

**S219 – Brookfield Country Club Sewer Lining**

**SECTION NO. 00901**

**TECHNICAL SPECIFICATIONS**

**MANHOLE REPAIR / REHABILITATION**

**PART 1 GENERAL**

**REHABILITATION OF EXISTING MANHOLES**

1.01 Description

- A. Technical Specifications for the rehabilitation of manholes by inserting or placing a lining into a manhole. Additionally, the Technical Specifications cover the work items that support the performance of manhole repair and rehabilitation field work in general, as well as the ancillary technical work items that allow for the complete rehabilitation of a manhole.

1.02 Definitions

- A. The term “Engineer”, “Design/Builder”, and “Contractor” in this Section 00901 is defined as Contractor.
- B. The Work covered by this Section includes furnishing all labor, equipment, and materials required to install manhole liners as well as the denoted supporting and ancillary items of work that effect an overall manhole rehabilitation program.

1.03 Substitutions

- A. It is the intent that these specifications be non-preferential and not restrict installation methodology or materials to a single vendor or sole source. Recognized cured-in-place-pipe liner systems include but are not limited to:
  - 1. Cured-in-Place Epoxy Resin Liner as manufactured Poly-TriPlex Liner System by SunCoast Environmental International, Inc.
  - 2. SewperCoat Calcium aluminate cementitious liner as manufactured by LaFarge Aluminates.
  - 3. Equal products pre-approved by the Fulton County Department of Public Works - Water Services Division.
- B. Request for approval of products not previously approved by Fulton County Department of Public Works - Water Services Division shall reach Fulton County Purchasing no later than thirty (45) days prior to the bid date. Proposers of equal products will be advised of approval or rejection in writing no later than fourteen (14) days prior to the bid date. Rejected submittals may be supplemented with additional information and resubmitted no later than seven (7) days prior to the bid date. Proposers making supplementary submittals will be advised of approval or rejection in writing no later than three (3) days prior to the bid date. No exceptions will be allowed for approval of new products.
- C. Approval of any substitution will be made under the following provisions:
  - i. If the term “PRE-APPROVED” follows the names of approved manufacturers, the other manufacturers desiring approval may submit the product to the engineer for pre-approval during the bidding phase. The manufacturer should include the following items in this pre-submittal:

1. Descriptive literature, including information on materials used minimum design standards features, manufacturing processes and facilities, and similar information, which will indicate experience and expertise in the manufacture of the product being evaluated;
2. Performance specifications applicable to the manufacturer's standard design, which indicates the level of performance to be expected from the product;
3. A complete set of submittal drawings of similar equipment that has been completed and placed into operation;
4. A list of existing installations of equipment similar in type and size;
5. Evidence of technical ability of the manufacturer to design and manufacture equipment and systems meeting project requirements. Evidence submitted shall include, as a minimum, descriptions of engineering and manufacturing staff capabilities;
6. Information required the satisfy specified experience requirements or a copy of the bond to be submitted in lieu of experience;
7. A complete list of all requirements of the drawings and specifications with which the manufacturer cannot conform, including reasons why alternate features are considered equivalent; and
8. All other information necessary to fully evaluate the product for consideration

This pre-submittal shall reach the engineer no later than four weeks prior to the bid date. Manufacturers will be advised of approval or rejection in writing no later than fourteen days prior to the bid date. Rejected submittals may be supplemented with additional information and resubmitted no later than one week prior to the bid date. Manufacturers making supplementary submittals will be advised of approval or rejection in writing no later than three days prior to the bid date.

#### D. Checklist for Product Pre-Approval

The following checklist is shall be used as a guideline for the information that is to be submitted for product pre-approval consideration:

**Checklist for Product Pre-Approval**

The following checklist is shall be used as a guideline for the information that is to be submitted for product pre-approval consideration:

1. Product Identification:
  - Product Name
  - Manufacturer Name
2. Method of Application:
  - Cured in Place
  - Spray On
  - Encapsulation
  - Trowel
  - Paste
  - Paint
3. Primary Material:
  - Cement (Portland)
  - Cement (Calcium Aluminate)
  - Mortar
  - Epoxy
  - PVC
  - Fiberglass
  - Rubber
  - Silicone
  - Coal Tar
  - Polyester
4. Pre-conditioning:
  - Be able to apply liner without the need to repair all surface defects and stop all leaks
  - Acceptable to allow basic pre-conditioning to repair surface defects and repair all leaks
5. Application and Curing Time:
  - The length of time it will take to apply the liner and have it cured in order to minimize the time that it may be necessary to institute measures to restrict flow through the manhole such as by-pass pumping.
6. Chemical Resistance:
  - Verifiable evidence in the form of independent testing confirming that the lining system is capable of resisting attack from hydrogen sulfide in the long term.
7. Structural Integrity:
  - Compressive Strength
  - Flexural Strength
  - Tensile Strength
  - Bond Strength
8. Manufacturer Warranty:
  - Indication of the confidence that the manufacturer places in the product.
9. Experience:
  - Indication of the number of applications and references from customers.
  - List of locations and customers where this product has been used.

**PART 2 – PROJECT SUPPORT ITEMS (NOT USED)**

**PART 3 – MANHOLE REHABILITATION**

3.01 Manhole Height Adjustment

A. Products

1. Brick

- a. Brick shall conform to ASTM C-32 for grade SM. Bricks shall conform to the following dimensions, unless otherwise approved by the Construction Manager:

	Depth (inches)	Width (inches)	Length (inches)
Standard Size	2-1/4	3-3/4	8
Allowable Variation	±1/4	±1/4	±1/2

- b. All Brick shall be new and whole, or uniform standard size and with substantially straight and parallel edges and square corners. Bricks shall be of compact textures, burned hard entirely through, tough and strong, free from injurious cracks and flaws, and shall have a clear ring when struck together. No soft or salmon brick shall be used except at such places, to such extent, and under such conditions as may be approved by the Construction Manager.

2. Mortar

- a. The Contractor shall use mortar meeting the requirements of ASTM C-270 Type S unless directed otherwise by the Construction Manager.
- b. The Contractor shall prepare mortar only in quantities needed for immediate use. Mortar which has been mixed for more than 30 minutes, which has set, or which has been retempered shall not be used.

B. Execution

1. Procedures for Manhole Height Adjustment

- a. The Contractor shall utilize maps, surveys, sounding instruments, or information from local residents to determine approximate location of buried manholes. Manholes shall be exposed utilizing hand techniques or by carefully probing with mechanical equipment. Manhole exposure in paved areas shall be accomplished by making a square cut in the surface with sufficient width to allow for the excavation of the material around the manhole to expose it to a depth necessary to facilitate adjustments.
- b. The Contractor shall adjust the top elevation of the manhole frame to grade where indicated on the Plans or directed by the Construction Manager using brick and mortar conforming to the requirements of this section. A maximum adjustment of 16 inches will be allowed using brick and mortar. Mortar shall be applied to create a smooth finish on the interior and exterior prior to backfill. Adjustments greater than 16 inches must be made by removing the cone section and adding the appropriate precast riser section.

3.02 Manhole Interior Rehabilitation

A. Products

The following tables and Standard Operating Procedures provide performance criteria for manhole rehabilitation products:

**TABLE 3.1: FULTON COUNTY - WATER SERVICES  
MANHOLE REHABILITATION CRITERIA  
UP TO 8 FEET DEEP**

<b>MANHOLES SUSCEPTIBLE TO LARGE AMOUNTS OF H<sub>2</sub>S (Drop manholes &amp; manholes with force main discharge connection)</b>	<b>MANHOLES IN FLOOD PLAINS SUSCEPTIBLE TO INFILTRATION</b>	<b>MANHOLES IN DANGER OF STRUCTURAL COLLAPSE</b>
<p><b>METHOD OF APPLICATION</b> Cured in Place, Spray on</p> <p><b>PRIMARY MATERIALS</b> Epoxy, PVC, Fiberglass/Resin, 100% Calcium Aluminate Based Cement</p> <p><b>PRECONDITIONING</b> Acceptable to allow basic preconditioning to repair surface defects and stop all leaks</p> <p><b>APPLICATION TIME</b> 8 hours or less</p> <p><b>CURING TIME</b> 4 hours or less</p> <p><b>CHEMICAL RESISTANCE</b> (Redner Test, County Sanitation Districts of Los Angeles) Less than or equal to 5 Biogenic Sulfuric Acid Corrosiion Test, Sand, University of Hamburg Weight loss &lt;= 2%</p> <p><b>STRUCTURAL PARAMETERS</b> Compressive Strength (psi) - 4,500 Flexural Strength (psi) - 1,500 Tensile Strength (psi) - 1,500 Bond Strength (psi) - 1,500</p> <p><b>WARRANTY</b> 10 years</p> <p><b>EXPERIENCE</b> 5,000 manholes or more</p>	<p><b>METHOD OF APPLICATION</b> Cured in Place, Spray on</p> <p><b>PRIMARY MATERIALS</b> PVC, Fiberglass/Resin, 100% Calcium Aluminate Based Cement</p> <p><b>PRECONDITIONING</b> Acceptable to require basic preconditioning to repair surface defects and stop all leaks</p> <p><b>APPLICATION TIME</b> 8 hours or less</p> <p><b>CURING TIME</b> 4 hours or less</p> <p><b>CHEMICAL RESISTANCE</b> (Redner Test, County Sanitation Districts of Los Angeles) Less than or equal to 6 Biogenic Sulfuric Acid Corrosiion Test, Sand, University of Hamburg Weight loss &lt;= 2%</p> <p><b>STRUCTURAL PARAMETERS</b> Compressive Strength (psi) - 4,500 Flexural Strength (psi) - 2,500 Tensile Strength (psi) - 1,500 Bond Strength (psi) - 1,500</p> <p><b>WARRANTY</b> 10 years</p> <p><b>EXPERIENCE</b> 10,000 manholes or more</p>	<p><b>METHOD OF APPLICATION</b> Cured in Place</p> <p><b>PRIMARY MATERIALS</b> Fiberglass/Resin</p> <p><b>PRECONDITIONING</b> Be able to apply liner without the need to repair all surface defects and stop all leaks</p> <p><b>APPLICATION TIME</b> 8 hours or less</p> <p><b>CURING TIME</b> 4 hours or less</p> <p><b>CHEMICAL RESISTANCE</b> (Redner Test, County Sanitation Districts of Los Angeles) Less than or equal to 6 Biogenic Sulfuric Acid Corrosiion Test, Sand, University of Hamburg Weight loss &lt;= 2%</p> <p><b>STRUCTURAL PARAMETERS</b> Compressive Strength (psi) - 7,000 Flexural Strength (psi) - 5,000 Tensile Strength (psi) - 2,500 Bond Strength (psi) - 1,500</p> <p><b>WARRANTY</b> 10 years</p> <p><b>EXPERIENCE</b> 10,000 manholes or more</p>

**TABLE 3.2: FULTON COUNTY - WATER SERVICES  
MANHOLE REHABILITATION CRITERIA  
GREATER THAN 8 FEET DEEP AND LESS THAN 20 FEET**

<b>MANHOLES SUSCEPTIBLE TO LARGE AMOUNTS OF H2S (Drop manholes &amp; manholes with force main discharge connection)</b>	<b>MANHOLES IN FLOOD PLAINS SUSCEPTIBLE TO INFILTRATION</b>	<b>MANHOLES IN DANGER OF STRUCTURAL COLLAPSE</b>
<b>METHOD OF APPLICATION</b> Cured in Place, Spray on	<b>METHOD OF APPLICATION</b> Cured in Place	<b>METHOD OF APPLICATION</b> Cured in Place
<b>PRIMARY MATERIALS</b> Epoxy, PVC, Fiberglass/Resin, 100% Calcium Aluminate Based Cement	<b>PRIMARY MATERIALS</b> Fiberglass/Resin	<b>PRIMARY MATERIALS</b> Fiberglass/Resin
<b>PRECONDITIONING</b> Acceptable to allow basic preconditioning to repair surface defects and stop all leaks	<b>PRECONDITIONING</b> Be able to apply liner without the need to repair all surface defects and stop all leaks	<b>PRECONDITIONING</b> Be able to apply liner without the need to repair all surface defects and stop all leaks
<b>APPLICATION TIME</b> 8 hours or less	<b>APPLICATION TIME</b> 8 hours or less	<b>APPLICATION TIME</b> 8 hours or less
<b>CURING TIME</b> 4 hours or less	<b>CURING TIME</b> 4 hours or less	<b>CURING TIME</b> 4 hours or less
<b>CHEMICAL RESISTANCE</b> (Redner Test, County Sanitation Districts of Los Angeles) Less than or equal to 5 Biogenic Sulfuric Acid Corrosiion Test, Sand, University of Hamburg Weight loss <= 2%	<b>CHEMICAL RESISTANCE</b> (Redner Test, County Sanitation Districts of Los Angeles) Less than or equal to 5 Biogenic Sulfuric Acid Corrosiion Test, Sand, University of Hamburg Weight loss <= 2%	<b>CHEMICAL RESISTANCE</b> (Redner Test, County Sanitation Districts of Los Angeles) Less than or equal to 5 Biogenic Sulfuric Acid Corrosiion Test, Sand, University of Hamburg Weight loss <= 2%
<b>STRUCTURAL PARAMETERS</b> Compressive Strength (psi) - 4,500 Flexural Strength (psi) - 1,500 Tensile Strength (psi) - 1,500 Bond Strength (psi) - 1,500	<b>STRUCTURAL PARAMETERS</b> Compressive Strength (psi) - 7,000 Flexural Strength (psi) - 7,500 Tensile Strength (psi) - 5,000 Bond Strength (psi) - 1,500	<b>STRUCTURAL PARAMETERS</b> Compressive Strength (psi) - 8,500 Flexural Strength (psi) - 10,000 Tensile Strength (psi) - 7,500 Bond Strength (psi) - 1,500
<b>WARRANTY</b> 10 years	<b>WARRANTY</b> 10 years	<b>WARRANTY</b> 10 years
<b>EXPERIENCE</b> 5,000 manholes or more	<b>EXPERIENCE</b> 10,000 manholes or more	<b>EXPERIENCE</b> 10,000 manholes or more

**TABLE 3.3: FULTON COUNTY - WATER SERVICES  
MANHOLE REHABILITATION CRITERIA  
GREATER THAN OR EQUAL TO 20 FEET DEEP**

<b>MANHOLES SUSCEPTIBLE TO LARGE AMOUNTS OF H<sub>2</sub>S (Drop manholes &amp; manholes with force main discharge connection)</b>	<b>MANHOLES IN FLOOD PLAINS SUSCEPTIBLE TO INFILTRATION</b>	<b>MANHOLES IN DANGER OF STRUCTURAL COLLAPSE</b>
<p><b>METHOD OF APPLICATION</b> Cured in Place, Spray on</p> <p><b>PRIMARY MATERIALS</b> Epoxy, PVC, Fiberglass/Resin, 100% Calcium Aluminate Based Cement</p> <p><b>PRECONDITIONING</b> Acceptable to allow basic preconditioning to repair surface defects and stop all leaks</p> <p><b>APPLICATION TIME</b> 8 hours or less</p> <p><b>CURING TIME</b> 4 hours or less</p> <p><b>CHEMICAL RESISTANCE</b> (Redner Test, County Sanitation Districts of Los Angeles) Less than or equal to 5 Biogenic Sulfuric Acid Corrosion Test, Sand, University of Hamburg Weight loss &lt;= 2%</p> <p><b>STRUCTURAL PARAMETERS</b> Compressive Strength (psi) - 4,500 Flexural Strength (psi) - 1,500 Tensile Strength (psi) - 1,500 Bond Strength (psi) - 1,500</p> <p><b>WARRANTY</b> 10 years <b>EXPERIENCE</b> 5,000 manholes or more</p>	<p><b>METHOD OF APPLICATION</b> Cured in Place</p> <p><b>PRIMARY MATERIALS</b> Fiberglass/Resin</p> <p><b>PRECONDITIONING</b> Be able to apply liner without the need to repair all surface defects and stop all leaks</p> <p><b>APPLICATION TIME</b> 8 hours or less</p> <p><b>CURING TIME</b> 4 hours or less</p> <p><b>CHEMICAL RESISTANCE</b> (Redner Test, County Sanitation Districts of Los Angeles) Less than or equal to 5 Biogenic Sulfuric Acid Corrosion Test, Sand, University of Hamburg Weight loss &lt;= 2%</p> <p><b>STRUCTURAL PARAMETERS</b> Compressive Strength (psi) - 8,500 Flexural Strength (psi) - 10,000 Tensile Strength (psi) - 7,500 Bond Strength (psi) - 1,500</p> <p><b>WARRANTY</b> 10 years <b>EXPERIENCE</b> 10,000 manholes or more</p>	<p><b>METHOD OF APPLICATION</b> Cured in Place</p> <p><b>PRIMARY MATERIALS</b> Fiberglass/Resin</p> <p><b>PRECONDITIONING</b> Be able to apply liner without the need to repair all surface defects and stop all leaks</p> <p><b>APPLICATION TIME</b> 8 hours or less</p> <p><b>CURING TIME</b> 4 hours or less</p> <p><b>CHEMICAL RESISTANCE</b> (Redner Test, County Sanitation Districts of Los Angeles) Less than or equal to 5 Biogenic Sulfuric Acid Corrosion Test, Sand, University of Hamburg Weight loss &lt;= 2%</p> <p><b>STRUCTURAL PARAMETERS</b> Compressive Strength (psi) - 8,500 Flexural Strength (psi) - 15,000 Tensile Strength (psi) - 10,000 Bond Strength (psi) - 1,500</p> <p><b>WARRANTY</b> 10 years <b>EXPERIENCE</b> 10,000 manholes or more</p>

DEPARTMENT OF PUBLIC WORKS  
WATER SERVICES DIVISION  
SYSTEM MAINTENANCE



<b>SUBJECT: STANDARD OPERATING PROCEDURES</b>	
<b>ADJUST MANHOLE</b>	
<b>Origination Date: July 12, 2004</b>	<b>Number: SMS 015</b> <b>Page 1 Of 3</b>
<b>Approved:</b>	<b>New</b>

Statement of Policy:

It is the policy of the System Maintenance Division to adjust the level of manholes on the sewer system for visibility, facilitate access for maintenance and ensure that there is no adverse effect on traffic.

Applicability:

This policy applies to all Water Services, Waste Water Collection System Maintenance employees.

Responsibility:

It is the responsibility of the Systems Maintenance Deputy Director and/or his designees to ensure adherence of this policy.

Personnel:

The adjustment and repair of manholes require a minimum two person crew which may vary depending on the nature and complexity of the assignment.

Equipment:

Equipment used may include dump trucks, backhoes, excavators, mechanical saws, jack hammers, metal detection devices, mechanical tampers, ventilation systems, gas monitors and other assorted tools; along with all Safety Equipment necessary to comply with OSHA Standards and meet County, Local, State and Federal Regulations.

Materials:

Pre-cast concrete risers, concrete spacers, cones, metal rims and cover, plastic risers, steel risers, cement, crusherrun, #57 stone, non-shrink grout, high early strength cement, water, disinfectants, lime, etc.

