Society for Testing and Materials;
AWG	American (Brown and Sharpe) Wire Gauge;
AWS	American Welding Society;
AWWA	American Water Works Association;
CRSI	Concrete Reinforcing Steel Institute;
EPA	Environmental Protection Agency (Federal);
EPD	Environmental Protection Division (Georgia State);
GDOT	Georgia Department of Transportation ("GDOT");
MARTA	Metropolitan Atlanta Rapid Transit Authority;
NACE	National Association of Corrosion Engineers;
NFPA	National Fire Protection Association;

NSF	National Sanitary Foundation;
OSHA	Occupational Safety and Health Administration; and
UL	Underwriter's Laboratories Incorporated.

GC-5 ADEQUACY OF DESIGN

Before placing its Bid to the City, and continuously after the execution of the Agreement, Contractor shall carefully study and compare the Agreement Documents and shall at once report any error, ambiguity, inconsistency or omission that may be discovered, including any requirement which may be contrary to any law, ordinance, rule, regulation, or order of any public authority bearing on the performance of the Work. By submitting its Bid for the Agreement and the Work under it, Contractor agrees that the Agreement Documents, along with any supplementary written instructions issued by or through the Engineer that have become a part of the Agreement Documents, appear accurate, consistent, and complete. Contractor shall perform no portion of the Work at any time without Agreement Documents or, where required, approved shop Drawings, product data, or samples for such portion of the Work.

No claims shall be made by Contractor based on claims of defects, errors, omissions, ambiguities or inconsistencies in the Agreement Documents which were reasonably discoverable by a review of the Agreement Documents and correlation thereof with the actual conditions at the Project Site. No observation of the Engineer or City, and no inspections, tests or approval shall relieve Contractor from its obligation to perform the Work in strict conformity with the Agreement Documents.

Contractor has determined, by its own investigation and research, all the conditions affecting the work to be done and materials to be furnished and does not rely upon any representation by the City in connection therewith.

THE CITY, ITS AGENTS AND EMPLOYEES MAKE NO REPRESENTATION OR WARRANTY OF ANY NATURE WHATSOEVER TO CONTRACTOR CONCERNING THE AGREEMENT DOCUMENTS. By the execution hereof, Contractor acknowledges and represents that it has received, reviewed and carefully examined such documents, has found them to be complete, accurate, adequate, consistent, coordinated and sufficient for construction, and that Contractor has not, does not, and will not rely upon any representations or warranties by the City concerning such documents as no such representations or warranties have been or are hereby made.

Prior to execution of the Contract, Contractor has evaluated and satisfied itself as to the condition and limitations under which the Work is to be performed, including, without limitation, (i) the location, condition, layout, and nature of the Project Site and surrounding areas, (ii) generally prevailing climatic conditions, (iii) anticipated labor supply and costs, (iv) availability and cost of materials, tools and equipment, and (v) other similar issues. With the exception of any differing site conditions clause, if any, that may be included in the Agreement Documents, the City assumes no responsibility or liability for the physical condition of the Project Site, or any

improvements located on the Project Site. Contractor shall be solely responsible for providing a safe place for the performance of the Work.

Contractor acknowledges and agrees that its obligation to construct the Work in accordance with the Agreement Documents is not in any way altered or affected by the observations or inspections of the City or the Designer. Further, Contractor acknowledges and agrees that any warranty periods included herein merely set forth the time period during which Contractor is contractually required to specifically perform corrective work and that these warranty periods are not and shall not be construed to be exclusive remedies of the City. Instead, Contractor acknowledges and agrees that it shall be liable to the City for the cost of correcting Work not performed in accordance with the Agreement Documents for the full period of the applicable statute of limitations.

GC-6 CITY OF ATLANTA ORDINANCES

Contractor shall be bound by the provisions of all City of Atlanta Ordinances. It is Contractor's responsibility to be aware of and adhere to all existing or future ordinances that are in effect during the performance of the Agreement.

GC-7 PERMITS AND REGULATIONS

All applicable federal laws, state laws, municipal ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the Project shall apply to the Agreement throughout to the extent that such requirements do not conflict with federal laws or regulations and in the event of a conflict, federal laws shall govern. All Work performed within the right of way of GDOT shall be in accordance with GDOT regulations, policies, and procedures.

Except as expressly stated in the Contract Documents, Contractor shall secure and will provide all building permits, licenses, and other applicable legal documents required for Contractor's performance of the Project.

Contractor shall give all notices and comply with all permits, laws, ordinances, rules and regulations bearing on the conduct of the Work as drawn and specified.

If any permit, license or certificate expires or is revoked, terminated or suspended as a result of any action on the part of Contractor or any person or entity for which Contractor is responsible, it shall neither be entitled to any additional compensation, nor to an extension of Agreement Time.

GC-8 TAXES

Contractor shall pay all sales, retail, occupational, service, excise, old age benefit and unemployment compensation taxes, consumer, use and other similar taxes as well as any other

taxes or duties on the Material, Equipment and labor for the Work or portions thereof provided by Contractor which are legally enacted by any municipal, county, federal or state authority or department or agency thereof at the time Bids are received, whether or not yet effective.

All records maintained by Contractor pertaining to such taxes and levies and payment thereof shall be made available to the City at reasonable times for inspection, audit and copying.

GC-9 ARREARS TO OFFSET DEBT AGAINST CITY

No money shall be paid by the City upon any claim, debt, demand or account whatsoever, to any person, firm, or corporation who is in arrears to the City for taxes, or any other debt or claim, and the City shall be entitled to counterclaim and/or offset any such debt, claim, demand or account in the amount of taxes so in arrears or other debts or claims of the City, and no assignment or transfer of such debt, claim, demand, or account after the said taxes are due or after any such debt or claim is asserted by the City, shall affect the right of the City to so offset the said taxes, debts, or other obligations against the same.

Contractor agrees that the City shall be allowed to setoff and recoup any claim or demand that it may have against Contractor (or any of its constituent members if Contractor is a joint venture) whether such claim or demand is liquidated or unliquidated. Contractor further agrees that in the event it assigns or sells any amounts due or to become due under this Agreement, notice to the City of such assignment or sale shall not affect the City's rights of setoff or recoupment against Contractor for claims subsequently arising on this or any other project. Any assignee or purchaser of any amounts due Contractor under this Agreement shall be bound to these provisions and shall assume the risk of subsequently arising claims of setoff or recoupment.

GC-10 LIENS

Contractor acknowledges that neither it nor any of its Subcontractors or Suppliers have lien rights on public property. Contractor will furnish the City with evidence, satisfactory to the City that all persons who have done Work or furnished materials in performance of this Agreement have been fully paid before it shall demand final payment due or unpaid under this Agreement. In case such evidence is not furnished, an amount necessary to meet the lawful claims of the persons aforesaid may be retained from any monies due or that may become due the said Contractor under this Agreement until the lawful claims aforesaid shall be fully discharged, and it is understood and agreed that the City assumes no obligation nor in any way undertakes to pay such lawful claim out of any funds due or that may become due the said Contractor out of the City's own funds.

If, in its sole discretion, the City wishes to make joint payment to Contractor and any of its Subcontractors or Suppliers, Contractor agrees that the City may do so, and Contractor agrees to cooperate with the City in identifying the amounts due Subcontractors and Suppliers to facilitate the making of said joint payment.

GC-11 ASSIGNMENTS

Contractor shall retain personal control and shall give personal attention to the fulfillment of this Agreement. Contractor shall not assign the whole or any part of this Agreement or any monies due or to become due hereunder without the written consent of the City. In case Contractor assigns all or any part of any monies due or to become due under this Agreement, the instrument of assignment shall contain, or shall be deemed to contain, a clause substantially to the effect that it is agreed that the right of the assignee in and to any monies due or to become due to Contractor shall be subject to claims of all persons, firms, and corporations for services rendered or materials supplied for the performance of the Work called for in this Agreement and to setoffs and recoupments by the City as set forth in GC-9 above. Any assignment of this Agreement in whole or in part or any assignment of monies due or to become due hereunder must bind the assignee to all terms and conditions of this Agreement and protect and preserve all rights and remedies of the City as against Contractor and extend to the City the same rights and remedies against assignee. In the event that any person or entity should claim entitlement to all or any part of any monies due or to become due under this Agreement under the doctrine of subrogation, it further agrees that its rights shall be subject to claims of all persons, firms, and corporations for services rendered or materials supplied for the performance of the Work called for in this Agreement and to setoffs and recoupments by the City as set forth in GC-9 above.

GC-12 PATENTS AND ROYALTIES

Contractor shall indemnify and hold harmless the City and its officers, agents, servants, and employees from liability or all claims of any nature or kind, including costs, attorneys' fees, and expenses for, or on account of, any patented or unpatented invention, process, article, or appliance manufactured or used in the performance of the Agreement, including its use by the City, unless otherwise specifically stipulated in the Agreement Documents.

If Contractor uses any design, device or Materials covered by letters, trademarks, patent or copyright, it shall provide for such use by suitable agreement between the City and the holder of such design, device or Material. It is mutually agreed and understood that, without exception, the Agreement Price shall include all royalties or costs arising from the use of such design, device, or Materials in any way involved in the Work. Contractor or its sureties or both shall indemnify and hold harmless the City, its officers and employees from any and all claims for infringement by reason of the use of such patented or copyrighted design, device or Materials or any trademark or copyright in connection with Work agreed to be performed under this Agreement and Contractor shall indemnify the City for any cost, expense or damage which it may be obliged to pay by reason of such infringement at any time during the prosecution of the Work or after completion of the Work, including any costs or expenses for experts and attorneys' fees.

GC-13 OUT-OF-STATE CONTRACTORS

If the lowest responsive Bidder is a foreign corporation, partnership, or sole proprietorship, the Bidder hereby irrevocably appoints the Secretary of State of Georgia as its agent for services of all legal process for the purpose of this Agreement only and shall obtain all required certificates and licenses required by the Georgia Law.

GC-14 CONTRACTOR'S OBLIGATIONS

GC-14.1 Supervision and Construction Procedures

GC-14.1.1

Contractor shall supervise and direct the Work, using Contractor's best skill and attention. Contractor shall be solely responsible for all construction means, methods, techniques, sequences and procedures and shall coordinate all portions of the Work under the Agreement. All Work under the Agreement shall be performed in a skillful and workmanlike manner. Contractor shall exercise its control over all means, methods, techniques, and procedures so as to carefully and diligently coordinate the work of all Subcontractors and Suppliers or anyone working by, through, or under Contractor or a Subcontractor or Supplier.

GC-14.1.2

Contractor shall be responsible to the City for the acts and omissions of Contractor's employees, Subcontractors, Suppliers, and their agents and employees, and any other persons performing any of the Work under a contract with Contractor or a Subcontractor or Supplier.

GC-14.1.3

Contractor shall not be relieved from Contractor's obligations to perform the Work in accordance with the Agreement Documents by the activities or duties of the Engineer in the administration of the Agreement or by inspections, tests, or approvals required or performed by persons other than Contractor.

GC-14.1.4

Contractor shall carefully study and compare the Agreement Documents with each other and with the site conditions and other information furnished by the Owner and shall at once report in writing to the Owner alleged errors, inconsistencies or omissions. If Contractor performs any construction activity involving an error, inconsistency or omission in the Agreement Documents that Contractor recognized or reasonably should have recognized and without having given written notice to the Owner, Contractor shall assume complete responsibility for such performance and shall bear the full amount of the attributable costs for correction.

GC-14.1.5

Contractor shall take field measurements and verify field conditions and shall carefully compare such field measurements and conditions and other information available to Contractor with the Agreement Documents before commencing activities. Errors, inconsistencies, or omissions discovered shall be reported in writing to the Owner at once and shall be subject to the provisions of the last sentence of GC-14.1.4 above.

GC-14.2 Labor and MaterialsGC-14.2.1

Unless otherwise provided in the Agreement Documents, Contractor shall provide and pay for all labor, Materials, Equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for the proper execution and completion of the Work, whether temporary or permanent, and whether or not incorporated or to be incorporated in the Work.

GC-14.2.2

Contractor shall, at all times, enforce strict discipline and good order among Contractor's employees and Subcontractors, and shall not employ on the Work any Subcontractor, unfit person or anyone not skilled in the task assigned them. The City may, after Written Notice, require Contractor to remove from the Work any employee the City deems incompetent, careless, or otherwise objectionable, including any employee of a Subcontractor or Supplier.

GC-14.2.3

All Work at the site shall be performed during regular working hours, except upon the City's written consent given after prior Written Notice.

GC-14.3 Contractor's Construction Schedule

Contractor shall comply with all scheduling requirements set forth in the Agreement Documents, including but not limited to the Special Conditions requirements for a CPM Schedule for performance of the Work.

GC-14.4 Conditions Affecting the Work

Contractor shall be responsible for having taken all steps necessary to ascertain the nature and location of the Work and the general and local conditions that can affect the Work or the cost thereof. Failure by Contractor to fully acquaint itself with conditions that may affect the Work, including but not limited to conditions relating to transportation, handling, storage of Materials, availability of labor, water, roads, weather, topographic and subsurface conditions, as-built conditions, other separate contracts to be entered into by the City relating to this Project that may

affect the Work of Contractor, applicable provisions of law, and the character and availability of equipment and facilities needed prior to and during the prosecution of the Work, shall not relieve Contractor of its responsibilities under the Agreement Documents and shall not constitute a basis for an equitable adjustment or additional compensation under any circumstances. The City assumes no responsibility for any understanding or representations concerning conditions made by any of its officers, agents, or employees prior to the execution of the Agreement, unless such understanding or representations are expressly stated in the Agreement Documents.

GC-15 RIGHT OF ENTRY

The City reserves the right to enter the Site of the Work herein contracted for, by such agent or agents as they may elect, for the purpose of inspecting the Work, or for the purpose of installing such collateral Work as the City may desire. Contractor shall cooperate and coordinate with other contractors prosecuting other phases of the construction. Furthermore, if deemed necessary by the Engineer, Contractor will incorporate work activities of other City contractors directly into the schedule such that no phase of the Project(s) is delayed or impacted.

GC-16 NOTICES

Any notice, consent, approval, or other communication which is provided for or required by the Agreement Documents must be in writing and may be delivered in person to any party or may be sent by a facsimile transmission or by registered or certified U.S. mail, with postage prepaid, return receipt requested. Copies of all facsimiles shall also be sent via first class mail. Any such notice or other written communication shall be deemed received by the party to whom it is sent (i) in the case of delivery by hand or delivery by reputable national or local courier (such as United Parcel Service or Federal Express), on the date of delivery to the party to whom such notice is addressed, (ii) in the case of facsimile transmission, one working day after the date of successful transmission (provided that an additional first class mail copy of such notice is subsequently received within five (5) days of the facsimile transmission), and (iii) in the case of registered or certified mail, the date receipt is acknowledged on the return receipt for such notice. All such notices and other written communications shall be sent to the persons and addresses listed below

If to Owner:

Contract Administrator
Department of Watershed Management
55 Trinity Avenue
Suite 5400
City Hall
Atlanta, Georgia 30303

and

Chief Procurement Officer
Department of Procurement
Room 1790
55 Trinity Avenue
Atlanta, Georgia 30303_____

If to Contractor:

Representative
Contractor
Address
City, State, Zip_____

The addresses and persons listed may be changed at any time by giving Written Notice in accordance with this Article GC-16.

GC-17 SAFETY PRECAUTIONS AND PROGRAMS

The City, the Engineer, or their agents, employees or representatives are not responsible for the means, methods, techniques, sequences or procedures utilized by Contractor, or for the safety precautions and programs in connection with the Work. Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work and for complying with all applicable rules, ordinances, state and federal laws and regulations.

GC-18 SAFETY OF PERSONS AND PROPERTY

GC-18.1 Damage, Injury, or Loss

Contractor shall take all reasonable precautions for the safety of, and shall provide all reasonable protection to prevent damage, injury, or loss to:

- (1) All employees on the Work and all other persons who may be affected thereby;
- (2) All the Work and all Materials and Equipment to be incorporated therein, whether in storage on or off the site, under the care, custody, or control of Contractor or any of Contractor's Subcontractors;
- (3) Other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction; and
- (4) The Work of the City or other separate contractors.

GC-18.2 Notice

Contractor shall give all notices and comply with all applicable laws, ordinances, rules, regulations, and lawful orders of any public authority bearing on the safety of persons or property or their protection from damage, injury, or loss.

GC-18.3 Warning, Signage

Contractor shall erect and maintain, as required by existing conditions and the progress of the Work, all reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent utilities.

GC-18.4 Hazardous Materials

When the use or storage of explosives or other hazardous materials or equipment is necessary for the execution of the Work, Contractor shall exercise the utmost care and shall carry on such activities under the supervision of properly qualified personnel.

GC-18.5 Remedy

Contractor shall promptly remedy all damage or loss to any property caused in whole or in part by Contractor, any Subcontractor, Supplier or anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable, except damage or loss attributable solely to the acts or omissions of the City, the Engineer or anyone directly or indirectly employed by any of them in any way, or by anyone for whose acts any of them may be liable, and not attributable to the fault or negligence of Contractor. The foregoing obligations of Contractor are in addition to Contractor's obligations under the Insurance Section of the General Conditions or other provisions of the General Conditions.

GC-18.6 Project Safety Coordinator

Contractor shall provide a project safety coordinator who shall be devoted full time toward accident prevention during construction. The qualifications of the project safety coordinator shall be submitted to the Department of Watershed Management Office of Security and Safety (OSS) for approval. If the candidate meets the qualifications, the candidate will be interviewed by OSS to confirm the candidate's experience. Individuals must meet the requirements outlined below to be qualified for the position.

- (1) (a) Four (4) year Bachelor's degree and Five (5) years of construction loss control or construction safety experience; OR
 - (b) Ten (10) years of construction loss control or construction safety experience, AND
- (2) Current certifications as listed below in a, b, and c:

(a) OSHA 510 or equivalent 30 hours of construction safety training.

- Trenching and Excavation (Standards- 29 CFR- 1926.651)
- Confined Space Entry (Standards- 29 CFR- 1910.146 App. E), AND

(b) Traffic Control/flagging (Certified GDOT flagger), AND

(c) First Aide/CPR/AED (Standards- 29 CFR- 1910.266 (App. B).

GC-18.7 Loads

Contractor shall not load or permit any part of the Work to be loaded so as to endanger its safety.

GC-18.8 Emergencies

In any emergency affecting the safety of persons or property, Contractor shall act, at Contractor's discretion, to prevent threatened damage, injury or loss. Any additional compensation or extension of time claimed by Contractor on account of emergency Work shall be determined as provided in the Agreement Documents, including GC-26 and GC-41.

GC-18.9 Miscellaneous

GC-18.9.1

Contractor acknowledges that it is fully aware of appropriate and safe procedures regarding blasting, including the contents and requirements of Official Code of Georgia Annotated § 25-9-1 through § 25-9-12, Blasting or Excavating Near Underground Gas Pipes and Facilities, any amendments thereto and rules and regulations issued pursuant thereto, and Contractor shall fully comply therewith. Contractor agrees and acknowledges that any failure on its part to adhere to appropriate procedures and said laws, rules and regulations shall not only be a violation of law but shall also be a breach of Agreement.

GC-18.9.2

Contractor acknowledges that it is fully aware of appropriate and safe procedures regarding high voltage lines, including the contents and requirements of Official Code of Georgia Annotated § 46-3-30 through § 46-3-39, Safeguards Against Contact with High Voltage Lines, any amendments thereto and rules and regulations issued pursuant thereto, and Contractor shall fully comply therewith. Contractor also confirms that representatives of Contractor have visited the site of the Work and have taken into consideration the location of all electric power lines on and adjacent to all areas onto which the Agreement Documents require or permit Contractor to Work, to store materials or to stage operations, and that Contractor has obtained from the owner or owners of the

aforesaid electric power lines advice in writing as to the amount of voltage carried by the aforesaid lines. Contractor agrees that any failure on its part to adhere to appropriate procedures and said laws, rules and regulations shall not only be a violation of the law but shall also be a breach of Agreement.

GC-18.9.3

Contractor acknowledges and agrees that he is the person responsible under the law and that he is the person employing or directing others to perform labor within the meaning of Official Code of Georgia Annotated § 34-1-1, Labor and Industrial Relations. He acknowledges and agrees likewise that he will comply with said law.

GC-18.9.4

Contractor shall protect all Work, including but not limited to, excavations and trenches, from rain water, surface water, and backup of drains and sewers. Contractor shall furnish all labor, pumps, shoring, enclosures, and Equipment necessary to protect and keep the Work free of water.

GC-18.9.5

The provisions, terms and conditions of this Section, although very specific, are in no way intended to limit the general requirements hereof or the applicability of laws relating to Work conditions, safety or accident prevention and no specific provision or combination of specific provisions in any of said subsections or in any other parts or sections of the Agreement Documents shall be deemed to limit the obligations or responsibility of Contractor contained in general provisions with respect thereto or in laws, statutes, acts, rules or regulations which are applicable thereto but which are not specifically referred to in any part of the Agreement Documents.

GC-19 USE OF PREMISES AND CLEAN UP

GC-19.1 Storage, Cleanup and Cutting

Contractor expressly undertakes at no additional cost to the City:

- (1) To store its Materials, Supplies and Equipment at the Site of the Work in such orderly fashion and in such locations as approved by the Engineer that will not unduly interfere with the progress of the Work, or the Work of any other contractors or the activities of City personnel.
- (2) To clean up all refuse, rubbish, scrap materials, and debris caused by its operations to the end that at all times the Site of the Work shall present a neat orderly and workmanlike appearance. No items shall be left or discarded

elsewhere on the Site, or any other City sites. Items that are to be discarded shall be removed to approved dump areas.

- (3) To remove all surplus material, false work, temporary structures, including foundations thereof, temporary plants of any description and debris of every nature resulting from its operations, and to put the Site in a neat, orderly condition before final payment. Such final cleanup Work shall be performed within the time specified for completion of Work, with such exceptions as may be approved in writing by the City. Unless otherwise provided in the Specifications, Contractor shall clean any portion of Work for which a separate time for completion is specified and the Site thereof to the above standards within the specified time, with such exceptions as may be approved in writing by the City.
- (4) To effect all cutting, fitting or patching of its Work required to make the same to conform to the Plans and Specifications and except with the consent of the City, not to cut or otherwise alter the Work of any other contractor.

GC-19.2 Protection and Use of Site

Contractor shall, at no additional cost to the City:

- (1) Coordinate all of Contractor's operations with, and secure approval from, the City before using any portion of the Site. Contractor shall assume full responsibility for any damage to any such land or area, or to the City or occupant thereof or of any land or areas contiguous thereto, resulting from the performance of the Work.
- (2) Cause its agents and employees to park their vehicles only at locations directed by the City. Contractor's agents and employees shall clean vehicles leaving the Site so as not to muddy roads in the vicinity of the Site. Vehicles shall be brought to the Site only in connection with necessary Work on the Project. In no event shall vehicles be brought to the Site outside normal working hours unless the City gives specific written permission in advance.
- (3) In connection with Contractor's operations, provide for the free flow of traffic over roads or streets in or adjacent to the Site. Contractor shall keep roads and streets free from obstructions of any character that might present a hazard or interference with traffic and in such condition that traffic can be adequately accommodated. When operations in connection with the Work necessitates the closing of traffic lanes, Contractor shall arrange in advance with the City, any adjacent property owners affected, and appropriate local authorities for such closing and shall provide as necessary appropriate barricades, signs, markers, flares and other devices and flagmen as may be required by the Engineer or the local authorities for traffic guides and public safety.
- (4) Provide facilities for its use and only at locations approved or directed by the City. Unless otherwise specified in the Agreement Documents, Contractor shall

provide all power and lighting necessary for its Work, complying in all cases with local and national electrical codes, OSHA regulations, and any other applicable laws. The City shall direct the point or points to be used for service connection. Contractor shall provide telephone facilities for its own use and only at locations approved or directed by the City.

- (5) Unless otherwise specifically provided in the Agreement Documents, Contractor shall provide its own temporary facilities, including an office and a watertight, closed area for storage and protection of Materials and Equipment to be used for, or incorporated in, the Work, except as specifically agreed in the Agreement Documents. Contractor's shanties, material storage rooms, field offices and the like will be approved by the City and placed in locations designated by the City. If it becomes necessary during the course of the Work for Contractor to relocate its field operations, it will do so in an expeditious manner and at no additional cost.
- (6) Contractor shall take measures to control the blowing or spreading of dust, smoke, dirt, mud and refuse from its Work to avoid nuisance and inconvenience to others whether on or off the Site. These measures shall be in compliance with, without being limited to, all applicable laws, and shall be subject to the City's approval. Contractor shall furnish all necessary labor and Materials such as water, approved chemicals, and Equipment.
- (7) Contractor shall be responsible for the removal or drainage of all water interfering with the proper prosecution of its Work. It shall, at all times, assure such drainage and shall not be a nuisance or inconvenience to the City, other contractors or their Work, or the occupants or users of any other public or private area on or off the Site. This Article supplements, and does not supersede, any drainage or dewatering called for elsewhere in the Agreement Documents.
- (8) Contractor shall not use permanent installed systems or equipment without permission of the City. If such permission is granted prior to completion of the Work, Contractor shall restore all parts of the system or equipment used by replacing materials, traps, valves, filters, motors, lamps, and the like to the extent that the City considers them to have been damaged or if their usefulness has been impaired or diminished by their temporary use by Contractor.
- (9) No part of any surface shall be loaded during construction with more weight than it can safely bear at the time. Should damage occur through violation of this requirement by Contractor, it shall be solely liable for such damage and any consequence.
- (10) It shall be Contractor's responsibility to receive and unload its Materials and pay all charges therefor, including, without limitation, demurrage or charges for delays in loading. Contractor shall instruct vendors or Suppliers making such deliveries exactly where they shall go. Contractor shall constantly keep the City

advised of its Material delivery schedule and shall update it as required by the City so that Materials will be available to complete the Work on time. Contractor shall schedule Material deliveries so as to interfere as little as possible with anyone else's Work on the Project but within the normal Work hours. Contractor shall require that Materials and Equipment delivered shall be identified with Contractor's name, purchase order, and identification numbers. Contractor shall sign for all Materials delivered and shall be responsible for their safekeeping.

GC-20 PROTECTION OF AGREEMENT WORK

Contractor shall be responsible for:

- (1) Maintenance and protection of Work until final completion and acceptance, including, but not limited to, the storage of Materials and Equipment, erection of temporary structures and provisions for drainage as necessary to protect Work from injury, damage or loss;
- (2) Any injury, damage, or loss to Work resulting from the action of the elements or any other cause, irrespective of fault or negligence, excepting only such injury, damage, or loss as is caused solely by the negligence or willful misconduct of the City;
- (3) Protection of its Work and materials and the Work and materials of its Subcontractors or Suppliers from damage or injury from the weather; and
- (4) Exercising due care to avoid injury or damage to the Work of other contractors on site.

Any portion of Work suffering injury, damage, or loss for which Contractor is responsible under 1, 2, 3 or 4, above, will be considered defective and shall be corrected or replaced without additional cost to City.

GC-21 DEFECTS IN THE WORK AND UNAUTHORIZED WORK

Contractor shall promptly remove from the premises all Work rejected by the City for failure to comply with Agreement Documents, whether incorporated in the construction or not, and Contractor shall promptly replace and re-execute the Work in accordance with the Agreement Documents and without expense to City and shall bear the expense of making good all Work of other contractors destroyed or damaged by such removal, or replacement. All removal and replacement Work shall be done at Contractor's expense.

If Contractor defaults or neglects to carry out all or any part of the Work in accordance with the Agreement Documents, and fails within three (3) working days after receipt of Written Notice from the City to commence and continue correction and cure of such default, noncompliance, or

neglect with diligence and promptness, the City may, after twenty-four (24) hours following receipt by Contractor of an additional Written Notice and without prejudice to any other remedy the City may have, make good such deficiencies and may further elect to perform and to complete all or any part of Work thereafter through such means as the City may select, including the use of a new or supplemental contractor. In such case an appropriate Change Order shall be issued deducting from the payments then or thereafter due Contractor, the cost of correcting such deficiencies. If the payments then or thereafter due Contractor are not sufficient to cover such amount, Contractor shall pay the difference to the City on demand.

Minor, inconsequential defects may be waived in writing by the City, but the City's failure or refusal to exercise such authority shall not be subject to claim by Contractor. If a waiver (whether minor or major, consequential or inconsequential) will result in an appreciable saving of costs to Contractor, including costs of Work in place and savings when compared to potential costs of rejection and replacement under this clause, it will be made only upon an equivalent adjustment in compensation.

GC-22 GUARANTEE OF WORK AND MATERIALS

GC-22.1 Warranty of Materials, Equipment and Work

Contractor warrants to the City and the Engineer that all Materials and Equipment furnished under this Agreement will be new and of workmanlike quality unless otherwise specified, and that all Work will be of good quality, free from faults and defects and in conformance with the Agreement Documents. All Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. If required by the Engineer, Contractor shall furnish satisfactory evidence as to the kind and quality of Materials and Equipment. This warranty is not limited by any other provision of the Agreement Documents. The Warranties set forth in this Article and elsewhere in the Agreement Documents shall survive final acceptance of the Work. All warranties are in addition to the rights, remedies, and redress that the City has at law or in equity, and none of Contractor's warranties shall be deemed a sole or exclusive remedy to the City.