Safety Program

The County undertakes to provide all relevant safety training to employees and facilitate certification with respect to competent person for confined space, excavation/trench safety and flagging/traffic

control. Incorporated in these standard operating procedures are the reference material and training manuals received by employees as part of the certification process. Reference materials include:

- (a) Confined Space Entry Competent Person - *HB Training and Consulting*
- (b) Excavation Competent Person - *HB Training and Consulting*
- (c) Manual on Uniform Traffic Control Devices (Chapters 1, 5, 6) – *USDOT*
- (d) Operation and Maintenance of Wastewater Collection Systems, Fifth Edition, Volume I – *US Environmental Protection Agency*
- (e) Operation and Maintenance of Wastewater Collection Systems, Fifth Edition, Volume II – *US Environmental Protection Agency*
- (f) First Aid and CPR, Fourth Edition – *National Safety Council*

All employees are required to use personal protection equipment (safety boots, safety vests, hard hats, eye protection, gloves, polypropylene coveralls, etc.) as is necessary for compliance with the safety program

Procedures:

The following steps shall be utilized to properly adjust manholes:

ADJUST MANHOLE

1. Manhole levels should be flush with final road surface
2. For outfalls, manhole levels should be of the order of 24 inches above ground level unless otherwise directed.
3. Secure site in accordance with safety program at all times.
4. Pay particular attention to the requirements for confined space entry and the use of gas monitors and ventilation systems.
5. Adjusting up to 3 inches
  - 5.1 Remove lid
  - 5.2 Clean all rust and debris from seating areas with wire brush
  - 5.3 Take measurements and determine height of risers to be used.
  - 5.4 Add appropriately sized steel risers to ring up to 3 inches in height
  - 5.5 If using plastic risers, use combinations of 1" or 1½" risers up to 3 inches.
  - 5.6 Replace manhole lid.
6. Adjusting greater than 3 inches and less than 12 inches
  - 6.1 Check for utility locates. If there are any missing utility locates, do not excavate and call Supervisor.
  - 6.2 For any excavation work around utilities, hand digging should be performed until all marked utilities have been exposed and secured. Please refer to Standard Operating Procedure for Utility Protection and Damage Control.
  - 6.3 For pavement cuts, please refer to Standard Operating Procedures for Pavement Cuts

- 6.4 Saw cut square around manhole 60" x 60"
  - 6.5 Excavate all material up to a minimum of 10"
  - 6.6 Remove manhole frame and cover to expose cone.
  - 6.7 Add an appropriate number of pre-cast concrete spacers to cone.
  - 6.8 If brick layers are found, remove brick and replace with concrete spacers.
  - 6.9 Use at least ¾ inch non-shrink grout between spacers.
  - 6.10 Replace manhole frame and seal with at least ¾ inch non-shrink grout.
7. Adjusting for 12 inches and greater.
- 7.1 Determine appropriate method using combination of risers, spacers and rings
  - 7.2 Check for utility locates. If there are any missing utility locates, do not excavate and call Supervisor.
  - 7.3 For any excavation work around utilities, hand digging should be performed until all marked utilities have been exposed and secured. Please refer to Standard Operating Procedure for Utility Protection and Damage Control.
  - 7.4 For pavement cuts, please refer to Standard Operating Procedures for Pavement Cuts
  - 7.5 Saw cut square around manhole 60" x 60"
  - 7.6 Continue excavating using the method of trench stabilization recommended for the specific soil types, depths and general conditions as per reference material provided as part of the competent person certification.
  - 7.7 Remove cover, frame and cone to expose manhole.
  - 7.8 Install an appropriate number of risers and spacers.
  - 7.9 Use tar based joint sealer between risers.
  - 7.10 Use at least ¾ inch non-shrink grout between spacers.
  - 7.11 Seal joints on the inside with non-shrink grout
  - 7.12 Replace manhole frame and seal with at least ¾ inch non-shrink grout
- 7 For roadways, backfill using crusher run or other approved material.
- 8 Compact in 6 inch layers using mechanical tamper up to 10 inches below ground surface
- 9 Coat the vertical wall faces of the pavement with a solution of Portland cement and water mixed to a consistency of heavy paint.
- 10 Fill the 10" open area with Class "A" high early strength Portland cement that has been dyed to match the surrounding pavement.
- 11 Before leaving the job site, the area should be thoroughly cleared of all surplus material, debris and tools.
- 12 Submit completed work order form.

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**B. Requirements**

1. The installer shall warrant and save harmless the Owner and the PM Team against all claims for patent infringement and any loss thereof.
2. The Contractor shall handle and store all materials and shall dispose of all wastes in accordance with applicable regulations.
3. Each lining system shall be designed for application over wet (but not active running water) surfaces without degradation of the final product and the bond between the product and the manhole surfaces.
4. All Work shall be performed in strict observance of OSHA regulation, especially those related to confined space entry.
5. The contractor shall notify the Water Department and obtain approval and water meter, if required, before using fire hydrants.

**C. Equipment**

- a. The required equipment shall consist of chemical pumps, chemical grout containers, injection packers, hoses, valves, and any other miscellaneous equipment required to seal the manhole. The chemical injection pumps shall be equipped with pressure meters to provide for monitoring pressure during the chemical sealant injection process. If necessary, fluid by-pass lines equipped with pressure regulated by-pass valves will be incorporated into the system.

**D. Materials for Patching, Repainting, Filling, and Repairing non-leaking holes, cracks, and spills in concrete and masonry manholes.**

- a. The Contractor shall use a premixed non-shrink cement-based patching material consisting of hydraulic cement, graded silica aggregates, special plasticizing and accelerating agents, which has been formulated for vertical or overhead use. It shall not contain chlorides, gypsum, plasters, iron particles, aluminum powder, or gas-forming agents or promote the corrosion of steel it may come into contact with. Set time (ASTM C-191) shall be less than 30 minutes. One-hour compressive strength (ASTM C-109) shall be a minimum of 200 psi and the ultimate compressive strength (ASTM C-109) shall be a minimum of 5000 psi. Bond strengths (ASTM C-882 Modified) shall be a minimum of 1700 psi.

**3.03 Spray Applied Calcium Aluminate Cementitious Liner****a. Products**

1. Calcium aluminate cementitious liner shall be SewperCoat as manufactured by LaFarge Aluminates or equal products pre-approved by the Fulton County Department of Public Works - Water Services Division.

**b. Requirements**

1. Material supplied under this specification shall be a prepackaged mortar mix, including all cement, aggregates, and any required additives. It is the intent of this specification that the Contractor only be required to add the proper amount of potable water so as to produce concrete suitable for pneumatic application. Typical package weights shall not be less than 50 lbs and shall be identical for all material furnished on this project.
2. The chemical composition of the cement portion as well as the aggregates of the mortar mix shall be as follows:

Al <sub>2</sub> O <sub>3</sub>	CaO	FeO + Fe <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>
39-44%	35-39%	9-14%	5-7%

3. Mortar mix must have at least five (5) years of successful performance in similar applications and be supplied by an ISO 9002 approved manufacturer.
4. In addition, the mortar mix shall be designed to withstand long-term exposure to a bacterially corrosive hydrogen sulfide environment that may be expected to produce a pH of 1 on normal Portland Cement concrete or typical brick and mortar surfaces.
5. Water used in mixing shall be fresh, clean, potable water, free from injurious amounts of oil, acid, alkali, vegetable, sewage and/or organic matter. Water shall be considered as weighing 8.33 pounds per gallon.
6. Mortar mix shall be stored with adequate provisions for the prevention of absorption of moisture. It shall be stored in a manner that will permit easy access for inspection and identification of each shipment.

3.04 Cured-In-Place Epoxy Resin Liner System

A. Products

1. Cured-in-Place Epoxy Resin Liner shall be Poly-TriPlex Liner System by SunCoast Environmental International, Inc. or equal product pre-approved by the Fulton County Department of Public Works - Water Services Division.

B. Requirements

1. The Cured-In-Place Epoxy resin based liner material shall be used to form a structural enhanced monolithic liner covering all interior surfaces of the manhole including benches and inverts.
2. The finished manholes shall be corrosion resistant to: Hydrogen Sulfide; 20% Sulfuric Acid; 17 % Nitric Acid; 5% Sodium Hydroxide as well as other common ingredients of the sanitary wastewater environment. Other material may be used as approved by the Construction Manager.

3.05 Execution

A. Manhole Preparation

1. Cleaning: All concrete and masonry surface to be rehabilitated shall be cleaned prior to applying any lining system. All grease, oil, laitance, coatings, loose bricks, mortar, unsound brick or concrete and other foreign materials shall be completely removed. Cleaning shall include an acid wash using a 1:2 solution of muriatic acid followed by hydro blasting unless directed otherwise by the Construction Manager. Other methods such as wet or dry sandblasting, concrete cleaners, degreasers, or mechanical means may be required to properly clean surface. All surfaces on which these methods are used shall be thoroughly rinsed, scrubbed, and neutralized to remove cleaning agents and their reactant products. Debris resulting from cleaning shall be removed from the manhole and not allowed to be carried downstream.
2. Flow Control: The Contractor shall be responsible for plugging or diverting the flow of wastewater as needed for manhole rehabilitation or fiberglass insert Patching: Loose material shall be removed from the area to be patched exposing a sound sub-base. Holes or voids around steps, joints or pipes, spilled areas, and cavities caused by

missing or broken brick shall be patched and missing mortar repaired using a non-shrink patching mortar conforming to the requirements of this section. Cracks not subject to movement and greater than 1/16 inch in width shall be routed out to a minimum width and depth of ½ inch and patched with non-shrink patching mortar conforming to the requirements of this section. Bench repair and patching of walls is considered incidental to manhole preparation for liner application.

3. All manholes which have exposed cured-in-place or deformed/reformed pipe segments in the manhole invert channel shall require the use of a concrete bonding adhesive prior to the spray application of the cementitious manhole liner. The bonding agent shall be any synthetic emulsion specifically formulated for bonding new concrete to existing surfaces. The bonding agent shall be mixed and applied in accordance with manufacturer's recommendations.
4. All incoming or outgoing pipes shall be plugged or otherwise protected during liner application to prevent clogging. Manhole steps shall be protected during spraying or all laitance removed and steps thoroughly cleaned after spraying. If manhole steps must be removed during liner installation, the Contractor shall replace the steps.

**B. Stopping Infiltration**

- a. The contractor shall use hydraulic cement to stop infiltration at each identified point of leakage into the manhole.
- b. If the flow of water into the manhole is too great for stoppage utilizing hydraulic cement, the Contractor shall drill holes at each point of leakage that shall extend through the manhole wall. Chemical sealant injection devices shall be placed into the drilled holes in a manner to provide a watertight seal between the holes and the injection device.
- c. Hoses shall be attached to the injection devices from an injection pump. A mixture of manhole chemical sealants shall then be pumped until material refusal is recorded on the pressure gauge of the pumping unit. The Contractor shall ensure that excessive pumping pressures do not develop that may cause damage to the manhole walls.
- d. Once the injection of the chemical sealants have been completed, the injection packers shall be removed and the holes shall be filled and toweled flush with the surface of the manhole wall using a fast-set non-shrinking grout.
- e. Excessively leaking manholes will be considered additional manhole preparation. The Contractor must notify and receive approval from the Construction Manager before additional preparation begins. Additional manhole preparation without approval from the Construction Manager will be considered incidental to the Work.

**C. Sampling and Testing**

1. A recognized independent testing laboratory shall test mortar materials used on the project. Specific materials recommended by the Engineer shall then be tested.
2. Any materials failing to meet the requirements of these specifications shall not be incorporated into the work plan.

**D. Qualification of Work Crew**

1. Prior to project commencement, the Contractor must satisfy the Engineer that all Contractor's work crew personnel have performed satisfactory work in similar capacities elsewhere for a sufficient period of time to be fully qualified to properly

perform the work in accordance with the requirements of the related specifications (minimum 5 years).

2. Foreman shall have at least 5 years experience with similar work and project conditions.
3. Nozzle operators shall be qualified by having had similar work experience.
4. Project responsibilities prior to application of SewperCoat shall include the following:
  - a. Ensure all sub-surfaces are clean and free of laitance or loose material.
  - b. Ensure that overhead sub-surfaces have been prepared to a minimum degree of roughness designated as **CSP 4** by the **International Concrete Repair Institute (ICRI) Guideline No. 03732 – Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays**. This reference document explains the means and methods of achieving the minimum designated degree of roughness. The contractor should consider utilizing a higher standard depending upon the surface conditions.
  - c. Ensure that sub-surfaces other than overhead have been prepared to a minimum degree of roughness designated as **CSP 3** by the **International Concrete Repair Institute (ICRI) Guideline No. 03732 – Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays**. This reference document explains the means and methods of achieving the minimum designated degree of roughness. The contractor should consider utilizing a higher standard depending upon the surface conditions.
  - d. Ensure the operating air pressure is uniform and provides adequate nozzle velocity for proper compaction.
  - e. Continuously regulate the water content so that the applied materials consistently achieve proper compaction with a low percentage of rebound and no visible “sag”.
  - f. Ensure that the installation equipment nozzle is held at the proper distance away from and as nearly perpendicular to the prepared sub-surface as the working conditions will permit to secure maximum material compaction with minimum rebound and no visible “sag”.
  - g. Follow a sequence routine that will fill corners with adequately compacted material applied at a maximum practicable layer thickness.
  - h. Determine necessary operating procedures for placement in confined spaces, extended distances or around unusual obstructions where placement velocities and mix consistency may need to be adjusted.
  - i. Direct the crew as to when to start and stop the flow of materials during installation and to immediately stop all work when material is not arriving uniformly at the nozzle.
  - j. Ensure that slough pockets are removed and prepared for installation of replacement material.
  - k. Bring the installed materials to established finished elevations in a neat and timely manner and within established tolerances.
5. Applicator’s job foreman shall operate the pneumatic mixing/placing equipment and direct the work of mixing crew personnel. Applicator’s work crew shall also maintain proper line pressures throughout the pneumatic mixing/placing equipment to ensure the

necessary consistent nozzle velocity. Applicator's work crew shall further see that all material fed to the nozzle is uniformly fed through this equipment.

6. Equipment shall be of pneumatic type and approved by the material manufacturer. Alternate equipment may be utilized provided it meets the performance requirements of the specification. All equipment must also be kept in operating condition and good repair.

## **PART 4 – ANCILLARY ITEMS**

### **4.01 Construction Methods**

#### **A. Surface Preparation**

1. To ensure sufficient bond, all sub-surfaces shall be cleaned and prepared to a degree of roughness as described in this specification. Sub-surfaces shall also be thoroughly moistened with water prior to the application of the lining materials. In no instance shall shotcrete be applied in an area where running water exists. It is the intent of this specification that the existing surface be saturated just prior to installation.
2. If applying to new concrete, the same criteria for sub-surface cleanliness, roughness, and saturation.
3. All surfaces to be lined shall be saturated with water just prior to lining materials application. If saturation does not occur naturally, it can be accomplished by presoaking all sub-surfaces for a minimum of 24 hours immediately prior to the application of the lining materials.

#### **B. Operations**

1. The Contractor shall provide all equipment necessary to individually gauge, control, and monitor the actual amounts of all component materials necessary to complete the lining installation. The type of equipment and methods used to gauge, control, and monitor component materials shall be subject to approval by the Engineer and Manufacturer.
2. All lining materials shall be thoroughly mixed by mechanical means to ensure all agglomerated particles are reduced to original size or removed prior to placement into the application equipment (i.e. the hopper). Each batch of material should be entirely discharged before recharging with fresh material. Mixing equipment shall be cleaned at regular intervals to remove all adherent materials.
3. The addition of water to the mix shall be in strict accordance with the Manufacturer's recommendations.
4. Re-mixing or tempering shall not be permitted. Rebound materials shall not be reused.

#### **C. Protection of Adjacent Surfaces**

1. During progress of the work, adjacent areas or grounds which may be permanently discolored, stained or otherwise damaged by dust and rebound material, shall be adequately protected and, if contacted, shall be cleaned by early scraping, brushing or washing as the surroundings permit.

#### **D. Inflow And Infiltration Prevention**

1. If inflow or infiltration is observed within the structure after surface preparation is complete, a rapid setting crystalline enhanced hydraulic cement product specifically

formulated for infiltration control shall be used to stop minor infiltration flows in accordance with the manufacturer's recommendations. The material shall meet the following strength requirements:

Compressive Strength (ASTM C597B)	600 psi	(24 hours)
	1000 psi	(7 days)
Bond Strength (ASTM C321)	30 psi	(1 hour)
	80 psi	(1 day)

2. The material shall be Preco Plug, Octocrete, Burke Plug or equal products pre-approved by the Fulton County Department of Public Works - Water Services Division. Where infiltration flows are more severe, pressure grouting may be required. The material for pressure grouting shall be Avanti A-220, DeNeef or equal products pre-approved by the Fulton County Department of Public Works - Water Services Division, installed in accordance with the manufacturer's written instructions.
3. All materials, labor, equipment, and incidentals required to correct inflow and infiltration conditions will be considered incidental to rehabilitation.

E. Application of Materials

1. SewperCoat shall not be applied to a frozen surface or to a surface that may freeze within 24 hours of application. Frozen conditions shall be defined as ambient temperatures of 32 degrees Fahrenheit or below.
2. Sequence of application may be from bottom to top or vice versa if rebound is properly removed.
3. Application shall be from an angle as nearly perpendicular to the surface as practicable, with the nozzle held at least 1 foot from the working sub-surface (except in confined control). If the flow of material at the nozzle is not uniform and slugs, sand spots, or wet sloughs result, the nozzleman shall direct the nozzle away from the work until the faulty conditions are corrected. Such defects shall be replaced as the work progresses.
4. Application shall be suspended if:
  - 1) Air velocity separates the cement from the aggregate at the nozzle.
  - 2) Ambient temperature approaches freezing and the newly placed SewperCoat cannot be protected and insulated.
5. The time interval between successive layers of material application must be sufficient to allow "tackiness" to develop but not final set. If final set does occur, this surface shall be prepared in accordance with this document in order to provide a sufficient bond with succeeding applications.
6. Construction joints within a manhole shall be avoided. In the event a construction joint is necessary and approved by the Engineer, it shall be sloped off to a thin, clean, regular edge, at a 45-degree angle. Prior to placement of the adjoining materials, the sloped portion and adjacent applied material shall be thoroughly cleaned as necessary, then moistened and scoured with an air jet.
7. Nozzle operator shall bring the material to an even plane and to well formed corners.
8. After the body coat has been placed, the surface shall be trued with a thin-edge screed to remove high areas and expose low areas. Low areas shall be properly filled with

additional material to insure a true, flat surface in accordance with Section 4.5.5 of this document.

9. The minimum thickness of the SewperCoat shall be a ½ inch cover over all surfaces.

#### F. Curing

1. If the material has been applied and furnished in accordance to the specifications, and it has been determined that the environment is not moist enough for natural curing, the contractor will be required to apply a curing compound to all coated surfaces. Curing compound shall meet the requirements of ASTM C309 and have the approval of the lining material Manufacturer and the Engineer prior to use.
2. Moist curing may also be used in lieu of curing compound. If moist curing is selected, it should be implemented just after the notice of uniform heat generation of the installed lining. Moist curing can consist of the use of soaker hoses, water sprinklers, or vapor/misting machines. Regardless of delivery method, moist curing should be in accordance with manhole repair / rehab specification outlined in clause 3.02.

#### G. Cured-In-Place Epoxy Resin Liner

- a. Prior to entering manholes, an evaluation of the atmosphere will be conducted to determine the presence of toxic, flammable vapors or possible lack of oxygen. The evaluation shall be in accordance with local, state, and federal safety regulations.
- b. The installation of the cured-in-place epoxy resin liner shall be in strict accordance with the manufacturer's written instructions.
- c. Once the liner is fully saturated with resin at the job site, it shall be lowered into the structure to the pre-marked position at the cover seat of the manhole entrance ring. The liner shall form a monolithic structure permanently connecting the ring and cover seat to the chimney, corbel, walls, benches, and invert. The liner shall be pressurized at a minimum of 500 lbs. per sq. ft., and heated by a temperature inversion system of pressurization with steam injection into the high velocity hot air column, creating a steam/convection oven atmosphere to create a liner temperature of approximately 200°F for at least two hours curing time.
- d. Upon completion of the liner curing process, the inflation bladder shall be removed and all lines reopened and the liner cut off at the manhole cover seat.
- e. The finished invert surfaces shall be smooth, free of ridges, and will be sloped in the direction of flow. Special care shall be used to ensure a smooth transition between the new manhole invert and intersecting pipeline inverts such that flow will not be impaired.
- f. The flow through the manhole shall be re-established as soon as practical and following the liner manufacturer's recommendation for appropriate curing.
- a. The liner shall be installed by a trained experienced technician who has been certified by the manufacturer. Appropriate personal protection equipment shall be utilized.

#### H. Warranty

- a. The Contractor shall guarantee his work in Section 4.04 for warranty period of five (5) years from the date of acceptance. If, at anytime during the warranty period, any leakage, cracking, loss of bond, or other discontinuity is identified, the Contractor shall make repairs acceptable and at no additional cost to the Owner.

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**PART 5 SUBMITTALS**

5.01 Not Used

5.02 Manufacture's Brochures

- A. The Contractor is required to submit four (4) copies of the manufacturer's brochures giving a complete description of the product proposed, its physical and chemical composition, the same for the thermo-setting resin or epoxy hardener, the recommended range of curing temperature, period of cure, cool-down procedures and method of installation. Three (3) copies are to be sealed in an envelope addressed:

- Fulton County  
Department of Public Works  
141 Pryor Street, Suite 6001  
Atlanta, GA 30303  
Attention: Assigned Construction Manager

5.03 Pre-Installation Television Tapes and Logs

- A. To be submitted during the course of the work; 2 copies of each, Required for project close-out.

5.04 Traffic Control Plan and Permits

- A. Signed and sealed by a professional engineer licensed to practice in the State of Georgia. To be submitted during the course of the work for each phase of the work.

5.05 Proposal to Temporarily Interrupt Sewer Service

- A. During the course of and for each segment of the work, for the review and approval of the Construction Manager, provide contractor's evaluation of property usage and impacts because of proposed interruption of service.

5.06 Notification of Intention to Interrupt Sewer Service.

- A. During the course of and for each segment of the work, draft for the review and approval of the Construction Manager, copies of notifications mailed, receipts for certified mail, logs and records of personal and telephone contacts, related correspondence and inquiries by the public and replies.

5.07 Contractor's Proposal to Bypass Sewage and Sewer Flows.

- A. During the course of and for each segment of the work, for the review and approval of the Construction Manager.

5.08 Post-Installation Television Tapes and Logs

- A. Prior to acceptance of, during the course of and for each segment of the work, for the review and approval of the Construction Manager. 2 copies each. Required for close-out.

5.09 Certification of Supplier/Manufacturer of Liner System Employed

- A. That the materials furnished entering the work met the requirements of the industry, the standards of good practice, and these specifications. Required as part of submittal.

5.10 Certification of the Contractor

- A. Letter of Certification that the lining system used was installed in full accordance with the manufacturer's recommendations and these specifications.

5.11 Submittals for Ancillary Work Items

- A. The awarded vendor will be required to submit four (4) copies of the manufacturer's brochures giving a complete description of the product proposed its physical and chemical composition and manufacturer's recommendations. Three (3) copies are to be sealed in an envelope addressed:

Fulton County  
Department of Public Works  
141 Pryor Street, Suite 6001  
Atlanta, GA 30303  
Attention: Assigned Project Manager

- B. Submittals (10 copies) shall be specifically required for:
  - e. Remote Reconnection Device – Manufacturer's Brochure
  - f. Remote Packer-Grouting Device – Manufacturer's Brochure
  - g. Manhole Interior Rehabilitation – Fiberglass Liner System
  - h. Manhole Interior Rehabilitation – Contractor selected Spray Applied or Cured-in- Place System
- C. Submittals for Ancillary Work shall include all information necessary to demonstrate that the recommended product meets or exceeds the requirements of these Specifications. 10 copies of each.

5.12 Other Submittals

- A. As may be required elsewhere, that are necessary to accomplish the plan intent and as may be required by the Construction Manager.

5.13 Compensation for Submittals

- A. Submittals are considered as incidental to the other items of work in the bid proposal and no additional compensation will be paid the contractor therefore.

5.14 Testing Results

- A. The Contractor shall submit all test results to the Construction Manager within two weeks of performing any test described in this Section 00 900. If a test fails, the Contractor shall submit a corrective plan within two weeks of performing any test described in this Section 00900.

**END OF SECTION # 00901**

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**S219 – Brookfield Country Club Sewer Lining**  
**SECTION NO. 01010**  
**SUMMARY OF WORK**

1.01 LOCATION

- A. The work described by the drawings and specifications is located on Brookfield Country Club Sewer Lining in Fulton County, Georgia.

1.02 WORK INCLUDED

- A. The selected contractor will line the sewers and manholes with a cured-in-place lining system. The height of the manholes will be adjusted and each manhole will be sealed to prevent storm water from entering the sewer system. Other activities such as clearing, sewer preconditioning, and site restoration shall also be performed.

1.03 WORK COORDINATION

- A. The Contractor shall coordinate his 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 his work with owners of private and public property where access is required for the performance of the work. Legal access will be acquired and provided by the County.

1.04 CONDITIONS AT THE SITES

- A. The Contractor shall make all necessary investigations to determine the existence and location of all underground utilities.
- B. The Contractor will be held responsible for any damage to and for maintenance and protection of existing utilities and structures.
- 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 # 01010**

**S219 – Brookfield Country Club Sewer Lining****SECTION NO. 01011****UNIQUE REQUIREMENTS****PART 1 GENERAL****1.01 SCOPE**

- A. The scope of this Section is to convey to the Contractor unique and unusual stipulations and requirements which have been established for this Project. Some of the stipulations and requirements are a result of negotiations with various entities and organizations which have an interest in this Project. Some requirements are based on technical aspects of the Project which are not otherwise conveyed to the Contractor. The provisions of this Section shall supersede the provisions of the Division 1 through 17 Specifications but shall not supersede the Bidding Requirements, Contract Forms or Conditions of the Contract.

**1.02 EXISTING OPERATIONS**

- A. The existing facilities must of necessity remain in operation while the investigation and construction activities are in progress.
- B. The Contractor shall coordinate the work with the Owner so that the construction will not restrain or hinder the operation of the existing facilities. If, at any time, any portion of the facilities are out of service, the Contractor must obtain approval from the Owner as to the date, time and length of time that portion of the facilities are out of service.
- C. After having coordinated the work with the Owner, the Contractor shall prepare a submittal in accordance with Section 01340 to include the time, time limits and methods of each connection or alteration and have the approval of the Engineer before any work is undertaken on the connections or alterations.
- D. Before any roadway or facilities are blocked off, the Owner's approval shall be obtained.
- E. The Contractor shall be responsible for any (1) physical damage to areas affected by works including landscaping, trees, golf cart paths, etc... and (2) loss of operating income of the golf course in the event the Contractor causes the golf course to shut down for any amount of time. The contractor shall indemnify and hold harmless Fulton County for any of the above damage and loss of operating income.

**1.03 SEQUENCING**

- A. General
1. The Contractor shall be solely responsible for sequencing of all activities.
  2. The completion of specific preliminary sequencing tasks indicated will be required prior to any significant site demolition.
- B. Notify the Owner at least 72 hours prior to starting to relocate piping or taking existing components out of service.
- C. Sequence Submittal
1. Submit a proposed sequence in accordance with Section 01340 with appropriate times of starting and completion of tasks to Engineer for review.
  2. The Contractor may propose alternatives to the sequencing constraints to that shown in this Section in an attempt to reduce the disruption of the operation of the existing facility or

streamline the tasks of this Contract. The Owner and Engineer are not obligated to accept any of these alternatives.

#### 1.04 SEQUENCING CONSTRAINTS

- A. The following construction sequencing constraints are to emphasize critical tasks of the Work in this Contract. It is not a complete list of all work to be completed.
  - 1. All work activities must remain within the County easements and/or designated right-of-entries.
  - 2. Clearing and grubbing within the easements and/or right-of-ways must be done in order to gain access to portions of the trunk main.
  - 3. The condition of the sewer system shall be determined, by televised inspection, prior to cleaning and rehabilitation.
  - 4. Work in wetland areas shall be done in accordance with the requirements of the Corps of Engineers.

#### 1.05 CONTRACTOR'S SUPERINTENDENCE

- A. The CONTRACTOR shall submit, with the initial Detailed Construction Schedule, a detailed manpower organization chart indicating the management and supervisory personnel for the control and supervision of all aspects the WORKS. Particular reference must be made to those personnel proposed for overall project direction, co-ordination and programming roles. Only in exceptional circumstances will substitute candidates be allowed when work commences. Under these exceptional circumstances only a candidate may be submitted with equivalent or better experience.
- B. Particulars of nominees for all key positions shall be provided, including detailed resume, giving qualifications and previous experience. The key positions, which may be combined or separate, shall include:
  - 1. Project Director
  - 2. Project Manager
  - 3. Site Safety Manager/Supervisor
  - 4. Clearing and Grubbing Manager/Supervisor
  - 5. Internal Sewer Condition Assessment Manager/Supervisor
  - 6. Preconditioning and Cleaning Manager/Supervisor
  - 7. Sewerage Rehabilitation Installation Manager/Supervisor
  - 8. Sewerage Rehabilitation Testing Manager/Supervisor

**In general, managers shall have a minimum of five years experience and supervisors a minimum of three years experience.**

- C. The organization chart shall be an accurate statement of the CONTRACTOR'S intention.

#### 1.06 WORKING HOURS

- A. The CONTRACTOR'S representative on site directly responsible for the work shall be immediately contact-able at any time during the normal working day and shall immediately respond to all or any query by the CONSTRUCTION MANAGER.
- B. Adequate means of communication by telephone, portable radio, CB, walkie-talkies, or other electronic means of communication must be established at all times as part of the

routine work methodology and in case of an emergency, between all relevant points of any activity along the length of the sewer.

- C. Daytime working is defined as 0700 to 1900 hours. No work shall be carried out at any other time or on a bank holiday, including Saturday and Sunday, without permission in writing from the CONSTRUCTION MANAGER except when the work is unavoidable or absolutely necessary for the saving of life, property or for the safety of the works, in which case the CONTRACTOR shall immediately notify the CONSTRUCTION MANAGER of such works.
- D. Night work shall be defined as the period of 1900 to 0700 hours.
- E. Weekend working shall be defined as the period from 0700 hours Saturday to 0700 hours Monday.
- F. Work on principal highway routes shall be restricted to certain hours as directed by the CONSTRUCTION MANAGER. No work will be permitted outside these hours.

### 1.07 NOISE CONTROL

- A. The CONTRACTOR shall employ the “best practicable means” to minimize and mitigate noise as well as vibration resulting from operations. Mitigation measures shall include the utilization of sound suppression devices on all equipment and machinery particularly in residential areas and in the near vicinity of hospitals and schools, especially at night.
- B. Sound reduced equipment is defined as equipment which emits a sound pressure level not exceeding 75dB(A) at 30-feet in any direction from the center of the machine if the equipment is to be used between the hours of 0700 and 1900, and 65 dB(A) if used outside those hours.
- C. The CONTRACTOR shall inform the CONSTRUCTION MANAGER before the commencement of the Works, or of any significant phase thereof, or immediately any change in the method of working not previously notified is affected.
- D. Any pumps, generators, combination cleaners or other noise emitting equipment shall be suitably screened to minimize nuisance and pollution.
- E. This shall not be taken as preventing or prohibiting the execution of works which are absolutely necessary for the saving of life or property or for the safety of the works. The use of machinery or equipment in an emergency situation shall be notified as soon as practicable to the CONSTRUCTION MANAGER.

### 1.08 SITE PROTECTION PLAN

- A. Any proposal to impact the existing operations, including any sewer rehabilitation, repair or replacement construction, shall be outlined in writing and submitted to the Construction Manager at least 14 days prior to the implementation of the flow control system or sewer rehabilitation, repair or replacement.
- B. Prior to any proposed sewer rehabilitation, repair or replacement construction, the Contractor shall describe, in detail if necessary, any planned activity where the Contractor’s vehicles, equipment, or materials impact local areas such as the golf course. This includes any construction work which may impact existing activities and/or site features such as landscaping, golf cart pathways, putting greens, sand traps, and/or rough/fairway areas, etc.
- C. The Contractor shall submit ten copies of a site protection plan with sufficient detail to show:
  - the location, number and size of vehicles, including the specific delivery path and time when the vehicles will not be on the golf cart path

- the number, location size and type of equipment, including the specific delivery path and time when the equipment will not be on the golf cart path
  - the number, location, size and type of materials, including the specific delivery path and time when the materials will not be on the golf cart path
  - the number and description of golf course holes impacted at any one particular time
- D. The Contractor shall describe all proposed protective measures, including any specialized methods, erosion and sediment control activities, and/or storm water management procedures. Specialized methods may include hand carrying equipment or installing temporary creek crossings to eliminate additional damage to the golf course. The Contractor shall limit operations to the existing sewer easement and Owner approved right-of-entry areas. The Contractor shall clearly define existing conditions, including all features such as trees, grassing, endangered species, native wetland and wildflowers, etc. Pre- and Post-Construction Photographs shall be in the golf course protection plan according to Section 01320 Progress Reports, Videos, and Photographs of the Specification.
- E. The Contractor shall also notify the Construction Manager 24 hours prior to commencing actual construction operations. The Contractor's golf course protection plan must be approved by the Construction Manager before the Contractor shall be allowed to commence work on site.

#### **F. TRAFFIC MANAGEMENT**

- A. The CONTRACTOR shall comply with the relevant provisions related to traffic control and safety published by Fulton County and the Georgia Department of Transportation.
- B. The work shall be carried out so as not to interfere unnecessarily or improperly with the passage of pedestrians and vehicles or the access to use public or private roads; footpaths and properties.
- C. For work requiring occupation of the public highway the CONTRACTOR shall comply at all times with the requirements of the relevant Traffic Signs Manual concerning construction works in the highway. The CONTRACTOR shall supply and place and maintain warning signs to the satisfaction of the CONSTRUCTION MANAGER. These signs shall be removed when work is not in progress.
- D. The CONTRACTOR shall not commence any works which affect vehicular passage along the highway until details of all traffic management safety and control measures necessitated by the works have been submitted to the CONSTRUCTION MANAGER for consideration and are fully operational.
- E. If conditions are such that temporary traffic signals and signs, illuminated or otherwise, are necessary, then these will be provided and maintained by the CONTRACTOR.
- F. Where the volume of traffic on any road makes it impracticable or hazardous to carry out work during normal working hours, the CONTRACTOR shall apply to the CONSTRUCTION MANAGER for permission to work at night or weekends. The CONTRACTOR shall also make all necessary arrangements to enable work to be carried out at manholes which are covered by parked vehicles.
- G. Should the CONTRACTOR wish to divert traffic onto any temporary routes or to close a roadway or lane of traffic he shall submit any such request to CONSTRUCTION MANAGER at least 8 weeks in advance of the proposed diversion.
- H. The CONTRACTOR shall provide and allow for watching and lighting the site, provide safe passage to pedestrians and vehicular traffic at all times at no additional cost to the OWNER.

- I. If the use of traffic lights and associated signs is requested by Fulton County or requested by CONSTRUCTION MANAGER during the course of the work, then the CONTRACTOR shall make his own arrangements to provide these at no additional cost to the OWNER.
- J. The CONTRACTOR shall notify the local police of his presence when working on highways and shall keep the police aware of his appropriate area of working at all times. The CONTRACTOR shall make available to the police a telephone number of a person who may be contacted during the survey in order to resolve any queries.
- K. Where the volume of traffic or parked vehicles makes it impracticable or hazardous to carry out the work during normal working hours the CONTRACTOR shall apply to CONSTRUCTION MANAGER for permission to work outside of normal working hours.
- L. The CONTRACTOR shall comply with any special traffic requirements of Fulton County and any other municipality in which the work may be conducted.

### **1.09 WARRANTIES**

For the purposes of this project the following assumptions shall be made by the Contractor:

- A. The design life of all lining systems shall be 50 years.
- B. The warranty period against any defects being found in CONTRACTORS workmanship shall be two years.
- C. The warranty period against any shortcoming in material performance shall be five years.
- D. Warranty against sealants breaking down shall be given for a period of ten years.

OWNER reserves the right to inspect all rehabilitated and sealed manholes and sewers at any time within twelve months of construction for defects in workmanship and effectiveness. If any form of defect is found then the CONTRACTOR shall carry out approved remedial work to ensure that the rehabilitation or seal is/are fully effective. Payment may be either withheld from retention monies or other outstanding payments due to the contractor, whichever the CONSTRUCTION MANAGER deems appropriate in order to complete the remedial work.

**END OF SECTION # 01011**

**S219 – Brookfield Country Club Sewer Lining**  
**SECTION NO. 01020**  
**ALLOWANCES**

**1. DEFINITIONS / GENERAL**

- A. Allowances: Allowances are defined as sums of monies within the Contract Sum which may, at Owner's option and under terms established in the Contract, be utilized at the Owner's discretion to supplement corresponding basic requirements of Contract Documents.
- B. Owner allowances are exclusively for the cost of materials, delivery to the site and associated installation. The total allowance amount is exclusively for Owner use, and shall include no markup for the Contractor or for its subcontractors and subconsultants.

**2. SCHEDULE OF ALLOWANCES**

**A. OWNER-PROVIDED ALLOWANCES (As Required)**

*1. Manhole Lowering*

- a. Allowance amount: (\$5,000.00)
- b. This allowance shall cover the cost of lowering the existing raised manholes that may be required for this project. This allowance is solely for the use of the County at the Construction Manager's recommendation to adjust the top elevation of the manhole frame. Adjustments may require removing the cone section. The Contractor must notify Construction Manager at least (48) hours in advance of lowering to determine the final frame elevation height.

*2. Permitting Fees*

- a. Allowance amount: (\$5,000.00)
- b. This allowance shall cover the reimbursement of application and permitting fees that may be required for this project. The fees shall be reimbursed at direct cost with no mark-up. Any fees that must be paid because of resubmission or errors on the part of the Contractor shall not be reimbursed and shall be the responsibility of the Contractor. Contractor must notify Construction Manager in advance of Permit fees that are to be paid for reimbursement to be made.