GC-22.2 Warranty of Continued Liability of Electronics

Contractor shall warrant to Owner that all goods or equipment which Contractor is required to purchase under the Agreement and which contain embedded codes, chips, microprocessors, microcontrollers, clock circuits (including integrated circuits), computer operating systems, computer software, custom application programming, or other similar systems/technologies that calculate date or time data shall correctly and without failure, malfunction, or need for operator intervention, display, calculate, compute, and process date or time data before, during, and beyond any changes in the date, including leap year, and including changes at year end, decade end, and century end, as needed.

GC-22.3 Guarantee and Repair

If within one (1) year after the Date of Final Completion and Final Acceptance of the Work by the City, or within such longer period of time as may be prescribed by law or by the term of any applicable special warranty required by the Contract Documents, any of the Work is found to be defective or not in accordance with the Agreement Documents, Contractor shall correct it promptly after receipt of a Written Notice from the City to do so. This obligation shall survive both final payment for the Work or designated portion thereof and termination of the Agreement. The City shall give such notice promptly after discovery of the condition. Contractor acknowledges that this one (1) year period provides a period during which Contractor has a duty to repair and does not in any way limit Contractor's liability for Work that is not in accordance with the Agreement Documents, including any that may be discovered more than one (1) year after the Date of Final Completion and Final Acceptance.

GC-22.4 Manufacturer Warranties

Without limiting the responsibility or liability of Contractor under the Agreement, all warranties given by manufacturers on Materials or Equipment incorporated in the Work are hereby assigned by Contractor to the City at no additional cost to the City. If requested, Contractor shall execute enforceable formal assignments of said manufacturer's warranties to the City at no additional cost to the City. Contractor shall not obtain any Materials or Equipment under warranties, which do not run directly to the benefit of the City, and all such warranties shall be directly enforceable by the City, but Contractor understands and agrees that it is jointly and severally liable with the manufacturers for any warranties provided.

GC-22.5 Non-Exclusive Nature of Warranties

The foregoing warranties, and those contained elsewhere in the Agreement Documents or implied by law, shall be deemed cumulative and not alternative or exclusive. No one or more of them shall be deemed to alter or limit any other.

GC-23 TERMINATION OF AGREEMENT

GC-23.1 Termination for Contractor Default

If Contractor becomes insolvent, or makes a general assignment for the benefit of creditors, or if a receiver is appointed on account of Contractor's insolvency, or if Contractor refuses or fails, except in cases for which extension of time is provided, to supply enough properly skilled workers or proper Materials, or fails to make prompt payment to Subcontractors or for Materials or labor, or disregards laws, ordinances, rules, regulations or orders of any public authority having jurisdiction, or otherwise is guilty of a material violation of a provision of the Agreement Documents so as to be in material breach and default of the Agreement, then City may terminate the Agreement for default, either in whole or in part, without prejudice to any other right or remedy the City may have after giving Contractor and its surety seven (7) days to cure the default. For purposes of this Article, a material violation shall include, without limitation, any

violation of or failure to comply with any obligation of the Agreement which the City, in its sole discretion, determines is likely to result in any damage to the City, the Work, or any public or private interest.

If the surety and/or Contractor does not cure the default within seven (7) days from the date of the mailing to Contractor and the surety of notice of default, City may, without further notice, terminate for default and may take over Work and prosecute the same to completion by contract or by Force Account or by whatever means it deems appropriate for the account and the expense of Contractor and Contractor and its surety shall be liable to City for any excess cost incurred thereby, and in such event City may take possession of and utilize in completing Work, such materials, appliances, and plant as may be on the Site of Work and necessary therefore. Upon such termination Contractor shall:

- (1) Preserve all Materials, Drawings and records and Plans at Site of the Work until notified in writing of those items that will be used in completing Work.
- (2) Remove from Site of the Work all construction materials, equipment and plant not designated for use in such notice.
- (3) Assist the City in making an inventory of all Materials and Equipment in storage at the Site of Work, in route to the Site of Work, in storage or manufactured at other locations, and on order from Suppliers.

The City shall further have the right to declare a default without terminating the Agreement for default in whole or in part. In such event, the City shall have the right, at its sole discretion, to supplement Contractor's forces if the City so chooses and deduct the cost of same from the amounts otherwise due Contractor. The City's failure to declare a default or terminate the Agreement in whole or in part shall not determine whether Contractor is, in fact, in material breach of the Agreement because the City shall also have the option to allow Contractor's defective performance to continue and collect such damages as the City may incur from Contractor and its surety.

In the event that the City incurs costs or expenses in performing or completing any portion of Contractor's scope of Work, the City's actual damages shall, at the City's discretion, include a fee up to 15% of such actual costs for performing such work. Such fee shall be computed on the actual costs incurred by the City for labor, materials, equipment, services, administrative and personnel costs and additional design and professional consulting fees, incurred as a result of Contractor's default.

Contractor acknowledges and agrees that an appropriate termination for default is adequate grounds for Contractor's disqualification from future City contracts. This provision shall survive the expiration or termination of this Agreement and any amendments to this Agreement.

In the event any termination for default is found to be wrongful or improper, Contractor agrees that its sole and exclusive remedy is to have the termination treated as a termination for convenience in accordance with the provisions of this Agreement.

GC-23.2 City's Right to Stop the Work

If Contractor fails to correct defective Work as required by the Agreement Documents, or fails to carry out the Work or supply labor or Materials in accordance with the Agreement Documents, or otherwise fails to meet or satisfactorily complete any of its obligations under this Agreement, the City, in writing, may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of the City and the Engineer to stop the Work shall not give rise to any duty on the part of the City to exercise this right for the benefit of Contractor or any other person or entity. Contractor shall not be entitled to any extension of time or for compensation of any sort in the event that the City stops work pursuant to this provision.

GC-23.3 Intentionally Omitted

GC-23.4 Termination for Convenience of City

GC-23.4.1

The City may, at any time upon ten (10) days Written Notice to Contractor, terminate (without prejudice to any right or remedy of the City) the whole or any portion of the Work for the convenience of the City.

GC-23.4.2

If, after Contractor has been terminated for default, it is determined that Contractor was not in default or that the termination for default was improper for any reason, then such termination shall be considered a termination for convenience.

GC-23.4.3

If the City terminates the whole or any portion of the Work for convenience, then the City shall only be liable to Contractor for those costs reimbursable to Contractor in accordance with Article 23.4.4; provided, however, that if it reasonably appears to the City that Contractor would have sustained a loss on the entire Agreement had it been completed, no profit shall be included or allowed hereunder and an appropriate adjustment shall be made reducing the amount of settlement so that Contractor's loss on the portion of the Agreement it did perform is proportioned, from a percentage completion basis, to the loss Contractor would have sustained on the entire Agreement. In no event shall Contractor be entitled to anticipated profit on work not performed. Contractor shall, however, be entitled to any profit earned on the work performed to date, but Contractor acknowledges (1) that unit rates may be subject to adjustment, either upward or downward, based upon the variation in estimated quantity provisions of this

Agreement, and (2) if the City determines that Contractor's schedule of values was materially unbalanced (or "front-end loaded"), payments previously made to Contractor shall be refunded to the City or withheld from amounts otherwise due Contractor. The intent of this Article is to avoid any Contractor windfall at the City's expense while at the same time preserving the benefit of the bargain, either positive or negative, for Contractor.

GC-23.4.4

If the City terminates the whole or any portion of the Work for convenience, the City shall pay Contractor the amounts determined by the Engineer as follows:

- (1) To the extent not previously paid for, Contractor shall be paid on a percentage completion basis in accordance with any approved schedule of values for the value of the work completed to date, including items such as mobilization and general conditions costs (based on percent complete).
- (2) To the extent not previously paid for and to the extent that the Agreement Documents call for payment on the basis of unit rates, Contractor shall be paid for all work actually performed at the unit rate established in the Agreement Documents, with such adjustment, if any, as may be required either upward or downward by the variation in estimated quantity provisions applicable to unit rates under the Agreement.
- (3) The reasonable costs of settlement, including accounting, clerical, and other expenses reasonably necessary for the preparation of settlement claims and supporting data with respect to the terminated portion of the Agreement and for the termination and settlement of subcontracts thereunder, together with reasonable storage, transportation, and other costs incurred in connection with the protection or disposition of property allocable to this Agreement. This amount shall not include any attorneys' fees or other legal costs or claim preparation costs or expert or consulting fees, and Contractor shall not be entitled to recovery or compensation of any such costs or fees under any circumstances.

GC-23.4.5

Contractor shall specifically require its Subcontractors and suppliers and those with whom they contract to agree to the provisions of this Article governing termination for convenience. In no event shall the City be responsible for anticipated profit on work not performed or "restocking charges." The City's potential liability for convenience termination costs shall be based on work actually performed and costs actually incurred, provided that the termination shall not in any event transform a Contractor or Subcontractor's probable net loss position into a profitable or "cost plus" recovery.

GC-23.5 General Termination Provisions

GC-23.5.1

If the City terminates the whole or any part of the Work for default, then the City may procure, upon such terms and in such manner as the City may deem appropriate, supplies or services similar to those so terminated, and Contractor shall be liable to the City for any excess costs for such similar supplies or services. Contractor shall continue the performance of this Agreement to the extent not terminated hereunder.

GC-23.5.2

In the event of a Contractor default under any of the provisions of the Agreement, after written notice and a failure to cure within seven (7) days of that notice, Contractor and its surety shall be responsible to pay to the City such reasonable attorneys' fees as the City may expend as a result of the default, including all costs, expenses and filing fees incidental thereto, including, without limitation, expert fees, consultants' fees, arbitrator fees (if any), and prejudgment interest at the commercial account rate on all sums due, whether liquidated or unliquidated. Any judgment or arbitration award entered in favor of the City against Contractor or its surety shall bear interest from the time of entry of the judgment or the date of the arbitration award at the commercial account rate.

GC-23.5.3

After receipt of a notice of termination from the City, whether for default or for convenience, and except as otherwise directed by the City, Contractor shall:

- (1) Stop Work under the Agreement on the date and to the extent specified in the notice of termination;
- (2) Place no further orders or subcontracts for Materials, services, or facilities, except as may be necessary for completion of such portion of the Work under the Agreement as is not terminated;
- (3) Terminate all orders and subcontracts to the extent that they relate to the performance of Work terminated by the notice of termination and are not assigned as set forth below;
- (4) If so requested by the City, assign to the City in the manner, at the times and to the extent directed by the City, all of the rights, title, and interest of Contractor under the orders and subcontracts so selected and requested for assignment;
- (5) Settle all outstanding liabilities and all claims arising out of such termination of orders and subcontracts, with the approval or ratification of the City to the extent the Engineer may require, in accordance with the provisions of this Agreement;
- (6) Transfer title and deliver to the entity or entities designated by the City, in the manner, at the times and to the extent, if any, directed by the City, and to the

extent specifically produced or specifically acquired by Contractor for the performance of such portion of the Work as has been terminated:

- (a) The fabricated or unfabricated parts, Work in progress, partially completed supplies, and Equipment, Materials, parts, tools, dies, jigs, and other fixtures, completed Work, supplies and other material produced as part of, or acquired in connection with the performance of the Work terminated by the notice of termination; and
 - (b) The completed or partially completed Plans, Drawings, information, and other property related to the Work, including as-built information;
- (7) If so requested by the City, use best efforts to sell for the benefit of the City, in the manner, at the times, to the extent, and at the price or prices directed or authorized by the City, any property of the types referred to in Article GC-23.5.3(6); provided, however, that Contractor:
- (a) Shall not be required to extend credit to any buyer; and
 - (b) May re-acquire any such property under the conditions prescribed by and at a price or prices approved by the City; and, provided, further that the proceeds of any such transfer or disposition shall be applied in reduction of any payments to be made by the City to Contractor under this Agreement or shall otherwise be credited to the price or cost of the Work covered by this Agreement or paid in such other manner as the City may direct;
- (8) Complete performance of such part of the Work as shall not have been terminated by the notice of termination; and
- (9) Take such action as may be necessary, or as the City may direct, for the protection and preservation of the property related to the Agreement, which is in the possession of Contractor and in which the City has or may acquire an interest.

GC-23.5.4

Contractor shall preserve and make available to the City, at all reasonable times at the office of Contractor, but without direct charge to the City, all its books, records, documents and other evidence bearing on the costs and expenses of Contractor and any Subcontractor or Supplier under the Agreement, and any photographs, microphotographs, or other authentic reproductions thereof and Owner shall have the right at any time to audit the same.

GC-23.5.5

In arriving at any amount due Contractor for any termination for default or convenience, there shall be deducted:

- (1) All unliquidated advance or other payments on account theretofore made to Contractor applicable to the termination portion of this Agreement;
- (2) Any claim which the City may have against Contractor;
- (3) Such claim as the Engineer determines to be necessary to protect the City against loss because of outstanding or potential claims of any type or nature; and
- (4) The agreed price for, or the proceeds of sale of, any Materials, supplies, or other things acquired by Contractor or sold, pursuant to the provisions of Article GC-23.5.3(7) and not otherwise recovered by or credited to the City.

GC-23.5.6

Contractor shall refund to the City any amounts paid by the City to Contractor in excess of Contractor's entitlement specified hereunder.

GC-23.5.7

The City may, at its option, have costs audited and certified by independent certified public accountants selected by the City.

GC-23.5.8

Contractor shall be entitled to only those damages and that relief from termination by the City as specifically provided hereunder.

GC-24 SUSPENSION OF WORK

GC-24.1 Right to Suspend Work

The City may order Contractor, in writing, to suspend, delay, or interrupt all or any part of the Work for such period of time as the City may determine to be appropriate for the convenience of the City.

GC-24.2 Rights Upon Certain Unreasonable Suspensions

If the performance of the Work is, for an unreasonable period of time, suspended, delayed, or interrupted by an act of the City or Engineer in the administration of the Agreement, or by failure of any one of them to act within the time specified in the Agreement (or if no time is specified, within a reasonable time), or by any act of either of them which is attributable to their fault or neglect, adjustment shall be made in the Agreement Time only for any extension in the time

required for performance of the Work necessarily caused by such unreasonable suspension, delay, or interruption and the Agreement modified in writing accordingly. However, no adjustment shall be made under this Article for any suspension, delay, or interruption for which an adjustment is provided or excluded under any other provision of the Agreement Documents, and no adjustment shall be made to the extent that performance would have been so suspended, delayed or interrupted by any other cause, including the fault or negligence of Contractor or excusable delays that are unforeseeable and not attributable to the fault or neglect of the City or Contractor and beyond the control of each of them. No claim for a time adjustment under this Article shall be allowed unless it is presented in accordance with the provisions of the Agreement governing Claims and compliance with the claims provision shall be a condition precedent to the right to a time adjustment.

GC-24.3 Damages Upon Suspension

Nothing contained in this Article authorizes the recovery of delay or impact damages, except as expressly authorized in this Agreement; and compliance by Contractor with the claims provision shall be a condition precedent to the right to any Contract adjustment on account of a suspension of the Work. Contractor expressly agrees that it shall not be entitled to any increase in the Agreement Price or to any monetary damages on account of a suspension, delay, interruption, interference or impact, unless the notice, documentation, and pricing requirements of this Agreement have been met.

GC-24.4 Time Extension Upon Suspension

Under the terms of this Agreement, in order for Contractor to receive extensions of time for excusable delays, the delays must (i) be on the critical path, (ii) be beyond the reasonable control of Contractor and those for whom it is responsible including its Subcontractors and Suppliers and others working by or through them, (iii) not be attributable to any factor for which Contractor has assumed the risk of performance (such as labor availability), (iv) not be attributable in whole or in part to Contractor's fault or neglect or the fault or neglect of those for whom Contractor is responsible, including Subcontractors and Suppliers and others working by or through them, and (v) not be concurrent with non-excusable delays that are on the critical path. If Contractor meets these five (5) requirements, then Contractor's sole remedy for such delay shall be an extension of the Agreement Time for the period of time during which all five (5) elements continue to be met, which shall be implemented by Change Order; provided, however, Contractor shall not be entitled to any extension of the Agreement Time (i) if Contractor fails to comply with notice requirements in the Contract, (ii) if such delays do not cause Contractor to achieve Substantial Completion of the entire Work later than the then current Substantial Completion Date, or (iii) if Contractor fails to work around such delay where such work around was available to Contractor. In all events, Contractor must comply with the notice and claim provisions set forth in this and other provisions of the Agreement in order to be entitled to any extension of the Agreement Time.

GC-24.5 Damages for Non-Excusable Delays

Under the terms of this Agreement, liquidated or actual damages (as specified in the Agreement and as appropriate) shall be assessed for all non-excusable delays. Unless and until Contractor satisfies its obligations under and satisfies all criteria set forth in GC-24.4, delays shall be deemed non-excusable. The burden of proof shall be upon Contractor to establish that delays and untimely completion are attributable to excusable delays.

GC-24.6 Abnormal Weather

Abnormal weather may constitute an excusable delay if other requirements for excusable delays are met (for example, weather-sensitive work must be on the critical path.) The Agreement Time will not, however, be extended due to normal inclement weather. Unless Contractor can substantiate that there was greater than normal inclement weather using a ten (10) year average of accumulated record mean values from climatological data compiled by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration for Atlanta, Georgia, and that such alleged greater than normal inclement weather qualifies as excusable delay as set forth above, Contractor shall not be entitled to an extension of time. In no event will “dry-out” delay days be allowed. Any time extension shall be based on the number of additional days of adverse weather and not upon the time required to recover from said weather.

GC-24.7 Impacts From Adjacent Property

Contractor acknowledges and agrees that it will be interacting with numerous citizens and residents of the City and will be working in close proximity to their homes, businesses, and private property. Contractor warrants that it has made due allowance for dealing with the concerns and complaints of these citizens and residents and any delays, interruptions, interferences, disruptions, or other impacts resulting therefrom. Contractor further warrants and agrees that it will fully cooperate with the City to minimize the adverse affects of the Project on the City’s residents by resequencing work or adjusting its means, methods, techniques, and procedures to minimize and mitigate the effect upon the City’s residents and that the cost of these mitigation efforts has been included in Contractor’s price to the City.

GC-25 COMMENCEMENT AND PROSECUTION OF THE WORK

Contractor shall, within ten (10) days after receipt from the City of a written Notice to Proceed, commence Work to be done under this Agreement. Contractor shall diligently prosecute Work and all portions thereof to completion within the times specified therefor. The capacity of Contractor's construction and manufacturing equipment and plans, sequence and methods of operations, and forces employed, including management and supervisory personnel, shall be such as to ensure completion of Work within the specified time.

It is expressly understood and agreed by and between Contractor and City that Agreement Time for the completion of Work described herein is a reasonable time, taking into consideration the unique requirements of the Work (including performance of the Work in close proximity to the private property of the citizens and residents of the City), the average climate and economic

conditions in the area, and other factors prevailing in the locality of the Work (such as, without limitation, the availability of labor, equipment and materials).

GC-26 TIME

GC-26.1 Progress and Completion

GC-26.1.1

All time limits stated in the Agreement Documents are of the essence of the Agreement.

GC-26.1.2

Contractor shall begin the Work within ten (10) days after the issuance of written Notice to Proceed. Contractor shall carry the Work forward expeditiously with adequate forces and shall achieve Substantial Completion of the Work and Final Completion within the times stated in the Agreement Documents.

GC-26.2 Delay, Damages, and Extensions of Time

GC-26.2.1

Contractor shall not be entitled to payment or compensation of any kind from the City for direct, indirect, impact, or delay damages, including but not limited to costs of delay, disruption, interference, impact or hindrance from any cause whatsoever, whether such delay, disruption, interference, impact or hindrance be reasonable or unreasonable, foreseeable or unforeseeable, or avoidable or unavoidable, except as expressly provided in this Agreement.

In any and all events, the City's liability for damages for delay, disruption, interference, impact or hindrance shall be limited to the following actual direct job site related costs that are solely incurred as a function of time: (1) costs of job site supervision, (2) direct cost of general conditions items, including job site office expenses for trailer rental, telephone, electricity, heat, and water, (3) except for tunnel boring machines which shall be governed by the terms of GC-41.6, equipment expenses at the Force Account rates specified in the provisions of this Agreement governing changes; and (4) a markup for profit and overhead on actual direct costs, in accordance with the Force Account rates specified in the provisions of this Agreement governing changes.

GC-26.2.2

The Agreement Time shall be adjusted only for excusable delays. In the event Contractor requests an extension of the Agreement Time, it shall furnish such justification and supporting evidence as the City may deem necessary for a determination as to whether Contractor is entitled to an extension of time under the provisions of the Agreement. The

City, after receipt of such justification and supporting evidence, shall make a decision thereon and shall advise Contractor in writing thereof. If the City finds that Contractor is entitled to any extension of the Agreement Time, the City's determination as to the total number of days' extension shall be based upon the current CPM and on all data relevant to the extension as described in the Agreement Documents. Contractor acknowledges and agrees that delays in activities that according to the approved and current CPM Schedule do not affect the critical path do not have any effect upon the Agreement Time and therefore will not be the basis for a change thereof.

GC-26.2.3 [Intentionally Omitted]

GC-26.2.4 [Intentionally Omitted]

GC-26.2.5 [Intentionally Omitted]

GC-26.2.6 [Intentionally Omitted]

GC-26.2.7

In order for Contractor to be entitled to any extension of the Agreement Time, Contractor must comply with the Claim provisions of GC-41 and GC-26. Such statement of the claim, in addition to complying with all other provisions of the Agreement relating to Claims and delays, must provide all information required by the scheduling requirements of the Agreement Documents and further provide the following specific information:

- (1) Nature of the delay;
- (2) Date (or anticipated date) of commencement of delay;
- (3) Activities on the approved current CPM Schedule affected by the delay, and/or new activities created by the delay and their relationship with existing activities;
- (4) Identification of person(s) or organization(s) or event(s) responsible for the delay;
- (5) Anticipated extent of delay; and
- (6) Recommended action to avoid or minimize the delay.

GC-26.2.8

The City shall receive and process such claims for extensions of time in accordance with the procedures set forth in Article GC-41, except that any Change Order issued shall only amend the time for completion.

GC-26.2.9

The failure of Contractor to file any claims for extension of time within the time limits prescribed and in the form and manner required shall be deemed a material prejudice to the interests of the City in canceling and mitigating such impacts, and shall constitute an absolute waiver of the claim and the right to file or thereafter prosecute the same. The purpose of the time limits, notice and form and manner requirements are, in part, to eliminate disputes over the existence, scope, and nature of events giving rise to claims, and the failure to abide by same will result in material prejudices to the City, even if the City were otherwise on notice of facts giving rise to the claim because, in part of the impact to the City's ability to document, dispute, or resolve issues as they arise, and also because of the impact to the City's efforts to entirely avoid disputes over claims not asserted in accordance with the Agreement Documents.

GC-26.2.10

If no schedule or agreement is made stating the date upon which written interpretations as set forth in the Agreement Documents shall be furnished, then no claim for delay shall be allowed on account of failure to furnish such interpretations until fifteen (15) days after demand is made for them, and not then unless such claim is reasonable.

GC-27 RESPONSIBILITY FOR COMPLETION

GC-27.1 Duty to Accelerate

Subject to the other provisions of the Agreement Documents, Contractor shall furnish such manpower, Materials, facilities, and Equipment and shall work such hours, including night shifts, overtime operations and Sundays and holidays, as may be necessary to ensure the prosecution and completion of the Work in accordance with the approved and currently-updated CPM Schedule. If Work actually in place falls behind the currently updated and approved CPM Schedule, and it becomes apparent from the current approved CPM Schedule that the Work will not be completed within the Agreement Time, Contractor agrees that it will, as necessary or as directed by the City, take some or all of the following actions at no additional cost to the City to improve its progress:

- (1) Increase manpower in such quantities and crafts as will eliminate, in the judgment of the City, the delay and backlog of Work;
- (2) Increase the number of working hours per shift, shifts per working day, working days per week, the amount of equipment or any combination of the foregoing,

sufficiently to eliminate in the judgment of the City, the delay and backlog of Work;

- (3) Reschedule activities as necessary to eliminate in the judgment of the City the delay and backlog of Work; and
- (4) Any other measure required by the schedule requirements of the Special Conditions.

In addition, the City may require Contractor to submit a proposed revised CPM Schedule Recovery Plan demonstrating its program and proposed plan to make up lag in scheduled progress and to ensure completion of the Work within the Agreement Time. If the City finds the proposed plan not acceptable, the City may require Contractor to submit a new and/or revised plan with direction and other input from the City and Engineer.

GC-27.2 Recoverable Acceleration Expenses

In the limited and exclusive event that (1) the City directs Contractor to accelerate, and (2) it is subsequently determined that Contractor was entitled to time extensions for excusable delays which the City failed or refused to grant, and (3) Contractor in fact succeeds in accelerating substantial completion of the Project by substantially completing the Project significantly and materially sooner than what would have been the case had the City granted all time extensions to which Contractor was entitled, then, and only then, Contractor may be entitled to recoverable acceleration expenses as defined below if Contractor properly and timely complies with the provisions related to time, notice and form and substance of claims of the Agreement (including, without limitation, Articles GC-24, GC-26, and GC-41) Recoverable acceleration expenses shall be limited to the following without any markup for overhead and profit:

- (1) the premium portion only of overtime costs for hours worked in a single week that exceed 40 hours per week
- (2) if the overtime continues for more than 65% of the skilled labor on the site (including subcontractor personnel) for a continuous period of 8 weeks or more, then beginning in the 9th week, a multiplier of 10% of the premium portion of the overtime costs may be added as recoverable acceleration expenses to cover the cost of any loss or damage or additional expense resulting from the acceleration.

No expenses other than the two items noted above shall be allowed as recoverable acceleration expenses. No claims for acceleration for work that is not on the critical path shall be permitted.

GC-27.3 Acceleration by City's Forces

Failure of Contractor to substantially comply with the requirements of Article GC-27.1 may be considered grounds for a determination by the City and/or the Engineer that Contractor is failing to prosecute the Work with such diligence as will ensure its completion within the time specified. In such case, upon forty-eight (48) hours prior Written Notice to Contractor, City shall have the

right to furnish such additional labor and Materials as may be required to comply with the schedule, and Contractor shall be liable for such costs incurred by City as provided elsewhere in this Agreement.

GC-27.4 Set-Off of Acceleration Costs

Any monies due to the City under this Article may be set-off by the City against monies due from the City to Contractor.

GC-27.5 Acceleration Remedies Cumulative

The remedies of the City set out in this Section are in addition to, and without prejudice to, all other rights and remedies of the City including those stated elsewhere in the Agreement Documents. The remedies of Contractor, however, are sole and exclusive and contingent upon compliance with the Agreement provisions as to time, notice, form, and substance of Claims, including, without limitation, Articles GC-24, GC-26, and GC-41.

GC-28 WORKING DRAWINGS, SHOP DRAWINGS, DATA ON MATERIAL AND EQUIPMENT, SAMPLES, AND LICENSES

GC-28.1 General

GC-28.1.1

Contractor shall submit to the Engineer for review and exception, if any, such working Drawings, Shop Drawings, test reports and data on Materials, licenses, and Equipment (hereinafter in this article called data), and material samples (hereinafter in this article called samples) as are required for the proper control of Work, including but not limited to, those working Drawings, Shop Drawings, data and samples specifically required elsewhere in the Specifications and Agreement Documents. Submittals are required for any product that becomes a part of, or affects, the permanent Work.

GC-28.1.2

Data on Materials and Equipment include, without limitation, Materials and Equipment lists, catalog data sheets, cuts, diagrams and similar descriptive material. Materials and Equipment lists shall give, for each item thereon, the name and location of the Supplier or manufacturer, trade name, catalog reference, size, finish and all other pertinent data.

GC-28.1.3

It is the duty of Contractor to check all Drawings, data and samples prepared by or for it before submitting them for review. Drawings and schedules shall also be checked and coordinated with the Work of all trades involved. Drawings and other submittals originating from Subcontractors will be reviewed and checked similarly by Contractor.

Pursuant to this required review, Contractor shall indicate its approval, before they are submitted for review by the City, by affixing its stamp of approval, properly initialed and dated. All submittals shall be referenced to the applicable item, section or division of the Specifications.

GC-28.1.4

The Engineer's review of Drawings, data and samples submitted by Contractor will cover only general conformity to the Specifications, external connections, and dimensions which affect the installation. The Engineer's review and exception, if any, will not constitute an approval of dimensions, quantities, and details of the Material, Equipment, device, or item shown.

GC-28.1.5

Contractor shall not begin any of the Work covered by a Drawing, data, or a sample returned for correction until a revision or correction thereof has been reviewed and returned to it.