*3. Unforeseen Utility Conflicts*

- a. Allowance amount: (\$5,000.00)
- b. This allowance shall cover re-routing or upgrade of existing utility service(s) and/or relocation of facilities or portion of the facilities that are a part of this work due to unforeseen conditions. This allowance is not to cover general relocation of aboveground utilities that could be seen or anticipated prior to bidding of this project. All work is to have the Owner's written approval prior to execution.

*4. Site Restoration*

- a. Allowance amount: (\$100,000.00)
- b. This allowance shall cover the cost of restoring the condition of the golf course and any other areas affected by Contractor, including but not limited to, sewer easements, designated right-of-entries, golf cart pathways, putting greens, sand traps, and/or rough/fairway areas. The amount provided is for the services of an independent, qualified, specialty subcontractor to restore the condition of areas affected by construction of the project. The presence of this allowance in no way diminishes the responsibility of the Design/Builder to reduce the impacts due to construction. All work is to have the Construction Manager's written approval prior to execution.

B. CONTRACTOR-CALCULATED ALLOWANCES – NOT USED

**3. PROCEDURES**

- A. At no additional cost to the County, the Contractor shall propose for consideration and approval of the County, specific details for the use of the discretionary Owner-provided allowance items number 1 through 5.
- B. To the extent that the full amount of an Owner-provided allowance is not approved by the County for utilization for the described purpose, the Contract shall be amended to apply the available balance to other requirements.

**END OF SECTION # 01020**

**S219 – Brookfield Country Club Sewer Lining**  
**SECTION NO. 01025**  
**APPLICATIONS FOR PAYMENT**

**1. 01 SUBMITTAL OF APPLICATION FOR PAYMENT**

- A. The County will make payments to the Contractor on the basis of a duly certified and approved estimate of the Work completed through the 25th day of each calendar month, as reviewed by the Construction Manager, provided the estimate was submitted in accordance with the following requirements:
- B. The Applications for Payment shall be itemized as directed by the Construction Manager. Applications for Payment are to serve as certification by the Contractor as to the status of the Work. All monthly payments invoiced by the Contractor to the County shall be based on Completion of the work in accordance with the cost-loaded Construction Schedule, and Schedule of Values.
- C. On or prior to the 20th day of each month, the Contractor will prepare a preliminary, itemized Application for Payment for work completed and the value of any stored materials, projected through the 25th of the current month, as well as additional information required herein or as Construction Manager may require to verify and approve the amount of payment applied for. The Contractor may be requested to review the Application for Payment with the Construction Manager on the jobsite in order to verify work in place or the location of stored materials.
- D. After the Construction Manager has advised the Contractor of the acceptability of the Application for Payment, and on or before the 25th day of each month, the Contractor shall submit to the Construction Manager an itemized, notarized Application for Payment. The Contractor shall also submit items in paragraph (I) and if requested, additional documentation, including, but not limited to, all sworn statements, waivers and releases of liens and claims, including those required of sub-contractors of any tier as may be requested by the Construction Manager, reflecting all retainage, previous Applications for Payment, payment for labor and material, payment for materials stored and other documentation and requirements related to Work performed as provided elsewhere in the Contract Documents or as required by the Construction Manager.
- E. Late applications will not be accepted for any reason whatsoever. If the Contractor is late with its pay application, it will not be processed until the next pay cycle.
- F. The Contractor shall submit the Application for Payment in four (4) paper hardcopies and one electronic copy on CD-ROM. An electronic version of the standard forms will be provided to the Contractor at or before the Pre-Construction Conference. Each copy shall display an original signature by a duly authorized agent of the Contractor. The application shall be generated by the use of Microsoft Excel or other applications package acceptable to the Construction Manager, and provided that the forms generated are in the format acceptable to the Construction Manager. All four copies shall be individually notarized.
- G. Nothing in this section is meant to be in conflict with the Contract. Any inconsistencies between this section and the contract, the contract shall prevail.
- H. For a payment submittal to be accepted by the Construction Manager all the conditions as defined in the contract must be met by the Contractor. Failure to meet these requirements constitutes non-submittal of the payment request.

- I. With each payment submittal the Contractor must include:
  - 1. a reasonably detailed description of all Work actually completed during the period of the payment submittal
  - 2. an up-to-date and annotated Construction Schedule which shall reflect the status of the Contractor 's Construction Schedule since the date of the last payment submittal
  - 3. an up-to-date and annotated Schedule of Values indicating the percentage of Work completed by activity and milestone for the project.
  - 4. revisions to the critical path schedule which shall reflect changes in the critical path schedule since the date of the last payment submittal.
  - 5. notice of any liens or "Encumbrances which have been filed, together with evidence that the Contractor has bonded or discharged such liens or encumbrances
  - 6. a complete and filled-out Exhibit G, Technical Proposal Form 8
  - 7. construction Progress Photos
  - 8. any other documents or information relating to the Work or this Contract requested by the Construction Manager as my be required by Applicable Law or this Contract
  
- J. Schedule Of Values Utilization
  - 1. Applications for Payment: The Schedule of Values, that is acceptable to the County, shall be the basis for the Contractor's applications for payment.
  - 2. Changes to the Schedule of Values: The County shall have the right to require the Contractor to alter the value or add/delete categories listed on the Schedule of Values at any time for the following reasons:
    - a) The Schedule of Values appears to be incorrect or unbalanced.
    - b) A revision to the segregation of values is required due to the Contractor revising the sequence of construction or assembly of building components, which in turn invalidates the Schedule of Values.
    - c) Change Orders are issued to the Contractor and require incorporation into the Schedule of Values.
  
- K. At no time during the contract will the Contractor be allowed to bill for an amount which is in excess of the amount of its contract (total bid amount), including all signed and executed change orders.

**1.02 PAYMENT FOR MATERIALS STORED ON SITE**

- A. As provided in the Contract Documents, payments will be made on account of materials or equipment not incorporated in the Work, but delivered and suitably stored at the site, provided such materials are stored according to the provisions of the Contract Documents and the satisfaction of the Construction Manager.
- B. The Contractor shall include with his payment request an itemization of the quantity of such materials, and shall document with invoices, Bills of Sale or other documentation acceptable to the Construction Manager, the cost of said materials.

**1.03 PAYMENT FOR MATERIALS STORED OFF SITE**

- A. Payment for materials stored at a location off the project site will not be made under any circumstance.

**1.04 PROGRESS PAYMENTS**

- A. If the Contractor has made Application for Payment as detailed herein, the Construction Manager will confirm the amounts to be paid to the Contractor, certify each copy by original signature, retain one signed copy for its project files, and transmit the remaining copies as Certification for Payment to the County.
- B. The Contractor may expect payment from the County within forty-five (45) days of the Certification by the Construction Manager of the Contractor's submittal of an Application for Payment per Paragraph 1.01 of this Section. Any follow-up inquiries on the status of payments shall be through the Construction Manager. The Contractor is not permitted to contact the County directly with any payment inquiries.
- C. No approval of any application for progress payment, or any progress payment, or any partial or entire use of occupancy of the Work or the Project by the County, shall constitute an acceptance of any Work not in accordance with the Contract Documents.
- D. Progress Payments will be delivered to the Contractor via U.S. Mail only.

**1.05 RETAINAGE**

- A. The County shall withhold a retainage amount of each monthly payment otherwise due and payable to the Contractor in the amount of 10 percent. Such holdbacks shall continue until the Contractor satisfactorily completes 50 percent of the value of the Design/Build Work performed is satisfactory to the County, at which time further payments will not be subject to retainer holdbacks. The County may, however, withhold additional retainage after 50 percent of the work is complete pursuant to the Design/Build Contract. The retained amount shall be released upon Acceptance except for amounts equal to 200 percent of the value of any outstanding Design/Build Work.

**1.06 FINAL PAYMENT/CLOSE-OUT OF PROJECT**

- A. Following acceptance and the project milestone **“Complete”** has been achieved the project must be closed-out for the Contractor to receive the Final Payment. The Contractor shall provide as part of the project submittals the following documents:
  - 1. An affidavit that all payrolls, bills for materials and equipment, and other indebtedness connected with the work have been paid otherwise satisfied; each subcontractor must also provide an affidavit.
  - 2. The surety's and guarantor's consent to final payment
  - 3. Certificate of Occupancy when applicable
  - 4. Contractor Statement of Completion of all Work
  - 5. OCIP Signoff –Exhibit B
  - 6. A Final Exhibit G – Prime Contractor and Sub-contractor Utilization Report (TPP8)
  - 7. Notification of Warranty Period for all major pieces of equipment
  - 8. Transmittals signed by Construction Manager for all deliverables
  - 9. A final invoice for the Work

**END OF SECTION # 01025**

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**S219 – Brookfield Country Club Sewer Lining**  
**SECTION NO. 01040**  
**COORDINATION**

**PART 1 - GENERAL**

**1.01 SCOPE**

- A. Management of the Project shall be through the use of a logical method of construction planning, inspection, scheduling and cost value documentation.
- B. The work under this Section includes all surface and subsurface condition inspections and coordination by the Contractor necessary for the proper and complete performance of the Work.
- C. This Section applies to the work of every division and every section of these Specifications.
- D. The Contractor shall become thoroughly familiar with the requirements of the Contract Documents, as well as jobsite conditions and the work of separate contractors (if any), and shall make any adjustments necessary to maintain the Project schedule.
- E. Close coordination will be required by the Contractor with the County, Construction Manager, other authorities having jurisdiction, separate contractors (if any), and others having an interest in the Project to assure that all work on the site, access to and from the site, and the general conduct of the operations is maintained in a safe and efficient manner, and that disruption and inconvenience to existing streets and property are minimized.

**1.02 SITE CONDITIONS**

- A. Inspection
  - 1. Prior to performing any work under a section, the Contractor shall carefully inspect the installed work of other trades and verify that all such work is complete to the point where the work under that section may properly commence.
  - 2. The Contractor shall verify that all materials, equipment and products to be installed under a section may be installed in strict accordance with the original design and pertinent reviewed shop drawings.
  - 3. Observation of the Work by the Construction Manager or others shall not be interpreted as relieving the Contractor of its responsibility for the coordination of all Work, superintendence of the Work, or scheduling and direction of the Work.
- B. Discrepancies
  - 1. In the event of discrepancy, immediately notify the Engineer.
  - 2. In the event of discrepancy, the General Conditions, Section 00 700, (Article 17) will govern.

**1.03 EXISTING FACILITIES**

- A. The existing Facility must of necessity remain in FULL operation while the new construction is in progress.
- B. The Contractor shall coordinate the work with the Owner so that the construction will not restrain or hinder the operation of the existing wastewater facilities. If, at any time, any portion of the wastewater facilities are out of service, the Contractor must obtain approval

from the Owner as to the date, time and length of time that portion of the wastewater facilities are out of service.

- C. Connections to the existing facilities or alteration of existing facilities will be made at times when the piping or facility involved is not in use or at times, established by the Owner, when the use of piping or facility can be conveniently interrupted for the period of time needed to make the connection or alteration.
- D. After having coordinated the work with the Owner, the Contractor shall notify the Engineer of the time, time limits and methods of each connection or alteration and have the approval of the Engineer before any work is undertaken on the connections or alterations.
- E. Before any roadway or facilities are blocked off, the Owner's approval shall be obtained to coordinate operations for these facilities.

#### **1.04 COORDINATION**

- A. Carefully coordinate work with all other trades and subcontractors to insure proper and adequate interface of the work of other trades and subcontractors with the work of every section of these Specifications.
- B. The Contractor shall coordinate operations with all utility companies in or adjacent to the area of Contractor's work. The Contractor shall require said utilities to identify in the field their property and provide drawings as necessary to locate them.
- C. The Contractor shall so schedule the Contractor's Work that the Contractor does not interrupt the operation of any existing facility, including water mains and sewers. In the event certain tie-ins or other operations make it absolutely necessary to interrupt the operation of existing facilities, the Owner will be notified and such work will be done at a time and in a manner acceptable to the Owner/Engineer.

**END OF SECTION # 01040**

**S219 – Brookfield Country Club Sewer Lining**

**SECTION 01 060**

**REGULATORY REQUIREMENTS**

**PART - 1 GENERAL**

**1.01 SCOPE**

- A. Permits and Responsibilities: The Contractor shall, without additional expense to the Owner, be responsible for obtaining all licenses and permits, including building permits, and for complying with any applicable federal, state, county and municipal laws, codes and regulations, in connection with the prosecution of the Work.
- B. The Contractor shall take proper safety and health precautions to protect the Work, the workers, the public and the property of others.
- C. The Contractor shall also be responsible for all materials delivered and work performed until completion and acceptance of the Work, except for any completed unit of construction thereof which may heretofore have been accepted.
- D. Business Licenses: The Contractor shall provide the County, on the proper form, proof of being licensed to do business within Fulton County; proof of proper business licenses shall also be provided by the Contractor for any and all subcontractors coming under the jurisdiction of this Contract.

**END OF SECTION 01 060**

**S219 – Brookfield Country Club Sewer Lining****SECTION NO. 01070****ABBREVIATIONS****PART I - GENERAL****1.01 INTENT**

Wherever in these Specifications and Contract Documents the abbreviations or pronouns in place of them are used, the intent and meaning shall be interpreted as specified herein.

**1.02 ABBREVIATIONS**

AASHTO	American Association of State Highway Transportation Officials
ACI	American Concrete Institute
AEIC	Association of Edison Illuminating Companies
AIA	American Institute of Architects
AIEE	American Institute of Electrical Engineers
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
ANSI	American National Standards Institute
APA	American Plywood Association
APHA	American Public Health Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWPA	American Wood Preservers Association
AWS	American Welding Society
AWWA	American Water Works Association
CFR	Code of Federal Regulations
CRSI	Concrete Reinforcing Steel Institute
EUS	Electronic Industries Association
EPA	Environmental Protection Agency
FS	Federal Specifications
IEEE	Institute of Electronic and Electrical Engineers
IES	Illuminating Engineering Society
IPCEA	Insulated Power Cable Engineers Association
IPC	Institute of Printed Circuits
ISA	Instrument Society of America
NACE	National Association of Corrosion Engineers
NBFU	National Board of Fire Underwriters
NBS	National Bureau of Standards
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NRMA	National Ready-Mix Association
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute
SBC	Southern Building Code
SSPC	Steel Structures Painting Council
UBC	Uniform Building Code

UL Underwriters Laboratories  
USDC United States Department of Commerce  
WPCF Water Pollution Control Federation

**END OF SECTION**

**S219 – Brookfield Country Club Sewer Lining****SECTION NO. 01090****REFERENCE STANDARDS****1. APPLICABILITY OF STANDARDS**

- A. Where reference is made to standards or specifications published by various organizations (“standards”), the Work shall conform to latest edition of such standards as amended and revised in effect at the date of Contract, unless a specific date is indicated.
- B. Where material is designated for certain applications, material shall conform to standards designated in the applicable building code governing the Work. Similarly, unless otherwise specified, installation methods and standards of workmanship shall also conform to standards required by such code. Where no particular material is specified for a certain use, the Contractor shall select from choices offered in the governing code.
- C. Where a standard does not provide all information necessary for the complete installation of an item, comply with manufacturer's instructions for installation and workmanship.
- D. Where specific articles, sections, divisions or headings for standards are not given, such standards shall apply as appropriate. Standards when included in the Contract Documents by abbreviations or otherwise, shall form a part of Contract Documents. In the event of conflicts between cited standards and/or the Contract Documents, the more stringent shall govern.

**2. ABBREVIATIONS AND ACRONYMS**

- A. Abbreviations and acronyms used throughout the Contract Documents refer to associations, institutes, societies and other public bodies who publish standards which are readily available to the public, and to the titles of the standards which they publish. Where such abbreviations or acronyms are used in the Contract Documents, they shall mean the recognized name of the trade association, standards-generating organization, authority having jurisdiction, or other entity applicable to the context of the text provision. Refer to the "Encyclopedia of Associations," published by Gale Research Co., available in most libraries.
- B. Whenever initials representing such a body are shown, followed by a number or a combination of numerals and letters, reference is to a particular standard to which Contractor shall conform. The number or combination of numerals and letters following abbreviation designates the particular standard to be followed.

**3. CONTRACTOR’S DUTIES AND RESPONSIBILITIES**

- A. The Contractor shall be responsible when required by Contract Documents, or upon written request from the Construction Manager, to deliver required proof that materials or workmanship, or both, meet or exceed the requirements of a reference standard.

**4. CONFLICTING STANDARDS**

1. Where compliance with two or more standards is specified and where the standards may establish different or conflicting requirements for minimum quantities or quality levels, refer requirements that are different but apparently equal and other uncertainties to the Construction Manager for a decision before proceeding.

**5. COPIES OF STANDARDS**

- A. Each entity engaged in construction on the Project is required to be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents. Where copies of standards are needed to perform a required construction activity, the Contractor shall obtain copies directly from the publication source.

**END OF SECTION # 01090**

**S219 – Brookfield Country Club Sewer Lining**  
**SECTION NO. 01091**  
**APPLICABLE CODES**

**PART 1 - GENERAL**

**1.01 DESCRIPTION**

- A. Whenever reference is made to conforming to the standards of any technical society, organization, body, code or standard, it shall be construed to mean the latest standard, code, specification or tentative specification adopted and published at the time of advertisement for Bids. This shall include the furnishing of materials, testing of materials, fabrication and installation practices. In those cases where the Contractor's quality standards establish more stringent quality requirements, the more stringent requirement shall prevail. Such standards are made a part hereof to the extent which is indicated or intended.
- B. The inclusion of an organization under one category does not preclude that organization's standards from applying to another category.
- C. In addition, all work shall comply with the applicable requirements of local codes, utilities and other authorities having jurisdiction.
- D. All material and equipment, for which a UL Standard, an AGA or NSF approval or an ASME requirement is established, shall be so approved and labeled or stamped. The label or stamp shall be conspicuous and not covered, painted, or other-wise obscured from visual inspection.
- E. The standards which apply to this Project are not necessarily restricted to those organizations which are listed in Article 1.02.

**1.02 STANDARD ORGANIZATIONS**

**A. Piping and Valves**

ACPA	American Concrete Pipe Association
ANSI	American National Standards Institute
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
AWWA	American Water Works Association
CISPI	Cast Iron Soil Pipe Institute
DIPRA	Ductile Iron Pipe Research Association
FCI	Fluid Controls Institute
MSS	Manufacturers Standardization Society
NCPI	National Clay Pipe Institute
NSF	National Sanitation Foundation
PPI	Plastic Pipe Institute Uni-Bell PVC Pipe Association

**B. Materials**

AASHTO	American Association of State Highway and Transportation Officials
ANSI	American National Standards Institute

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- ASTM American Society for Testing and Materials
  - C. Painting and Surface Preparation
    - NACE National Association of Corrosion Engineers
  - D. SSPC Steel Structures Painting Council
  - E. Electrical and Instrumentation
    - AEIC Association of Edison Illuminating Companies
    - AIEE American Institute of Electrical Engineers
    - EIA Electronic Industries Association
    - ICEA Insulated Cable Engineers Association
    - IEEE Institute of Electrical and Electronic Engineers
    - IES Illuminating Engineering Society
    - IPC Institute of Printed Circuits
    - IPCEA Insulated Power Cable Engineers Association
    - ISA Instrument Society of America
    - NEC National Electric Code
    - NEMA National Electrical Manufacturers Association
    - NFPA National Fire Protection Association
    - TIA Telecommunications Industries Association
    - UL Underwriter's Laboratories
    - VRCI Variable Resistive Components Institute
  - F. Aluminum
    - AA Aluminum Association
    - AAMA American Architectural Manufacturers Association
  - G. Steel and Concrete
    - ACI American Concrete Institute
    - AISC American Institute of Steel Construction, Inc.
    - AISI American Iron and Steel Institute
    - CRSI Concrete Reinforcing Steel Institute
    - NRMA National Ready-Mix Association
  - H. PCA Portland Cement Association
    - PCI Prestressed Concrete Institute
  - I. Welding
    - ASME American Society of Mechanical Engineers
    - AWS American Welding Society
  - J. Government and Technical Organizations

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AIA	American Institute of Architects
APHA	American Public Health Association
APWA	American Public Works Association
ASA	American Standards Association
ASAE	American Society of Agricultural Engineers
ASCE	American Society of Civil Engineers
ASQC	American Society of Quality Control
ASSE	American Society of Sanitary Engineers
CFR	Code of Federal Regulations
CSI	Construction Specifications Institute
EDA	Economic Development Administration
EPA	Environmental Protection Agency
FCC	Federal Communications Commission
FMHA	Farmers Home Administration
FS	Federal Specifications
IAI	International Association of Identification
ISEA	Industrial Safety Equipment Association
ISO	International Organization for Standardization
ITE	Institute of Traffic Engineers
NBFU	National Board of Fire Underwriters
(NFPA)	National Fluid Power Association
NBS	National Bureau of Standards
NISO	National Information Standards Organization
OSHA	Occupational Safety and Health Administration
SI	Salt Institute
SPI	The Society of the Plastics Industry, Inc.
USDC	United States Department of Commerce
WEF	Water Environment Federation

K. General Building Construction

AHA	American Hardboard Association
AHAM	Association of Home Appliance Manufacturers
AITC	American Institute of Timber Construction
APA	American Parquet Association, Inc.
APA	American Plywood Association
BHMA	Builders Hardware Manufacturers Association

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BIFMA	Business and Institutional Furniture Manufacturers Association
DHI	Door and Hardware Institute
FM	Factory Mutual Fire Insurance Company
HPMA	Hardwood Plywood Manufacturers Association
HTI	Hand Tools Institute
IME	Institute of Makers of Explosives
ISANTA	International Staple, Nail and Tool Association
ISDSI	Insulated Steel Door Systems Institute
IWS	Insect Screening Weavers Association
MBMA	Metal Building Manufacturers Association
NAAMM	National Association of Architectural Metal Manufacturers
NAGDM	National Association of Garage Door Manufacturers
NCCLS	National Committee for Clinical Laboratory Standards
NFPA	National Fire Protection Association
NFSA	National Fertilizer Solutions Association
NKCA	National Kitchen Cabinet Association
NWMA	National Woodwork Manufacturers Association
NWWDA	National Wood Window and Door Association
RMA	Rubber Manufacturers Association
SBC	SBC Standard Building Code
SDI	Steel Door Institute
SIA	Scaffold Industry Association
SMA	Screen Manufacturers Association
SPRI	Single-Ply Roofing Institute
TCA	Tile Council of America
UBC	Uniform Building Code

L. Roadways

AREA	American Railway Engineering Association
DOT	Department of Transportation
SSRBC	Standard Specifications for Road and Bridge Construction, Georgia Department of Transportation
SSHC	Standard Specification for Highway Construction, 1986 Edition, South Carolina Department of Highways and Public Transportation

M. Plumbing

AGA	American Gas Association
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NSF	National Sanitation Foundation
PDI	Plumbing Drainage Institute
SPC	SBCC Standard Plumbing Code

N. Refrigeration, Heating, and Air Conditioning

AMCA	Air Movement and Control Association
ARI	American Refrigeration Institute
ASHRAE	American Society of Heating, Refrigeration, and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
CGA	Compressed Gas Association
CTI	Cooling Tower Institute
HEI	Heat Exchange Institute
IIAR	International Institute of Ammonia Refrigeration
NB	National Board of Boilers and Pressure Vessel Inspectors
PFMA	Power Fan Manufacturers Association
SAE	Society of Automotive Engineers
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
TEMA	Tubular Exchangers Manufacturers Association

O. Equipment

AFBMA	Anti-Friction Bearing Manufacturers Association, Inc.
AGMA	American Gear Manufacturers Association
ALI	Automotive Lift Institute
CEMA	Conveyor Equipment Manufacturers Association
CMAA	Crane Manufacturers Association of America
DEMA	Diesel Engine Manufacturers Association
MMA	Monorail Manufacturers Association
OPEI	Outdoor Power Equipment Institute, Inc.
PTI	Power Tool Institute, Inc.
RIA	Robotic Industries Association
SAMA	Scientific Apparatus Makers Association

**1.03 SYMBOLS**

Symbols and material legends shall be as scheduled on the Contract Drawings.

**END OF SECTION # 01091**

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**S219 – Brookfield Country Club Sewer Lining**  
**SECTION NO. 01150**  
**MEASUREMENT OF PAYMENT-ALLOWANCE**

**PART 1**

**1.01 GENERAL**

- A. This section identifies each Measurement of Payment for items in the Bid Sheet and describes the methods by which evaluation of work complete will be based. This section should be used to assist in the development of the Construction Schedule, the Schedule of Values and in determination for completion of work the following measurement criteria shall be used.

**1.02 NON-PAYMENTS**

- A. No separate payment shall be made for any traffic control, work area protection, recording, safety measures, set-up of equipment and set-up of staging area except as indicated below. Payment for these items shall be part of the unit price bid for each particular item of work.
- B. The contractor shall allow the County a minimum of 15 days after the issue of a RFI. No payment shall be made for “down time”.

**PART 2 - MEASUREMENT AND PAYMENT**

**2.01 SCOPE**

- A. The Bid lists each item of Work for which payment will be made. No payment will be made for any items other than those listed in the Bid.
- B. Required items of work and incidentals necessary for the satisfactory completion of the Work which are not specifically listed in the Bid, and which are not specified in this section to be measured or to be included in one of the items listed in the Bid, shall be considered as incidental to the Work. All costs thereof, including Contractor’s overhead costs and profit, shall be considered as included in the lump sum or unit prices bid for the various Bid items. The Contractor shall prepare his Bid accordingly.
- C. Work includes furnishing all plant, labor, equipment, tools, and materials, which are not furnished by the County, and performing all operations required to complete the Work satisfactorily, in place, as indicated on the Drawings, specified or directed by the Construction Manager.

**2.02 DESCRIPTIONS**

- A. Measurement of an item of Work will be by % completion of activities and milestones as indicated on the schedule of value.
- B. Unless otherwise stated in individual sections of the Specifications or in the Bid Schedule, no separate payment will be made for any item of Work, materials, parts, equipment, supplies or related items required to perform and complete the Work. The costs for all such items required shall be included in the Contract Price bid of which it is a part.
- C. Payment will be made at the Contract Price per unit indicated in the Bid Schedule, with the total price of the Contract being equal to the Total Bid and then summing the extended prices to reflect actual work. Such price and payment shall constitute full compensation to the Contractor for furnishing all plant, labor, equipment, tools, and materials not furnished by the County, and for performing all operations required to provide to the County the entire Project, complete in place, as specified and as indicated on the Drawings.

- D. "Products" shall mean materials or equipment permanently incorporated into the work.
- E. "Provide" shall mean furnish and install.

**2.03 SEWER REHABILITATION**

- A. Payment for pipe lining shall be made at the unit price proposal for each pipe size of each item listed.
- B. Unit rates for sewer rehabilitation shall include all materials, labor, equipment, supplies, site clean up, ventilation, safety, and testing as necessary for a complete and acceptable installation.
- C. Cured-in-place pipe (CIPP) lining shall be performed in accordance with 00900. The liner must be installed such that storm water or groundwater is not allowed to enter the sewer segment.

**2.04 REHABILITATE MANHOLES**

General

- A. Payment for manhole lining process shall be according to the depth of the manhole at the unit price rate. Manhole lining shall be PolytripleX or Approved Equal. Proposed Equals shall be submitted in accordance with Section 00901.
- B. Payment for raising manholes shall include all materials, labor, equipment, supplies, manhole risers, steps, cleaning, ventilation and safety control measures, testing, excavation, earthwork and paving necessary to complete the work according to the height to be raised per manhole at the unit price rate.
- C. Vacuum testing will be paid by each for the labor, material, and equipment necessary to provide an air tight seal per Section 02730, paragraph 3.08, part H. contained herein. Each test will be paid at the unit price rate.

**2.05 SEWER PRECONDITIONING**

- A. Payment for sewer preconditioning shall be made at the unit price rate per linear foot of each pipe size. Measurement of the actual number of feet of sewer preconditioned shall be made from the center of the manholes. Manhole preconditioning must be performed in accordance with Specification 02706 contained herein.

**2.06 MANHOLE PRECONDITIONING**

- A. Payment for manhole preconditioning shall be made per manhole at the unit price rate per manhole vertical foot and diameter and shall include cleaning all surfaces or appurtenances in manholes, including walls, cones, slabs (both intermediate and roof slabs), rungs and benching to a general level of service. Manhole preconditioning shall also include removal and disposal of all roots, corroded concrete, corroded rungs, corroded ladders and intruding laterals which shall be cut flush with the interior surface. The unit rate for preconditioning shall include disposal of all material arising. Sewer preconditioning must be performed in accordance with Specification 02706 contained herein.

**2.07 CCTV**

- A. Payment for CCTV shall be made at the unit price rate per linear foot. The unit price rate shall include all labor, materials, equipment, and safety precautions necessary to CCTV the sewer system and record and submit the video via CD. This unit price rate shall include costs for the use of tripods and any other equipment for confined space entry. This unit price rate shall also include the review of the CCTV by the Contractor and reports generated from the review.
- B. Payment for Reviewing CCTV shall be made at the unit price rate per linear foot. The unit price rate shall include all costs for the video review and reports generated from the review.

**2.08 FLOW BYPASS AND DIVERSION PUMPING**

- A. Payment will be made at the unit price rate for diverting pumping for the specific pipe size which is being bypassed to facilitate sewer line rehabilitation, pipe installation, or manhole work.
- B. Payment will be for each line segment (manhole to manhole) bypassed where flow is stopped, diverted and actually pumped around the line segment(s) being worked on.
- C. Payment will only be made once for a particular line segment, regardless of how many times pumps are used, set-up or demobilized, and how many pumps or pipes are utilized.
- D. Sewer flow control shall be paid for at the unit price rate per set-up plus the unit price per hour of operation stated.
- E. Flow bypass and diversion pumping must be performed in accordance with Specification 01511.

**2.09 SEWER EASEMENT CLEARING**

- A. Payment for sewer easement clearing shall be made at the unit prices proposed according to the schedule below. No payment shall be made for areas which proper erosion control devices are not constructed and maintained. The Contractor must clearly submit a drawing where clearing will occur. The drawing must be included in the work order. Clearing must be performed in accordance with Specification 02110.
  - 1. Light Clearing: This area requires “bush hog” equipment for tree and shrub removal.
  - 2. Medium Clearing: This area requires “bush hog” and “chipper” equipment for tree and shrub removal.
  - 3. Heavy Clearing: This area requires “timbering” equipment for tree and shrub material.

**2.10 EROSION AND SEDIMENTATION CONTROL**

General

- 1. No separate payment shall be made for temporary and/or permanent erosion and sedimentation controls, except as noted below. All other temporary and/or permanent erosion and sedimentation control costs shall be included in the unit price proposal for the item to which it pertains.

2. No payment will be made for any portion of the Project for which temporary erosion and sedimentation controls are not properly maintained.
  3. Quantities for payment shall be based upon actual quantity constructed and authorized by the Engineer.
- A. Rip Rap: All costs for rip rap is to be measured by square yard and paid by the unit rate listed in Bid Form.
- B. Grassing
1. No separate payment will be made for temporary grassing.
  2. Payment shall be made only for the final permanent perennial grassing. This item is primarily intended for areas that are **not** located on the main golf course. All costs for grassing, including seeding, fertilizing, mulching as well as temporary measures, shall be included in the price proposed for Grassing.
- C. Temporary Stream Crossings: All costs for constructing temporary stream crossings, including temporary culverts, stone, necessary earthwork, periodic maintenance and repair, and removal of sediment and all materials placed by the Contractor, following the end of the usefulness of the temporary crossing, shall be included in the unit price proposal for Temporary Stream Crossings.
- D. Reinforced Silt Fence: All costs for reinforced silt fence, where ordered by the Engineer, including installation, maintenance, repair, replacement, and removal, shall be included in the unit price proposal for Reinforced Silt Fence.

**END OF SECTION # 01150**

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**S219 – Brookfield Country Club Sewer Lining**  
**SECTION NO. 01200**  
**PROJECT MEETINGS**

1.01 DESCRIPTION

- A. The Construction Manager will schedule and administer the preconstruction meeting.
- B. The Construction Manager shall schedule and preside at the periodic progress meetings and specially called progress meetings throughout the progress of the work..
- C. Representatives of contractors, subcontractors and suppliers attending the meetings shall be qualified and authorized to act on behalf of the entity each represents.
- D. The Construction Manager will attend progress meetings to ascertain that work is executed consistent with the Contract Documents and the construction schedules.
- E. Related Requirements:
  - 1. Section 01010: Summary of Work
  - 2. Section 01310: Construction Schedules
  - 3. Section 01340: Shop drawings, Product Data, and Samples

1.02 PRECONSTRUCTION MEETING

- A. The Construction Manager will schedule the meeting within 30 days after Notice of Award of Contract. The Construction Manager will prepare agenda for the meeting, distribute written notice of the meeting to the meeting invitees.
- B. The location, date and time of the meeting will be designated by the Construction Manager.
- C. The following parties shall attend the meeting:
  - 1. County's Representative.
  - 2. Construction Manager and/or Program Manager
  - 3. Resident Project Representative
  - 4. Contractor's Superintendent.
  - 5. Major Subcontractors.
  - 6. Major Suppliers.
  - 7. Others as Appropriate.
- D. Suggested Agenda:
  - 1. Distribution and discussion of:
    - A. List of major subcontractors and suppliers.
    - B. Projected Construction Schedules.
  - 2. Critical work sequencing.
  - 3. Major equipment deliveries and priorities.
  - 4. Project Coordination.
    - A. Designation of responsible personnel.
  - 5. Procedures and processing of:
    - A. Field decisions.
    - B. Proposal requests.
    - C. Submittals.
    - D. Change Orders.

- E. Applications for Payment.
  6. Adequacy of distribution of Contract Documents.
  7. Procedures for maintaining Record Documents.
  8. Use of premises:
    - A. Office work and storage areas.
    - B. County's requirements.
  9. Construction facilities, controls and construction aids.
  10. Temporary utilities.
  11. Safety and first aid procedures.
  12. Security procedures.
- D. The Contractor shall record the minutes, including all significant proceedings and decisions reached during the meeting. The contractor shall submit the audio recording of the meeting together with a draft of the written meeting minutes in electronic and hardcopy formats acceptable to the Construction Manager within three days after the meeting. The Contractor shall incorporate the Construction Manger's comments and distribute the final meeting minutes to all participants in the meeting and to all parties affected by decisions made at the meeting within two(2) days after receiving Construction Manager's comments.

### 1.03 PROGRESS MEETINGS

- A. The location, date and time of the regular periodic meetings will be designated by the Construction Manager.
- B. The following parties shall attend the meetings:
  1. Construction Manager, and and/or Program Manager.
  2. Subcontractors as appropriate to the agenda.
  3. Suppliers as appropriate to the agenda.
  4. Others as required.
- C. The Contractor shall prepare agenda for these meetings, and distribute written notice of the meetings at least three(3) work days in advance of the each meeting date, and make physical arrangements for the meetings. The Contractor shall submit a draft agenda for each meeting for Construction Manager's review and approval at least two(2) work days prior to distribution to the meeting invitees.
- D. Suggested Agenda:
- E. Review and approval of minutes of previous meeting.
  - 1 Review of work progress since previous meeting.
  - 2 Field observations, problems, and/or conflicts.
  - 3 Problems which impede Construction Schedule.
  - 4 Review of off-site fabrication, delivery schedules.
  - 5 Corrective measures and procedures to regain projected schedule.
  - 6 Revisions to Construction Schedule.
  - 7 Plan progress, schedule, during succeeding work period.
  - 8 Coordination of schedules.
  - 9 Review submittal schedules; expedite as required.
  - 10 Maintenance of quality standards.
  - 11 Review proposed changes for:
    - i. Effect on Construction Schedule and on completion date.
    - ii. Effect on other components of the Project.
  - 12 Other business.

- F. The Contractor shall record the minutes, including all significant proceedings and decisions reached during the meetings. The contractor shall submit the audio recording of the meeting together with a draft of the written meeting minutes in electronic and hardcopy formats acceptable to the Construction Manager within three days after each meeting. The Contractor shall incorporate the Construction Manger's comments and distribute the final meeting minutes to all participants in the meeting and to all parties affected by decisions made at the meeting within two(2) days after receiving Construction Manager's comments.

1.04 OTHER PROJECT MEETINGS

- A. At the discretion of the Construction Manager, other project meetings, including but not limited to, milestone progress meetings, non-conformance review and resolution, and safety issue review and resolution, may be scheduled.
- B. The location, date and time of these meetings will be designated by the Construction Manager.
- C. The following parties shall attend the meetings:
  - Construction Manager, and and/or Program Manager.
  - Subcontractors as appropriate to the agenda.
  - Suppliers as appropriate to the agenda.
  - Others as required.
- D. The Construction Manager will prepare agenda for the meetings, distribute written notice of the meetings to the meeting invitees.
- E. The Contractor shall record the minutes, including all significant proceedings and decisions reached during the meetings. The contractor shall submit the audio recording of the meeting together with a draft of the written meeting minutes in electronic and hardcopy formats acceptable to the Construction Manager within three days after each meeting. The Contractor shall incorporate the Construction Manger's comments and distribute the final meeting minutes to all participants in the meeting and to all parties affected by decisions made at the meeting within two(2) days after receiving Construction Manager's comments.

**END OF SECTION # 01200**

**S219 – Brookfield Country Club Sewer Lining**  
**SECTION NO. 01310**  
**SCHEDULING OF THE WORK**

**1.0 INTRODUCTION**

This Section describes the Construction Scheduling and progress reporting requirements of the Contract. The primary objectives of the requirements are:

1. To insure adequate planning and execution of the work by the Contractor ;
2. To assist the County and Construction Manager in evaluating the progress of the work;
3. To provide for optimum coordination by the Contractor of its sub-contractors, trades, and suppliers, and of its Work with the work or services provided by the County or any separate contractors; and
4. To permit the timely prediction or detection of events or occurrences which may affect the timely prosecution of the Work?
5. To provide for a basis of progress of work for invoicing and payment to Contractor.