GC-28.1.6

The CPM Schedule shall include respective dates for the submission of shop and work Drawings, the beginning of manufacture, testing, and installation of Materials, Supplies, and Equipment.

GC-28.1.7

Acceptable submittals will be marked "No Exceptions Taken." Submittals requiring minor corrections before the Material or Equipment is acceptable will be marked "Make Corrections Noted." Contractor may order, fabricate, or ship the items included in the submittal, provided the indicated corrections are made. Drawings must be resubmitted for review prior to installation of Equipment or use of Materials, unless otherwise directed in writing by the Engineer.

GC-28.1.8

Submittals marked "Amend and Resubmit" must be revised to reflect required changes, and the initial review procedure repeated.

GC-28.1.9

The "Rejected - See Remarks" notation is used to indicate Materials or Equipment that are not acceptable. Upon return of a submittal so marked, Contractor shall repeat the initial review procedure utilizing acceptable Materials or Equipment.

GC-28.1.10

Drawings on other submittals not bearing the Engineer's "No Exceptions Taken" notation shall not be issued to Subcontractors or utilized for construction purposes. No Work shall be done or equipment installed without a drawing or submittal bearing the "No Exceptions Taken" notation. Contractor shall maintain at the job site a complete set of Drawings and other submittals bearing the Engineer's stamp.

GC-28.1.11

In the event Contractor obtains the City's approval for the use of equipment other than that which is called for in the Agreement Documents, Contractor shall, at its own expense and using methods approved by the City, make any changes to structures, piping and electrical work that may be necessary to accommodate this equipment. If Contractor substitutes any specified item of Material or Equipment with another item of Contractor's choosing as an "or equal" item, Contractor warrants the accuracy and adequacy of the design and performance of the substituted item and further warrants that it has exercised due diligence to ensure that the substituted item will function properly as a component into the integrated Project of which it is a part.

GC-28.1.12

Contractor shall submit all Drawings and schedules sufficiently in advance of construction requirements to provide no less than thirty (30) calendar days for checking and appropriate action.

GC-28.1.13

The review of Drawings and schedules will be general, but approval shall not be construed: (a) as permitting any departure from the Agreement requirements; (b) as relieving Contractor of responsibility for any errors, including details, dimensions, and Materials; and (c) as approving departures from details furnished by the City, except as otherwise provided herein.

GC-28.2 Shop DrawingsGC-28.2.1

When used in the Agreement Documents, the term "Shop Drawings" shall be considered to mean fabrication drawings, wiring and control diagrams, cuts, or entire catalogs, pamphlets, descriptive literature, and performance and test data. The Drawings shall be submitted using standard transmittal forms in accordance with detailed instructions furnished by the City. A separate transmittal sheet shall be used for reference to each item, section or division of the Specifications.

GC-28.2.2

Contractor shall submit six (6) sets of each Shop Drawing for review. On electrical and instrumentation and control submittals Contractor shall submit seven (7) copies of each for review.

GC-28.2.3

Each Shop Drawing shall include the following:

- (1) Number and title of the submittal;
- (2) Date of Drawing or revision;
- (3) Name of Project;
- (4) Name of Contractor and/or Subcontractor submitting Drawing and with its seal of approval;
- (5) Specification title and number; and
- (6) Clear identification of contents and location of the Work.

GC-28.2.4

Drawings for Work on utility facilities, streets and other facilities, which are constructed for owners other than the City, shall be coordinated so that information required by these owners is included on the Shop Drawings for their facilities.

GC-28.2.5

If Drawings show variations from Agreement requirements, Contractor shall describe such variations in its letter of transmittal. If acceptable, proper adjustment in the Agreement shall be implemented where appropriate. If Contractor fails to describe such variations, it shall not be relieved of the responsibility for executing the Work in accordance with Agreement, even though such Drawings have been reviewed.

GC-28.2.6

If the Drawings or schedules as submitted describe variations and show a departure from the Agreement requirements which the City finds to be in the interest of the City and to be so minor as not to involve a change in Agreement Price or Time, the City may return the reviewed Drawings without noting an exception.

GC-28.2.7

If no exceptions are taken by the City, each of the Shop Drawings will be identified by being so stamped and dated. Shop Drawings stamped "Rejected - See Remarks" and with required corrections shown, will be returned to Contractor for correction and re-submittal. On re-submittals, Contractor shall direct specific attention, in writing or on resubmitted Drawings, to revisions other than the corrections requested by the City on previous submissions. Contractor shall make any corrections required by the City. If

Contractor considers any correction indicated on the drawings to constitute a change to the Agreement Drawings or Specifications, Contractor shall give Written Notice thereof to the City in accordance with GC-41. At least two (2) copies of Drawings or data submittals will be returned to Contractor.

GC-28.2.8

When the Drawings or data submittals have been completed to the satisfaction of the City, Contractor shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions from the City.

GC-28.2.9

After final review in which there are no exceptions noted or referenced, and before final payment is made, Contractor shall furnish to the City two (2) sets of record Shop Drawings, all clearly revised and completed and brought up to date, showing the permanent construction as actually made and marked FINAL/AS-BUILTS. One (1) set of such Shop Drawings shall be either drawn in ink on tracing cloth, or reproduced on mylar from which clear prints can be made. The other set could be a complete paper print.

GC-28.2.10

Contractor shall be responsible for and bear all cost of damages which may result from the ordering of any Material or from proceeding with any part of Work prior to the review, without exception, by the City of the necessary Shop Drawings.

GC-28.3 Working Drawings

GC-28.3.1

When used in the Agreement Documents, the term "Working Drawings" shall be considered to mean Contractor's plans, including a detailed narrative, for temporary structures such as temporary bulkheads, support of open cut excavation, support of utilities, ground water control systems, forming and false work; for underpinning; and for such other work as may be required for construction but does not become an integral part of the Project.

GC-28.3.2

Copies of Working Drawings shall be submitted to the City where required by the Agreement Documents or requested by the City and shall be submitted at least thirty (30) calendar days in advance of their being required for Work.

GC-28.3.3

Working Drawings shall be signed and sealed by an engineer licensed to practice in the State of Georgia and shall convey, or be accompanied by, calculation of other sufficient information to completely explain the structure, machine, or system described and its intended manner of use. Prior to commencing such Work, Working Drawings must have been reviewed to the satisfaction of the City, and each Working Drawing identified by the City with the Engineer's stamp of "No Exception Taken." Review of the Working Drawings by the Engineer will not relieve Contractor in any way from its responsibility with regard to the fulfillment of the terms of Agreement. All risks of error are assumed by Contractor. The City and the Engineer shall have no responsibility therefor.

GC-28.4 Record Agreement Drawings

Contractor shall keep at least one (1) record copy of all Agreement Documents, reference documents, and all technical submittals at the Site in good order and annotated to show all changes made during the construction process. Record drawings shall be updated and kept current on a monthly basis by Contractor. The record drawings will be reviewed monthly by the Engineer prior to approval of Contractor's monthly Payment Application. Final "as-built" plans of the Work, shall be satisfactory to the Engineer, and will be provided at Contractor's expense within thirty (30) days following Substantial Completion of the Work or any portion thereof. The provision of such as-built documents satisfactory to the Engineer shall be an express condition precedent to final payment. Upon request, the Engineer will provide one (1) set of reproducibles of the original Agreement Drawings, at no cost, to Contractor within two weeks subsequent to the execution of this Agreement.

GC-28.5 Samples

GC-28.5.1

Contractor shall furnish at no additional cost, for the approval of the City, samples required by the Agreement Documents or requested by the City. Samples shall be delivered to the City as specified or directed. Contractor shall prepay all shipping charges on samples. Materials or Equipment for which samples are required shall not be used in Work until approved by the City.

GC-28.5.2

Each sample shall have a label indicating:

- (1) Name of Project;
- (2) Name of Contractor and Subcontractor;
- (3) Material or Equipment Represented;
- (4) Place of Origin;
- (5) Name of Producer and Brand (if any); and
- (6) Location in Project.

GC-28.5.3

Contractor shall prepare a transmittal letter for each shipment of samples containing the information required in Article B above. It shall enclose a copy of this letter with the shipment and send a copy of this letter to the City. Approval of a sample shall be only for the characteristics or use named in such approval and shall not be construed to change or modify any Agreement requirement. Substitutions will not be permitted unless they are considered to be to the City's best interest.

GC-28.5.4

Approved samples not destroyed in testing shall be sent to the City or stored at the Site of the Work. Approved samples of the hardware in good condition will be marked for identification and may be used in the Work. Materials and Equipment incorporated in the Work shall match the approved samples. Samples which failed testing or were not approved will be returned to Contractor at its expense if so requested at time of submission.

GC-28.5.5

Contractor will provide architectural samples to the City in a composite color board format for review and color coordination. These samples shall be of the precise Material and color specified and of sufficient size for comparison to other material samples.

GC-28.5.6

Custom colors and coatings may be required to complete the Project within acceptable architectural standards. Contractor shall comply with the Architect's selection and provide Materials that precisely match the approved samples.

GC-28.6 Operation and Maintenance Manuals

GC-28.6.1

Operation and maintenance manuals are operator and shop maintenance instructions that enable an average journeyman mechanic without prior knowledge of the specific type, make, or model to maintain and repair the Equipment. The manuals shall include repair parts data that provides positive identification for an item of the complete Equipment with reference to the manufacturer or dealer facilities to identify ordering part numbers in support of procured Equipment.

GC-28.6.2 Preparation Instructions

An operation and maintenance manual set is required to cover each specific make, model, year and serial numbered piece of Equipment scheduled for delivery under terms of this Agreement. It is the intent of these requirements to use standard commercial manuals modified to meet the minimum Specification set forth herein. The manuals shall provide

instructions, illustrations, and other associated data for operations, preventive and corrective maintenance and repair, including a complete catalog of parts used in the assembly of the end item. The manuals provided shall contain complete instructions and information as set forth below for all Equipment components, assemblies, subassemblies, attachments, and accessories manufactured by the prime Supplier or those purchased by the prime Supplier from other sources and assembled in the finished end item.

GC-28.6.3 Contents of Operation and Maintenance Manuals

The contents of complete set of manuals shall include, at a minimum, the following:

- (1) Table of Contents;
- (2) Operating instructions;
- (3) Preventive maintenance, service, and corrective maintenance or repair instructions;
- (4) Parts list with recommended quantity; and
- (5) Approved Shop Drawing(s).

GC-28.6.4 Binding and Delivery

The manual(s) shall be bound or otherwise securely enclosed in an oil and moisture resistant binder(s). Each binder cover shall indicate in bold type the manufacturer's name, contract number, model number, and serial number of the unit or equipment. Five (5) copies of the manual(s) shall be delivered with the Shop Drawings and must be approved with the Shop Drawings.

GC-29 CONTRACTOR'S TITLE TO MATERIALS

No Materials or supplies for the Work shall be purchased by Contractor or by any Subcontractor subject to any chattel mortgage, security agreement, or under a conditional sales contract or other agreement by which any security interest is retained by the seller. Contractor warrants that it has good title to all Materials and supplies used in the Work, free from all liens, claims or encumbrances.

GC-30 INSPECTION AND TESTING OF MATERIALS

All Materials and Equipment used in the construction of the Project shall be subject to adequate inspection and testing in accordance with accepted standards and the requirements of the Agreement Documents. The laboratory and inspection agency shall be provided by Contractor and approved by the City for these tests; provided, however, that if the City has already secured the services of identified testing consultants/agencies, then Contractor shall engage the services of the testing consultant/agency designated by the City. Additional tests performed after rejection of Materials or Equipment shall be at Contractor's expense.

Materials of construction, particularly those upon which the strength and durability of the structure may depend, shall be subject to inspection and testing to establish conformance with Specifications and suitability for uses intended, but failure to inspect Materials will in no way waive the City's right to reject defective Materials or to condemn Work in which they are used. Contractor will provide for travel expenses, factory performed testing and set up costs for the factory inspection and testing of all major architectural elements, mechanical, electrical or process equipment. A factory visit for both designers' representative and a City representative may be required. No funds for stored materials or fabrication items will be released until the factory inspection is completed and a certified Payment Application is submitted.

All tests performed by Contractor shall be witnessed by the City unless the requirement therefor is waived in writing. Contractor shall give the City reasonable advance notice of all such tests. The City may perform additional tests on materials tested by Contractor, and Contractor shall furnish samples for this purpose as requested.

In the event that the City directs additional testing or inspection of the Work and the testing or inspection reveals that the Work is not in accordance with the Agreement Documents, Contractor shall pay for all costs of correction of the Work as well as for all costs of testing and inspection. In the event that any portion of Contractor's Work depends upon the Work of the City or any of its separate contractors, the Contractor agrees that the City's Work or that of its separate contractor is adequate and installed such that it is ready and sufficient in all respects to accept Contractor's Work, unless written notice of any defect or deficiency is provided by the Contractor to the City prior to the Contractor beginning performance of the Work.

GC-31 MATERIALS AND EQUIPMENT

Contractor shall furnish all Materials and Equipment to be incorporated into the Work. Only Materials and Equipment conforming to the requirements of the Drawings and Specifications shall be incorporated into the Work. Except as otherwise specified or approved in specific instances, all such Materials and Equipment shall be new and unused and of the highest quality available. Materials and Equipment for which no specific requirements are given in the Drawings or specifications shall be those best suited for the specified use, considering function, strength, durability and resistance to corrosion. Manufactured Materials and Equipment shall be obtained from sources which are currently manufacturing such Materials or Equipment, except as otherwise approved in writing.

If so ordered by the Engineer, sources of Materials shall be approved by him before delivery from those sources is commenced. Approval of a source of Materials may be withdrawn by the Engineer at any time that the Materials delivered from that source are found to be defective, and Contractor shall thereupon cease all deliveries from that source.

Manufacturer's warranties, certifications, guarantees, manuals, instruction sheets and parts lists provided with Materials and Equipment shall be furnished to the Engineer before final payment is made and receipt of same is a condition precedent to any obligation to make final payment.

GC-32 STORAGE OF MATERIALS AND EQUIPMENT

Materials and Equipment to be incorporated in the Work shall be stored in such a manner as to preserve their quality and fitness for incorporation in the final project. They shall be stored in a manner acceptable to the Designer and Owner and in an accessible facility that allows inspection. If at any time the City determines that any Materials or Equipment are not being properly stored, they may issue a directive to correct the storage or reject the Material for incorporation in the Project. No additional payment will be made for storage requirements. No payment will be made on Materials stored improperly or replaced due to improper storage.

No Equipment may be stored outside without the express written permission of the City on that specific piece of equipment stating that unit's unique I.D. numbers.

For any Equipment or units that have rotating parts or bearing assemblies and must be stored for more than sixty (60) days, Contractor shall set up a schedule to manually rotate the units every fifteen (15) days and maintain a certification log to preserve the service life and warranties.

GC-33 REPORTS, RECORDS, AND DATA

GC-33.1 General

Contractor shall submit to the City schedules of quantities and costs, progress schedules, reports, estimates, records, certificates, and other data as the City may request concerning Work performed or to be performed under this Agreement.

GC-33.2 Payroll Reports

Contractor shall be required to furnish weekly payroll reports to the City, certifying conformance with the wage rates listed in the Specifications. The requirement applies to Contractor, its Subcontractors, and any lower-tier Subcontractor providing labor at the site. These reports shall show completed payroll information, and such certificates and statements of compliance as required in the Federal Labor Standards and by the City relative to payrolls. The schedule of wage rates shall be posted on a bulletin board available to the workers.

GC-33.3 Contractor's Daily Reports

As soon as Contractor has started Work on the Project, it shall compile written daily reports of the Work performed the previous day by its employees, including the employees of Subcontractors.

The reports shall be prepared by Contractor's representative and shall bear his signature. Each report shall contain at least the following information:

- (1) Description of Work items and references to payment items;
- (2) Work forces and construction Equipment employed;
- (3) Materials and Equipment installed;
- (4) Work performed by Subcontractors; and

- (5) Description of any accidents, interruptions, impacts, delays, problems, visitors, impediments, etc. encountered or continued.

Contractor shall require similar reports from Subcontractors for each day on Site and shall attach copies to Contractor's Daily Report when submitted.

GC-34 CONTRACTOR'S SUPERVISION OF THE WORK

GC-34.1 General

Contractor shall provide competent, efficient supervision of the Work. All Work shall be performed in a skillful, workmanlike and orderly manner, and Contractor and its supervisory personnel shall enforce this requirement at all times.

GC-34.2 Contractor's Representative

Before beginning Work, Contractor shall notify the City in writing of one (1) person within its organization, satisfactory to the City, who shall have complete authority to supervise Work, to receive orders from the City, and to represent and act for Contractor in all matters arising under Agreement. Contractor shall not remove its representative without first designating, in writing, a new representative, who meets all of the foregoing requirements. Upon ten (10) days notice, the City or the Engineer may request replacement of Contractor's Representative if, in the City's opinion, it is necessary to ensure the timeliness or quality of the Work.

Contractor's representative shall normally be present at or about the Site of Work while the Work is in progress. Before leaving the Site of Work for any extended period, whether or not the Work is in progress, Contractor's representative shall notify the City, in writing, of the designation of an assistant, satisfactory to the City, with full authority to act for the representative in his absence, or shall make substitute arrangements satisfactory to the City. When neither Contractor, its representative, nor the representative's authorized assistant is present on a part of Work, the superintendent, foreman, or other employee or Contractor in charge of that part of the Work shall be an authorized representative of Contractor for the purposes set forth above.

GC-35 SUBCONTRACTORS AND SUPPLIERS

Contractor may utilize the services of specialty Subcontractors on those parts of Work that, under normal contracting practices, are performed by specialty Subcontractors, except as otherwise required by the Agreement Documents.

In addition to the designation of Subcontractors in the proposal documents, Contractor shall submit to the City a listing of the Subcontractor name, full address and telephone number, contact person, class or trade of work, list of similar past projects worked on, including reference names, telephone numbers, and other information as applicable to that Subcontractor and the provisions of the Agreement Documents. Contractor shall make Subcontractor submittals sufficiently in advance of construction requirements to provide the Engineer and City with no less than sixty (60) days for review and appropriate action.

Contractor shall be as fully responsible to the City for the acts and omissions of all Subcontractors and Suppliers, and of persons either directly or indirectly employed by them, as it is for the acts and omissions of persons directly employed by it. Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to Work to bind Subcontractors and Suppliers to Contractor by the terms of the General Conditions and other Agreement Documents, insofar as applicable to the work of Subcontractors and Suppliers, and to give Contractor the same power as regards terminating any subcontract that the City may exercise over Contractor under any provisions of the Agreement Documents.

Nothing contained in this Agreement shall create any contractual relation between any Subcontractor or Supplier and the City. The Contractor shall not award more than seventy-five percent (75%) of the Work to Subcontractors, provided that, to the extent that a more stringent standard is required in the Special Conditions, the more stringent standard shall control.

GC-36 INSPECTION OF WORK

GC-36.1 General

All of Work shall be subject to inspection by the City for conformity with the Drawings and Specifications, Working Drawings, Shop Drawings, data on Materials and Equipment, and material samples. Inspection of the balance of Work will be in accordance with this article, unless otherwise expressly indicated. Material tests and all other specified tests will be considered part of the inspection process and shall be subject to all of the provisions of this clause.

GC-36.2 Engineer's Access to Work

The Engineer shall have access to, and may inspect Work at all times and places. He shall have access to, and may inspect, Materials and Equipment to be incorporated in Work at all times at the place of production or manufacture and at the shipping point, as well as at Site of Work.

The Engineer will designate the Materials and Equipment to be inspected at the place of production or manufacture. Contractor shall give the Engineer fourteen (14) days advance written notice of the start of manufacture or production of Materials and Equipment so designated. The Engineer's failure to so designate Materials and Equipment shall in no way limit his right to inspect them at the place of production or manufacture.

Contractor's Materials and Equipment contracts shall include a notice to the Supplier or Subcontractor of the inspection requirements of this clause.

GC-36.3 Cooperation And Safety

The Engineer will perform inspections in such manner as not to delay Work unnecessarily, and Contractor shall perform the Work in such manner as not to delay inspection unnecessarily.

Contractor shall give the Engineer reasonable advance notice of operations requiring special inspection of a portion of Work at any time by reasonable advance notice to the Engineer.

If requested by the Engineer, Contractor shall submit written certification, in a form approved by the Engineer, that he has inspected the Work prior to inspection by the Engineer, and that it complies with the Agreement Documents.

Contractor shall bear any additional inspection costs resulting from Contractor's failure to have a portion of Work ready for inspection at the time requested by Contractor for its inspection, or from reinspection of any previously rejected portion of Work where the defects requiring such rejection were due to Contractor's fault or negligence. Such costs may be deducted, in whole or in part, from any money due or that may become due Contractor under the Agreement.

Contractor shall furnish the Engineer all reasonable facilities for his safety and convenience in inspecting the Work, at all times and at all places where inspection may take place. If the Engineer finds that conditions are unsafe for inspection at a particular location, he may, upon notice to Contractor, refuse to inspect in that location until such conditions are corrected. Contractor shall bear any additional costs incurred to permit subsequent inspection of any portion of Work covered or completed at the location after correction of the conditions, whether or not such portion of Work is found to meet the requirements of the Agreement Documents.

GC-36.4 Inspection of Covered or Completed Portions of Work

If so ordered in writing by the Engineer, Contractor shall uncover, remove, tear out, or disassemble, in whole or in part, any covered or completed portion of Work to permit its inspection. If that portion of Work is found to be defective or unauthorized, Contractor shall bear all costs of uncovering, removal, tearing out, or disassembly. If such portion of the Work is found to conform with the Agreement Documents, including Agreement Drawings and Specifications, it shall be recovered, replaced, reassembled, or otherwise restored by Contractor to its original condition and, except as stated below, all Work required in connection with the inspection will be considered extra Work. If such portion of Work was covered or completed without the approval of the Engineer, where such approval was required by the Specifications or required in advance by the Engineer, Contractor shall bear all costs involved in the inspection, notwithstanding conformance of such portion of Work with the Agreement Documents including the Agreement Drawings and Specifications.

GC-36.5 Inspection Not a Waiver or Acceptance

Neither the inspection nor lack of inspection of any portion of the Work, nor the presence or absence of the Engineer during performance of any of the Work, nor acceptance of the whole or any part of the Work by the Engineer, nor any possession taken by the City or its employees shall operate as a waiver of any provision of this Agreement Documents or any power herein reserved to City or any rights to damages herein provided. Should an error in the estimate, or conclusive proofs of defective Work or materials used by or on the part of Contractor be discovered after the final payment has been made, the City reserves the right to claim and

recover by process of law such sums as may be sufficient to correct the error or to make good the defects in the Work and Materials.

GC-36.6 Correction of Non-Compliant Work

If Contractor is found to have Work that fails to meet the intent of the Plans and Specifications or other Agreement Documents, or is in other aspects unsuitable it may be issued a notice of non-compliance on that portion of the Project Work. Contractor shall remedy the defective or incorrect Work within twenty-four (24) hours unless a different schedule is agreed to in writing. This non-compliance status may be issued on temporary installations that fail to protect the Work or site conditions.

GC-37 CITY'S AUTHORITY

The City shall have authority to decide all questions as to interpretation and fulfillment of the requirements and obligations of the Agreement Documents, including, without limitation, all questions as to the prosecution, progress, quality, and acceptability of Work. The City may implement and enforce its decisions by orders, instructions, notices, and other appropriate means.

Any decision, order, instruction, or notice of the City will be confirmed in writing. Such confirmation shall state the specific subject of the decision, order, instruction, or notice and its date, time, place, author and recipient.

Inspectors may be appointed to inspect all Materials used and all Work performed. Such inspection may extend to all or any part of the Work and to the preparation or manufacture of the Materials to be used. Inspectors will not be authorized to approve or accept any portion of the completed Work or to issue instructions contrary to the Plans and Specifications or other Agreement Documents. Inspector will have authority to reject defective Material and to suspend Work that is being improperly performed, subject to the final decision of the City. Inspector shall, in no case, act as foreman or perform other duties for Contractor.

GC-38 PROGRESS PAYMENTS

GC-38.1 Progress Estimates

Within the time set forth in the Special Conditions or, if none, then prior to the submittal of the first Payment Application, Contractor shall submit to the Engineer for approval, in the form directed or acceptable to the Engineer, a complete schedule of values of the various portions of the Work, including quantities and unit prices, aggregating the Agreement Price (except in cases and to the extent that accepted unit prices form the basis of payment). The schedule shall subdivide the Work into component parts in sufficient detail to serve as the basis for progress payments during construction and to coordinate with the progress schedule required under the Special Conditions, and shall be supported by such data to substantiate its correctness as the Engineer may require. Each item in the schedule of values shall include its proper share of overhead and profit. An unbalanced breakdown providing for overpayment to Contractor on

items of Work which would be performed first will not be approved. The schedule of values, when approved by the Engineer, shall be used only as a basis for Contractor's monthly request for payment and shall not be used as the basis for computing additions to or deductions from the Agreement Price.

Subject to the provisions of this clause, Contractor shall prepare a written report for the Engineer's approval, on the form approved by the City, of the total amount of value of Work performed under the proposal items of Agreement to the time of such estimate and in accordance with the progress report based on the approved schedule.

No progress estimate or payment shall be considered an approval or acceptance of any Work performed, Material, or Equipment furnished. All estimates and payment will be subject to correction in subsequent estimates and the final estimate.

Progress payments will be made for all completed activities and for suitably stored Materials as herein provided.

GC-38.2 Progress Payments

Upon completion of each monthly estimate of Work performed and Materials furnished, the Engineer, subject to the provisions of the Agreement Documents, shall recommend payment to Contractor for the estimated value of such Work, Materials, and Equipment, less the amount of all prior payments and all liquidated damages and other amounts to be deducted or retained under the Agreement. Contractor will be paid one hundred (100%) percent, less retainage, of the cost of Materials received and properly stored but not incorporated into the Work. Payments for Materials or Equipment stored on the Site shall be conditioned upon submission by Contractor of bills of sale or such other procedures satisfactory to the Engineer to establish the City's title to such Materials or Equipment or otherwise protect the City's interest, including applicable insurance. No progress estimate or payment needs to be made when, in the Engineer's judgment, the increment in the estimated value of Work performed and Materials and Equipment furnished since the preceding estimate is less than Ten Thousand Dollars (\$10,000.00). Contractor will be paid on or before the twenty-fifth day following receipt of the approved estimate from the Engineer.

GC-38.3 Retention from Progress Payments

The amounts retained by the City from each progress payment shall be as follows:

- (1) Except as noted below, withholding ten percent (10%) of the estimated value of the Work performed until 50 percent of the Contract value, including change orders and other additions to the Contract value provided for by the Contract Documents, is due and the manner of completion of the Contract Work and its progress are reasonably satisfactory to the City.
- (2) At the discretion of the City and with the approval of Contractor, the retainage of each Subcontractor may be released separately as the subcontractor

completes his or her work.

(3) Upon receipt of written request from Contractor, the City may, in its unilateral discretion, reduce retainage to Contractor for payment of retainage to Subcontractors who have completed their Work. If such retainage is released, Contractor shall furnish the City with an affidavit certifying that all monies due the Subcontractor have been paid. If the City determines that the released retainage has not been paid to the Subcontractor, the amount released shall be reinstated.

(4) The City may, in its unilateral discretion, elect to reduce Contractor's retainage and that of Subcontractors who have not completed all their work if the City believes it to be in its interest to do so.

(5) If reduced, the City may reinstate ten percent (10%) withholding if it believes it necessary or desirable to do so. Contractor agrees that the City is free to do so.

(6) If, after discontinuing the retention, the City determines that the Work is unsatisfactory or has fallen behind schedule, retention may be resumed at the previous level. If retention is resumed, Contractor and Subcontractors shall be entitled to resume withholding retainage accordingly.

GC-38.4 Additional Payment Conditions

GC-38.4.1

The submission and approval of the CPM Schedule and periodic updates thereof, as required by the Schedule requirements of the Special Conditions, shall be an integral part and basic element of the application upon which Progress Payments shall be made. Contractor shall be entitled to Progress Payments only as determined from the currently approved and updated CPM Schedule.

GC-38.4.2

Contractor shall promptly pay each Subcontractor upon receipt of payment from the City, out of the amount paid to Contractor on account of such Subcontractor's Work, the amount to which said Subcontractor is entitled, reflecting the percentage actually retained, if any, from payments to Contractor on account of such Subcontractor's Work. Contractor shall, by an appropriate agreement with each Subcontractor, require each Subcontractor to make payments to their Subcontractors in similar manner.

GC-38.4.3

The City may, on request and at its discretion, furnish to any Subcontractor, if practicable, information regarding the percentages of completion or the amounts applied

for by Contractor and the action taken thereon by the City on account of Work done by such Subcontractor.

GC-38.4.4

Neither the City nor the Engineer shall have any obligation to pay or to see to the payment of any Subcontractor or Supplier, but may at its sole option, withhold payment from Contractor on account of claims of nonpayment by Subcontractors and Suppliers in accordance with GC-38.5.1.