**Contract Term**

The Contract will have a Term of 240 calendar days. This term is the maximum time that the Contract is in effect and constitutes the maximum period of time during which the Work can be accomplished and completed without change order. The Contractor shall prepare their detailed Construction Schedule to be less than or equal to the term of the Contract.

**2.0 GENERAL SCHEDULING REQUIREMENTS**

- A. The work of this contract shall be planned, scheduled, executed, and reported using the critical path method (CPM). The Contractor shall use one of the following software programs to develop its detailed Construction Schedule:
  1. Microsoft Project, latest version
  2. SureTrak Project Manager, latest version
  3. Primavera Project Planner
- B. The detailed Construction Schedule shall represent the Contractor's commitment and intended plan for completion of the Work in compliance with the Contract completion date and interim milestone dates specified. The detailed Construction Schedule shall take into account all foreseeable activities to be accomplished by any separate Contractors or the County, and interface dates with utility companies, the County's operations, and others. The detailed Construction Schedule shall anticipate all necessary manpower and resources to complete the Work within the dates set forth.
- C. Once approved by the Construction Manager, the detailed Construction Schedule will become the Baseline Schedule and Schedule of Record for coordinating the Work, scheduling the Work, monitoring the Work, reviewing the progress payment requests, evaluating time extension requests, and all other objectives listed above.
- D. The Contractor is responsible for determining the sequence of activities, the time estimates of the detailed construction activities and the means, methods, techniques and procedures to be employed. The detailed Construction Schedule shall represent the Contractor's best judgment of how it will prosecute the Work in compliance with the Contract requirements.

The Contractor shall ensure that Detailed Construction Schedule is current and accurate and is properly and timely monitored, updated and revised as Project conditions and the Contract Documents may require.

- E. When there are separate contractors working concurrently on the Project whose work must interface or be coordinated with the Work of the Contractor, the Contractor shall coordinate its activities with the activities of the separate contractors, and the Detailed Construction Schedule shall take into account and reflect such work by others.
- F. The Contractor shall be solely responsible for expediting the delivery of all materials and equipment to be furnished by it so that the progress of construction shall be maintained according to the currently approved Construction Schedule for the Work. The Contractor shall notify the Construction Manager in writing, and in a timely and reasonable manner, whenever the Contractor determines or anticipates that the delivery date of any material or equipment to be furnished by the Contractor will be later than the delivery date indicated by the currently approved Construction Schedule, or required consistent with the completion requirements of this Contract, subject to schedule updates as herein provided.

### 3.0 DETAILED CONSTRUCTION SCHEDULE

- A. Initial D/B Schedule was submitted with the successful Contractor's proposal in response to the D/B RFP. Within 14 days after the Notice to Proceed, the Contractor shall submit a detailed Construction Schedule according to the requirements. The Construction Manager will review the Construction Schedule and will return the reviewed copy within the time-period specified for submittals. If required, the Contractor shall resubmit schedule to the Construction Manager making any required revisions within ten (10) days following the return date, and then again similarly for all such partial approvals and the final approval.
- B. The detailed Construction Schedule shall consist of a time-scaled, detailed network graphic representation of all activities that are part of the Contractor's construction plan and an accompanying listing of activity's dependencies and interrelationships. The detailed Construction Schedule submission shall include, but not be limited to, the following information:
  - 1. Project name
  - 2. The Work shall be divided into logical and identifiable subdivisions called activities. All activities will be assigned to a Milestone. The total cost of the all the work represented by all the Milestones shall equal the Total Bid Amount (section 00300). Work shall be further subdivided into Activities as defined below.
  - 3. Activities for all aspects of the work, with durations not exceeding fourteen (14) calendar days for all activities for which the Contractor will perform actual construction work. Material procurement, submittals, concrete curing and other similar activities may exceed fourteen (14) calendar days if approved by the Construction Manager. Related activities, each of duration of five (5) calendar days or less, may be shown as one activity together, if not on the critical path of timely job completion.
  - 4. The Construction schedule shall indicate the Critical Path for the work. This can be accomplished on the Construction Schedule, on a separate schedule.
  - 5. Outage schedules for existing utility services, if any, that will be interrupted during the performance of the Work
  - 6. Acquisition and installation of equipment and materials supplied and/or installed by the County or separate contractors
  - 7. All start dates, milestones, float and completion dates

8. An accounting of the number of workdays anticipated to be lost due to weather. This accounting shall be in accordance with allowable days per month provided elsewhere in the Contract Documents.
  9. A tabular report listing all predecessor and successor activities for each activity
  10. A legible time scaled network diagram
  11. A listing of the project calendar, indicating the anticipated days of work performance
  12. A CD-ROM in a form and format acceptable to the Construction Manager, of the detailed Construction Schedule including all required submission information resident in the computer system and containing all of the files associated with the schedule; or a legible spreadsheet report with activity number, description, duration and successor activities.
- C. All Milestones and Activities are to appear on the detailed Construction Schedule shall include, but not be limited to, preliminary construction activities, pre-construction meetings, site work, structure erection, roof close-in, exterior wall systems, paving, major material fabrication and delivery, shop drawings submittals, bi-weekly progress meetings, furniture delivery and installation, equipment delivery and installation, coordination requirements, mock-up installations and inspections, dates of Substantial and Final Completion, Certificate of Occupancy inspection, systems testing and instruction, and special County decision points that impact the Work.
- D. Schedule Reports: Schedule submissions will contain the following minimum information for each activity:
1. Activity number, description and estimated duration
  2. Anticipated start and finish dates
  3. Responsibility for activity
  4. The cost loading values for each activity.
- E. For all major equipment and materials to be fabricated or supplied for the Project, the Detailed Construction Schedule shall show a sequence of activities including:
1. Preparation of shop drawings and sample submissions
  2. A reasonable time for review of shop drawings and samples or such time as specified in the Contract Documents
  3. Shop fabrication, delivery and storage
  4. Erection or installation
  5. Testing of equipment and materials.
- F. The Contractor shall submit, as a part of the data submitted to the Construction Manager, a narrative report indicating the anticipated allocation by the Contractor of the following resources and work shifts for each activity which he proposes to be utilized on the Project:
1. Labor resources;
  2. Equipment resources; and
  3. Whether it proposes the Work to be performed on single, double or triple shifts, and whether it is to be done on a 5, 6 or 7 day work week basis. (see work hours)
- G. The Construction Manager shall have the right to require the Contractor to modify any portion of the Contractor's Detailed Construction Schedule, or Recovery Schedule, including cost loading with the Contractor bearing the expense thereof, which the Construction Manager reasonably determines to be:
1. Impractical;

2. Based upon erroneous calculations or estimates;
3. Unreasonable;
4. Not in compliance with other provisions of the Contract Documents;
5. Required in order to ensure proper coordination by the Contractor of the Work of its sub-contractors and with the work or services being provided by any separate contractor;
6. Necessary to avoid undue interference with the County's operations or those of any utility companies or adjoining property owners;
7. Necessary to ensure completion of the Work by the milestone and completion dates set forth in the Contract Documents;
8. Required in order for the Contractor to comply with the requirements of this Appendix or any other requirements of the Contract Documents; or
9. Not in accordance with the Contractor's actual operations.

#### **4.0 BASELINE SCHEDULE**

- A. Upon final approval, the detailed Construction Schedule shall be used as a Baseline Schedule. The Baseline Schedule will be change only under the following circumstances after review and approval of the Construction Manager.
  1. An approved Change Order to the Work, which constitutes an adjustment to the original scope of work and requires additional time to complete. The baseline schedule will be change to reflect the additional time of the change order.
  2. Unavoidable delays, not the fault of the Contractor, contained in a time-only approved Change Order. The baseline schedule will have the additional time added to the schedule.
  3. A Change Order approved by the County that has an additional time extension.
  4. A request by the Contractor for a revision to the Detailed Construction Schedule that does not extend the Acceptance Date beyond the term of the Contract.
- B. It should be noted that delays attributed to the Contractor or failure of the Contractor to make major milestones that require a subsequent recovery schedule does not change the baseline (original) schedule. Recovery schedules, when required, will be used until the project regains the baseline schedule or until the Work is complete, the term of the contract reached or the contract terminated. The baseline schedule remains the baseline unless changed by an approved change order or is revised and equals the term of the contract.

#### **5.0 SCHEDULE OF VALUES**

- A. As part of the submission of the detailed Construction Schedule, the Contractor shall submit a breakdown of the expected value of each of the schedule activities for which payment will be requested. Activities shall roll-up into Milestones. . The total cost of all Milestones will be equal to the Total Bid Amount (section 00300). The cost breakdown of the detailed Construction Schedule shall have a direct correlation to the Schedule of Values to be used as the basis for Applications for Payment.
- B. Draw Down Schedule: Upon acceptance, by the County of the Schedule of Values, the Contractor shall prepare and submit to the County a schedule of draw down payments, referred to as Draw Down Schedule, totaling the Total Amount of Bid. This Draw Down Schedule will be used by the County to anticipate the cash flow needed to meet its financial

obligations under the Design/Build Contract. Any change in the Schedule of Values, as specified below, will require that the Draw Down Schedule be revised and resubmitted.

## **6.0 UPDATING OF CONSTRUCTION SCHEDULE—DESIGN AND CONSTRUCTION PROGRESS REPORTS**

- A. The Contractor shall submit for the monthly progress report and for all payment requests an update of the Construction Schedule. The Construction Manager will review the Construction Schedule contained in Monthly Progress Report or payment request to determine the Contractor's actual progress. Prepared by the Contractor, said schedule updates shall set forth current and accurate progress data and shall be based upon the Contractor's best judgment. Said schedule updates shall be prepared by the Contractor in consultation with all principal sub-contractor and suppliers.
- B. The updated Schedule shall show the activities, or portions of activities, completed during the reporting period, the actual start and finish dates for these activities, remaining duration and/or estimated completion dates for activities currently in progress, and quantities of material installed during the reporting period. The Construction Manager will produce a computerized update worksheet for the Contractor to complete as a part of this process.
- C. At the monthly progress meeting held in accordance with Appendix 10, a total review of the Project will take place including but not limited to, the following:
  - 1. Current update of the Detailed Construction Schedule
  - 2. Anticipated detailed construction activities for the subsequent report period
  - 3. Critical items pending
  - 4. Contractor's requested changes to the detailed Construction Schedule. These changes shall be accompanied by a change order to the scope of work and term or a change order to the term only.
- D. The Contractor shall submit a narrative with the progress report which shall include, but not be limited to, a description of problem areas, current and anticipated delaying factors and their impact, explanations of corrective actions taken or planned, any proposed newly planned activities or changes in sequence, and proposed logic for a Recovery Schedule, if required, as further described herein. The report shall also include:
  - 1. A narrative describing actual work accomplished during the reporting period
  - 2. A list of major construction equipment used on the Project during the reporting period
  - 3. The total number of men by craft actually engaged in the work during the reporting period, with such total stated separately as to office, supervisory, and field personnel
  - 4. A manpower and equipment forecast for the succeeding thirty (30) days, stating the total number of men by craft, and separately stating such total as to office, supervisory and field personnel
  - 5. A list of Contractor supplied materials and equipment, indicating current availability and anticipated job site delivery dates
  - 6. Anticipated changes or additions to Contractor's supervisory personnel.
- E. As part of the updating process, the Construction Manager will calculate, based upon progress data provided by the Contractor and agreed to by the Construction Manager, the value of Work completed based on the sum of the cost loading amounts for all activities, including activities specifically defined for stored materials, less the amount previously paid. Summation of all values of each activity less the appropriate percent of retainage shall be the maximum amount payable to the Contractor, provided that the Contractor has complied with all requirements of the Contract Documents.

## **7.0 RECOVERY SCHEDULE**

- A. Should the updated detailed Construction Schedule, at any time during the Contractor's performance, show, in the sole opinion of the Construction Manager, that the Contractor is fourteen (14) or more days behind schedule for any milestone or completion date for any location or category of work, the Contractor, at the request of the Construction Manager, shall prepare a Recovery Schedule within 5 days, at no additional cost to the County (unless the County is solely responsible for the event or occurrence which has caused the schedule slippage), explaining and displaying how the Contractor intends to reschedule its Work in order to regain compliance with the detailed Construction Schedule.
- B. The Contractor in preparing a recover schedule shall prepare and submit to the Construction Manager a Recovery Schedule, incorporating the best available information from sub-contractors and others that will permit a return to the Detailed Construction (baseline) Schedule at the earliest possible time. The Contractor shall prepare a Recovery Schedule to the same level of detail as the detailed Construction Schedule. The Recovery Schedule shall be prepared in coordination with other separate contractors on the Project.
- C. Within two (2) days after submission of the Recovery Schedule to the Construction Manager, the Contractor and any of the necessary sub-contractors, suppliers, vendors, manufacturers, etc. shall participate in a conference with the Construction Manager to review and evaluate the Recovery Schedule. Each of the participants will give a written commitment to comply with the Recovery Schedule. Within two (2) days of the conference, the Contractor shall submit the revisions necessitated by the review for the Construction Manager's review and approval. The Contractor shall use the approved Recovery Schedule as its plan for returning to the detailed Construction Schedule.
- D. The Contractor shall confer continuously with the Construction Manager to assess the effectiveness of the Recovery Schedule. As a result of these conferences, the Construction Manager will direct the Contractor as follows:
  1. If the Construction Manager determines the Contractor continues behind schedule, the Construction Manager will direct the Contractor to prepare a Schedule Revision. If the submitted Schedule Revisions will exceed the term of the Contract then the Contractor must also submit and change order request. This change order request will be for the amount of time the project has been delayed. All conditions effecting the requested change order and liquidated damages or construction claims that might arise from the delay or from the change order must be included in the Change Order request.
  2. If the Construction Manager determines the Contractor has successfully complied with provisions of the Recovery Schedule, the Construction Manager will direct the Contractor to return to the use of the approved detailed Construction Schedule.

## 1.0 SCHEDULE REVISIONS

- A. If the Contractor cannot recover the detailed Construction Schedule via the Recovery Schedule then the Contractor must prepare a Schedule Revision and if this revision extends the detailed Construction Schedule beyond the term of the Contract, a request for a Change Order must be submitted. If the Schedule does not exceed the term of the contract the Construction Manager can approve the revision that now becomes the new Detailed Construction Schedule and Baseline. If the Term of the Contract is exceeded then a Change Order request must be submitted and the schedule revision with reasons for the delay. If the delay is the fault of the Contractor then only the detailed Construction Schedule is revised with the Baseline remaining unchanged. If the delay is County's fault or request or an uncontrollable circumstance then the detailed Construction Schedule and baseline will be revised following approval of the Change Order. Change Orders within Fulton County can

take several months. The requests for a Change Order must be well thought out and analyzed to insure that all delays are requested and documented.

- B. Requests for revision will be accompanied by evidence acceptable to the Construction Manager that the Contractor's suppliers, and sub-contractor are in agreement with the proposed revisions. If there are separate contractors on the Project, the approval of the separate contractors shall be obtained to make the proposed schedule revisions. If accepted by the Construction Manager and County, the revisions shall be binding upon the Contractor and all separate contractors on the Project.

## 9.0 FLOAT TIME

- A. Float or slack time associated with one chain of activities is defined as the amount of time between earliest start date and latest start date or between earliest finish date and latest finish date for such activities, as calculated as part of the currently approved Construction Schedule. Float or slack time shown on the currently approved Construction Schedule is not for exclusive use or benefit of either the County or the Contractor and is available for use by either of them according to whichever first needs the benefit of the float to facilitate the effective use of available resources and to minimize the impact of Project problems, delays, impact, acceleration or changes in the Work which may arise during performance. The Contractor specifically agrees that the County or Construction Manager in conjunction with their review activities or to resolve Project problems may use float time. The Contractor agrees that there will be no basis for any modification of the milestone or completion dates or an extension of the Contract Time, or a claim for additional compensation as a result of any Project problem, delay, impact, acceleration, or change order which only results in the loss of available float on the currently approved Construction Schedule.
- B. Float time shown on any Construction Schedule shall not be used arbitrarily by the Contractor in a manner, which, in the opinion of the Construction Manager, unnecessarily delays separate contractors from proceeding with their work in a way which is detrimental to the interests of the County

**END OF SECTION # 01310**

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**S219 – Brookfield Country Club Sewer Lining**  
**SECTION NO. 01320**  
**PROCESS REPORTS AND PHOTOGRAPHS**

**1.01 GENERAL**

- A. The Contractor shall submit to the Construction Manager, on the last day of each week, the daily progress reports for each day worked that week, including the following information:
- B. Prior to the beginning of any work, the Contractor shall take project photographs of the work area to record existing conditions. Following completion of the work, another recording shall be made showing the same area and features as in the pre-construction photographs. All conditions which might later be subject to disagreement shall be shown in sufficient detail to provide a basis for decisions. The pre-construction photographs shall be submitted to the Construction Manager within 25 calendar days after the date of receipt by the Contractor of Notice to Proceed. Post-construction photographs shall be provided prior to final acceptance of the project. Two (2) 8" x 10" color prints of each photographic shot, for a total of thirty (30) shots shall be submitted for the Pre-Construction and Post-Construction Phases.
1. A statement of work performed that day
  2. manpower report indicating numbers working that day by trade, including subcontractors.
  3. A copy of a delivery receipt of all deliveries, to the project on that day, of the equipment or materials that require approval according to these Specifications.
  4. Weather conditions.
  5. Other data pertinent to the progress of the work.
- C. As the work progresses, the Contractor shall provide record photographs with negatives of all major components of the construction. The photographs shall be taken at least monthly, or more frequently as necessary to provide an appropriate record of the work. A minimum of three (3) 8" x 10" color prints of each photographic shot, for a total of ten (10) shots shall be submitted monthly with each pay request. The photographs shall be representative of the primary work being claimed for during the period under consideration. The view selection will be agreed to with the Construction Manager. Pertinent information will be provided at the bottom front left corner of each photograph, including: project name, Contractor's name, description of subject, orientation, and date and time of exposure. Photographs submitted shall be enclosed back to back in a double face plastic sleeve punched to fit a standard three-ring binder.
- D. Additionally, all photos taken shall be provided to the Construction Manager on CD-ROM at the same time that hardcopies are required.

**END OF SECTION # 01320**

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**S219 – Brookfield Country Club Sewer Lining**  
**SECTION NO. 01340**  
**SHOP DRAWINGS, PRODUCT DATA AND SAMPLES**

1.01 GENERAL

- A. The Contractor shall submit shop drawings, product data and samples as required by the Contract Documents or as requested by the Construction Manager.
- B. Related Requirements:
  - 1. General Conditions

1.02 SHOP DRAWINGS AND PRODUCT DATA

- A. Submit shop drawings, product data, and/or samples covering the following items of work.
  - 1. Paving and surfacing materials
  - 2. Concrete mix design
  - 3. Water pipe material
  - 4. Ductile iron pipe
  - 5. Precast concrete structures
  - 6. Manhole frames, covers and flexible joints
  - 7. Pumps
  - 8. Pump motors
  - 9. Pump controls
  - 10. Electrical equipment
  - 11. Building specialties
  - 12. Valves
  - 13. Chemical Feed and Storage Equipment
  - 14. Structural steel
  - 15. Miscellaneous metals
  - 16. Paints, waterproofing
  - 17. Hoisting Equipment
  - 18. Instrumentation and SCADA Equipment
  - 19. Flow measurement equipment
  - 20. Piping layouts
- B. Submit shop drawings and product data for any additional items of work as necessary for the successful completion of the project.
- C. Shop drawings for any structure shall consist of such detailed plans as may be required for the prosecution of the work but not included in the Drawings. All necessary shop drawings shall be furnished by and through the Contractor. They shall include shop details, erection plans, and bending diagrams for reinforcing steel. Review by the Construction Manager must be obtained before any work involving these plans may be performed. Plans for falsework, centering and form work may also be required, and such cases shall be likewise subject to review by the Construction Manager.