GC-38.4.5

No certification of Progress Payment (any progress payment), or any partial or entire use or occupancy of the Project by the City, shall constitute an acceptance or approval of any Work not fully in accordance with the Agreement Documents.

GC-38.4.6

Any and all funds paid to Contractor pursuant to the City-Contractor Agreement are hereby declared to constitute trust funds in the hands of Contractor, to be applied first to the payment of claims of Subcontractors, laborers, and Suppliers arising out of the Work, to claims for utilities furnished and taxes imposed, and to the payment of premiums on surety and other bonds and on insurance, before application to any other purpose. Whenever required by the Engineer, it shall be the duty of Contractor to file with the Engineer a verified statement, in form satisfactory to the Engineer, certifying the amounts then due and owing from Contractor for labor and materials, setting forth therein the names of the person whose charges or claims for labor or materials are unpaid, and the undisputed amount due to each respectively. The City, at its option, may also require the Contractor to furnish evidence of payment of Subcontractors and Suppliers in any form satisfactory to the City in addition to the requirements of GC-38.6.

GC-38.4.7

No payments made hereunder by City to Contractor prior to Final Payment shall be deemed conclusive as to the actual value of the Work performed by Contractor or of Contractor's performance of the Agreement.

GC-38.4.8

City reserves the right to issue any Progress Payment and Final Payment by check jointly to Contractor and any Subcontractor or Supplier at City's option.

GC-38.4.9

Should the City fail to issue any Progress Payment within sixty (60) days of approval of an acceptable monthly estimate of Work performed and Materials furnished, annual

interest on the payment amount may accrue at the Prime Rate, plus one percent. The Prime Rate shall be based on that published in the Wall Street Journal on the first business day of January or June, whichever has most recently passed, of the current year. Nothing stated herein shall invalidate any other conditions of Progress Payment approval.

GC-38.4.10

Contractor agrees to execute such payment application forms and release of claim forms as the City may require as a condition precedent to the City's obligation to make payment.

GC-38.4.11

This Article 38 shall completely supersede the Georgia Prompt Payment Act as it relates to Owner payments and any modifications or successors to it to the full extent allowed by law.

GC-38.5 Payments Withheld

GC-38.5.1

The City may decline to approve payment and may withhold any payment, in whole or in part, to the extent necessary to reasonably protect the City from loss because of:

- (1) Defective Work not remedied;
- (2) Third party claims filed or reasonable evidence indicating probable filing of such claims;
- (3) Failure of Contractor to make payments properly to Subcontractors, or for labor, Materials or Equipment;
- (4) Reasonable evidence that the Work cannot be completed for the unpaid balance of the Agreement Price;
- (5) Damage or the reasonable expectation of damage to the City or another contractor;
- (6) Reasonable evidence that the Work will not be completed within the Agreement Time;
- (7) Failure to carry out the Work in accordance with the Agreement Documents;
- (8) Failure of Contractor to fully comply with the Schedule requirements of the Special Conditions;
- (9) Failure to comply with insurance and safety requirements;
- (10) Failure to keep current "As-Built" Records; or
- (11) Failure of Contractor to comply with the requirements of the Agreement Documents in connection with the Payment Application process.

GC-38.5.2

When the grounds in Article GC-38.5.1., above are removed, payment shall be made for amounts withheld because of them.

GC-38.6 Waiver and Preservation of Claims In Periodic Application of Payments

Contractor has been employed by the City to furnish labor, Material, services, and other improvements. Upon receipt of the amounts requested in any monthly Application for Payment, Contractor waives and releases any and all claims it may have against the City or the Engineer through the date of that Payment Application, excepting those rights that Contractor may have in any retained amounts on account of labor or Materials, or both, furnished by Contractor and the unresolved claims, if any, enumerated in the Application for Payment. Contractor expressly warrants by submission of its periodic Application for Payment that all due and payable bills with respect to the Work have been paid to date or shall be paid from the proceeds of the Application for Payment, and waivers and releases from all Subcontractors and materialmen have been or will be obtained and delivered to the City in such form as to constitute effective waivers and releases of claims under all applicable laws. Upon receipt of payment of the amounts certified in the Application for Payment, Contractor does thereby waive, release, and relinquish any claims for additional compensation or an extension of time which Contractor has then or may have had arising out of the performance of the work or the furnishing of the labor or materials by Contractor through the date of the Application for Payment. This waiver and release applies to all facts, events, circumstances, changes, constructive or actual delays, acceleration, extra work, disruption, interferences, impacts and the like, which have occurred or may be claimed to have occurred prior to the date of the Application for Payment, excepting only claims which are then currently unresolved for which written notice has previously been provided to the City **and** which Contractor specifically enumerates in its Application for Payment. Failure to so enumerate claims shall be a final waiver and relinquishment of claim, whether or not such claims were previously submitted in accordance with GC-41.

GC-39 SUBSTANTIAL COMPLETION (“Substantial Completion”)

GC-39.1 Certificate of Substantial Completion

When Contractor considers that the Work, or a designated portion thereof which is acceptable to the City, is Substantially Complete, Contractor shall prepare for the Engineer a list of items to be completed or corrected. The failure to include any items on such list does not alter the responsibility of Contractor to complete all Work in accordance with the Agreement Documents. When the Engineer, on the basis of an inspection, determines that the Work or designated portion thereof is Substantially Complete, they will then prepare a Certificate of Substantial Completion of the Work which shall establish the Date of Substantial Completion of the Work, shall state the responsibilities of the City and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance and shall fix the time within which Contractor shall complete the items listed therein. The Certificate of Substantial Completion of the Work shall be submitted to the City and Contractor for their written acceptance of the responsibilities assigned to them in such Certificate.

GC-39.2 Warranty Commencement

Warranties required by the Agreement Documents shall commence on the Date of Final Completion of the Project or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion of the Work or designated portion thereof.

GC-39.3 Intentionally Omitted**GC-40 FINAL PAYMENT (“Final Payment”)**GC-40.1 Certificate for Final Payment

Following the Engineer's issuance of the certificate of Substantial Completion of the Work or designated portion thereof, and Contractor's Completion of the Work, Contractor shall forward to the Engineer a Written Notice that the Work is ready for final inspection and acceptance, and shall also forward to the Engineer a final Application for Payment. Upon receipt, the Engineer will make the necessary evaluations. When the Engineer finds the Work acceptable under the Agreement Documents and the Agreement fully performed, the Engineer will issue a certificate for Payment that will approve the final Payment due Contractor (“Final Payment”).

GC-40.2 Final Payment Conditions

Neither the Final Payment nor the retainage shall become due until Contractor submits to the Engineer:

- (1) An affidavit that all payrolls, bills for Materials and Equipment, and other indebtedness connected with the Work have been paid or otherwise satisfied;
- (2) Consent of surety, if any, to Final Payment;
- (3) Clear title for all vehicles and/or trailers, if any, to remain as City property;
- (4) Complete set of as-built record Drawings;
- (5) Documentation for all state sales taxes paid by Contractor including completed State Department of Revenue Refund forms and all necessary back up documentation required by the Department of Revenue;
- (6) If required by the Engineer or City, other data establishing payment or satisfaction of all such obligations, such as receipts, releases, and waivers of liens arising out of the Agreement, to the extent and in such form as may be designated by the Engineer or City. If any Subcontractor refuses to furnish a release or waiver required by the Engineer or City, Contractor may furnish a bond satisfactory to the City to indemnify the City against any such loss. If any lien or indebtedness

remains unsatisfied after all payments are made, Contractor shall refund to the City all monies that the latter may be compelled to pay in discharging such lien or other indebtedness, including, without limitation, all costs, expenses, arbitration fees, reasonable attorneys' fees, expert fees, or consultant fees incurred in connection with same; and

- (7) As a condition of Final Payment on the Project, Contractor shall, prior to final payment, complete and submit to the City, all of the invoice documentation and the State of Georgia Revenue Department forms required to obtain the sales tax refund on all applicable equipment expenditures. This submittal shall include the certified forms and auditable back-up necessary to substantiate the expenditures for State refund.

GC-40.3 Intentionally Omitted

GC-40.4 Waiver of Claims by Contractor Upon Final Payment

The acceptance of Final Payment shall constitute a waiver of all claims by Contractor except those previously made in writing and identified **and** enumerated by Contractor as unsettled at the time of the application for Final Payment. Failure to so enumerate unsettled claims shall be a final waiver and relinquishment of claim, whether or not such claims were previously submitted in accordance with GC-41.

GC-41 CLAIMS, CHANGES, AND EXTRA WORK

Contractor acknowledges the extreme importance to Owner of identifying and resolving Claims on an "as-you-go" basis in order for Owner to maintain its relationship with all available funding sources, including local taxpayers as well as the state and federal governments. Contractor further acknowledges the extreme prejudice suffered by Owner as a result of any attempted assertion by Contractor of Claims except as specifically permitted herein in the precise manner and within the time limits established herein, which prejudice includes, but is not limited to that resulting from the trouble and expense of having to deal with disputes over claims, if any, that were not made in accordance with the precise manner and within the time established herein.

GC-41.1 Claims and Contractor's Obligation to Proceed in the Face of Disputes

GC-41.1.1

A claim is any demand, contention, or assertion by Contractor seeking additional time or money under the Agreement Documents. Claims by Contractor must be made in writing as specified herein. Claims from Contractor must contain all of the following:

- (1) a narrative statement referencing and attaching the supporting documentation and specifically describing the legal, factual, and contractual basis of the claim;

- (2) if the claim alleges delay to the work or requests an extension time for excusable delay, the claim must include the precise number of days claimed, all alleged impacts on the work, as well as a detailed critical path as-built schedule analysis illustrating that the delays claimed were on the critical path of the Project, and that no concurrent delays were experienced during the critical path delay;
- (3) if the claim alleges improper acceleration of the work pursuant to GC-27.2, the claim must include the precise number of days' time extension Contractor contends it would have been entitled to receive, but for the acceleration, and the precise number of days by which the work has been accelerated. No claims for acceleration for work that is not on the critical path shall be permitted. Claims for acceleration must be accompanied by a detailed CPM analysis. Claims for acceleration shall be limited to the recoverable acceleration expenses referenced in Article GC-27 of this Agreement; and
- (4) if the claim is for additional compensation, the claim must include a detailed calculation of the precise amount claimed with all supporting documentation and shall also comply with Atlanta Procurement Code §2-1201 for claims expected to exceed \$20,000.00. All claims must reference the specific contract provisions relied upon to support the claim. Claims that are not based upon a contractual provision or remedy shall be void as Contractor agrees that its entitlement is limited to the remedies offered by the terms of this Agreement. All claims must specifically reference, by name, this Article, and the fact that the claim is being submitted under this Article. Any writing or other form of notice, however designated, which fails to specifically reference this Article, by name, shall not be deemed to constitute a valid claim hereunder.

Items (1), (2), (3) and (4) above shall hereinafter be referred to as the "Final Accounting."

Initial written notice of Contractor's intent to assert a claim (the "Initial Notice") must be made in writing within seven (7) days after the occurrence of the event giving rise to the claim or the right to submit a claim is waived. Contractor shall submit all information reasonably available to it that is otherwise required in the Final Accounting at the time of the Initial Notice.

Except for Claim events that continue more than thirty (30) days, within thirty (30) days after the conclusion of the event giving rise to the Claim, Contractor shall provide the Final Accounting. Failure to timely provide the Final Accounting shall constitute a waiver of the Claim even if timely Initial Notice is provided. Any waiver by the City of the notice requirements for the Initial Notice or the Final Accounting for a single claim, event, or occurrence shall not

constitute a waiver of these notice requirements for any other claim, event, or occurrence. Each request for time or money by Contractor shall be considered a separate claim. All information required in the Final Accounting must be submitted within the time limits established herein, and no supplementation of the information or claims shall be permitted. Any attempted reservation of the right to submit or supplement an earlier made claim shall be void.

For events giving rise to a claim that Contractor contends continues for more than thirty (30) days, including any alleged continuing claims or continuing impacts that Contractor contends continue to accrue beyond thirty (30) days, then Contractor shall give the Initial Notice as required herein, stating therein that the event or impact is continuing. Within thirty (30) days of the start of the event (as documented by the Initial Notice), Contractor shall provide all information available to it that is required in the Final Accounting, including without limitation a quantification of any costs incurred to date. Contractor shall supplement the required information, including without limitation any additional damages accrued during the period and any scheduling information required, every thirty (30) days thereafter until the event or impact ceases, culminating in the Final Accounting within thirty (30) days thereafter. Failure to timely provide: (a) the Initial Notice; (b) the information due within thirty (30) days thereafter; (c) timely and complete supplements; or (d) the timely Final Accounting shall be deemed a waiver of any claim for time or money for events occurring after the date Contractor last timely and completely complied with the requirements hereof. Any attempt to reserve the right to supplement at a different time or to accrue costs or impacts beyond thirty (30) days shall be void and shall be deemed a waiver of any further claim relating thereto.

The Final Accounting shall be accompanied by a sworn statement from a representative of Contractor who is the person most knowledgeable of the facts and circumstances surrounding the Claim and personally familiar with such facts and circumstances certifying that (a) the claim is submitted in good faith, (b) the cost data and all backup information submitted are true, accurate, and complete, and (c) that the amount requested accurately reflects the amount for which Contractor and the Affiant believe the City is liable.

GC-41.1.2 Claim Review

Upon receiving a statement of claim, and with the advice and assistance of the Engineer as appropriate, the City may review the statement of claim submitted by Contractor. In conducting this review, the Engineer or other person designated by the City shall have the right to require Contractor to submit such additional or supporting documents, data and other information as the City and/or the Engineer may require, and the failure to submit such additional documents, data or other information within thirty (30) days following written request shall be deemed a waiver of the claim. Contractor agrees that it will produce any documents requested that would otherwise be produceable in a civil action under O.C.G.A. § 9-11-34. Upon completion of such review, to take place within such

time as the City may designate following receipt of the additional documents, data or other information as may have been required by the City and/or the Engineer, the City in consultation with the Engineer may issue a written determination, and if it deems appropriate accept such parts of the claim as are found in good faith to be proper. If Contractor agrees, a Change Order shall be issued to amend the Agreement Price, the time for completion or either of them as may be found proper. If Contractor disputes the determination made by the City, Contractor as a condition precedent to any further action to resolve such dispute must notify the City and the Engineer in writing within ten (10) days following receipt of the decision of the factual basis of such dispute and permit the City fifteen (15) additional days to reconsider and, if it deems it appropriate, issue a modified decision.

GC-41.1.3 No Waiver

Nothing contained in this section shall operate to limit or extinguish any right or defense of the City contained elsewhere in the Agreement Documents or available at law or in equity or constitute a waiver by the City of any right or defense otherwise available. Nothing in this Article GC-41 shall alter Article GC-24 or GC-26 or give Contractor the right to recover additional compensation not authorized by other items of the Contract Documents or precluded thereby.

GC-41.1.4 Absolute Conditions Precedent

The failure of Contractor to file any claim within the time limits prescribed herein or in the form or manner precisely as required hereby shall be deemed a material prejudice to the interests of the City and shall constitute an absolute waiver of the claim and the right to file or thereafter prosecute the same.

GC-41.1.5

Claims by the Owner shall not be subject to the requirements of Section 41.1, Claims by the Owner shall be asserted within a reasonable time of discovery of the claim and shall include information necessary for Contractor to reasonably evaluate the claim. The Owner agrees to notify Contractor in writing of its claims within a reasonable time but not later than the close of discovery in any arbitration or litigation conducted hereunder.

GC-41.1.6

Pending final resolution of a Claim, except as otherwise agreed in writing, Contractor shall proceed diligently with performance of the Work and the Owner shall continue to make undisputed payments in accordance with the Agreement Documents. The making of any payment by Owner shall not constitute a waiver of any Claims by the Owner or an acknowledgement by Owner that Contractor is entitled to additional time or money.

GC-41.1.7

Contractor acknowledges the extreme importance to the City of completing the Work as expeditiously as possible and the prejudice the City may suffer if the Work is not completed as scheduled. Contractor further acknowledges the strong likelihood that disputes between the parties will arise and that Contractor will likely be required to perform disputed work which the City contends to be included within Contractor's scope of work, or that if acknowledged as changed or extra work, the likelihood that the City may dispute the amount of Contractor's alleged entitlement. Irrespective of whether it is within the general scope of the Work, Contractor agrees to perform all work, whether disputed or undisputed, that the City directs. No dispute or controversy shall interfere with the progress of construction, and Contractor shall proceed with the work without interruption, deficiency, or delay. Contractor warrants and represents that Contractor and its Surety have sufficient capitalization and resources to complete the Work, including all disputed work whether or not it is within the general scope of the work, and resolve disputes in accordance with the terms of this Agreement. Contractor therefore agrees that any failure or refusal by Contractor to perform disputed work which the City directs Contractor to perform shall be a material and substantial breach of the Agreement for which Contractor and its surety are jointly and severally liable. Contractor acknowledges and agrees that its failure or refusal to perform disputed work will cause the City significant damage and that such damages may include increased costs to have another contractor complete the work at a premium over the costs Contractor would have incurred to perform the disputed work. Contractor acknowledges and agrees that should it refuse to proceed in the face of disputes, it is liable for all additional costs incurred in completing both Contractor's base Agreement scope of work and any changed, extra, or additional work.

GC-41.2 Changes in the Work

GC-41.2.1 General

GC-41.2.1.1

Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Agreement, by Change Order, Field Change, Work Authorization or Change Directive. For purposes of this Agreement, the terms "extra work" or "additional work" shall have the same meaning as "changed work" and be governed by the same Agreement provisions governing changes.

GC-41.2.1.2

Changes in the Work shall be performed under applicable provisions of the Agreement Documents, and Contractor shall proceed promptly, unless otherwise provided in the Change Order, Field Change, Work Authorization or Change Directive. A change in the Agreement Price or the Agreement Time shall be accomplished only by Change Order or Change Directive, and no other compensation shall be due to Contractor other than that permitted pursuant to a Change Order or a Change Directive. Accordingly, no course of conduct or

dealings between the parties, nor express or implied acceptance of alterations or additions to the Work, and no claim that Owner has been unjustly enriched by any change to the Work, whether or not there is, in fact, any unjust enrichment, shall be the basis of any claim for an increase in any amounts due under the Agreement Documents or a change in any time period provided for the Agreement Documents. Any failure to comply with the notice and other claim procedure requirements included herein or any other Agreement requirements shall be a waiver of the right to additional time or money.

GC-41.2.1.3

Any written directive which Contractor believes to constitute a Change hereunder must be accompanied by the notice required under Article GC-41 governing claims. ALL CONTRACTOR CLAIMS FOR CHANGES MUST BE ASSERTED IN ACCORDANCE WITH ARTICLE GC-41 OR THEY ARE WAIVED AND RELEASED.

GC-41.2.2 Change Orders

GC-41.2.2.1 [Intentionally Omitted]

GC-41.2.2.2 [Intentionally Deleted]

GC-41.2.2.3

Methods used in determining adjustments to the Agreement Price for Change Orders shall be limited to those listed, below:

Any Change Order accepted by Owner and Contractor constitutes a full and final settlement and accord and satisfaction of all effects of the change, including but not limited to any and all impact, delay and/or disruption relating thereto upon any and all aspects of the Work or the Agreement Documents, and will compensate Contractor fully. In such case, Contractor expressly waives any and all right to make a Claim or to take any action or proceeding for any other consequences of any Change Order, whether the consequences result directly or indirectly from the Change Order. In addition, Contractor expressly waives and releases any Claim it may have against the Owner for any adjustment in the Substantial Completion Date or Final Completion Date resulting from, arising out of, or related to the change reflected in any such Change Order, including, but not limited to, any impact that such change may have on the unchanged portion of the Work or the Substantial or Final Completion Date. In addition, Contractor expressly waives and releases any Claim it may have against the Owner for any additional compensation or damages resulting from, arising out of, or related to, the change reflected in any such Change Order, including, but not limited to any

Claim for damages due to delay, disruption, hindrance, impact, ripple effect, cumulative impact, interference, cardinal change, abandonment, inefficiencies or extra work arising out of, resulting from, or related to the change reflected in any such Change Order, including, but not limited to, any impact that such change may have on the unchanged portion of the Work or the Substantial or Final Completion Date.

GC-41.2.3 Change Directives

GC-41.2.3.1

The Owner may, by Change Directive, without invalidating the Contract, order Changes in the Work consisting of additions, deletions or other revisions, the Agreement Price and Agreement Time being adjusted accordingly to the extent necessary. Any Claim arising from a Change Directive must be made in accordance with the terms of this Contract.

GC-41.2.3.2

A Change Directive shall be used in the absence of total agreement on the terms of a Change Order, Field Change, or Work Authorization.

GC-41.2.3.3

If the Change Directive warrants an adjustment to the Agreement Price, the adjustment shall be based on one of the following methods:

- (1) mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- (2) unit prices stated in the Agreement Documents or subsequently agreed upon;
- (3) cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- (4) by Force Account as provided hereafter.

GC-41.2.4 Force Account

When no agreement is reached for Changed Work to be done at Lump Sum or Unit Prices or another mutually agreed manner, such work may be authorized by the City to be done on a Force Account basis. A Force Account estimate that identifies all anticipated costs shall be prepared by Contractor. Work shall not begin until the Force Account is approved. Payment for Force Account work will be in accordance with the following:

GC-41.2.4.1 Labor

For all labor, equipment operators, and supervisors, excluding superintendents, in direct charge of the specific operations, Contractor shall receive the rate of wage agreed upon in writing before beginning work for each and every hour that said labor, equipment operators, and supervisors are actually engaged in such work.

Contractor shall receive the actual costs paid to, or in behalf of, workers by reason of subsistence and travel allowances, health and welfare benefits, pension fund benefits, or other benefits, when such amounts are required by collective bargaining agreement or other employment contract generally applicable to the classes of labor employed on The Work.

An amount equal to 10% of the sum of the above items will also be paid Contractor. Said 10% shall be deemed to include 3% for Contractor's fee and 7% for Contractor's overhead.

GC-41.2.4.2 Bond, Insurance, and Tax

For bond premiums, property damage, liability, and worker's compensation insurance premiums, unemployment insurance contributions, and Social Security taxes on the Force Account work, Contractor shall receive the actual cost, to which cost no percentage will be added. Contractor shall furnish satisfactory evidence of the rate or rates paid for such bond, insurance, and tax.

GC-41.2.4.3 Materials

For materials accepted by the Engineer and used, Contractor shall receive the actual cost of such material incorporated into The Work, including Contractor paid transportation charges (exclusive of machinery rentals as hereinafter set forth), to which cost 10% will be added. Said 10% shall be deemed to include 3% for Contractor's fee and 7% for Contractor's overhead.

GC-41.2.4.4 Equipment

For any machinery or special equipment (other than small tools) including fuel and lubricant, plus transportation costs, the use of which has been authorized by the Engineer, Contractor shall receive the rental rates indicated below for the actual time that such equipment is in operation on the Work or the time, as indicated below, the equipment is directed to stand by.

Equipment rates shall be based on the edition in effect at the time of Contractor's original bid of the *Rental Rate Blue Book for Construction Equipment* or *Rental Rate Blue Book for Older Construction Equipment*,

whichever applies, as published by EquipmentWatch using all instructions and adjustments contained therein and as modified below.

Allowable Equipment Rates shall be established as defined below:

- Allowable Hourly Equipment Rate = Monthly Rate/176 x Adjustment factors x 70%.
- Allowable Hourly Operating Cost = Hourly Operating Cost x 70%.
- Allowable Rate Per Hour = Allowable Hourly Equipment Rate + allowable Hourly Operating Cost.
- Standby Rate = Allowable Hourly Equipment Rate x 35%

NOTE: The monthly rate is the basic machine plus any attachments.

Standby rates shall apply when equipment is not in operation and is directed by the Engineer to standby for later use. In general, Standby rates shall apply when equipment is not in use, but will be needed again to complete The Work and the cost of moving the equipment will exceed the accumulated standby cost. Payment for standby time will not be made on any day the equipment operates for 8 or more hours. For equipment accumulating less than 8 hours operating time on any normal workday, standby payment will be limited to only that number of hours which, when added to the operating time for that day equals 8 hours. Standby payment will not be made on days that are not normally considered workdays.

The City will not approve any rates in excess of the rates as outlined above.

Payable time periods will not include:

- Time elapsed while equipment is broken down;
- Time spent in repairing equipment; or
- Time elapsed after the Engineer has advised Contractor the equipment is no longer needed.

If a piece of equipment is needed which is not included in the above *Blue Book* rental rates, reasonable rates shall be agreed upon in writing before the equipment is used. All equipment charges by persons or firms other than Contractor shall be supported by invoices.

Transportation charges for each piece of equipment to and from the site of the Work will be paid provided:

- The equipment is obtained from the nearest approved source;
- The return charges do not exceed the delivery charges;
- Haul rates do not exceed the established rates of licensed haulers; and

- Such charges are restricted to those units of equipment not already available and not on or near the Project.

No additional compensation will be made for equipment repair.

GC-41.2.4.5 Miscellaneous

No additional allowance will be made for general superintendence, the use of small tools, or other costs for which no specific allowance is herein provided.

GC-41.2.4.6 Compensation

Contractor's representative and the Engineer shall compare records and agree on the cost of work done as ordered on a Force Account basis at the end of each day. Should Contractor fail or refuse to fulfill this daily record keeping function by meeting with the Engineer and agreeing upon the cost of Force Account Work, Contractor agrees that it forfeits and releases any right to payment or right to claim for the Force Account Work for that day.

GC-41.2.4.7 Subcontract Force Account Work

For work performed by an approved Subcontractor or lower-tier Subcontractor, all provisions of this Section that apply to Contractor in respect to labor, materials and equipment shall govern. Contractor shall coordinate the work of its Subcontractor. The prime Contractor will be allowed an amount to cover administrative cost equal to 5% of the Subcontractor's amount earned but not to exceed \$5,000.00 per Subcontractor for each Change in Work performed by Force Account. Markup for lower-tier Subcontract work will not be allowed. The 5% shall be for Contractor's overhead in administering the change.

Should it become necessary for Contractor or Subcontractor to hire a firm to perform a specialized type of work or service which Contractor or Subcontractor is not qualified to perform, payment will be made at reasonable invoice cost. To each invoice cost a markup to cover administrative cost equal to 5% of the total invoice but not to exceed \$5,000.00 will be allowed Contractor or Subcontractor but not both. If paid to Contractor, the 5% shall be for Contractor's overhead in administering the change.

GC-41.2.4.8 Statements

No payment will be made for work performed on a Force Account basis until Contractor has furnished the Engineer with duplicate itemized statements of the cost of such Force Account work detailed as follows:

- (1) Name, classification, date, daily hours, total hours, rate, and extension for each laborer, equipment operator, and supervisor, excluding superintendents;
- (2) Designation, dates, daily hours, total hours, rental rate, and extension for each unit of machinery and equipment;
- (3) Quantities of materials, prices, and extensions;
- (4) Transportation of materials; and
- (5) Cost of property damage, liability, and worker's compensation insurance premiums, unemployment insurance contributions, and Social Security tax.

Statements shall be accompanied and supported by invoices for all materials used and transportation charges. However, if materials used on the Force Account work are not purchased specifically for such work but are taken from Contractor's stock, then, in lieu of the invoices, Contractor shall furnish an affidavit certifying that such materials were taken from its stock, that the quantity claimed was actually used, and that the price and transportation claimed represent the actual cost to Contractor.

Payment based on Force Account records shall constitute full payment and settlement of all additional costs and expenses caused by, arising from, or associated with the Work performed, including any time related or impact costs in connection with the Force Account work or any unchanged work impacted thereby.

GC-41.2.5

If any change or Change Directive meets the requirements for excusable delay and a change in the Agreement Time is warranted as a direct result of the change or Change Directive, then the four items of delay damage compensation identified in Article GC-26.2.1 for the unenforceability exception to the recoverability of delay damages under the Agreement may be included as a part of the adjustment in the Agreement Price for the change or change directive if Contractor has met all other requirements of the Agreement, including the notice and claim procedure requirements. Provided, however, Contractor shall, under no circumstances, be allowed to duplicate any costs included under this Article so as to receive a double recovery. In the event that Contractor is entitled to the four items of delay damage compensation referenced above, there shall be deducted from said entitlement all amounts paid or allowed Contractor for overhead pursuant to the percentage markups included herein.

GC-41.2.6

Upon receipt of a Change Directive, Contractor shall promptly proceed with the Change in the Work involved and advise the Owner of Contractor's agreement or disagreement with the method, if any, provided in the Change Directive for determining the proposed adjustment in the Agreement Price or Agreement Time utilizing the notice and claim procedures set forth herein.

GC-41.2.7

A Change Directive signed by Contractor indicates the agreement of Contractor therewith, including adjustment in Agreement Price and Agreement Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order, Field Change or Work Authorization, as applicable.

GC-41.2.8

If Contractor does not respond promptly or disagrees with the method for adjustment in the Agreement Price, the method and the adjustment shall be based upon the actual expenditures and savings attributable to the change, as determined in accordance with Article 41.2.4.