1.03 CONTRACTOR'S RESPONSIBILITIES

- A. Approve shop drawings, product data and samples prior to submission.
- B. Determine and verify:
  - 1. Field measurements and quantities.

- 2. Field construction criteria.
- 3. Materials of construction.
- 4. Catalog numbers and similar data.
- 5. Conformance with specifications.
- C. Coordinate each submittal with requirements of the work of other submittals and of the Contract Documents.
- D. Notify the Construction Manager in writing, at time of submission, of any deviations in the submittals from the requirements of the Contract Documents in order that, if the deviations are deemed acceptable, suitable action may be taken for proper adjustment. Otherwise, the Contractor will not be relieved of the responsibility for executing the work in accordance with the Drawings and Specifications even though such shop drawings have been reviewed by the Construction Manager.
- E. Fabrication or work which requires submittals shall not begin until return of submittals after the Construction Manager's review.
- F. Keep one set of approved and reviewed shop drawings on the job site at all times.
- A. Produce the required shop drawings.

1.04 SUBMISSION REQUIREMENTS

- A. Make submittals promptly in accordance with approved schedule, and in such sequence as not to cause delay in the work or in the work of any other contractor.
- B. Number of submittals required
  - 1. Shop drawings and product data: The Contractor shall submit seven copies of shop drawings and product data to the Construction Manager for review.
  - 2. Samples: The Contractor shall submit two samples, with tags and properly identified, for each item requiring samples.
- C. Each submission must be accompanied by a consecutively numbered letter of transmittal in duplicate, listing the contents of the submission and identifying each item by reference to Specification Section or Drawing number.
- D. Submittals shall contain:
  - 1. The date of submission and the dates of any previous submissions.
  - 2. The Project title and number.
  - 3. Contract identification.
  - 4. The names of:
    - a. Contractor.
    - b. Supplier.
    - c. Manufacturer.
  - 5. Identification of the product, with the Specification Section number.
  - 6. Field dimensions, clearly identified as such.
  - 7. Relation to adjacent or critical features of the work or materials.
  - 8. Applicable standards, such as ASTM or Federal Specification numbers.
  - 9. Identification of deviations from Contract Documents.
  - 10. Identification of revisions on resubmittals.
  - 11. An 8 inch by 3 inch blank space for Contractor and Construction Manager stamps.

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12. Contractor's stamp shall be initialed or signed, certifying to approval of the submittal, to the verification of products, field measurements and field construction criteria, and to the coordination of the information within the submittal with the requirements of the work and of Contract Documents.
- E. Catalog plates and other similar materials that cannot be conveniently labeled shall be bound in suitable covers bearing the identifying data.
- F. Shop drawings shall be accompanied by all required certifications and other such supporting materials, and shall be submitted in such sequence or in such groups that all related items may be reviewed together. When shop drawings cannot be reviewed because the submission is not complete, or because related shop drawings or items have not been received, such shop drawings will be returned without action or will be held until the lacking materials are received. Any delay to the project resulting from the submission of incomplete shop drawing data shall be the responsibility of the Contractor and shall not constitute grounds for a project time extension.
- G. Other special requirements may be listed in the Specifications and/or given to the Contractor at the preconstruction conference.
- 1.05 RESUBMISSION REQUIREMENTS
- A. Make any corrections or changes to the submittals required by the Construction Manager and resubmit for review.
- B. Shop drawings and product data:
1. Revise initial drawings or data, and resubmit as specified for the initial submittal.
  2. Indicate any changes which have been made other than those requested by the Construction Manager.
- C. Samples: Submit new samples as required for initial submittal.
- 1.06 DISTRIBUTION
- A. Distribute shop drawings and product data which have been reviewed by the Construction Manager to:
1. Job site file.
  2. Subcontractors.
  3. Supplier or Manufacturer.
  4. As requested by Construction Manager.
- 1.07 CONSTRUCTION MANAGER'S DUTIES
- A. Review submittals with reasonable promptness and in accordance with the shop drawing schedule.
- B. Affix stamp and initials or signature, and indicate whether the review is complete, or resubmittal is required.
- C. Return submittals to the Contractor for distribution, or for resubmission.
- 1.08 REVIEW OF DRAWINGS
- A. Review of shop drawings will be general, for conformance with the design concept of the project and compliance with the information given in the Contract Documents, and will not include verification of quantities, detailed dimensions, nor adjustments of dimensions to actual field conditions. Review shall not be construed as permitting any departure from the Contract requirements, as authorization of any increase in price, or as relieving the

Contractor of the responsibility for any error in details, dimensions or otherwise that may exist.

- B. Review by the Construction Manager of Contractor's shop drawings does not relieve the Contractor of any responsibility for accuracy of dimensions and details. The Contractor shall be responsible for agreement and conformity of his shop drawings with the Drawings and Specifications.
- C. Allow a minimum of 30 days for the Construction Manager's initial processing of each submittal. This time frame shall also apply to resubmitted shop drawings.

1.09 PAYMENT

- A. The contract price shall include the cost of furnishing all shop drawings, product data and samples. No extra payment will be made for such drawings, data, and samples.

**END OF SECTION # 01340**

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**S219 – Brookfield Country Club Sewer Lining**  
**SECTION NO. 01420**  
**INSPECTION OF WORK**

1.01 CONSTRUCTION MANAGER'S INSPECTION

- A. The Construction Manager shall have the right of access to and inspection of the work at all times. Materials, equipment and products shall be subject to the Construction Manager's review as specified herein.
- B. The Construction Manager is responsible for general surveillance of the work on behalf of the County. The Construction Manager is not responsible for construction means, methods, sequences, or procedures or for safety precautions and programs in connection with the work. The Construction Manager is not responsible for supervision of the work and shall not give instruction to the Contractor's personnel as to methods of execution of the work. The Construction Manager is not responsible for the Contractor's failure to carry out the work in accordance with the Contract Documents.

1.02 CONTRACTOR'S DUTIES

- A. The Contractor is responsible for all materials, equipment, methods, and procedures in execution of the work.
- B. The Contractor shall correct to the satisfaction of the Construction Manager any work or material found to be defective or of deficient quality. Such corrections shall be made by the Contractor at no additional expense to the County.

1.03 RIGHT OF ENTRY

- A. Representatives of Fulton County System, the Environmental Protection Division of the Georgia Department of Natural Resources, and the U.S. Department of Agriculture, Soil Conservation Services and others as may be identified by the County shall have access to the work wherever it is in preparation or progress. The Contractor shall provide proper facilities for such access and inspection.

**END OF SECTION # 01420**

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**S219 – Brookfield Country Club Sewer Lining**  
**SECTION NO. 01500**  
**CONSTRUCTION FACILITIES & TEMPORARY CONTROLS**

1.01 WORK INCLUDED

- A. The work covered by this Section includes furnishing all labor, equipment, and materials required for temporary control of construction operations.

1.02 PUMPING

- A. The Contractor shall furnish and operate pumping and appurtenant piping for dewatering, flow rerouting, or any similar purposes.
- B. Pumping equipment which could disturb the public shall be operated only during a standard work day or as approved by the Construction Manager.
- C. No discharge of raw sewage will be permitted to area water courses under any circumstances.

1.03 TEMPORARY FACILITIES

- A. The Contractor shall provide all temporary facilities for water, heat, electric light, and power as required for the work during the entire period of operations. Contractor shall be responsible for payment of utilities costs for the duration of construction.
- B. The Contractor shall provide temporary toilets as required and shall maintain them in a sanitary condition for the duration of the work and remove them at completion.
- C. On or before the completion of the work, the Contractors shall remove all temporary facilities, together with all rubbish and trash, as directed by the Construction Manager.

1.04 STORAGE

- A. The Contractor shall secure adequate storage to accommodate the required equipment, vehicles, and materials for the period of performance of the Contract.

1.05 CONTRACTOR'S OFFICE (NOT USED IN THIS CONTRACT)

- A. The Contractor shall maintain an office convenient to the site of the work during the period of construction, at which he or his authorized agent shall be while work is in progress. The size of the office shall be as required for general use and to provide space for project meetings. Furnishings shall be provided as necessary. The office shall be provided with telephone service. Copies of the Contract, Drawings and Specifications and approved shop drawings shall be kept on file at this office for reference at any time. The Contractor's attention is directed to Section 01720, Project Record Documents of these Specifications. Notices, instructions, orders, directions or other communications from the Construction Manager, left at this office, shall be considered as received by the Contractor.

1.06 COUNTY'S/CONSTRUCTION MANAGER'S FIELD (NOT USED IN THIS CONTRACT)

1.07 CONSTRUCTION UTILITIES

- A. The plant permanent lighting and power systems, may be utilized, if available, to provide light and power to construction offices, and for construction purposes. The Contractor shall pay all power company installation and use charges for the electrical energy utilized for the construction related power and light. The Contractor shall make his own arrangements at his own expenses for obtaining the water supply necessary for construction purposes, and he shall pay for all water consumed during construction.

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1.08 TEMPORARY BUILDINGS (NOT USED IN THIS CONTRACT)

1.09 REMOVAL

- A. The Contractor shall remove temporary facilities from the site of the work when so notified by the Construction Manager.

1.10 USE OF PREMISES

- A. The Contractor shall not load nor permit any part of any structures to be loaded with a weight which will endanger its safety.
- B. The Contractor shall confine his apparatus, the storage of materials and the operations of his workmen to the limits defined by laws, ordinances, permits or directions of the Construction Manager and shall not unduly encumber the premises with his materials.
- C. The Contractor shall enforce the instructions of the Construction Manager regarding signs, advertisements, fire and smoking.

1.11 MAINTENANCE DURING CONSTRUCTION

- A. The Contractor shall maintain, at his expense, the work during construction and until final acceptance of all work under the Contract. Continuous and effective work shall be prosecuted day by day, with adequate equipment and forces as required to keep the backfill, pavement, structures, pipe lines and other features in satisfactory and acceptable condition at all times.
- B. In the event the Contractor fails to remedy any unsatisfactory situation, within twenty-four hours after receipt of written notice from the Construction Manager describing the unsatisfactory conditions, the County may be immediately proceed with adequate forces and equipment to maintain the project, and the entire cost of this maintenance will be deducted from the monies otherwise due the Contractor under the Contract.
- C. As an alternative to the above specified maintenance, the cost of all of the items which are not properly maintained may be deducted at the Contract Prices from the current partial payment request even if such items have been paid for in previous estimates.

1.12 CLEAN-UP AND DISPOSAL

- A. At the end of each day's operation, the Contractor shall thoroughly clear the work site of all dirt or debris, and generally restore the site to an acceptable condition. Upon completion of the work, all excess material and rubbish shall be removed from the job site and disposal of. The surrounding construction area shall be left in as good a condition as that which existed prior to construction.
- B. The Contractor shall transport and expeditiously dispose of all materials removed from the construction site. Disposal shall be at a site approved by the Construction Manager at no additional cost to the County, and in a manner consistent with all applicable codes and regulations.

1.13 TRAFFIC CONTROLS

- A. The Contractor shall provide all signs, barriers, markers, and flagmen as required to maintain traffic.
- B. The Contractor shall maintain traffic at all times, as practicable.
- C. No road shall be closed to traffic without the approval of the Construction Manager.
- D. Open trenches adjacent to traveled rights-of-way shall be properly barricaded, bridged, or otherwise maintained safe for traffic.

1.14 ACCESS ROADS

- A. Streets, road and drives used by the Contractor for access to and from the site of the work shall be protected from damage caused by the normal traffic of vehicles used for or in connection with construction work. Any such damage done shall be repaired immediately and left in good condition at the end of the construction period. Any new access road construction shall be all weather and have drainage structures placed as shown or as required.

1.15 RESTORATION OF PAVING

- A. The Contractor shall restore in a neat and acceptable manner all streets, roadways, or other areas where trenches have been opened.
  - 1. Bituminous concrete, and prime and seal paving shall be restored so that the wearing surface and base course shall each be one and one-half times the original thickness.
  - 2. Gravel surfacing shall be restored to its original thickness with a size gravel to match the existing, but in no case shall restored surfacing be less than 4 inches.
- B. The Contractor shall restore concrete curbs, gutters, and walks to the size and shape as were existing. Damaged sections shall be replaced with complete new sections. Patching of damaged sections will not be permitted.

1.16 RESTORATION OF DEVELOPED PROPERTY

- A. The Contractor shall replace or restore as nearly as practicable to their original condition, all clothes line posts, mailboxes, fences, lawns, hedges, shrubs and other such items which have been disturbed by the performance of the work.
- B. The Contractor shall reseed, mulch and maintain trenches in lawn until 4 inch stand of grass has been produced. Seed shall be of the type to produce a stand of grass similar to the existing.

1.17 TREE AND PLANT PROTECTION

- A. The Contractor shall preserve and protect existing trees and plants at the site which are designated to remain and those adjacent to the site.
- B. Temporary barriers to a height of six feet shall be provided around each tree, or around each group of trees, or around plants to be protected.
- C. The Contractor shall carefully supervise excavating, grading and filling, and subsequent construction operations to prevent damage.
- D. The Contractor shall consult with the Construction Manager, and remove those roots and branches which interfere with construction.
- E. The Contractor shall replace, or suitably repair, trees and plants designated to remain, which have been damaged or destroyed due to construction operation.
- F. Reasonable care shall be taken during construction to avoid damage to vegetation. Ornamental shrubbery and tree branches shall be temporarily tied back, where appropriate, to minimize damage. Trees which receive damage to branches shall be trimmed of those branches to improve the appearance of the tree. Tree trunks receiving damage from equipment shall be treated with a tree dressing.

1.18 SOIL EROSION

- A. The Contractor shall be required to take the necessary steps to minimize siltation and soil erosion during construction. This work shall consist of furnishing all labor, equipment, and materials and performing all operations in connections with the construction, installation, and maintenance of all erosion and pollution controls through the use of berms, sediment basins, mulches, hay erosion checks, ditches, debris filters, and other devices.

- B. Temporary pollution control shall be coordinated with the permanent landscape program to assure economical, effective and continuous erosion control throughout the construction period.

**END OF SECTION # 01500**

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**S219 – Brookfield Country Club Sewer Lining**  
**SECTION NO. 01510**  
**TEMPORARY FACILITIES**

**PART 1 GENERAL**

**1.01 SCOPE**

- A. Temporary facilities required for this work include, but are not necessarily limited to:
  - 1. Temporary utilities such as water and electricity.
  - 2. First aid facilities.
  - 3. Sanitary facilities.
  - 4. Potable water.
  - 5. Temporary enclosures and construction facilities.

**1.02 GENERAL**

- A. First aid facilities, sanitary facilities and potable water shall be available on the Project site on the first day that any activities are conducted on site. The other facilities shall be provided as the schedule of the Project warrants.
- B. Maintenance: Use all means necessary to maintain temporary facilities in proper and safe condition throughout progress of the Work. In the event of loss or damage, immediately make all repairs and replacements necessary, at no additional cost to the Owner.
- C. Removal: Remove all such temporary facilities and controls as rapidly as progress of the Work will permit.

**1.03 TEMPORARY UTILITIES**

- A. General
  - 1. Provide and pay all costs for all electricity and other utilities required for the performance of the Work. Water will be provided by the Owner.
  - 2. Pay all costs for temporary utilities until Project completion.
  - 3. Costs for temporary utilities shall include all power, water and the like necessary for testing equipment as required by the Contract Documents.

**1.04 FIRST AID FACILITIES**

- A. The Contractor shall provide a suitable first aid station, equipped with all facilities and medical supplies necessary to administer emergency first aid treatment. The Contractor shall have standing arrangements for the removal and hospital treatment of any injured person. All first aid facilities and emergency ambulance service shall be made available by the Contractor to the Owner and the Engineer's personnel.

**1.05 SANITARY FACILITIES**

- A. Prior to starting the Work, the Contractor shall furnish, for use of Contractor's personnel on the job, all necessary toilet facilities which shall be secluded from public observation. These facilities shall be either chemical toilets or shall be connected to the Owner's sanitary sewer system. All facilities, regardless of type, shall be kept in a clean and sanitary condition and shall comply with the requirements and regulations of the area in which the Work is performed. Adequacy of these facilities

will be subject to the Engineer's review and maintenance of same must be satisfactory to the Engineer at all times.

#### **1.06 POTABLE WATER**

- A. The Contractor shall be responsible for furnishing a supply of potable drinking water for employees, subcontractors, inspectors, engineers and the Owner who are associated with the Work.

#### **1.07 ENCLOSURES AND CONSTRUCTION FACILITIES**

- A. Furnish, install and maintain for the duration of construction, all required scaffolds, tarpaulins, canopies, steps, bridges, platforms and other temporary construction necessary for proper completion of the Work in compliance with all pertinent safety and other regulations.

#### **1.08 PARKING FACILITIES**

- A. Parking facilities for the Contractor's and Contractor's subcontractors' personnel shall be the Contractor's responsibility. The storage and work facilities provided by the Owner will not be used for parking by the Contractor's or subcontractor's personnel.

#### **1.09 TEMPORARY SIGNAGE**

- A. Project Signs: The Contractor shall construct, erect and maintain two (2) four foot by eight foot (4'x8') project signs of 3/4 inch (minimum) exterior grade plywood, given two coats of paint and mounted securely on two four inch by four inch (4"x4") posts set 30 inches (30") (minimum) into the ground. The signs shall be clearly lettered by one skilled in the sign trade with the facility name, address, County Logo, names of County Commissioners, the County Manager and other County representatives, Contractor name, major subcontractor names and the jobsite telephone number. Locate the project signs as designated by the Construction Manager. Avoid placement that may inhibit safe entry or exit from the site. Verify each sign's content with County, through the Construction manager, prior to procuring and erecting the sign.
- B. No other signs or advertising shall be displayed on the premises without the approval of the Construction Manager, other than the posting of required notices and cautionary signage by the Contractor, and signage on equipment and trailers to designate ownership.