GC-41.2.9

The amount of credit to be allowed by Contractor to the Owner for a deletion or change which results in a net decrease in the Agreement Price shall be the actual cost, and that proportion of Contractor's Fee (including both profit and overhead) allocable to such actual cost.

GC-41.2.10

Pending final determination of the total cost of a Change Directive to the Owner, amounts not in dispute for such changes in the Work may be included in Applications for Payment accompanied by a Change Order, Field Change or Work Authorization (as applicable) indicating the parties' agreement with part or all of such costs. For any portion of such cost that remains in dispute, the Owner may make an interim determination for purposes of monthly certification for payment for those costs. That interim determination of cost, if made, shall be subject to the right of the Owner to change or withdraw the same unless and until finalized by Change Order, Field Change or Work Authorization, as applicable.

GC-41.2.11

When Contractor agrees with the determination made by the Owner concerning the adjustments in the Agreement Price and Agreement Time, if any, or Owner and Contractor otherwise reach agreement upon the adjustments, such agreement shall be

effective immediately and shall be recorded by preparation and execution of an appropriate Change Order, Field Change or Work Authorization, as applicable.

GC-41.3 No Oral Changes

It is expressly agreed that, except in an emergency endangering life or property, no modifications, additions or changes to the Work shall be made except upon written order of Contractor, and Contractor shall not be liable to Subcontractor for any extra labor, materials or equipment furnished without such written order. No officer, employee or agent of Contractor is authorized to direct any extra or Changed work by verbal order nor is Subcontractor authorized to proceed with any work upon verbal order.

No eliminations, additions, or alterations shall be made in the Work except upon written order of The City. No course of conduct or dealings between the parties, nor express or implied acceptance of alterations or additions to the Work, and no claim that the City has been unjustly enriched by any alteration or addition to the Work, whether or not there is, in fact, any unjust enrichment to the Work, shall be the basis of any claim for an increase in any amounts due under the Agreement Documents or an increase in any time period provided for in the Agreement Documents. No action, conduct, omission, prior failure, or course of dealing by the City shall waive, modify, change, or alter the requirement that Change Orders, Field Changes, Work Authorizations and Change Directives must be in writing signed by the City and/or Contractor, and that written Change Orders are the exclusive methods for effecting any change to the Agreement Price or Agreement Time. Contractor understands and agrees that the Agreement Price and Agreement Time cannot be changed by implication, oral contracts, verbal directives, actions, inactions, course of conduct, or constructive change order. Contractor shall be under no obligation to perform pursuant to an oral directive to perform work in addition to the Project scope excepting the case of an emergency threatening personal injury or property damage. Contractor acknowledges and agrees that no one in the City's organization has the authority to order changes without a signed writing.

GC-42 WORK AUTHORIZATIONS

When directed by the City's Representative through a Work Authorization, the Contractor will perform Work that is expressly or generally contemplated under any allowance or contingency items designated by the Agreement Documents, which may include a Change for the addition of Work that does not result in an increase in the overall Agreement Price. Work Authorizations may include Work items that are not necessarily shown in the Agreement Documents, but may be necessary for the successful completion of the Project. The performance of the Work Authorization items must conform to the standards of the Agreement Documents. The funding for Work Authorizations is an allowance only and not a compensable pay item. The City is solely responsible for the appropriation of the funds. The Contractor shall have no claims to such funds. The City will retain ownership of any such funds not used after the completion of Work. The Work shall be assigned and directed by the City's Representative in written form. Measurement, Payment, Invoicing and Pricing of Adjustments for Work Authorizations will be in accordance with the Agreement Documents.

GC-43 OWNERSHIP AND USE OF DOCUMENTS

All Contract Documents furnished to the Contractor remain the property of the City. The Contract Documents are to be used only with respect to this Project and are not to be used on any other project. All Contract Documents are to be returned to the City upon request at the completion of the Work. The Contractor may maintain a record set of the Contract Documents for its records, but will maintain the confidentiality of the record set, except as required by law. The Contractor can use the Contract Documents for any purposes required for the Project that will not be considered publication in derogation of the common law copyright or other reserved rights of the holder.

Neither Contractor nor any Subcontractor, Sub-Subcontractor, Supplier, vendor or other person or organization performing or furnishing any of the Work under a direct or indirect contract with City acquires any title to or ownership rights in any of the Contract Documents. The Contractor may not reuse the Contract Documents for extensions of the Project or for any other project without written consent of the City.

GC-44 CHANGED CONDITIONS

Contractor shall notify the Engineer in writing of the following conditions, hereinafter called "changed conditions," promptly upon their discovery and before they are disturbed, in any event no later than seven (7) calendar days after their discovery:

- (1) Subsurface or latent physical conditions at the site of Work differing materially from those indicated in this Agreement; or
- (2) Unknown physical conditions at the site of the Work of an unusual nature differing materially from those ordinarily encountered and generally recognized as inherent in Work of the character provided for in the Agreement.

The Engineer shall promptly investigate the conditions, and if he finds that such conditions do materially so differ and cause an increase or decrease in Contractor's cost of, or the time required for, performance of any part of the Work under this Agreement, whether or not changed as a result of such conditions, an equitable adjustment shall be made and the Agreement modified in writing in accordance with the provisions of this Agreement, subject to the provisions regarding Change Orders, Change Directives, notice and claims procedure and excusable delays. If the Engineer determines that conditions of which he has been notified by Contractor do not justify an adjustment in compensation, he will so advise Contractor in writing. Should Contractor disagree with such determination, it may submit a notice of claim to the Engineer as provided herein and follow the claims procedures of Article GC-41.

In computing any equitable adjustment sought by Contractor, the actual costs incurred by Contractor, computed in accordance with the Force Account provisions for changes shall be the standard for determining Contractor's entitlement. Provided, however, that if the City shows that

conditions encountered by Contractor on the Project were more favorable and less costly than what Contractor reasonably should have expected to encounter, the net effect on Contractor from both the favorable and unfavorable conditions shall be considered in determining the amount of any equitable adjustment.

GC-45 INTENTIONALLY OMITTED

GC-46 INTENTIONALLY OMITTED

GC-47 INTENTIONALLY OMITTED

GC-48 INTENTIONALLY OMITTED

GC-49 MEASUREMENT AND PAYMENT

GC-49.1 Measurement

All items of Work to be paid for at Agreement Prices per unit of measurement will be measured or certified by the Engineer.

GC-49.2 Payment at Agreement Prices

The Agreement prices for items of Work shall include full compensation for all costs of items, including the costs for any Work, Materials and Equipment incidental to the items but not specifically shown or described in the Drawings and Specifications, subject only to such express limitations as may be stated in the Specifications defining the items or prescribing payment thereof.

GC-50 HISTORICAL, SCIENTIFIC, AND ARCHEOLOGICAL DISCOVERIES

All articles of historical or scientific value, including, but not limited to, coins, fossils, articles of antiquity, which may be uncovered by Contractor during process of Work, shall become the property of City. Such findings shall be reported immediately to the Engineer who will determine the further operations of Contractor, the method of removal, where necessary, and the final disposition thereof.

GC-51 SEPARATE AGREEMENTS

GC-51.1 Separate Contractors

The City reserves the right to award other Agreements in connection with this Project. Contractor shall afford other contractors reasonable opportunity for the introduction and storage of their materials and the execution of their work and shall properly connect and coordinate its Work with theirs. If the proper execution of any part of Contractor's Work depends upon the work of another contractor, Contractor shall inspect and promptly report to the Engineer any defects in such work that render it unsuitable for such proper execution and results.

GC-51.2 Cooperation

The City may perform additional work related to the Project by itself, or it may let other contracts containing provisions similar to these. Contractor shall afford the other contractors who are parties to such contracts and/or the City, if it is performing the additional work itself, reasonable opportunity for the introduction and storage of materials and equipment and the execution of work and shall properly connect and coordinate its work with theirs.

GC-51.3 Review of Separate Contractor's Work

If any part of Contractor's Work depends for proper execution or results upon the work of the City or any separate contractor, Contractor shall, prior to proceeding with the Work, promptly report to the Engineer any apparent discrepancies or defects in such other work that render it unsuitable for such proper execution and results. Failure of Contractor so to report shall constitute an acceptance of the City's or separate contractor's work as fit and proper to receive the work, except as to defects which may subsequently become apparent in such work by others.

GC-51.4 Notice to Contractor

If the performance of additional work by other contractors of the City is not noted in the Agreement Documents prior to the execution of the Agreement, Written Notice thereof shall be given to Contractor prior to starting any such additional work.

GC-51.5 Damage to Separate Contractor

Should Contractor wrongfully delay, impact, or cause damage to the work or property of any separate contractor, Contractor shall, upon due notice, promptly attempt to settle with such other contractor by agreement, or otherwise to resolve the dispute. If such separate contractor sues or initiates a proceeding against the City or the Engineer on account of any delay or damage alleged to have been caused by Contractor, the City shall notify Contractor, who shall defend such proceedings at Contractor's expense, and if any judgment or award against the City or the Engineer arises therefrom, Contractor shall pay or satisfy it and shall reimburse the City for all costs and expenses, including without limitation, attorneys' fees, expert fees, consultant fees, court costs, and litigation or arbitration fees or expenses that the City has incurred.

GC-51.6 City's Right to Clean Up

If a dispute arises between Contractor and separate contractors as to their responsibility for cleaning up or for accomplishing coordination, the City may clean up and carry out such work and charge the cost thereof to Contractors responsible therefor as the Engineer shall determine to be just.

GC-52 OFFICIAL NOT TO BENEFIT

No officer or employee of the City shall be permitted to participate in the performance of this Agreement or receive any benefit or compensation arising out of the performance of such Agreement, and any Agreement entered into by the City in which any officer or employee of the City shall be personally interested shall be void, and no payment shall be made thereon by the City or any officer thereof; but this provision shall not be construed to extend to the Agreement if made with a corporation for its general benefit.

A bribe or attempt to bribe any representative or officer of City by Contractor shall be considered as a breach of the Agreement in bad faith, and shall thus empower City to complete Work and deduct the entire cost thereof from any monies due or to become due Contractor under the Agreement.

GC-53 GRATUITIES AND KICKBACKS

The Contractor's Contract may be terminated in accordance with the Clause titled "TERMINATION FOR DEFAULT" if, after notice and hearing, the City determines that the Contractor, its agent, or another representative offered or gave a gratuity or kick-back to an officer, official, or employee of the City and intended, by the gratuity, to obtain a contract or favorable treatment under a contract.

The rights and remedies of the City provided in this Clause are not exclusive and are in addition to any other rights and remedies provided by law or under this Contract.

The Contractor warrants that: (1) it has not employed nor retained any company or person, other than a bona fide employee working for the Contractor, to solicit or secure the contract; and that the Contractor has not paid or agreed to pay any person, company, association, corporation, individual or firm, other than a bona fide employee working for the Contractor, any fee, commission, percentage, gift or any other consideration contingent upon or resulting from the award or making of the contract. After Notice and hearing and upon a finding in contradictions to this Paragraph constituting a breach or violation of the above warranty, the City has the right to terminate the contract or take other appropriate actions.

GC-54 PRECONSTRUCTION CONFERENCE

Within twenty (20) days after delivery of the executed agreement by City to Contractor, but before issuance of Notice to Proceed, a conference will be held to review progress schedules, to

review the insurance and safety program, to establish procedures for handling Shop Drawings and other submittals and for processing progress payments, and to establish a Working understanding between the parties as to the Project.

Contractor shall submit to the City for approval, prior to the preconstruction conference, a preliminary schedule of Shop Drawing submittals, and certification of insurance as required by Appendix B.

GC-55 TIME OF COMPLETION AND LIQUIDATED DAMAGES

GC-55.1 Liquidated Damages

It is understood and agreed that the City will sustain substantial monetary and other injury and damages, including, but not limited to, increased costs, expenses and liabilities in the event of failure by Contractor to perform its Work in accordance with the Completion and any Interim Milestone Date(s) set forth in the CPM Schedule prepared in accordance with the Special Conditions. Accordingly, should Contractor not complete the Work, or any such portion thereof, within the date(s) required by the CPM Schedule initially approved by the Engineer, as they may be adjusted pursuant to the Agreement Documents, then charges shall be assessed against any money due or that may become due Contractor in accordance with the following schedule:

For Each day of delay in Substantial Completion of the entire Work: \$2000/ day

For Each day of delay in Final Completion of the entire Work: \$1500/ day

The amount of such charges is hereby agreed upon as fixed liquidated damages due the City after the expiration of the Agreement Date(s) for completion specified in the CPM Schedule for the Work or portions thereof. Contractor and its surety shall be liable for any liquidated damages in excess of the amount due Contractor on the Final Payment.

If the CPM Schedule projects an untimely completion with unexcused delay and the City in good faith believes that retainage will be insufficient to cover the City's damages, Contractor agrees that the City may withhold additional funds to assure the payment of the liquidated damages owed by Contractor.

GC-55.2 No Penalty

The fixed liquidated damages are not established as a penalty but are calculated and agreed upon in advance by the City and Contractor due to the uncertainty and impossibility of making a determination as to the actual direct, incidental and consequential damages which are incurred by the City as a result of the failure on the part of Contractor to complete the Work within the Agreement Time and completion date(s) specified in the Agreement Documents. Liquidated damages shall start in accordance with the above schedule upon notification to Contractor in writing that all apparent Agreement Time allowed to achieve the relevant completion date has been consumed. Liquidated Damages as they accrue will be deducted from periodic partial payments to the extent they are sufficient to cover the liquidated damages owing; provided that

any excess liquidated damages owing over the periodic partial payment amount may be deducted from retainage. Such deduction shall be in addition to the retainage provided for in the Agreement Documents. The remaining amount of liquidated damages owing upon completion will be deducted from any amounts owing as Final Payment to Contractor or its surety. Any excess amount owing as liquidated damages shall be paid upon demand.

GC-56 RIGHT TO AUDIT

Contractor shall keep and maintain accurate books and records, and supporting data, documentation, correspondence, reports, instructions, Drawings, receipts, vouchers, and memoranda regarding performance of Work hereunder and including specifically, but without limitation, such information as estimates (pre and post Bid), costs incurred, labor and Materials consumed, schedules and progress records and quality control. Such books and records shall be available for inspection, audit, and copying by the City or its authorized representative for any purpose during the Work and for a period of three (3) years after Final Payment.

GC-57 DISPUTES

GC-57.1 Mediation

In the event of any controversy, claim, dispute or other matter in question arising out of or relating to this Agreement of the breach thereof or otherwise in connection with the Project to which this Agreement pertains, at the City's sole and exclusive option the parties shall, if the City so elects and as an express condition precedent to any party to this Agreement commencing legal action against the other relating to or arising out of the dispute, mediate the dispute utilizing a mutually agreeable mediator. Prior to commencing any legal action against the City, Contractor must either mediate the dispute, at the City's election, or obtain a written waiver from the City of its right to mediate.

GC-57.2 Arbitration at the City's Election

At the Owner's sole election, any Claim arising out of or related to the Agreement shall be subject either to binding arbitration or litigation at the City's option. Prior to arbitration or litigation, the parties shall endeavor to resolve Claims or disputes in accordance with the terms of this Contract.

GC-57.2.1

If Claims are not resolved by negotiation, mediation, or otherwise, and the Owner elects arbitration, the arbitration shall be held in Atlanta, Georgia and shall be in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association currently then in effect or such other similar rules and organization as the Owner may elect. The demand for arbitration shall be in writing and filed with the appropriate organization selected by the Owner and shall be served on the other party to the Contract.

The agreement to arbitrate shall be specifically enforceable under applicable law in any court having jurisdiction thereof. In any arbitration or litigation, the arbitrators or the Court shall have the jurisdiction to award the City costs, arbitrator fees, expert fees, and attorneys' fees, and the arbitrators or the Court shall award all such fees to the City if it is the prevailing party.

GC-57.2.2

Except at Owner's sole discretion and with its consent, no arbitration arising out of or relating to the Agreement shall include, by consolidation or joinder or in any other manner, any other person or entity, including but not limited to the Designer and its employees and consultants, any of Contractor's subcontractors and suppliers, and any other separate contractors or suppliers. The Owner's consent or election to allow consolidation or joinder or shall not constitute consent to arbitration of any claim not subject to arbitration pursuant to this Contract.

GC-57.2.3

Any award rendered by an arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

GC-57.3 Litigation If Arbitration Not Elected

If the Owner does not elect arbitration, any Claims shall be resolved in Fulton County, Georgia Superior Court. Contractor hereby submits to jurisdiction and venue in Fulton County, Georgia, and waives all defenses based on a lack of jurisdiction and/or venue. Contractor acknowledges that this Agreement was negotiated, at least in part, in Fulton County, Georgia. In any arbitration or litigation, the arbitrators or the Court shall have the jurisdiction to award the City costs, arbitrator fees, expert fees, and attorneys' fees, and the arbitrators or the Court shall award all such fees to the City if it is the prevailing party.

GC-58 AGREEMENT ADMINISTRATION DOCUMENTS

A substantial number of documents will be required for the administration of the Agreement. Some of these documents are identified in this document and elsewhere in the Agreement Documents (such as the Payment and Performance Bond forms) and others may not be. The Engineer shall have full power and authority to designate and prepare the documents to be used and Contractor and all Subcontractors and Material Suppliers shall utilize the documents so prepared and provided to them by the Engineer and shall follow the instructions of the Engineer with respect thereto in all regards save and excepting only those documents, if any, which Contractor reasonably determines contain terms or requirements contrary to or in addition to and not reasonably inferable from the terms of the Agreement Documents. If Contractor believes that any form or other document provided by the Engineer under the authority of this Section is subject to rejection by Contractor under the terms hereof, it shall notify the Engineer thereof within ten (10) days following its first receipt of the particular document or form giving specific reasons why the document or form is entitled to rejection. Thereafter, the form or document will

be withdrawn, amended, or utilized as the Engineer finds in good faith to be appropriate after reviewing the notice provided by Contractor. All agreement administration documents may be revised at any time by the Engineer.

GC-59 MISCELLANEOUS PROVISIONS

GC-59.1 Governing Law

The Agreement shall be governed by the law of the State of Georgia.

GC-59.2 Contingent Assignment

Effective as of any termination of the Agreement, Contractor hereby assigns to City all of Contractor's interest in those subcontracts and purchase orders entered into by Contractor prior to termination if the City specifically requests such an assignment by Written Notice. All Subcontractors and Purchase Orders shall provide that they are freely assignable by Contractor to the City and its assigns. City shall be at liberty to negotiate with and engage (for itself) any Subcontractors, Suppliers, or others that Contractor dealt with prior to termination.

GC-59.3 Rights and Remedies

GC-59.3.1

The duties and obligations imposed by the Agreement Documents and the rights and remedies available thereunder shall be in addition to, and not a limitation of, any duties, obligations, rights and remedies otherwise imposed or available by law.

GC-59.3.2

No action or failure to act or to require in any one or more instances upon the strict performance of any one or more of the provisions of the Agreement Documents, or to exercise any right herein contained or provided by law by the City or the Engineer, shall constitute a waiver of any right or duty afforded any of them under the Agreement Documents, nor shall any such action or failure to act constitute an approval of or acquiescence in any breach hereunder, nor shall it be construed as a waiver of the right to subsequently demand strict performance or exercise such rights, and the rights shall continue unchanged and remain in full force and effect, except as may be specifically agreed in writing.

GC-59.3.3

Contractor agrees that it can be adequately compensated by money damages for any breach of this Agreement which may be committed by the City and hereby agrees that no default, act, or omission of the City, or the Engineer, shall constitute a material breach of the Agreement entitling Contractor to cancel or rescind the provisions of this Agreement

or (unless the City shall so consent or direct in writing) to suspend or abandon performance of all or any part of the Work. Contractor hereby waives any and all rights and remedies to which it may otherwise be or become entitled, save only its right to money damages.

GC-59.4 Unenforceability of any Article

If any Article or term of the Agreement Documents is held as a matter of law to be unenforceable or unconscionable, the remainder of the Agreement shall be enforceable without such clause or term, and only the narrowest possible portion of the clause or term that is allowed by law shall be unenforceable.

GC-59.5 Obligation to Perform

Contractor shall carry on the Work and adhere to the approved current CPM Schedule during and notwithstanding all disputes or disagreements with City. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as Contractor and City may otherwise agree in writing.

GC-59.6 Labor Relations

Work on the Project may be performed by both union and nonunion separate contractors, Subcontractors, Suppliers, and other entities and persons. In the event of any strike, picket, sympathy strike, work stoppage, or other form of labor dispute at the Project whether directed at Contractor, other separate contractors, Subcontractors, Suppliers or other persons, Contractor shall continue to perform its Work required hereby without interruption or delay. In the event Contractor fails to continue its Work without interruption or delay, because of any or such events, the City, in addition to all other rights it has in the Agreement Documents and at law, may terminate the Agreement after giving Contractor forty-eight (48) hours written notice of its intent to do so for reason of Contractor's failure to perform. Additionally, if Contractor is party to one or more labor agreement, Contractor shall take all reasonable action to avoid any Work stoppage, and in the event of a work stoppage, Contractor shall within twenty-four (24) hours take all legal action permitted by such labor agreements or by law in order to expedite resumption of Work on this Project.

GC-59.7 Covenant Not to Sue

Should the City elect to terminate the employment of Contractor for default as provided herein, then Contractor covenants that it will not file any suit or proceeding of any kind against the City by reason thereof until the City shall have either abandoned the Project or completed the Work as defined under the Agreement Documents. If Contractor should breach this "Covenant Not To Sue," then Contractor shall be liable to the City for all costs resulting to the City therefrom, including, without limitation, all attorneys' fees expended by the City in defending said suit or proceeding, unless a positive determination is made therein that Contractor's termination by the City was motivated by fraud and bad faith and was without justification of any kind.

GC-59.8 Publicity and Advertising

The Contractor will not make any announcement, take any photographs, or release any information concerning the Work, this Contract, or the Project to any member of the public, press, business entity, or any official body, unless prior written consent is obtained from the City's Representative. The Contractor may not erect any signs without the written approval of the City's Representative.

GC-60 STATEMENT OF NON-DISCRIMINATION

During the performance of this Agreement, Contractor agrees to comply with all provisions of Part 2, Chapter 2, Article X, Division 11, including Section 2-1414 of the Code of Ordinances, City of Atlanta, as may be hereafter amended.

GC-61 EQUAL BUSINESS OPPORTUNITY (EBO)

During the performance of this Agreement, Contractor agrees to comply with all provisions of Part 2, Chapter 2, Article X, Division 11, including Section 2-1441 through 2-1460 of the Code of Ordinances of the City of Atlanta, the Equal Business Opportunity ("EBO") Program as may be hereafter amended.

GC-62 WAGE RATES AND REPORTING PROCEDURES**GC-62.1 Certified Payrolls**

Contractor shall maintain accurate payroll records and be prepared to submit certified copies for the prime contractor and all subcontractors. Payrolls reporting an employee for the first time must contain the complete name, address, and social security of the employee.

GC-62.2 Submittals

All required payrolls shall be submitted to the Office of Contract Compliance. Any questions concerning these submittals can be addressed:

Office of Contract Compliance
55 Trinity Avenue, Suite 1700
Atlanta, Georgia 30303
(404) 330-6010

GC-62.3 [Intentionally Omitted]

SPECIAL CONDITIONS

SC-1 PRECONSTRUCTION VIDEO SURVEY AND INSPECTIONS

Contractor is expressly advised that the protection of buildings, structures, equipment, electrical systems, instrumentation and related work adjacent and in the vicinity of its operations, wherever they may be, is solely its responsibility. Conditional inspection of buildings, structures, equipment, electrical systems and instrumentation shall be performed by and be the responsibility of the Contractor.

Repairs or replacement of all conditions disturbed by the construction shall be made to the satisfaction of the Engineer. This does not preclude conforming to the requirements of the insurance underwriters. Two (2) copies of surveys, photographs, videos, reports, etc., shall be given to the Engineer.

The Contractor shall retain an independent Consultant, specializing in preconstruction surveys, to conduct the required inspections. The preconstruction survey will be performed by a firm specializing in performing such surveys. The qualifications and experience of the proposed consultant shall be submitted to the Engineer for approval prior to assignment of the Services.

Perform a preconstruction video survey and inspection in advance of construction to document the existing condition of buildings, facilities, structures, utilities, roads, driveways and related work.

The video surveys and inspections shall clearly document the existing conditions and be completed before any operations have begun and subject areas disturbed by any construction activities. The video surveys and inspection notes, reports, etc. shall be submitted to the Engineer. The video surveys and inspections shall make an examination of the interior and exterior of buildings, structures, facilities and utilities, and record by notes, measurements, photographs, videos, etc., conditions which might be aggravated by construction activities. Prior to any type of blasting, video surveys and inspections of residences and other private structures existing within the survey and inspection corridor shall have been completed.

The cost of all pre-construction video surveys and inspections shall be borne by the Contractor.

SC-2 RIGHT OF WAY AND CONSTRUCTION ACCESS

The City will furnish all rights of way for the performance of Services included in this Agreement. Areas designated on the Agreement Drawings as the Contractor's Work Area will be provided to the Contractor for the duration of construction, without charge. The Contractor will be responsible for observing the limits of the right-of-way and shall prohibit any Services being done on or any damage to property outside the bounds of the right-of-way. Additional work and storage space, if required, shall be obtained by the Contractor at no additional costs to the City.

SC-3 SAFETY AND HEALTH

The Contractor shall comply with all applicable health and safety standards and provisions required by the City of Atlanta, Fulton County, State of Georgia, and the Federal Government and its regulatory agencies. The Contractor shall maintain an accurate record of all cases of death, occupational diseases, and injury requiring medical attention or causing loss of time from work arising out of and in the course of employment on work under the Contract. This project involves work in and around operating combined and sanitary sewer systems. In these areas as well as in shafts and tunnels, the potential exists for toxic and/or explosive gases. The Contractor shall exercise caution when entering any confined space. The atmosphere shall be tested for oxygen levels, presence of chemicals, and explosivity before entry. Contractor alone shall be responsible for the safety, efficiency, and adequacy of his plant, appliances, and methods, and for any damage, which may result from their failure or their improper construction, maintenance, or operation.

- A. Emergency phone numbers (fire, medical, police) shall be posted at the Contractor's phone and its location known to all.
- B. Accidents shall be reported immediately to the Engineer by messenger or phone.
- C. All accidents shall be documented and a fully detailed written report submitted to the Engineer after each accident.

SC-4 LAYOUT OF THE WORK AND SURVEYING

SC-4.1 General

- A. The Services required include providing field engineering services, which includes establishing and maintaining survey control points and baselines as necessary to control the alignment (vertical and horizontal) and all parts of the Services within the specified tolerances, and documentation of the results.
- B. The Contractor shall be responsible for the development and implementation of a surveying program capable of satisfying all Project survey and accuracy requirements. This program shall be subject to the review of the Engineer before commencement of the work. The review shall in no way release the Contractor of liabilities associated with or dependent on this part of the Services.
- C. Control datum for the survey has been established by the Engineer and is indicated on the Drawings.

SC-4.2 Quality Control

- A. Planning and execution of the field engineering services shall be supervised by engineers or land surveyors registered in the State of Georgia and shall be conducted by personnel with documented experience in the specific types of work required.
- B. The allowable combined errors of land surveys shall be compatible with excavation, and pipe placement tolerances.

SC-4.3 Submittals Related to Contractor's Field Engineering Services

- A. Submit qualifications of land surveyor supervisor(s) with detailed references made to projects requiring application of similar surveying procedures and techniques including name, address, and telephone number to the Engineer for review prior to commencement of any survey work.
- B. Submit detailed description of proposed survey method, network diagrams and equipment type, accompanied with manufacturer's literature specifying probable accessories, calibration procedures, requirements and frequencies.
- C. Submit shop drawings showing survey monument materials and methods of installation, preservation and recovery.
- D. Submit mathematical pre-analysis to demonstrate that the required accuracies can be achieved using the proposed methods.
- E. Submit, upon request, a complete and accurate log of control and survey work including documentation verifying accuracy of survey work as it progresses, and upon completion of the Work. Documentation shall include, but not be limited to, survey field books, sketches, drawings and layouts.

SC-4.4 General Requirements Related to Contractor's Field Engineering Services

- A. The Engineer has established basic survey control points as shown on the Drawings. The Contractor shall examine and verify locations of survey control points, and shall notify the Engineer of any discrepancies discovered, within forty-eight (48) hours of discovery and before starting the Services.
- B. Establish, verify and maintain a minimum of **three (3)** additional survey monuments for the work.. The monuments shall be permanent on site and referenced to the established survey control points. Record locations, with horizontal and vertical data, on Project Record Documents. Monuments will also be checked and verified by the construction verification surveyor. Survey notes relating to the monuments and primary control points shall be submitted to the Engineer.
- C. At all times, protect, preserve and maintain survey control points used for the Services. Report to the Engineer the loss, destruction or relocation of any survey control point and replace survey control points based on original survey control. Make no changes without prior written notice to the Engineer.
- D. Use equipment and implementation techniques such as forced centering techniques at survey control points as necessary to achieve required accuracies.

- E. Furnish information to adjust, move or relocate existing structures, utility poles, lines, services or other appurtenances located in, or affected by, construction. Through the Engineer, coordinate with local authorities having jurisdiction.
- F. Establish elevations, lines and levels. Locate and layout by instrumentation and similar appropriate means:
 - 1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes and invert elevations.
 - 2. Grid or axis for structures.
 - 3. Foundation and wall locations, sloping floor elevations, and embedment centerlines and elevations.
- G. Where the dimensions and locations of existing structures are of critical importance in the installation or connection of any part of the work, verify such dimensions and locations in the field before the fabrication of any material or embedment, which is dependent on the correctness of such information.

SC-4.5 Calibration and Data Processing

- A. Calibrate all procedures and instruments as required and as recommended by the instrument manufacturer. Maintain a log showing date and type of calibration performed indicating the name of the individual performing the calibration.
- B. Data reduction shall incorporate calibrations and meteorological corrections, and rigorous reduction of measurements to the ellipsoid and thence to the coordinate system. Correct distance measurements by electro-optical distance measurement instrument for scale, cyclic error, zero error, and meteorological effects. Correct azimuths using the Laplace correction and include the effect of the deflection of the vertical components on angles and azimuth measurements.
- C. Data processing shall include, as required, rigorous least squares adjustments. Employ data outlier detection. Determine horizontal and vertical confidence intervals.

SC-5 DISPOSAL OF WASTE MATERIAL

The disposal of all excavated material or spoil not required for use in the permanent work shall be the responsibility of the Contractor. He shall remove all excess excavated material or spoil from the site of the Work and dispose of the same in a legal manner at no additional cost to the City. Burning of debris on site will not be allowed.

SC-6 REMOVAL OF CONDEMNED MATERIAL

Material on the site, which has been determined by the Engineer to be unsuitable or not in conformity with the Contract documents shall be removed from the vicinity of the work without delay and disposed of in an approved area.

If the Contractor fails to do so within forty-eight (48) hours after the receipt of notice, the condemned materials may be removed by the City and the cost of said removal shall be borne by the Contractor.

SC-7 DETECTION OF MOVEMENT

In order to detect any movement of buildings or structures that may be affected by his work, Contractor shall, prior to excavation, establish a system of vertical and horizontal control points on or about such buildings or structures, tied to bench marks and indices sufficiently remote to not be moved by his operations. A plan of this system shall be submitted to the Engineer for review. Reading shall be taken of these points and permanently recorded prior to the start of excavation. The City will not assume any responsibility for alleged damages to any building or structure arising from the Services performed under this Agreement.

SC-8 EXISTING UTILITIES

SC-8.1 Verification of the Location of the Existing Utilities

Representations of existing utilities, facilities, and structures in the Contract Documents are based upon the best available information. The City and the Engineer will not be responsible for the completeness or accuracy thereof nor for any deductions, interpretations, or conclusions drawn therefrom. The Contractor shall verify to his own satisfaction by test pit or other means, the actual location of existing utilities prior to construction in their vicinity.

- A. Should the Contractor in the course of his operations encounter any underground utilities the presence of which was not previously known, or a different type than shown, he shall immediately notify the Engineer and take all necessary precautions to protect the utility and maintain continuance of service until said utilities can be adjusted by the appropriate owners.
- B. Contractor will notify all public utility corporations, jurisdictional agencies, or other owners to make all necessary adjustments to public utility fixtures and appurtenances within or adjacent to the limits of construction. Delays and additional cost resulting from a failure of the Contractor to notify the utility or to provide adequate notice to the utility shall be at no additional cost to the City, when such facilities are indicated in the Agreement Documents, and in such case, no extension of time will be granted for delays caused by utility adjustments.
- C. Damage caused to utilities either directly or indirectly by the Contractor shall be repaired and the facilities restored to their original condition to the satisfaction of the Engineer and the utility owner, at no additional cost to the City.

SC-8.2 Work in Vicinity of Existing Utilities

At least three (3) working days prior to starting work in the vicinity of utility structures and appurtenances, Contractor shall notify Engineer and appropriate utility companies and jurisdictional agencies. Contractor shall support and protect all utility structures and appurtenances in accordance with the requirements of the Agreement Documents and the utility companies, and shall take any other steps necessary to protect the structures from disturbance or damage.

A substitute City of Atlanta Ordinance adopted March 13, 1978 requires Contractors to contact each gas company maintaining underground gas pipes or facilities within the city limits prior to the start of excavation work by blasting or mechanized excavating equipment.

SC-8.3 Access to Utilities Facilities

The Contractor shall at all times permit free and clear access to the various affected facilities by personnel of the utility owners or operators who are working within the limits of work for the purpose of inspection, maintenance, or providing additional service requirements, and the construction of new facilities. When personnel of the utility owners or operators are working within the limits of work to be performed by Contractor, the Contractor will not be relieved of his responsibility for the maintenance and protection of such facilities.

SC-9 WORK IN FLOOD PLAIN AREAS

The Contractor shall comply with all regulations of Section 16-26006 of the Zoning Ordinance of the City of Atlanta concerning work in Flood Hazard Districts, and Fulton County Zoning Resolutions regarding Flood Protection.

SC-10 MAINTENANCE OF TRAFFIC

Contractor shall provide, erect, maintain, and finally remove all barricades, danger warning and detour signs necessary to properly protect and divert traffic. All barricades and signs, including detour signs, shall be illuminated at night or when visibility is reduced. The Contractor will be held responsible for all damage to the Services due to failure of the signs and barricades to properly protect the Services from traffic, pedestrians, animals, and from all other sources, and whenever evidence of any such traffic is found upon the Services the Engineer will order that the Work, if in his opinion it is damaged, be immediately removed and replaced by the Contractor at no additional cost to the City. The devices used will be in accordance with the manual of Uniform Traffic Control Devices for Streets and Highways compiled by the State Department of Transportation. Access to City streets and roads will be limited and will require the use of flagmen or the installation of traffic control signals, or both. The City must approve haul routes.

A City of Atlanta Substitute Ordinance adopted March 13, 1978 requires that Contractors obtain a permit for work involving blockage of a public street. Open pits, trenches, unpaved streets, debris, or other obstructions due to construction that will prevent the normal flow of traffic during an extended construction stoppage for any reason, will not be permitted. In the event an

extended construction stoppage is found to be necessary, Contractor shall, at his own expense, provide normal traffic flow during extended construction stoppage. Extended stoppage will be defined by the City.

SC-11 ENVIRONMENTAL PROTECTION

SC-11.1 General

Contractor shall conduct his operation in a manner to prevent pollution of the environment surrounding the area of work by every means possible and shall be responsible for furnishing all necessary items for fulfilling the work described herein.

SC-11.2 Material Transport

Contractor shall comply with Section 11-2021 of the Code of Ordinances of the City of Atlanta pertaining to the duties of the Contractor in hauling material over City owned rights-of-way. This includes but is not limited to, approval of proposed haul routes, prevention of dropping of materials or debris on the streets from trucks arriving and leaving the site, providing a suitable vehicle inspection and cleaning installation with permanent crew, and the removal of any material spilled in public areas at no additional cost to the local government agency.

SC-11.3 Waste Materials

No waste or erosion materials shall be allowed to enter natural or manmade water or sewage removal systems. Erosion materials from excavations, borrow areas, or stockpiled fill shall be contained within the work area. Contractor shall develop methods for control of waste and erosion, which shall include such means as filtration, settlement, and manual removal to satisfy the above requirements.

SC-11.4 Burning

No burning of waste shall be allowed.

SC-11.5: Dust Control

The Contractor shall at all times control the generation of dust by his operations. Control of dust shall be accomplished by water sprinkling or by other methods approved by the Engineer.

SC-11.6 Noise Control

The Contractor shall take every action possible to minimize the noise caused by his operation.

When required by agencies having jurisdiction, noise-producing work shall be performed in less sensitive hours of the day or week as directed by the Engineer.

The Contractor shall provide equipment that operates with the least possible noise. The use of noisy equipment is prohibited. Hoists and compressor plants shall be electrically operated unless otherwise permitted. The air intake of compressors shall be equipped with silencers, and machinery operated by gearing shall be provided with a type of gearing designed to reduce noise to a minimum. Internal combustion engines shall be equipped with mufflers in good order.

Noise generated by mobile construction equipment, stationary construction equipment, and other equipment involved in the construction of the work shall not exceed the decibel levels indicated below. Noise generated by mobile and stationary construction equipment will be measured three to 6 feet from building lines, and on the A weighing network of Type-2 general purpose sound level meter set at fast response.

	Combined Residential and Commercial
Allowable Sound Levels of Mobile Construction Equipment:	
- From 7 a.m. to 10 p.m., Monday thru Saturday, Except Legal Holidays	85 dBA
- At times other than those listed above	70 dBA
Allowable Sound Levels of Stationary Construction Equipment:	
- From 7 a.m. to 10 p.m., Monday thru Saturday, Except Legal Holidays	70 dBA
- At times other than those noted above	60 dBA

Contractor shall assure compliance by measuring noise levels as may be required.

SC-11.7 Use of Chemicals

All Chemicals used during construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant or of other classification, must show approval of either EPA or FDA. Use of all such chemicals and disposal of residues shall be in conformance with instructions.

SC-11.8 By-Passing During Construction

No wastewater shall be by-passed at sewage collection or treatment facilities during project construction unless a by-passing schedule has been approved by City and the Georgia Environmental Protection Division. It shall be the responsibility of the Contractor to prepare and secure the approval of any by-passing not specifically identified in the Agreement Documents.

SC-11.9 Responsibility for Spills and Accidental Discharges

In the event that the Contractor causes or has a spill or accidental discharge for which the City is fined by the State of Georgia EPD, the Contractor agrees to remediate the spill or discharge immediately in accordance with current EPD regulations and to pay any fines assessed against

the City and/or Contractor, and pay for the City's cost associated with efforts to remediate the situation.

SC-12 RIGHT TO OPERATE

As soon as any portion of structures and equipment are ready for use, the City shall have the right to operate such portion upon written notice to the Contractor by the City. The City shall also issue a certificate of completion for that portion of the work. Guarantee period on that portion of Service will begin upon issuance of certificate of completion for that portion.

Testing of equipment and appurtenance and training of City's personnel as specified hereinunder shall not constitute operation.

The execution of the bonds shall constitute the consent of the surety.

The Contractor shall provide an endorsement to his insurance permitting occupancy of the structures and use of equipment during the remaining period of construction.

SC-13 LIST OF MATERIALS, FIXTURES AND EQUIPMENT

- A. Within thirty (30) days after issuance of the Notice to Proceed, before any materials, fixtures or equipment are purchased, and prior to start of construction, the Contractor shall submit for approval by the Engineer the names and addresses of the manufacturers, and their catalog numbers and trade names for all materials, equipment and fixtures listed under the following Sections of the Agreement Documents:

Divisions 2, 3, 5, 7, 8, 9, 11, 12, 13, 15 and 16

The Contractor shall furnish other detailed information when so directed, under the various items. No consideration will be given to partial lists submitted from time to time except that approval of long delivery items of equipment may be requested individually. Items which are not in accordance with the Specification requirements may be rejected. The Contractor shall furnish a statement giving a complete description of all points wherein the equipment he proposes to furnish does not comply with the Specifications as well as any exceptions he may take to the Specifications. Failure to furnish such statements will be interpreted to mean that the equipment meets all requirements of the Specifications.

- B. In the event the Contractor wishes to resubmit items of materials, fixtures and equipment for review subsequent to obtaining approval as indicated in "A" above, then the Contractor shall pay the cost of the Engineering review of each such resubmittal including shop drawing review if this review has been performed.

SC-14 CITY OF ATLANTA PROJECT SIGN

The basic design of the Project sign shall conform *to Attachment 1 herein* including the names of all current Council Members, the Mayor and the Commissioner, Department of Watershed Management. The City seal portion of the sign must be shaded, such that it is visible from fifty (50) yards. A full color shop drawing submittal is required before fabrication. The Project sign will be no less than 4'-0" x 8'-0" and the City requires a Project sign at the designated entrance to the Project.

In addition to the Project sign, there is to be adequate temporary signage for identifying the Project areas, offices, delivery areas and any other designations the Engineer and/or the Contractor feel are needed. These signs will designate which Phase of the Agreement that they pertain to as part of the Project coordination.

SC-15 PROJECT MEETINGS

The Engineer shall schedule weekly progress meetings. The progress meetings will be held at least weekly and may be scheduled at a more frequent interval by the Engineer if necessary. Progress meetings shall be held at a location designated by the Engineer.

Progress meetings shall be attended by the Engineer, Contractor, Subcontractors as appropriate to the agenda, suppliers as appropriate to the agenda and others as required.

The meeting agenda shall generally include review and approval of minutes of previous meeting, review of work progress since previous meeting, field observations, problems, and conflicts, problems which impede Construction Schedule, review of off-site fabrication and delivery schedules, corrective measures and procedures to regain project schedule, revisions to Construction Schedule, progress and schedule of the preceding work period, coordination of schedules, review of submittal schedules and status, status of requests for information, maintenance of quality standards, pending changes and substitutions, and other business.

SC-16 CONSTRUCTION SCHEDULE

Timely performance is of the essence on this Project. The Contractor may complete the Project or any part of the Project earlier than is stipulated in the Contract and the Milestone requirements. The Contractor may schedule his work to complete earlier than required by the Contract or stipulated in the approved schedule, however, under no circumstances shall the Contractor be entitled to added compensation for delays, which occur during the originally stipulated contract period.

The City has purchased the entire scheduled time period by virtue of this Contract and further stipulates that only those delays which meet the tests set forth in GC-26 will be considered for adjustment and only to the extent that they delay the work past the originally contractually stipulated milestones.

SC-16.1 Procedures

- A. The Work under this Contract shall be planned, scheduled, executed, reported and accomplished using the Precedence Diagramming Critical Path Method (hereinafter referred to as CPM). The work required by this section includes the requirement to prepare, maintain, and update all detailed schedules as described in this section. The CPM Schedules shall be prepared in such a manner as to permit the orderly planning, organization, and execution of the Work and be sufficiently detailed to accurately depict all the Work required by the Contract. Contractor shall resource (labor, material and equipment) and cost load its Schedule as specified herein.
 - B. Contractor hereby agrees that in the process of preparing its baseline schedule and monthly updates, it will consult with all key Subcontractors and suppliers to assure concurrence with the feasibility and achievability of Contractor's planned start dates, sequencing, durations, and completion dates. A copy of the computer input files, XER format shall be submitted on CD-R with each submittal. The procedures, technical details and Contractor's participation and responsibilities shall be as hereinafter described.
 - C. Contractor is responsible for determining the sequence of activities, the time estimates for the detailed construction activities and the means, methods, techniques and procedures to be employed. The Schedules identified herein shall represent the Contractor's best judgment of how it will prosecute the Work in compliance with the Contract requirements. Contractor shall ensure that the Schedule is current and accurate and is properly and timely monitored, updated and revised as Project conditions may require and as required by the Contract Documents.
 - D. Contractor shall use Primavera Project Management software (P6) or latest version, and a hardware system commensurate with the size of the project. The system shall be capable of handling, processing, printing, and plotting all data required to satisfy the requirements of this section. All electronic files submitted to Owner or Engineer shall be compatible with Primavera Project Management (P6) or latest version. Any and all costs incurred by the Contractor in researching, training and/or educating its personnel in CPM Scheduling and/or Primavera P6 (or the utilization of outside consultants) shall be part of the Contractor's bid price and not reimbursed separately by the City
- 1. The Project Network Schedule Diagram, mathematical analysis, written narrative and monthly updates will be reviewed by either the Engineer or an independent consultant selected by the Engineer. Items will be reviewed for compliance with these Specifications and accurate reporting by the Contractor of work in place, resource loading and work activity durations.

2. Submit to the Engineer for acceptance a final CPM Baseline Construction Schedule, a Final Schedule of Values including Allowance Items, allocated to the CPM Schedule activities, and written narrative to further explain the plan as set forth in its CPM logic network and schedule within 45 days of the Notice to Proceed. Requirements for the final CPM Baseline Construction and Final Schedule of Values are further described hereinafter. Contractor's Application for Payment will not be approved until the final CPM Baseline Schedule and Schedule of Values have been accepted. The Contract Baseline Schedule submittal shall not show any progress until it is accepted by Engineer

SC-16.2 Standards

- A. Definition: CPM, as required by this Section, shall comply with the standards outlined in the Associated General Contractors' publication, "Construction Planning and Scheduling" unless specifically changed by this Section.
- B. CPM Construction Schedule: The Contractor's CPM Construction Schedule shall include a graphic time scaled logic network, computerized tabular reports and resource loading as described below. To be acceptable, the schedule must demonstrate the following:
 1. A logical succession of Work from start to finish. This logical succession, when accepted, is the Contractor's work plan and, contrary to normal CPM standards, is designated as early start/early finish solely to accommodate the Primavera software.
 2. Clear definition of each activity including cost, manpower, equipment and material quantities as resources. The assigned dollar value (cost loading) of each activity shall cumulatively equal the contract price.
 3. Proper interfacing of related activities including submittals, major material and equipment deliveries, procurement, required permits and other constraints such as equipment or manpower/crew availability. Submittal dates must include review periods and permit schedules must include agency review and issue dates. The narrative shall explain the rationale for all constraints, lags and unusual relationships.
 4. Agreement with the interim milestones, schedule coordination requirements, and completion dates indicated in the Contract Documents.
- C. CPM Graphic Logic Network
 1. The CPM graphic logic network or diagram shall be in the form of a time-scaled diagram of the customary precedence diagram and may be divided into a number of separate pages with suitable notation relating the interface points among the pages. Individual pages shall not exceed 34-inch by 44-inch. Notation on each activity line shall include activity descriptions, total float, and durations as a minimum.

2. All construction activities and procurement shall be indicated in a time-scaled format, and a calendar shall be shown on all sheets along the entire sheet length. Each activity shall be plotted so the beginning and completion dates of said activity can be determined graphically by comparison with the calendar scale. A legend shall be included clearly distinguishing between critical and non-critical path activities and progress to date.
- D. Duration: The duration indicated for each activity shall be in units of whole working days and shall represent the single best time considering the scope of the Work and resources planned for the activity including time for holidays and inclement weather. The calendar for the network shall be in calendar days. Except for certain non-labor activities, such as submittal preparation and review, curing concrete, delivering and fabrication of materials, or other activities described specifically in the Contract, activity durations shall not exceed 14 Days, be less than one Day, nor exceed \$50,000 in value unless otherwise accepted by the Engineer.
- E. For all equipment and materials to be fabricated or supplied for the Project, the Contract Baseline Schedule shall show a sequence of activities including: (a) preparation of shop drawings and sample submissions; (b) thirty (30) calendar days for review of shop drawings and samples (c) shop fabrication, delivery and storage, (d) erection or installation; and, (e) testing of equipment and materials
- F. The Interim Schedule and Contract Baseline Schedule shall show dependencies (or relationships) between each activity. Each activity must have a successor and predecessor, except for the Project Start and Finish Milestone. The use of date constraints shall be limited to Contract Milestones and Contract Completion dates only, unless approved by the Engineer.
- G. Contract Baseline Schedule shall contain or be able to demonstrate an orderly progression of work from Notice to Proceed to Final Completion and that the following items have been addressed: (a) the Project's name; (b) the Contractor's name; (c) revision or edition number; (d) activities of required work to complete, (e) activities relating to different areas of responsibility, such as subcontracted Work which is distinctly separated from that being done by the Contractor directly; (f) labor resources distinguished by craft or crew requirements; (g) equipment and material resources distinguished by equipment and material requirements; (h) distinct and identifiable subdivisions of work such as structural slabs, beams, columns; (i) locations of work within the contract limit lines that necessitates different times or crews to perform; (j) outage schedules for existing utility services that will be interrupted during the performance of the Work; (k) acquisition and installation of equipment and materials supplied and/or installed by the Owner or its separate contractors; (l) material to be stored on site; (m) Phases; and (n) Interim Milestones and the Contract Completion dates.
- H. Lag relationships, or durations between activities, shall be limited to 10 calendar days and used only upon acceptance by the Engineer.

- I. Computerized Tabular Reports: Reports shall include the following for each activity depicted in the schedule.
 - 1. Activity ID
 - 2. Activity Description
 - 3. Duration (original and remaining)
 - 4. Early Start Date
 - 5. Early Finish Date
 - 6. Total Float
 - 7. Percent Complete
 - 8. Activity Cost and Resources
 - 9. Actual Start Date
 - 10. Actual Finish Date

- J. Project Information: Each report shall be prefaced with the following summary data.
 - 1. Project Name
 - 2. Contractor
 - 3. Type of Tabulation (Initial or Updated)
 - 4. Project Duration
 - 5. Project Scheduled Completion Date
 - 6. Projected Completion Date

- K. The Contract Baseline Schedule shall include coding (both activity and project coding) to allow additional grouping and sorting means. The Engineer shall provide the coding dictionary. Coding shall include (but shall not be limited to) the following:
 - 1. Area
 - 2. Department
 - 3. Phase
 - 4. CSI Code
 - 5. Responsibility
 - 6. Crew/ Craft

SC-16.3 Acceptance

- A. The finalized CPM Baseline Construction Schedule will be acceptable to the Engineer when it provides an orderly progression of the Work from Notice to Proceed to Final Completion in accordance with the Contract requirements, adequately defines the Contractor's Work plan, provides a workable arrangement for processing submittals in accordance with the requirements, and properly allocates resource values for manpower, major materials, equipment and costs to each activity (free of unbalances in resources) as determined by the Engineer. Manpower may be represented as composite crews in the CPM Construction Schedule. The network diagram and tabular reports when accepted by the Engineer shall constitute the CPM Construction Schedule until revised and re-accepted.

- B. When the CPM Baseline Construction Schedule has been accepted, the Contractor shall submit to the Engineer:
1. six (6) copies of the CPM graphic logic network,
 2. six (6) copies of a computerized, tabular report in which activities have been sequenced by early starting date,
 3. two (2) copies of the schedule on CD
 4. six (6) copies of the narrative..
- C. The Engineer's review and acceptance of the Contractor's CPM Baseline Construction Schedule is for conformance to the requirements of the Contract Documents only. Review and acceptance by the Engineer of the Contractor's CPM Construction Schedule does not relieve the Contractor of any of its responsibility whatsoever for the accuracy or feasibility of the CPM Construction Schedule, or of the Contractor's ability to meet interim milestone dates and the Contract completion date, nor does such review and acceptance expressly or impliedly warrant, acknowledge, or admit the reasonableness of the logic, durations, and resource value loading of the Contractor's CPM Construction Schedule.
- D. The Contractor shall participate in a conference with the Engineer to review the Engineer's comments on the schedule and evaluation of the proposed network diagram, mathematical analysis and monetary value of activities. This meeting is to take place within five (5) calendar days upon return of reviewed submittal. The intent is to reach a clearer understanding of the CPM and reach consensus on any revisions to be made. Any revisions necessary as a result of this review shall be resubmitted to the Engineer within ten (10) calendar days after the conference. The accepted schedule shall then be used by the Contractor for planning, organizing and directing the work and for reporting progress. If the Contractor desires to make changes in his method of performing the Work, he shall notify the Engineer in writing stating the reason for the changes and receive written acceptance of the change prior to putting the change into the accepted schedule.

SC-16.4 Qualifications

- A. The Contractor shall demonstrate competence in the use of CPM scheduling through the submission of a fully compliant CPM Construction Schedule with the initial CPM submission. In the event the Contractor fails to so demonstrate competence in the CPM scheduling, the Engineer may direct the Contractor to employ the services of a Scheduling Firm that can demonstrate competence. The Contractor shall comply with such directive.
- B. The Contractor shall use the services of scheduler who has verifiable training and credentials in preparing and maintaining a computerized CPM Construction Schedule using Primavera (P6) or latest software as specified herein. The scheduler must qualify within the planning period.

1. Required Experience: Performed CPM scheduling on at least 2 completed construction projects of value at least 75 percent as large as this one and having at least 75 percent as many schedule items as this one. Scheduling of both projects shall have been done using Primavera software (P6 for Windows) or equal.
2. Submit the following:
 - a. Descriptions of at least 2 projects of the value and complexity above.
 - b. Copy of a CPM schedule from one of the previous projects.
 - c. Names and telephone numbers of facility owner representative, design engineer, and construction manager for each project.
 - d. Evidence supporting the above qualifications shall be submitted to the Engineer.

SC-16.5 Submittal Requirements

- A. Initial submittal, revisions and monthly updates of the network diagram, mathematical analysis, and written narrative shall be submitted in six hard copies and two data copies on CD. Submittals will not be accepted unless they are complete as described herein.
- B. The Contractor shall submit monthly the following:
 1. A CPM timescaled logic network, computer generated schedule using Primavera Project Management (P6) software (The latest version of P6 for Windows).
 2. Computerized Tabular Reports.
 - a. Activity sort by early start, organized by facility or area.
 - b. Predecessor/successor listing.
 - c. Activity code dictionary.
 - d. Resource code dictionary.
 3. Written narrative report describing the logic and reasoning of the schedule. Refer to section SC-16.16 for a complete list of narrative report requirements.
 4. Resource value allocation by activity.
 5. Breakdown of specific cost amount for each component of multi-component activities in the CPM Schedule in spreadsheet format (using Microsoft Excel) showing component unit quantities as well as costs. Such breakdown, when accepted by the Engineer shall constitute the Schedule of Values for the Project.
 6. CD copy of entire schedule, narrative and spreadsheet.

SC-16.6 SCHEDULE ORIENTATION SESSION

- A. Contractor shall, within ten (10) days after Notice to Proceed and/or upon notification from the Engineer, attend a Schedule Orientation Session relating to the Schedules and Reports requirements for this Contract. The Schedule Orientation Session is designed to review in detail, the objectives of the Schedules and Reports requirements and the requirements. Contractor shall arrange for its Project Manager, Superintendent, and Scheduler to attend the Schedule Orientation Session.
- B. The following items shall be discussed during the Schedule Orientation Session: (a) The procedures and requirements for the preparation of the Contract Baseline Schedule, and monthly updates by Contractor. (b) how the requirements of the Contract Documents will be monitored and enforced by the Engineer. (c) long-lead items and time requirements for the Work by Subcontractors will be identified and included in the Contract Baseline Schedule. (d) testing and startup. (e) coding and logic for the Contract Baseline Schedule, and (f) identification and scheduling of shop drawings and other submittals.

SC-16.7 Schedule of Values

A. Submittals

1. Contractor shall allocate a dollar value for each activity on the Contract Baseline Schedule. The dollar value for the activity shall be the cost of the Work including labor, materials and equipment. Allowances shall be loaded on activities specifically included for this purpose. No activity on the Contract Baseline Schedule shall exceed a value of \$50,000, unless approved by the Engineer. The sum of all activity costs shall equal the Contract Price. Contractor shall revise the resource and value loading as necessary to gain the acceptance of the Engineer
2. The Final Schedule of Values shall incorporate all comments associated with the Contractor's Schedule/Schedule of Values submittals.
3. Submit documentation to support the values with data, which will substantiate their correctness, as requested by the Engineer.
4. The Schedule of Values, when accepted by the Engineer, shall be used as the only basis for the Contractor's Applications for Payment. The total price paid for mobilization shall be as approved by the Engineer, but in no case shall it exceed three per-cent (3%) of the total bid amount (excluding allowances) and shall be substantiated with invoices and other backup documentation.
5. The Schedule of Values shall be derived from the assigned Progress Schedule Activity Values and identified by Activity ID.

B. Form and Content of Schedule of Values

1. Identify the Schedule of Values submittal with:

- a. Title of Contract and location.
 - b. Contract Number.
 - c. Name and address of Contractor.
 - d. Date of submission.
2. The Contractor's Schedule of Values shall list the installed value of the component parts of the Work in sufficient detail to serve as the basis for computing values for progress payments during construction.
3. Identify accounts with the location code and area code as defined in the Primavera Schedule format and list the number and title of the respective major Section of the Specifications.
4. All accounts in the Schedule of Values shall be derived from the activities in the Progress Schedule. Account data pertaining to the Schedule of Values shall, at a minimum, include the following for each Account:
 - a. CPM Activity number.
 - b. City of Atlanta Standard Code listed on the Bid Schedule.
 - c. Account representative quantities (cubic yards of concrete, tons of steel, etc.), unit costs, person-hours, item and account dollar value.
 - d. WBS code (as used Primavera Project Planner scheduling software), including location, responsibility and area codes.
 - e. CSI Specification Section Number.
 - f. Account Type: Lump Sum (LS), Unit Price (UP), Allowance (AL), or Change Order (CO)
5. The Schedule of Values must be developed separately from the baseline schedule in a tabular electronic format (i.e. a Microsoft Excel Spreadsheet). Upon approval of the Schedule of Values and the Project Baseline Schedule, the Schedule of Values will be merged with the Project Baseline Schedule in P6.

C. Lump Sum Accounts (LS):

1. The Lump Sum Items established in the Contractor's Bid shall be further divided into pay and progress items by the Contractor and submitted to the Engineer for approval, and as specified in SC16.7.A above. Payment for Lump Sum (LS) Accounts will be based upon physical progress (percent complete) for each related activity in the Progress Schedule.
2. The dollar value allocated to Lump Sum Accounts shall be representative of the Contractor's actual costs for performing the work including overhead and profit, and shall be balanced to ensure that sufficient funds are allocated for each portion of the work and shall be subject to acceptance by the Engineer.

3. In the event account values can not be agreed to between the Engineer and the Contractor, the Engineer shall have the exclusive right to determine the account dollar amounts contained in the Schedule of Values.
 4. Mobilization costs shall be specifically identified in the Schedule of Values. All mobilization sub-accounts contained in the Schedule of Values must have a corresponding CPM Schedule activity. Payments for mobilization sub-accounts will be based upon lump sum (LS) values as accepted by the Engineer.
- D. Unit Price Accounts (UP): Payment for Unit Price Accounts shall be based upon actual quantities of Work performed in compliance with the Contract Documents, as verified and accepted by the Engineer. Whenever the actual quantity differs from the estimated quantity on the Unit Price Accounts, the Contractor shall notify the Engineer in writing. Quantity overruns and under runs will be tracked on the Schedule of Values.
- E. Allowance Accounts (AL): Payment for Allowance Accounts will be based upon invoices submitted by the Contractor subject to conditions and limitations of the Contract Documents. Refer to Section 01200, Measurement and Payment, for requirements. The Allowance shall be adjusted to the actual amount paid for such services, and adjusted by Change Order either at the end of that phase of the Work or at the completion of the Work. The City will have sole discretion on determining when to make adjustments to the Allowance.
- F. Cost of materials shall be assigned to the appropriate item of work, and allocated to a materials Sub-account. All materials items contained in the Schedule of Values must have a corresponding CPM Schedule activity, for various portions of the Work:
- a. Except for Allowance Accounts identified in Section 01200, each account shall include a directly proportional amount of the Contractor's overhead and profit.
 - b. For accounts on which progress payments will be requested for materials suitably stored on site, break down the value into:
 - i. The cost of each material delivered and unloaded.
 - ii. Paid invoices will be required for materials.
- G. The Contractor shall include in his Schedule of Values items for site maintenance, and compliance with the terms of permit stipulations, as appropriate. These items will be monitored on a monthly basis. Non-compliance will result in monies being deducted from the appropriate items.
- H. A new account will be added to the Schedule of Values for approved Change Order work. Payment for Time and Materials Change Order work (CO) shall be based upon the General and Special Conditions of these Specifications.

- I. The sum of all Account Values listed in the Schedule of Values shall equal the total Contract Price, excluding Allowance Items.

16.7.1 Sub-Accounts

- A. Include a breakdown of major accounts into sub-accounts on which progress payments will be requested. The sub-account breakdown shall include elements for pay items/progress items as appropriate, and show the weight of each sub-account; e.g., fabrication, installation, etc., with the total weight of the sub-accounts equal to 100 percent of the major account.
- B. The form of the submittal shall be consistent with the Schedule of Values, with each account identified the same as the line item in the Schedule of Values.
- C. The Contractor's Schedule of Values shall list the delivered value of the products, manuals and services provided under the various Specification Sections. The lists shall be sufficiently detailed to serve as a basis for computing values for progress payments during the construction period.
- D. The unit quantity for bulk materials shall include an allowance for waste.
- E. The unit values for the materials shall be broken down into:
 - 1. Cost of the material delivered and unloaded at the site.
 - 2. Copies of paid invoices for component material shall be included with the payment request in which the material first appears.
- F. The installed unit value multiplied by the quantity listed shall equal the cost of that account in the Schedule of Values.
- G. Quantities and unit values identified in the Component Materials sub-accounts shall be used for determining progress payments only, and are not considered to be unit price pay items.

SC-16.8 Monthly Application for Payment

- A. Monthly Application for Payment: Contractor shall provide monthly Schedule Update, monthly Payment Report and monthly Narrative Report as his monthly Application for Payment package. Failure to submit all of the aforementioned submittals will result in the termination of the pay application process until all documents are received.
- B. Monthly Schedule Update: The Contractor shall submit, at intervals of 30 calendar days, an update of all activities in the as-planned CPM schedule. The Period-Ending Date shall be the 25th of each month. Update shall be created by updating the mathematical analysis and the corresponding computerized network diagram of the Schedule.

1. The schedule shall be updated by entering the following: Actual start and completion dates of completed activities and the actual start date and remaining duration of activities in progress.
 2. The updated network diagram shall be submitted in the same format as noted in Specification Section SC-16.1, with the calendar starting from the date of the update.
 3. The updated mathematical analysis shall be submitted in the same format noted in Specification Section SC-16.1.
 4. The schedule update shall include an update of the cash flow projections in the same format as the original approved submittal.
 5. The schedule update will state the percentage of the work actually completed and scheduled as of the report date.
- C. The Monthly Payment Report shall show the activities or portions of activities completed during the reporting period, their total monetary values and the monetary values earned as a basis for the Contractor's Application for Payment. A mutually agreed upon percent complete will be assigned to each completed and partially completed activity to be used for calculating the monetary value earned to date. For activities underway, the percent complete shall not be related to the remaining duration.
- D. A monthly narrative report shall be submitted each month. Refer to Specification Section SC-16.16 for the requirements of the narrative report.
1. Description of work accomplished.
 2. Summary of safety and quality issues occurring during the month and corrective actions taken.
 3. Contractor evaluation of actual progress versus progress planned.
 4. If the project is behind schedule, progress along all paths with negative float shall be reported along with the reasons for the delay.
 5. A description of all revisions made to the schedule including: all accepted added, deleted, and revised activities; all logic revisions; and all duration revisions.
 6. A description of the problem areas, current and anticipated delaying factors and their impact, and an explanation of corrective actions taken or proposed.
- E. If the Contractor fails to submit any of the required components of the Application for Payment, the Engineer will withhold approval of the Application for Payment until such time as the Contractor submits the required components.

SC-16.9 Progress Meetings and Look-Ahead Schedules

- A. For the weekly progress meetings, the Contractor shall submit a four week Look-Ahead Schedule. This schedule will cover four weeks: the immediate past week, the current week, and the forthcoming two weeks. This schedule will include all activities which are complete, started, are incomplete or underway, or scheduled to be worked during this four week time frame. This schedule shall list all activities from the accepted CPM Construction Schedule which are complete, are scheduled for Work during the period, are currently planned to be worked, even if out of sequence, and Work which is unfinished but scheduled to be finished. Actual start and completion dates shall be provided for the Work that has been completed the prior week; forecast start and finish dates shall be provided for the Work that is in-process or upcoming.
- B. Each activity noted above shall be identified by activity number corresponding to the accepted CPM Construction Schedule and detailed description of the activity.
- C. The Look-Ahead Schedule shall be delivered to the Engineer twenty-four (24) hours prior to the weekly progress meeting.
- D. The Look-Ahead Schedule shall be in a format approved by the Engineer.
- E. Tabular reports for manpower and equipment resources shall be provided for and with each Look-Ahead Schedule.

SC-16.10 CPM Construction Schedule Revisions

- A. The Engineer may direct and, if so directed, the Contractor shall propose, revisions to the CPM Construction Schedule upon occurrence of any of the following instances:
 - 1. The actual physical progress of the Work falls more than five percent (5%) behind the accepted CPM Construction Schedule, as demonstrated by comparison to the accepted monthly CPM Construction Schedule updates or as determined by the Engineer if a current accepted CPM Construction Schedule does not exist.
 - 2. The Engineer considers milestone or completion dates to be in jeopardy because of “activities behind schedule”. “Activities behind schedule” are all activities that have not or cannot be started or completed by the dates shown in the CPM Construction Schedule, regardless of the existence of positive float on the activity.
 - 3. A Change Order has been issued that changes, adds, or deletes scheduled activities or affects the time for completion of scheduled activities.
- B. When the instances requiring revision to the CPM Construction Schedule occur, the Contractor shall submit the proposed revised CPM Construction Schedule within ten (10) working days after receiving direction from the Engineer to provide such Schedule. No

additional payment will be made to the Contractor for preparation and submittal of proposed revised CPM Construction Schedules. However, if the Engineer accepts the proposed revised CPM Construction Schedule, it shall replace and supersede all previous CPM Construction Schedules and substitute for the next monthly CPM Construction Schedule update that would otherwise be required.

- C. Revisions to the CPM Construction Schedule shall comply with all of the same requirements applicable to the original schedule.

SC-16.11 Schedule Recovery

- A. If a revised CPM Construction Schedule accepted by the Engineer requires the Contractor to employ additional manpower, equipment, hours of work or work shifts, or to accelerate procurement of materials or equipment, or any combination thereof, as schedule recovery measures to meet Contract milestones, the Contractor shall implement such schedule recovery measures without additional charge to the City. All schedules containing negative float shall mandate the submission of a recovery schedule.
- B. Should it become apparent by the Engineer, that delays to the critical path have resulted in the current monthly update and that these delays are through no fault of the Owner or Engineer and that the Contract completion will not be met, the Contractor shall submit to the Engineer for review a written statement of the steps it intends to take to remove or mitigate the delay to the schedule. The Contractor shall promptly provide such level of effort to bring work back on schedule.
- C. Furthermore, if efforts to recover are not deemed effective as determined by the Engineer, or if prior to submittal of the recovery schedule, the Engineer determines that critical milestones are in jeopardy, the Engineer may direct the Contractor to implement the above or any other recovery efforts at no additional costs to the City.. Under no circumstances will the addition of construction forces, increasing the working hours or any other method, manner, or procedure to recover delays to the CPM Construction Schedule be considered justification for contract modifications or extra work.

SC-16.12 Time Impact Analysis Requirement

- A. When delays are experienced by the Contractor and a time extension is requested, the Contractor shall submit to the Engineer a written Time Impact Analysis illustrating the influence of all changes or all delays on the current Project completion date. The time impact analysis shall be constructed on an As-Built Schedule Analysis approach. The As-Built Schedule that is created will incorporate all actual start and finish dates, actual durations of activities, actual sequences of construction (referred to as the As-Built Logic) current as of the time the Time Impact Analysis is performed. This Time Impact Analysis shall incorporate all delays (including Engineer, Contractor and third party delays without exception) in the time frame that they actually occurred with actual logic ties. The As-Built Schedule data shall be obtained from the most recent approved monthly schedule

update. The As-Built Schedule shall be created as an early start schedule with the actual start and finish dates coinciding with the early start and finish dates from the most recent approved monthly schedule update. The As-Built Schedule shall show the original activity durations equal to the actual duration and the actual logic driving all activities. The Engineer will validate this As-Built Schedule. All requests for time extension shall be based upon an analysis of this As-Built Schedule. The critical path will be established and all Engineer -caused delays on the critical path will be identified. The time extension will be based solely upon the cumulative duration of all City and third party caused delays that are on the critical path. Any time extensions to the project's Interim Milestone Dates, if any, shall be non-compensable time extensions only.

- B. Each Time Impact Analysis shall demonstrate the estimated time impact based on the events of delay, the status of construction at that point in time, and the event time computation of all activities affected by the change or delay. The event times used in the analysis shall be those included in the latest approved update of the project schedule, in effect at the time the change or delay was encountered.

SC-16.13 Time Allowance for Inclement Weather

- A. The Contractor in the planning and scheduling of its baseline schedule shall consider and include corresponding time for normal weather occurrences in all weather sensitive schedule activities. The amount of time allowed for this inclement weather is defined under GC-24.6. Any activity which could be impacted by normally anticipated inclement weather (precipitation, high or low temperature, wind, etc.), due to the time period which the Contractor has scheduled the work, shall include an adjustment to include the anticipated weather impact from normal weather conditions. "Abnormal Inclement weather" is a lost workday, caused by abnormal inclement weather conditions, and is defined as a day in which the Contractor's workforce cannot work 50 percent or more of the day thereby resulting in a delay to the critical path. The Contractor shall notify the Engineer in writing when a lost workday has occurred due to abnormal inclement weather in accordance with the Contract Specifications requirements. If the number of actual inclement weather delay days exceeds the number of contract allowed inclement weather days, the Contractor will notify in writing the Engineer in accordance with the requirements of GC-26.2 Delays and Extensions of Time of the Contract Specifications. Such delays shall not entitle the Contractor to any additional compensation. The sole remedy of the Contractor shall be to seek a non-compensable extension of time.

SC-16.14 Ownership of Schedule Float and Early Completion:

- A. Project float, total float, slack time or contingency within the CPM Construction Schedule (i.e., the difference in time between the projected early completion date and the required Contract completion date), and free float or critical path float within the overall CPM Construction Schedule is for the exclusive use of the Owner. The use of float suppression techniques such as preferential sequencing, special lead/lag logic restraints, extended activity times or imposed dates shall be cause for rejection of the CPM Construction

Schedule and any revisions of updates. The use of float time shall be allowed as directed by the Engineer.

- B. Owner initiated changes that extend or shorten the Contract time shall be the sole basis to adjust the Contract completion date. Delays to the Project critical path for which no justified request for time extensions has been made in accordance with the General Conditions and the General Requirements shall be deemed to be the responsibility of the Contractor.
- C. Contractor agrees that there will be no basis for any Contract modification in regards to an extension of time for project delays, problems or change orders that only result in a loss of shared float in the CPM Construction Schedule.
- D. Any delays to the Contractors proposed early completion date shall be non-compensable and is considered COA-owned Project float which is for the exclusive use of the Engineer.

SC-16.15 Final Schedule As-Built Update:

- A. As a condition precedent to any release of retention, the last update to the CPM Construction Schedule submitted shall be identified by the Contractor as the As-Built Construction Schedule. This As-Built Construction Schedule shall reflect the exact manner in which the project was actually constructed including start and completion dates, activities, sequences and logic ties.
- B. This schedule submission shall be accompanied by a certification signed by an officer of the company and the Contractor's Project Manager and Project Scheduler, stating "To the best of our knowledge, the enclosed final update of the CPM Construction Schedule accurately reflects the actual start and actual completion dates and logical relationship ties of all activities contained herein and represents an accurate depiction of the way in which the project was constructed."

SC-16.16 Requirements of Written Narrative Monthly Progress Report:

Prepare a monthly written narrative progress report to be submitted in conjunction with the required updated CPM Construction Schedule as outlined below.

The narrative report shall contain the following format:

- 1. The Contractors submittal letter.
- 2. Schedule report indicating each activity on the CPM Construction Schedule that has been:
 - a. Completed during the reporting activity period.
 - b. In progress during this reporting period.
 - c. Scheduled for the next reporting period.
- 3. Analysis, by critical path of each negative path describing:

- a. The nature of the critical path.
 - b. Impacts on other activities, milestones and completion dates.
 - c. Recommendations on recovery of the critical path delays.
4. Current and anticipated delays:
 - a. Cause of the delay.
 - b. Corrective measures and schedule adjustments to correct the delay
 - c. Impact of the delay on other activities, milestones and completion dates.
5. Change in construction sequence, logic changes, relationship changes, duration changes and the rationale with such changes.
6. Pending issues and status of other items:
 - a. Permits.
 - b. Contract Modifications.
 - c. Time extension requests.
 - d. Long-lead procurement items.
7. Tabular schedule reports tabulated by:
 - a. Contractor early start activities.
 - b. Total float / early start.
 - c. Area / early start.
 - d. Activity number.
8. Added or deleted activities.
9. Out of Sequence Report describing the necessity of each item activity relationship shown to be out of sequence.
10. Illogical Progress / Restraint Reports.
11. Contract completion date status.
12. Ahead of schedule and number of days.
13. Behind schedule and number of days.
14. Summary of project cost data by appropriate breakdown including budget quantity, cost, percent complete, actions taken to date, actions taken this period, estimate to complete and variances.
15. Summary of project status including cumulative information to date, variances and forecasted completion.
16. Other project or scheduling concerns.
17. Review and update of CPM Schedule.
18. Safety reports and any code violations or warnings.
19. Computer disk containing the latest CPM Construction Schedule update.
20. Provide a list of all equipment supplied to project site, shutdown notices, permits, inspections and dates, approvals, etc.

SC-17 COOPERATION WITH OTHER CONTRACTORS AND FORCES

During progress of work under this Agreement, it will be necessary for other contractors and persons employed by the City to work in or about the Project. The City reserves the right to put such other contractors to work and to afford such access to the Site of the work to be performed hereunder at such times as the City deems proper. The Contractor shall not impede or interfere with the work for such other contractors engaged in or about the Services and shall so arrange

and conduct his work that such other contractors may complete their work at the earliest date possible.

When the Contractor and any contractor or subcontractor performing Services under or pursuant to another City Agreement are employed on related or adjacent work, or are using the same materials source, storage area, or disposal area, the contractor shall be responsible to the other for any injury, damage, or loss caused the other by his operations, by his unnecessary delay or hindrance of the other's work, or by his failure to complete the Services or any portion thereof within the time specified for its completion. The Contractor shall indemnify and save harmless the City and the Engineer, and all officers and employees of the City connected with the Services from all claims, suits, or actions of any nature brought on account of any injury, damage, or loss.

Contractor's responsibilities under the preceding paragraph shall be not greater as to any injury, damage, or loss than those imposed on the Contractor or subcontractor under the comparable provision of this Agreement or subcontract.

The Engineer will decide any disputed questions regarding the performance of the Services, access and cleaning up of the site, and priority in all relations between the Contractor and other contractors in utility companies, and maintenance crews.

The Contractor shall cooperate with all other contractors requiring access to the Services for the purpose of maintenance of security, temporary facilities, cleaning of the site, and like matters requiring common effort.

SC-18 EXTENDED SHIFT, WEEKEND AND HOLIDAY WORK

The City observes the following holidays:

New Year's Day, Martin Luther King's Birthday, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day and following Friday, and Christmas Day.

Should the Contractor deem it necessary to work on Saturdays, Sundays, holidays or longer than eight hours (8) per shift in order to comply with his construction schedule, or because of any emergency, the Contractor shall request permission of the Engineer to do so at least seven (7) calendar days in advance.

SC-19 PROJECT CLOSEOUT

SC-19.1 Restoration of Miscellaneous Surface Facilities

Construction operations on the Work may disturb or otherwise damage the surface contours and vegetation of natural and landscaped areas. Restoration of these areas shall be part of the Agreement. Restoration of pavements, trees, and ground vegetation is specified in the Technical Specifications.

SC-19.2 Pavement Restoration

Contractor shall secure permits from the appropriate jurisdictional Agency for all pavement restoration prepared in accordance with the requirements of the Agreement Documents and the jurisdictional Agency and submit them to the Engineer.

SC-20 EQUIPMENT SERVICE

The Contractor shall furnish the services of a competent factory representative of the manufacturer of the equipment to be installed, for the purpose of supervising and/or inspecting the installation, placing the equipment in service, and calibrating and adjusting each item of equipment. Qualification of the representative shall be appropriate to the type of equipment furnished and subject to the approval of the Engineer. Where equipment furnished has significant process complexity, engineering personnel knowledgeable in the process involved and the function of the equipment shall be furnished. These services shall be furnished in accordance with the requirements of the Technical Specifications.

When approved by the Engineer, periods of service on more than one item of equipment furnished by the same manufacturer may run concurrently. Each of these manufacturers shall furnish supervisory and/or inspection services for all equipment, which he furnishes.

During the initial operation period, a functional test shall be performed on each piece of equipment. The test shall consist of operation of the equipment on a normal duty cycle for a sufficient period of time to determine satisfactory operation (twenty-four [24] hours minimum). To the maximum extent practical, the full capabilities of all equipment shall be exercised, including remote operation, instrumented control schemes, alternate modes of operation, and emergency operation.

SC-21 CONCRETE POUR CARD

An approved concrete pour card must be obtained by the Contractor prior to the placement of concrete. The card shall be as provided to the Contractor by the Engineer. The pour card shall be completed by the contractor and approved by the Engineer before concrete is placed.

SC-22 PARTNERING STATEMENT

The City intends to encourage the foundation of a cohesive partnership with the Contractor and its subcontractors. This partnership will be structured to draw on the strengths of each organization to identify and achieve reciprocal goals. The objectives are effective and efficient Agreement performance, intended to achieve completion within budget, on schedule, and in accordance with plans and specifications.

This partnership will be bilateral in makeup, and participation will be totally voluntary. Any costs associated with effectuating this partnership will be agreed to by both parties and will be shared equally with no change in Agreement price. To implement this partnership initiative, it is anticipated that within sixty (60) days of Notice to Proceed, the Contractor's on-site project manager and the City's on-site representative will attend a partnership development seminar

followed by a team-building workshop, attended by key on-site staff from the Contractor's forces and City's personnel. Follow-up workshops will be held periodically through the duration of the Agreement as agreed by the Contractor and City. The City and Contractor shall mutually agree on a partnering facilitator and off-site facilities for the partnering sessions.

An integral aspect of partnering is the resolution of disputes in a timely, professional, and non-adversarial manner. Alternative dispute resolution methods will be encouraged to promote and maintain amicable working relationships at all levels of the project and to strengthen the partnership.

The mutual goals and objectives of the stakeholders form the Partnering Charter. The charter for each project, then, will be unique to that project. The charter may be a simple statement about communication and cooperation in all matters and resolution of conflicts at the lowest level. The following provides an idea of objectives, which might be included in the charter:

- A. We are a team dedicated to providing a quality project in accordance with the Agreement. We are committed to both employee and public safety, protection of the environment, and minimizing inconvenience to the public.
 - 1. Communication Objectives: We intend to deal with each other in a fair, reasonable, trusting and professional manner including:
 - a. Communicate and resolve problems within the terms of the Agreement;
 - b. Decision making at the lowest possible level;
 - c. Open, honest communication;
 - d. Treat each other with mutual respect, resolve conflicts immediately, and avoid personal attacks;
 - e. Timely notification of future meetings; and
 - f. Do not allow personal antagonism to interfere with professionalism.
 - 2. Conflict Resolution System:
 - a. Step 1: It is preferred that conflict be discussed and resolved at the level on which it originates;
 - b. Step 2: When conflict is not resolved at the originating level, it is taken to the next level of supervision;
 - c. Step 3: When conflict is not resolved at the immediate supervisory level, it is taken to the project manager and engineer; and
 - d. Step 4: When conflict is not resolved by the project manager and engineer, it is submitted to the Disputes Review Board for adjudication.
 - 3. Performance Objectives:

- a. Complete the project without litigation;
- b. Utilize cost reduction incentive proposals;
- c. Finish the project on time;
- d. No delays to project;
- e. No lost time injuries;
- f. Promote positive public relations;
- g. Make the project enjoyable to work on;
- h. Render a finished product everyone can be proud of; and
- i. Construct and administer the Agreement so that all parties are treated fairly.

SC-23 COLOR COORDINATION

The City will require a color coordination of architectural materials. All coatings are to be custom matched.

SC-24 TIE-INS OR MODIFICATIONS TO EXISTING SYSTEMS

Anytime the Contractor ties into or modifies an existing system, a detailed work plan shall be required. Submittal of this work plan must be a minimum of thirty (30) days in advance of commencement of the subject work. This work plan shall include a detailed description of the work, a step-by-step plan of the modification or tie-in, a schedule, a detailed list of materials and equipment required, demonstrated communications capacity, and a listing of any gates or valves, which must be operated. Working drawings shall be submitted as required under GC-28 for any permanent or temporary structural modifications. A temporary safety plan covering the period of the work, and a listing of contingency plans and supplies, including but not limited to spill prevention planning and spill containment kits, shall be required. A coordination meeting with the City's plant operating staff, the Contractor, the Engineer and the Designer must be held at least seven (7) days prior to the commencement of the modification or tie-in. The day before the commencement of the modification or tie-in, a final coordination shall be held giving final detailed work assignments to all parties involved.

The City and the Engineer have the right to require, at no additional cost to the City, stand-by equipment on any item(s) deemed critical enough to delay the work. The Contractor shall have available stand-by personnel to supplement the committed forces should problems arise. The Contractor is responsible for meeting all OSHA standards including entrance and exit safety, confined space entry, fall protection, scaffolding, rigging, etc.

SC-25 NOTICES OF COMMENCEMENT

- A. The Contractor shall file all "Notice of Commencement" required for this Project in accordance with O.C.G.A. § 36-91-92et. seq., as applicable, setting forth:

1. The name, address, and telephone number of the person providing the labor, material, machinery, or equipment;
 2. The name and address of each person at whose instance the labor, material, machinery, or equipment is being furnished;
 3. The name and location of the public work; and
 4. A description of the labor, material, machinery, or equipment being provided and, if known, the Agreement Price or anticipated value of the labor, material, machinery, or equipment to be provided or the amount claimed to be due, if any.
- B. The Contractor shall respond to all requests for copies of a Notice of Commencement. Should the City or Engineer receive such a request, this request will be forwarded to the Contractor for further handling. The name and address of the City shall be as stated as follows:
- City of Atlanta
Department of Watershed Management
55 Trinity Avenue, S. W.
South Tower
Suite 5400
Atlanta, Georgia 30303
- C. The name and description of the Project shall be as stated in the Invitation to Bid.

SC-26 VALUE ENGINEERING CHANGE PROPOSALS

A. Value Engineering Change Proposals

1. The Contractor may submit Value Engineering Change Proposals (VECP) for changes that the Contractor believes will result in instant Contract savings of at least fifty thousand dollars (\$50,000.00). VECPs will only be considered if the proposed change:
 - a. will result in a net reduction in the Agreement Price;
 - b. will not impair any essential form, fit, function or characteristic of the Work, such as but not limited to, safety, service life, reliability, economy of operation, ease of maintenance, aesthetics and necessary standard features; and
 - c. will not require an extension of the Agreement Time.
2. A VECP shall not increase the risk to cost or schedule of completion.
3. A VECP, if accepted, will be accepted and implemented by Change Order in accordance with this Article.

B. Definitions

1. "Collateral Costs", as used herein, means City costs of operation, maintenance, logistics support, or City-furnished property.
2. "Collateral Savings", as used herein, means those measurable net reductions resulting from a VECP in the City's overall projected collateral costs, exclusive of acquisition savings, whether or not the acquisition cost changes.
3. "Contractor's Development Costs", as used herein, mean those costs the Contractor incurs on a VECP specifically in developing, testing, preparing and submitting the VECP. Contractor's development costs will not be recoverable. If the VECP is adopted, the Contractor's share of the savings as hereinafter defined shall be considered full compensation to the Contractor for the VECP.
4. "Implementation Costs", as used herein, means those costs the Contractor incurs to make the contractual changes required by the City's acceptance of a VECP. Such costs will be subject to City audit.
5. "City Costs", as used herein, means those costs the City incurs that result directly from developing and implementing the VECP, such as but not limited to, any net increases in the cost of engineering, testing, operations, maintenance and logistic support. The term also includes the administrative costs of review and processing the VECP.
6. "Instant Agreement Savings", as used herein, means the reduction in Contractor cost of performance (which includes overhead and profit attributable to the reduced or eliminated work), resulting from acceptance of the VECP, minus implementation costs and City costs.

C. VECP Preparation

1. As a minimum, the Contractor shall include in each VECP the information described below:
 - a. A description of the difference between the existing Agreement requirement and that proposed, the comparative advantages and disadvantages of each, a justification when an item's function or characteristics are being altered, and the effect of the change on the end item's performance;
 - b. A list and analysis of the Agreement requirements that must be changed if the VECP is accepted, including a recommendation as to how the revisions must be made;
 - c. A separate, detailed cost estimate for (i) the affected portions of the existing Agreement requirement and (ii) the VECP. The cost estimate shall include, without

limitation, both capital cost savings, and life cycle cost savings. The cost reduction associated with the VECP shall take into account the Contractor's implementation costs;

- c. A description and estimate of costs the City may incur in implementing the VECP, such as test and evaluation and operating and support costs;
- e. A prediction of any effects the proposed change would have on collateral costs to the City.
- f. A statement of the time by which a Change Order accepting the VECP must be issued in order to achieve the maximum cost reduction, noting any effect on the Agreement Time, achievement of any milestones, or delivery schedule;
- g. Identification of any previous submissions of the VECP, including the dates submitted, and previous actions, (including those of the City) if known;
- h. All specifications, instructions, plans and drawings detailing the implementation of the VECP. All drawings and specifications must be prepared by and sealed by a professional engineer registered in the State of Georgia;
- i. A revised Schedule of Values;
- j. A revised schedule for the affected portion(s) of the Work; and
- k. Any other information required in the judgment of the City to review and/or implement the VECP. Such information shall be provided by the Contractor as soon as practicable after the City's request thereof.

D. Processing Procedures

1. Two (2) copies of each VECP shall be submitted to the Engineer. VECPs will be processed expeditiously, however, the City will not be liable for any delay in acting upon or for failure to act upon, any VECP submitted pursuant to this Article. The Contractor may withdraw, in whole or in part, a VECP not accepted by the City within the period specified in the VECP.
2. The City will be the sole judge of the acceptability of a VECP and of the savings and costs from the adoption of all or any part of such proposal. In determining the savings, the right is reserved to disregard the Agreement bid prices if, in the judgment of the City, such prices do not represent a fair measure of the value of the work to be performed or to be deleted. The decision of the City regarding acceptability or unacceptability of the VECP, as well as the savings and costs, shall be final.

3.The City may require the Contractor to modify the VECP to make it acceptable. If any modification increases or decreases the savings resulting from the VECP, the Contractor's fair share will be determined upon the basis of the VECP as modified.

4.The City may accept, in whole or in part, a VECP submitted pursuant to this Article by issuing a Change Order. However, pending issuance of a Change Order, the Contractor shall remain obligated to perform in accordance with the terms of the Agreement.

E. Sharing Arrangements

The Contractor and City shall each receive a fifty percent (50%) share in the Instant Agreement Savings. Upon acceptance of a VECP, a Change Order will be issued reducing the Agreement Price by fifty percent (50%) of the Instant Agreement Savings.

F. Warranty

1.The Contractor shall be, and remain, liable for the effectiveness of the design of the change proposed.

2.The Contractor warrants that such change: shall be free from defects in design, function, configuration and purpose; shall fully perform the function as intended and required by the Agreement Documents; complies with all laws, rules, regulations and ordinances governing such an item; and infringes no patent, copyright, trade secret or other third party proprietary right or interest.

G. Data

To the extent permitted or allowed by law, the City will not disclose, use or duplicate any data provided by the Contractor pursuant to this Article, while such VECP is being evaluated. This restriction shall not apply to any information if it is, or has been obtained, or is otherwise available, from the Contractor or from any other source, without limitation. If a VECP has been accepted, the City shall have the right to duplicate, use and disclose any data in any manner, and for any purpose, and have others do so, under this or any other City Agreement.

SC-27 ENCOUNTERING HAZARDOUS OR POTENTIALLY HAZARDOUS MATERIAL DURING CONSTRUCTION ACTIVITIES

Provide all labor, materials, supplies, and incidentals to protect onsite workers and the surrounding public from exposure to potentially hazardous substances, prevent spread of potentially contaminated or hazardous substances, notify Engineer, and stop all work until notified by the Engineer.

An emergency situation or imminent hazard may include, but is not limited to, the following;

- Buried drums or containers with unknown or known toxic contents.

- Groundwater or soils of unnatural color
- Spills or leaks of chemicals, solvents, or petroleum products.
- Unusual odors
- Other perceived threats

If a potentially hazardous substance is discovered during construction activities, do not remove it from the site. Leave the potentially hazardous substance in place and stop all work in the immediate area. If the material appears to be leaking or spreading, the Contractor shall contain or abate the spread of material. Take all measures to prevent the release of the material to the environment and protect all onsite workers and the public from potential exposure.

During the course of substance containment or evacuation of site personnel, the Contractor shall protect onsite workers, non-workers, and the general public from contact with or exposure to the contaminated substances or materials.

Attachment 1

96"

Atlanta City Council	
Felecia A. Moore	Council President
Carla Smith	District 1
Amir Farokhi	District 2
Ivory Lee Young, Jr.	District 3
Cleta Winslow	District 4
Natalyn Mosby Archibong	District 5
Jennifer N. Ide	District 6
Howard Shook	District 7
J.P. Matzigkelt	District 8
Dustin Hillis	District 9
Andrea L. Boone	District 10
Marci C. Overstreet	District 11
Joyce Sheperd	District 12
Michael Julian Bond	Post 1 At-Large
Matt Westmoreland	Post 2 At-Large
Andre Dickens	Post 3 At-Large

Department of Watershed Management
Kishia L. Powell
Commissioner



CITY OF ATLANTA DEPARTMENT OF
**watershed
management**

Keisha Lance Bottoms, Mayor

Project Name Goes Here

Cost: \$0.00

DWM Project Hotline Number:
404-546-3200

   
@ATLWatershed
www.atlantawatershed.org

Department of Watershed Management | A Project of the Five-Year Capital Improvement Plan

48"

INSURANCE AND BONDING REQUIREMENTS

APPENDIX B
INSURANCE & BONDING REQUIREMENTS
Howell Mill Outfall Sewer Improvements

A. Preamble

The following requirements apply to all work under the agreement. Compliance is required by all Contractors/Consultants. **To the extent permitted by applicable law, the City of Atlanta (“City”) reserves the right to adjust or waive any insurance or bonding requirements contained in this Appendix B and applicable to the agreement.**

1. Evidence of Insurance Required Before Work Begins

No work under the agreement may be commenced until all insurance and bonding requirements contained in this Appendix B, or required by applicable law, have been complied with and evidence of such compliance satisfactory to City as to form and content has been filed with City. Contractor/Consultant must provide City with a Certificate of Insurance that clearly and unconditionally indicates that Contractor/Consultant has complied with all insurance and bonding requirements set forth in this Appendix B and applicable to the agreement. If the Contractor/Consultant is a joint venture, the insurance certificate should name the joint venture, rather than the joint venture partners individually, as the primary insured. In accordance with the solicitation documents applicable to the agreement at the time Contractor/Consultant submits to City its executed agreement, Contractor/Consultant must satisfy all insurance and bonding requirements required by this Appendix B and applicable by law, and provide the required written documentation to City evidencing such compliance. In the event that Contractor/Consultant does not comply with such submittal requirements within the time period established by the solicitation documents applicable to the agreement, City may, in addition to any other rights City may have under the solicitation documents applicable to the agreement or under applicable law, make a claim against any bid security provided by Contractor/Consultant.

2. Minimum Financial Security Requirements

All companies providing insurance required by this Appendix B must meet certain minimum financial security requirements. These requirements must conform to the ratings published by A.M. Best & Co. in the current Best's Key Rating Guide - Property-Casualty. The ratings for each company must be indicated on the documentation provided by Contractor/Consultant to City certifying that all insurance and bonding requirements set forth in this Appendix B and applicable to the agreement have been unconditionally satisfied.

For all agreements, regardless of size, companies providing insurance or bonds under the agreement must meet the following requirements:

- i) Best's rating not less than A-,
- ii) Best's Financial Size Category not less than Class VII, and
- iii) Companies must be authorized to conduct and transact insurance contracts by the Insurance Commissioner, State of Georgia.
- iv) All bid, performance and payment bonds must be underwritten by a U.S. Treasury Circular 570 listed company.

If the issuing company does not meet these minimum requirements, or for any other reason is or becomes unsatisfactory to City, City will notify Contractor/Consultant in writing. Contractor/Consultant must promptly obtain a new policy or bond issued by an insurer acceptable to City and submits to City evidence of its compliance with these conditions.

Contractor/Consultant's failure to comply with all insurance and bonding requirements set forth in this Appendix B and applicable to the agreement will not relieve Contractor/Consultant from any liability under the agreement. Contractor/Consultant's obligations to comply with all insurance and bonding requirements set forth in Appendix B and applicable to the agreement will not be construed to conflict with or limit Contractor/Consultant's/Consultant's indemnification obligations under the agreement.

3. Insurance Required for Duration of Contract

All insurance and bonds required by this Appendix B must be maintained during the entire term of the agreement, including any renewal or extension terms, and until all work has been completed to the satisfaction of City.

4. Notices of Cancellation & Renewal

Contractor/Consultant must, notify the City of Atlanta in writing at the address listed below by mail, hand-delivery or facsimile transmission, within 2 days of any notices received from any insurance carriers providing insurance coverage under this Agreement and Appendix B that concern the proposed cancellation, or termination of coverage.

Enterprise Risk Management
68 Mitchell St. Suite 9100
Atlanta, GA 30303
Facsimile No. (404) 658-7450

Confirmation of any mailed notices must be evidenced by return receipts of registered or certified mail.

Contractor/Consultant shall provide the City with evidence of required insurance prior to the commencement of this agreement, and, thereafter, with a certificate evidencing renewals or changes to required policies of insurance at least fifteen (15) days prior to the expiration of previously provided certificates.

5. Agent Acting as Authorized Representative

Each and every agent acting as Authorized Representative on behalf of a company affording coverage under this contract shall warrant when signing the Accord Certificate of Insurance that specific authorization has been granted by the Companies for the Agent to bind coverage as required and to execute the Accord Certificates of Insurance as evidence of such coverage. City of Atlanta coverage requirements may be broader than the original policies; these requirements have been conveyed to the Companies for these terms and conditions.

In addition, each and every agent shall warrant when signing the Accord Certificate of Insurance that the Agent is licensed to do business in the State of Georgia and that the Company or Companies are currently in good standing in the State of Georgia.

6. Certificate Holder

The **City of Atlanta** must be named as certificate holder. All notices must be mailed to the attention of **Enterprise Risk Management** at **68 Mitchell Street, Suite, 9100, Atlanta, Georgia 30303**.

7. Project Number & Name

The project number and name must be referenced in the description section of the insurance certificate.

8. Additional Insured Endorsements Form CG 20 26 07 04 or equivalent

The City must be covered as Additional Insured under all insurance (except worker's compensation and professional liability) required by this Appendix B and such insurance must be primary with respect to the Additional Insured. **Contractor/Consultant must submit to City an Additional Insured Endorsement evidencing City's rights as an Additional Insured for each policy of insurance under which it is required to be an additional insured pursuant to this Appendix B. Endorsement must not exclude the Additional Insured from Products - Completed Operations coverage. The City shall not have liability for any premiums charged for such coverage.**

9. Mandatory Sub-Contractor/Consultant Compliance

Contractor/Consultant must require and ensure that all subContractor/Consultants/subconsultants at all tiers to be sufficiently insured/bonded based on the scope of work performed under this agreement.

10. Self Insured Retentions, Deductibles or Similar Obligations

Any self insured retention, deductible or similar obligation will be the sole responsibility of the contractor.

A. Workers' Compensation and Employer's Liability Insurance

Contractor/Consultant must procure and maintain Workers' Compensation and Employer's Liability Insurance in the following limits to cover each employee who is or may be engaged in work under the agreement. :

Workers' Compensation. **Statutory**

Employer's Liability:

Bodily Injury by Accident/Disease **\$1,000,000 each accident**
Bodily Injury by Accident/Disease **\$1,000,000 each employee**
Bodily Injury by Accident/Disease **\$1,000,000 policy limit**

B. Commercial General Liability Insurance

Contractor/Consultant must procure and maintain Commercial General Liability Insurance on form (CG 00 00 01 or equivalent) in an amount not less than **\$1,000,000 per occurrence subject to a \$2,000,000 aggregate**. The following indicated extensions of coverage must be provided:

- ☒ Contractual Liability
- ☒ Broad Form Property Damage
- ☒ Premises Operations
- ☒ Personal Injury
- ☒ Advertising Injury
- ☒ Medical Expense
- ☒ Independent Contractor/Consultants/SubContractor/Consultants
- ☒ Products – Completed Operations
- ☒ Additional Insured Endorsement* (primary& non-contributing in favor of the City of Atlanta)
- ☒ Waiver of Subrogation in favor of the City of Atlanta

C. Commercial Automobile Liability Insurance

Contractor/Consultant must procure and maintain Automobile Liability Insurance in an amount not less than **\$1,000,000** Bodily Injury and Property Damage combined single limit. The following indicated extensions of coverage must be provided:

- ☒ Owned, Non-owned & Hired Vehicles
- ☒ Waiver of Subrogation in favor of the City of Atlanta

If Contractor/Consultant does not own any automobiles in the corporate name, non-owned vehicle coverage will apply and must be endorsed on either Contractor/Consultant's personal automobile policy or the Commercial General Liability coverage required under this Appendix B.

D. Excess or Umbrella Liability Insurance

Contractor/Consultant shall procure and maintain a policy providing Excess or Umbrella Liability Insurance which is at least as broad as the underlying policy. This insurance, which shall be maintained throughout the life of the contract, shall be in an amount of not less than **\$2,000,000 per occurrence**.

- ☒ May be used to achieve minimum liability limits
- ☒ Coverage must be as broad as primary policy

E. Builders Risk / Installation Floater

Contractor/Consultant shall procure and maintain policy for Builders Risk/ Installation Floater with all risk coverage to cover damage or destruction to renovations, repairs or equipment being installed or otherwise being handled or stored by the Contractor, including off-site storage, transit and installation. The coverage must be in an amount equal to **100 percent of the value of the contract**. The following indicated extensions of coverage must be provided:

- ☒ All Risk Coverage
- ☒ Operational Testing Coverage included
- ☒ Loss Payee Endorsement

F. Pollution Liability

Contractor/Consultant must procure and maintain Pollution Liability Insurance in an amount not less than **\$1,000,000** each occurrence/aggregate. Completed operations coverage shall remain in effect for no less than three (3) years after final completion. This coverage can also be satisfied with an endorsement to the General Liability policy.

G. Performance Bond and Payment Bond

Contractor/Consultant shall furnish a Payment Bond and a Performance Bond to the City in an amount equal to **100 percent of the total contract value** and for the duration of the entire term.

The person executing the Bonds on behalf of the surety shall file with the Bonds a general power of attorney unlimited as to amount and type of bonds covered by such power of attorney, and certified by an official of said surety. **Surety Must Be a U.S. Treasury Circular 570 listed company.**

REQUIRED SUBMITTALS

- City of Atlanta Illegal Immigration Reform and Enforcement Act Forms (IIREA)
- Conflict of Interest Disclosure Form
- Certifications of Insurance and Bonding Ability
- Acknowledgement of Addenda
- Georgia Utility Contractor's License Certification
- Bid Form - Howell Mill Outfall Sewer Improvements

City of Atlanta
ILLEGAL IMMIGRATION REFORM AND
ENFORCEMENT ACT FORMS
(IIREA)

Illegal Immigration Reform and Enforcement Act Forms

INSTRUCTIONS TO PROPONENTS:

All Proponents/Bidders must comply with the Illegal Immigration Reform and Enforcement Act, O.G.G.A § 13-10-90, et seq. (IIREA). IIREA was formerly known as the Georgia Security and Immigration Compliance Act or GSICA. Proponents must familiarize themselves with IIREA and are solely responsible for ensuring compliance. Proponents/Bidders must not rely on these instructions for that purpose. They are offered only as a convenience to assist Proponents/Bidders in complying with the requirements of the City's procurement process and the terms of this RFP.

1. The attached Contractor Affidavit (Form 9) must be filled out COMPLETELY and submitted with the proposal/bid prior to proposal due date.
2. The Contractor Affidavit must contain an active Federal Work Authorization Program (E-Verify) User ID Number and Date of Registration.
3. Where the business structure of a Proponent/Bidder is such that Proponent/Bidder is required to obtain an Employer Identification Number (EIN) from the Internal Revenue Service, Proponent/Bidder must complete the Contractor Affidavit on behalf of and provide a Federal Work Authorization User ID Number issued to, the Proponent itself. Where the business structure of a Proponent/Bidder does not require it to obtain an EIN, each entity comprising Proponent/Bidder must submit a separate Contractor Affidavit.

Example 1. ABC, Inc. and XYZ, Inc. form and submit a proposal/bid as Acme Construction, LLC. Acme Construction, LLC must enroll in the E-verify program and submit a single Contractor Affidavit in the name of Acme Construction, LLC which includes the Federal Work Authorization User ID Number issued to Acme Construction, LLC.

Example 2. ABC, Inc. and XYZ, Inc. execute a joint venture agreement and submit a proposal/bid under the name Acme Construction, JV. If, based on the nature of the JV agreement, Acme Construction, JV is not required to obtain an Employer Identification Number from the IRS. The Proposal/Bid submitted by Acme Construction, JV must include both a Contractor Affidavit for ABC, Inc. and a Contractor Affidavit for XYZ, Inc.

4. All Contractor Affidavits must be executed by an authorized representative of the entity named in the Affidavit.
5. All Contractor Affidavits must be duly notarized.
6. All Contractor Affidavits must be submitted with proposal/bid package.
7. Subcontractor and sub-subcontractor affidavits are not required at the time of proposal/bid submission but will be required at contract execution or in accordance with the timelines set forth in IIREA.

Contractor Affidavit under O.C.G.A. § 13-10-91(b)(1)

By executing this affidavit, the undersigned contractor verifies its compliance with O.C.G.A. § 13-10-91, stating affirmatively that the individual, firm or corporation which is engaged in the physical performance of services on behalf of the City of Atlanta has registered with, is authorized to use and uses the federal work authorization program commonly known as E-Verify, or any subsequent replacement program, in accordance with the applicable provisions and deadlines established in O.C.G.A. § 13-10-91. Furthermore, the undersigned contractor will continue to use the federal work authorization program throughout the contract period and the undersigned contractor will contract for physical performance of services in satisfaction of such contract only with subcontractors who present an affidavit to the contractor with the information required by O.C.G.A. § 13-10-91(b). Contractor hereby attests that its federal work authorization user identification number and date of authorization are as follows:

Federal Work Authorization User Identification Number

Date of Authorization

Name of Contractor: _____

Name of Project: **Howell Mill Road Outfall Sewer Repair Project**

Name of Public Employer: City of Atlanta

I hereby declare under penalty of perjury that the forgoing is true and correct.

Executed on _____, ____, 20__ in _____ (city), _____ (state)

Signature of Authorized Officer or Agent

Printed name and Title of Authorized Officer or Agent

SUBSCRIBED AND SWORN BEFORE
ME ON THIS THE ____, DAY OF _____, 201____

NOTARY PUBLIC

My Commission Expires: _____

Subcontractor Affidavit under O.C.G.A. § 13-10-91(b)(3)

By executing this affidavit, the undersigned subcontractor verifies its compliance with O.C.G.A. § 13-10-91, stating affirmatively that the individual, firm or corporation which is engaged in the physical performance of services under a contract with (_____) (name of contractor)) on behalf of the City of Atlanta has registered with, is authorized to use and uses the federal work authorization program commonly known as E-Verify, or any subsequent replacement program, in accordance with the applicable provisions and deadlines established in O.C.G.A. § 13-10-91. Furthermore, the undersigned subcontractor will continue to use the federal work authorization program throughout the contract period and the undersigned subcontractor will contract for the physical performance of services in satisfaction of such contract only with sub-subcontractors who present an affidavit to the subcontractor with the information required by O.C.G.A. § 13-10-91(b). Additionally, the undersigned subcontractor will forward notice of the receipt of an affidavit from a sub-subcontractor to the contractor within five business days of receipt. If the undersigned subcontractor receives notice of receipt of an affidavit from any sub-subcontractor that has contracted with a sub-subcontractor to forward, within five business days of receipt, a copy of such notice to the contractor. Subcontractor hereby attests that its federal work authorization user identification number and date of authorization are as follows:

Federal Work Authorization User Identification Number

Date of Authorization

Name of Subcontractor: _____

Name of Project: **Howell Mill Road Outfall Outfall Sewer Repair Project**

Name of Public Employer: City of Atlanta

I hereby declare under penalty of perjury that the forgoing is true and correct.

Executed on _____, _____, 20__ in _____ (city), _____ (state)

Signature of Authorized Officer or Agent

Printed name and Title of Authorized Officer or Agent

SUBSCRIBED AND SWORN BEFORE
ME ON THIS THE ___, DAY OF _____, 201____

NOTARY PUBLIC

My Commission Expires: _____

Sub-subcontractor Affidavit under O.C.G.A. § 13-10-91(b)(4)

By executing this affidavit, the undersigned sub-subcontractor verifies its compliance with O.C.G.A. §13-10-91, stating affirmatively that the individual, firm or corporation which is engaged in the physical performance of services under a contract for (_____) (name of subcontractor or sub-subcontractor with whom such sub-subcontractor has privity of contract)) and (_____) (name of contractor)) on behalf of the City of Atlanta has registered with, is authorized to use and uses the federal work authorization program commonly known as E-Verify, or any subsequent replacement program, in accordance with the applicable provisions and deadlines established in O.C.G.A. §13-10-91. Furthermore, the undersigned sub-subcontractor will continue to use the federal work authorization program throughout the contract period and the undersigned sub-subcontractor will contract for the physical performance of services in satisfaction of such contract only with sub-subcontractors who present an affidavit to the sub-subcontractor with the information required by O.C.G.A. §13-10-91(b). The undersigned sub-subcontractor shall submit, at the time of such contract, this affidavit to (_____) (name of subcontractor or sub-subcontractor with whom such sub-subcontractor has privity of contract)). Additionally, the undersigned sub-subcontractor will forward notice of the receipt of any affidavit from a sub-subcontractor to (_____) (name of subcontractor or sub-subcontractor with whom such sub-subcontractor has privity of contract)). Sub-subcontractor hereby attests that its federal work authorization user identification number and date of authorization are as follows:

Federal Work Authorization User Identification Number

Date of Authorization

Name of Contractor: _____

Name of Project: **Howell Mill Road Outfall Sewer Repair Project**

Name of Public Employer: City of Atlanta

I hereby declare under penalty of perjury that the forgoing is true and correct.

Executed on _____, ____, 20__ in _____ (city), _____ (state)

Signature of Authorized Officer or Agent

Printed name and Title of Authorized Officer or Agent

SUBSCRIBED AND SWORN BEFORE
ME ON THIS THE ____, DAY OF _____, 201____

NOTARY PUBLIC

**CONFLICT OF INTEREST
DISCLOSURE FORM**

CONFLICT OF INTEREST DISCLOSURE FORM

Pursuant to City of Atlanta Code of Ordinances Section 2-1214 (Management of Conflicts in Source Selection), offerors shall disclose all organizational and personal relationships which may give rise to a conflict of interest if the offeror is awarded a contract. In addition, the Chief Procurement Officer ("CPO") may specify other types of relationships or interests which must be disclosed if, in the CPO's sole discretion, such disclosure is in the best interest of the City of Atlanta. Such personal, financial, or other relationship can render an offeror ineligible for award if the CPO determines that a conflict of interest cannot be mitigated or avoided. Before determining to withhold award of a contract based on conflict of interest considerations, the CPO shall provide notice to the offeror and reasonable opportunity for the offeror to respond.

Offerors must disclose the existence of personal or financial relationships involving City of Atlanta employees, officers or elected officials, as defined in the paragraphs below. To the extent that the CPO uses discretionary authority in the best interest of the city to require additional disclosures, these will be specified in the appropriately designated space below.

- (a) **"Personal relationships"** shall include executives, board members and partners in firms who have familial relationships with employees, officers and elected officials of the City of Atlanta. "Familial relationships" shall include the spouse, domestic partner registered under section 94-133, mother, father, sister, brother, and natural or adopted children of an official or employee.
- (b) **"Financial relationships"** shall include any interest held with a City of Atlanta employee, officer or elected official, or family members of a City of Atlanta employee, officer or elected official, which may yield, directly or indirectly, a monetary or other material benefit to the offeror or the offeror's family members.

Name of Offeror:			
Name of Executive, Board Member or Partner	City of Atlanta Employee, Officer or Elected Official	State Whether "Personal" or "Financial" Relationship	Specify Nature or Circumstance of Personal or Financial Relationship (Ex: Sister, Board Member)

Indicate **"Not Applicable"** or **"N/A"** if no disclosures to report, then sign. Additional lines or pages may be added, if necessary.

Additional Disclosures Required by Chief Procurement Officer			

CITY OF ATLANTA
DEPARTMENT OF PROCUREMENT

The undersigned individual certifies that the information provided herein is true and correct, that he or she holds the title entered below, and that he or she has the authority to complete this Conflict of Interest Form on behalf of the organization.

Completed this _____ day of _____, 20__ in response to **Solicitation**
Name/Number _____ by:

Printed Name: _____

Signature: _____

Title: _____

FOR INTERNAL USE ONLY

This Conflict of Interest Disclosure Form has been reviewed in the Department of Procurement and, to the extent that the Offeror has disclosed any Personal or Financial relationships that constitute a conflict of interest, the Offeror has provided an acceptable plan to avoid or mitigate the conflict; therefore, award of the above referenced contract is appropriate under Code Section 2-1214.

(PRINT NAME) Procurement Professional

(PRINT) Title

Signature of Procurement Professional

(PRINT NAME) Chief Procurement Officer

Signature of Chief Procurement Officer

(Date)

Required Submittal

Certification of Insurance Ability Instructions:

Offerors **MUST** submit a **completed copy of this form executed by their insurance company**. Failure to submit completed form will result in the Offeror being deemed non-responsive.

I, _____ [insert an individual's name], on behalf of _____ [insert insurance company full name], a _____ [insert type of entity LLC, LLP, corporation, etc.](**"Insurer"**), hereby represent and certify each of the following to the City of Atlanta, a municipal corporation of the State of Georgia (**"City"**) on this _____ day of _____, 20 ____ [insert date]:

- (a) Insurer is licensed by the Insurance and Safety Fire Commissioner of the State of Georgia to transact insurance business in the State of Georgia;
- (b) Insurer has reviewed the Agreement attached to the solicitation for **Howell Mill Outfall Sewer Repair Project ("Project")** and its corresponding **Appendix for Insurance Requirements**;
- (c) Insurer certifies that if, as of the date written above, (**"Offeror"**) was selected as the successful Offeror for the Project, Insurer would provide insurance to Offeror for this Project in accordance with the terms set forth in the corresponding **Appendix for Insurance Requirements**; and

PLEASE NOTE: If this Form is executed by an Attorney-in-Fact, then Insurer must attach a copy of a duly executed Power-of-Attorney evidencing such authority in addition to correctly completing this Form. If Offeror is unable to provide City with insurance that comply with the terms of the corresponding Appendix for Insurance Requirements within ten (10) days of receiving notice of intent to award the Project from the City, the City may, in its sole discretion, retain Offeror's security submitted with its offer and/or disqualify Offeror from further consideration for the award of the Agreement.

By executing this certification, Insurer represents that all of the information provided by Insurer herein is true and correct as of the date set forth above.

Insurer: [insert company name on line provided below]

By: _____

Print Name: _____

Title: _____

Corporate Secretary/Assistant Secretary
(Seal)

Required Submittal

Certification of Bonding Ability Instructions:

Offerors **MUST** submit a **completed copy of this form executed by their surety**. Failure to submit completed form from will result in the Offeror being deemed non-responsive.

I, _____ [insert an individual's name], on behalf of _____ [insert surety company full name], a _____ [insert type of entity LLC, LLP, corporation, etc.] ("**Surety**"), hereby represent and certify each of the following to the City of Atlanta, a municipal corporation of the State of Georgia ("**City**") on this _____ day of _____, 20____ [insert date]:

- (a) Surety is licensed by the Insurance and Safety Fire Commissioner of the State of Georgia to transact surety business in the State of Georgia;
- (b) Surety has reviewed the Agreement attached to the solicitation for **Howell Mill Outfall Sewer Repair Project** ("Project") and its corresponding **Appendix for Insurance Requirements**;
- (c) Surety certifies that if, as of the date written above, _____ ("**Offeror**") was selected as the successful Offeror for the Project, Surety would provide bonding to Offeror for this Project in accordance with the corresponding **Appendix for Insurance Requirements**; and
- (d) **Surety only**: The Surety states that Offeror's uncommitted bonding capacity (not taking into account this Project) is approximately \$ _____ (U.S.). Surety's statement set forth in this Section (d) does not represent a limitation of the bonding capacity of Offeror or that Offeror will have the bonding capacity noted above at the time of contract execution for this Project.

PLEASE NOTE: If this Form is executed by an Attorney-in-Fact, then Surety must attach a copy of a duly executed Power-of-Attorney evidencing such authority in addition to correctly completing this Form. If Offeror is unable to provide City with bonds that comply with the terms of the corresponding Appendix for Insurance Requirements within ten (10) days of receiving notice of intent to award the Project from the City, the City may, in its sole discretion, retain Offeror's security submitted with its offer and/or disqualify Offeror from further consideration for the award of the Agreement.

By executing this certification, Surety represents that all of the information provided by Surety herein is true and correct as of the date set forth above.

Surety: [insert company name on line provided below]

By: _____

Print Name: _____

Title: _____

Corporate Secretary/Assistant Secretary
(Seal)

Required Submittal

Acknowledgment of Addenda

Bidders should sign below and **email** this form with their Bid(s) to:

Roxanne Neal	RONEal@AtlantaGA.gov
Cynthia Lunn	CLunn@AtlantaGA.gov
Mikita Browning	MBrowning@AtlantaGA.gov
Damian Edwards	DEEdwards@AtlantaGA.gov

as acknowledgment of receipt of certain Addenda.

This is to acknowledge receipt of the following **Addenda** for **Howell Mill Outfall Sewer Repair Project**:

1. _____;
2. _____;
3. _____; and
4. _____.

Dated the _____ Day of _____, 20 _____

Corporate Bidder:
[Insert Corporate Name]

By: _____

Print Name: _____

Title: _____

Non-Corporate Bidder:
[Insert Bidder Name]

By: _____

Print Name: _____

Title: _____

Corporate Secretary/Assistant
Secretary (Seal)

Notary Public (Seal)
My Commission Expires: _____