END OF SECTION NO. 01 510

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**S219 – Brookfield Country Club Sewer Lining**  
**SECTION NO. 01540**  
**JOB SECURITY**

*PART 1 - GENERAL*

1.01 BARRICADES, LIGHTS and SIGNALS

- A. The Contractor shall furnish and erect such barricades, fences, lights and danger signals and shall provide such other precautionary measures for the protection of persons or property and of the Work as necessary. Barricades shall be painted in a color that will be visible at night. From sunset to sunrise, the Contractor shall furnish and maintain at least one light at each barricade and sufficient numbers of barricades shall be erected to keep vehicles from being driven on or into any Work under construction.
- B. The Contractor will be held responsible for all damages to the Work due to failure of barricades, signs and lights and whenever evidence is found of such damage, the Contractor shall immediately remove the damaged portion and replace it at the Contractor's cost and expense. The Contractor's responsibility for the maintenance of barricades, signs and lights shall not cease until the Project has been accepted by the County.
- C. The Contractor shall employ, when necessary, watchmen on the work and shall, when necessary, erect and maintain such strong and suitable barriers and such light as will effectively prevent the happening of any accident to health and/or property. Lights shall be maintained for the hours between sunset to sunrise.

**END OF SECTION # 01540**

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**S219 – Brookfield Country Club Sewer Lining**  
**SECTION NO. 01560**  
**ENVIRONMENTAL PROTECTION**

**1. GENERAL**

- A. Provide all facilities, establish procedures, and conduct construction activities in a manner which will ensure compliance with the County’s environmental requirements and other regulations controlling construction activities at the Project site.
- B. Definitions:
  - 1. Sediment: Soil that has been eroded and transported by runoff water.
  - 2. Degradable Debris: Debris which can undergo biodegradation or combustion, or which can be dissolved in or suspended by water.
  - 3. Non-degradable Debris: Inorganic debris which will not disintegrate nor dissolve when exposed to moisture or water.
  - 4. Chemicals: Petroleum or cementitious products, bituminous materials, salts, acids, solvents, alkalies, herbicides and pesticides.
  - 5. Waste: Sewage, including domestic sanitary sewage, garbage and trash resulting from food and food packaging.

**2. PRODUCTS**

- A. General: Products, devices and materials shall be approved by authorities having jurisdiction.
- B. Earth Stabilizer: Rye grass seed, hay, straw mulch, chemical stabilizer or any other device approved by authorities having jurisdiction.
- C. Hay Bales: Type and size as recommended by environmental protection authorities having jurisdiction.
- D. Silt Fence: Type and size as recommended by land disturbance and environmental protection authorities having jurisdiction.

**3. ENVIRONMENTAL PROTECTION PROCEDURES**

- A. General
  - 1. In the means and methods of construction, and in the coordination and control of the Work at the site, establish and enforce ecological preservation standards which avoid pollution of the atmosphere, waterways and vegetation.
  - 2. Conform to laws, ordinances, restrictions, and rules of governmental bodies having enforcement power in regard to site preservation and erosion control.
  - 3. Prevent droppings of petroleum products, cementitious waste and chemical substances on the ground or into storm, sanitary drains or waterways.
  - 4. This Section may be supplemented by notes on drawings relative to environmental protection.
  - 5. In performing sitework, provide and maintain protection during sitework for all existing lawns, trees, curbs, gutters, hydrants, light standards, drives, walks, street signs and buildings not noted for removal. Damaged items shall be repaired or replaced.
  - 6. The Contractor shall designate one person, the Superintendent or other, to enforce strict discipline on activities related to generation of wastes, pollution or air/water, generation of noise and similar harmful or deleterious effects which

- might violate regulations or reasonably irritate persons at or in vicinity of the Project site.
7. Take special precautions when working on floors directly above or below any occupied floors and adjacent to circulation or vehicular circulation. Minimize noise, dust, or other environmental hazards to spaces.
- B. Noise Control
1. Provide mufflers on combustion engine powered equipment to minimize noise.
  2. Blasting is strictly prohibited without written permission from first the Construction Manager and then all applicable State and Local regulatory agencies.
- C. Air Quality Control: Maintain acceptable air quality at all times. Acceptable air quality shall also be maintained in any existing, operating buildings or structures during construction operations that require physical connection to such buildings or structures so as to not interfere with any existing operations.
- D. Water Control
1. All pumping, bailing, or well point equipment necessary to keep excavations free from the accumulation of water during the entire progress of the Work shall be the responsibility of the Contractor.
  2. Keep the building or portions thereof free from water ingress due to construction operations at all times until Final Completion of the Work.
  3. Provide all pumping necessary to keep site utility lines, sewers, manholes and meter pit excavations and mass excavation free from water.
  4. Dispose of water in such a manner as will not endanger public health or cause damage or expense to public or private property. Abide by the requirements of all public authorities having jurisdiction.
- E. Dust Control
1. Effectively confine dust, dirt and noise to the actual construction area(s) until Substantial Completion of the Work.
  2. Clean up operations shall be by vacuuming, wet mopping, wet sweeping, or wet power brooming. In sandblasting operations, if any, confine the dust.
  3. Use wet-cutting methods for cutting concrete, asphalt, and masonry. Do not shake out bags containing cement, lime, and other dust-causing substances.
  4. Do not leave areas of disturbed earth unworked for long periods of time. As the earth is disturbed, continue the work to achieve temporary or permanent earth stabilization promptly.
  5. Keep dust down at all times, including non-working days, weekends and holidays. Temporary methods consisting of water sprinkling or similar methods will be permitted to control dust. Use of water will not be permitted when it will result in, or create, hazardous or objectionable conditions such as ice, flooding and pollution.
  6. Dust control shall be performed as the work proceeds and whenever a dust nuisance or hazard occurs.
- F. Snow and Ice Removal
1. Arrange for removal of snow and ice in and about the premises, as necessary to conform with local regulations on public sidewalks adjacent to the site, and as necessary on and about the site and the Work to permit safe access to continue or perform work.

2. When performing work under exposed conditions, remove snow and ice for the protection and execution of the Work.
- G. Controls During Earth Moving
1. Perform earth moving in such phases which minimize the area extent of exposed land.
  2. Control the rate water runoff by diversion ditches, benches, berms and other earth-formed shaping so the rate of flow is retarded and silting minimized. Reshape and restore conditions showing evidence of earth erosion without delay.
  3. Stabilize disturbed earth with temporary seeding or temporary mulching, or other effective temporary means, such as a stabilizing sprayed application or anchored netting.
  4. Establish and enforce the use of tarpaulin-covered dump trucks and avoid overfilling so that spillage of earth and other matter into highways and streets does not occur.
- H. Vermin Control: Control vermin during the construction period. If vermin are encountered, provide extermination arrangements as necessary.
- I. Disposal of Debris, Chemicals and Waste
1. Dispose of debris, chemicals, and waste off the site in compliance with Federal, State and local and regulations.
  2. Collect and contain materials before disposal in an orderly fashion and by means which prevent contamination of air, water and soil.
  3. Store chemicals in watertight containers.
  4. Degradable debris, not contaminated by chemicals, e.g., leaves, tree limbs, twigs and logs, may be shredded on site and used as mulch. Exclude paper, cementitious waste, and material which could cause contaminations of waterways. Non-degradable and degradable debris in excess of the above shall be disposed of off the site.
  5. Do not burn materials on the site.
- J. Clean-Up and Restoration of the Site
1. Maintain the site in good order through periodic pick up and clean-up of construction waste and wind-borne trash. Dispose of all waste and trash in tightly covered containers and schedule regular removal of trash and waste from the site.
  2. Existing sitework damaged during construction shall be restored to good and acceptable condition.
- K. Damage from Storms: Secure the site to avoid damage to the Work and stored materials, as well as damage to adjacent property.

**END OF SECTION # 01560**

**S219 – Brookfield Country Club Sewer Lining**  
**SECTION NO. 01562**  
**DUST CONTROL**

**PART 1 - GENERAL**

**1.01 SCOPE**

- A. Limit blowing dust caused by construction by applying water or employing other appropriate means or methods to maintain dust control subject to the approval of the County. As a minimum, this may require the use of a water wagon twice a day to suppress dusty conditions.

**1.02 PROTECTION OF ADJACENT PROPERTY**

- A. The Bidders shall visit the site and note the buildings, landscaping, roads, parking areas, and other facilities near the Work site that may be damaged by their operations. The Contractor shall make adequate provision to fully protect the surrounding area and will be held fully responsible for all damages resulting from Contractor's operations.
- B. Protect all existing facilities (indoors and out) from damage by dust, spray or spills (indoors or out). Protect motors, bearings, electrical gear, instrumentation and building or other surfaces from dirt, dust, welding fumes, paint spray, spills or droppings causing wear, corrosion, malfunction, failure or defacement by enclosure, sprinkling or other dust palliatives, masking and covering, exhausting or containment.

**END OF SECTION # 01562**

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**S219 – Brookfield Country Club Sewer Lining**  
**SECTION NO. 01600**  
**MATERIAL AND EQUIPMENT**

**PART 1 – GENERAL**

**1.01 SCOPE**

- A. These requirements for material and equipment apply, in general, to all equipment. They supplement the detailed equipment specifications. In case of conflict, the detailed material and equipment specification shall govern.

**1.02 COORDINATION**

- A. The Contractor shall assume full responsibility for the coordination of the installation of all equipment, materials and products furnished under these Contract Documents. The Contractor shall be completely responsible for verification that all structures, piping and equipment components furnished by him and/or his subcontractors and suppliers are compatible.

**1.03 PATENT ROYALTIES**

- A. All royalties and fees for patents covering materials, articles, apparatus, devices, or equipment shall be included in prices bid by the Contractor. Attention is directed to the requirements of the General Conditions concerning patents.

**1.04 ERECTION AND SETTING**

- A. The Contractor shall take all measurements necessary to properly fit his work in the field, and he shall be governed by and responsible for those measurements and the proper working out of all details.

**1.05 SPECIAL TOOLS AND ACCESSORIES**

- A. Equipment, including valves and hydrants, requiring periodic repair and adjustment shall be furnished complete with all special tools, instrument, and accessories required for proper maintenance. Equipment requiring special devices for lifting or handling shall be furnished complete with those devices.

**1.06 PAINTING**

- A. Unless otherwise specified in the detailed specifications, all equipment including valves and hydrants shall be hop painted. Shop painting shall consist of preparing surfaces in accordance with the requirements of the manufacturer and applying the manufacturer's standard primer.

**1.07 TRANSPORTATION HANDLING AND STORAGE**

- A. The Contractor shall be responsible for providing satisfactory storage facilities which are acceptable to the Construction Manager. In the event that satisfactory facilities cannot be provided on site, a satisfactory warehouse, acceptable to the Construction Manager, will be provided by the Contractor for such time until equipment, materials, and products can be accommodated at the site.
- B. The Contractor shall be responsible for the maintenance and protection of all equipment, materials, and products placed in storage and shall bear all costs of storage, preparation for transportation, transportation, rehandling and preparation for installation.

**END OF SECTION # 01600**

**S219 – Brookfield Country Club Sewer Lining**

**SECTION NO. 01610**

**TRANSPORTATION AND HANDLING**

**PART 1 GENERAL**

**1.01 SCOPE**

- A. The Contractor shall provide transportation of all equipment, materials and products furnished under these Contract Documents to the Work site. In addition, the Contractor shall provide preparation for shipment, loading, unloading, handling and preparation for installation and all other work and incidental items necessary or convenient to the Contractor for the satisfactory prosecution and completion of the Work.
- B. All equipment, materials and products damaged during transportation or handling shall be repaired or replaced by the Contractor at no additional cost to the Owner prior to being incorporated into the Work.

**1.02 TRANSPORTATION**

- A. All equipment and materials shall be suitably boxed, crated or otherwise protected during transportation.
- B. Where materials will be installed using existing cranes or hoisting equipment, the Contractor shall ensure that the weights of the assembled sections do not exceed the capacity of the cranes or hoisting equipment.

**1.03 HANDLING**

- A. All equipment, materials and products shall be carefully handled to prevent damage or excessive deflections during unloading or transportation.
- B. Lifting and handling drawings and instructions furnished by the manufacturer or supplier shall be strictly followed. Eyebolts or lifting lugs furnished on the equipment shall be used in handling the equipment. Shafts and operating mechanisms shall not be used as lifting points. Spreader bars or lifting beams shall be used when the distance between lifting points exceeds that permitted by standard industry practice.
- C. Under no circumstances shall equipment or products such as pipe, structural steel, castings, reinforcement, lumber, piles, poles, etc., be thrown or rolled off of trucks onto the ground.
- D. Slings and chains shall be padded as required to prevent damage to protective coatings and finishes.

**END OF SECTION NO 01610**

**S219 – Brookfield Country Club Sewer Lining**

**SECTION NO. 01611**

**MATERIAL STORAGE AND PROTECTION**

**PART 1 GENERAL**

**1.01 SCOPE**

- A. The work under this Section includes, but is not necessarily limited to, the furnishing of all labor, tools and materials necessary to properly store and protect all materials, equipment, products and the like, as necessary for the proper and complete performance of the Work.

**1.02 STORAGE AND PROTECTION**

- A. Storage
  - 1. Maintain ample way for foot traffic at all times, except as otherwise approved by the Engineer.
  - 2. All property damaged by reason of storing of material shall be properly replaced at no additional cost to the Owner.
  - 3. Packaged materials shall be delivered in original unopened containers and so stored until ready for use.
  - 4. All materials shall meet the requirements of these Specifications at the time that they are used in the Work.
  - 5. Store products in accordance with manufacturer's instructions.
- B. Protection
  - 1. Use all means necessary to protect the materials, equipment and products of every section before, during and after installation and to protect the installed work and materials of all other trades.
  - 2. All materials shall be delivered, stored and handled to prevent the inclusion of foreign materials and damage by water, breakage, vandalism or other causes.
  - 3. Substantially constructed weather tight storage sheds, with raised floors, shall be provided and maintained as may be required to adequately protect those materials and products stored on the site which may require protection from damage by the elements.
- C. Replacements: In the event of damage, immediately make all repairs and replacements necessary for the approval of the Engineer and at no additional cost to the Owner.
- D. Equipment and products stored outdoors shall be supported above the ground on suitable wooden blocks or braces arranged to prevent excessive deflection or bending between supports. Items such as pipe, structural steel and sheet construction products shall be stored with one end elevated to facilitate drainage.
- E. Unless otherwise permitted in writing by the Engineer, building products and materials such as cement, grout, plaster, gypsum board, particleboard, resilient flooring, acoustical tile, paneling, finish lumber, insulation, wiring, etc., shall be stored indoors in a dry location. Building products such as rough lumber, plywood, concrete block and structural tile may be stored outdoors under a properly secured waterproof covering.

- F. Tarps and other coverings shall be supported above the stored equipment or materials on wooden strips to provide ventilation under the cover and minimize condensation. Tarps and covers shall be arranged to prevent ponding of water.

**END OF SECTION NO 01611**

**219 – Brookfield Country Club Sewer Lining**  
**SECTION NO. 01630**  
**SUBSTITUTION AND PRODUCT OPTIONS**

**PART 1 - GENERAL**

**1.01 EQUIPMENT BIDS**

- A. Equipment bids shall be submitted in accordance with the procedures set forth in the Instruction to Bidders.

**1.02 MATERIAL AND EQUIPMENT LIST**

- A. Within 30 days after Notice of Award, the Contractor shall submit for approval a complete list of materials and equipment proposed for use in connection with the project. Partial lists submitted from time to time will not be considered.
- B. After any material or piece of equipment has been approved, no change in brand or make will be permitted unless satisfactory written evidence is presented to prove that the manufacturer cannot make scheduled delivery of approved material or that material delivered has been rejected and the substitution of a suitable material is an urgent necessity, or that other conditions have become apparent which indicates that approval of such other material is in the best interest of the County.

**1.03 SUBMISSIONS FOR PRODUCT SUBSTITUTION**

- A. Product substitutions may be proposed by the Contractor in accordance with procedures outlined in the Instructions to Bidders, as indicated by the “or equal” phrase appearing throughout these Specifications, provided the substitute product is equal to or better than named products.
- B. The Contractor shall furnish sufficient detailed information so that an evaluation can be made of any proposed “equal” product. This information shall be submitted with the shop drawings. Submission of inadequate or incomplete information as required to properly evaluate a proposed “or equal” product will be sufficient grounds for rejection. Submission shall include, but is not limited, to the following:
- a. Performance capabilities.
  - b. Materials and construction details.
  - c. Manufacturer’s production and service capabilities.
  - d. Evidence of proven reliability.
  - e. Specific references to characteristics either superior or inferior to specified requirements.
  - f. Detailed estimate of operating and maintenance costs.

**1.04 EVALUATION OF PRODUCT SUBSTITUTIONS**

The information required to be furnished for evaluation of product substitutions will be evaluated as follows:

- A. Performance capabilities, and materials and construction details will be evaluated based upon conformance with the Specifications. Products that do not conform to the Specifications will not be acceptable.
- B. Manufacturer’s production and service capabilities, and evidence of proven reliability will be acceptable if the following is furnished:

- a. Written evidence that the manufacturer has not less than three years experience in the design and manufacture of the substitute product.
  - b. Written evidence of at least one application, of a type and size similar to the proposed substitute product, in successful operation for a period of at least one year.
  - c. In lieu of furnishing evidence of a manufacturer's experience and successful operation of an application of the product to be substituted, the Contractor may furnish a cash deposit or bond, which will guarantee replacement if the product furnished, does not satisfy the other requirements specified in this section. The amount of cash deposit or bond will be subject to the approval of the Construction Manager.
- C. Specific reference to characteristics either superior or inferior to specified requirements will be evaluated based on their net effect on the project. Products with any characteristics inferior to those specified will not be acceptable unless offset by characteristics that, in the opinion of the Construction Manager, will cause the overall effect of the product on the project to be at least equal to that of those specified.
- D. The detailed estimate of operating and maintenance costs will be evaluated based on comparison with similar data on the specified products. Proposed substitute products which have an operating and maintenance costs, which, in the opinion of the Construction Manager, exceeds that of the specified products, will not be considered equal and will not be acceptable.

#### 1.05 REIMBURSEMENT

- A. The Contractor shall be responsible for all costs associated with the product substitutions, which require major design changes to related, or adjacent work made necessary by the substitutions.

**END OF SECTION # 01630**

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**S219 – Brookfield Country Club Sewer Lining**  
**SECTION NO. 01700**  
**PROJECT CLOSEOUT**

**1. GENERAL REQUIREMENTS**

- A. Comply with requirements for administrative procedures stated in this and other sections of the Project Manual in closing out the Work. Closeout procedures are summarized in this Section.
- B. Contract requirements shall be met when design and construction activities have successfully produced, in order, completion of these three closeout stages:
  - 1. Substantial Completion
  - 2. Final Completion
  - 3. Final Payment
- C. The Contractor shall provide all written notices and supporting documentation as described in Paragraphs 2 and 3 below when requesting Substantial Completion and Final Completion, respectively. Partial submittals of the required documents shall not represent a valid request, and the County and Construction Manager shall not be liable for any delays in the Substantial and Final Completion dates arising there from.

**2. SUBSTANTIAL COMPLETION**

- A. Reference the DEFINITIONS, regarding Substantial Completion.
- B. When the Work is substantially complete, the Contractor shall submit to the Construction Manager:
  - 1. a written notice that the Work, or designated portion thereof, is substantially
    - i. Complete.
  - 2. An original Certificate of Occupancy for the Project (as applicable).
  - 3. a list of items to be completed or corrected (hereinafter referred to as a
    - i. "Punch List").
  - 4. A request for a Substantial Completion inspection on a date acceptable to the County and the Construction Manager.
  - 5. Project record documents, operation & maintenance manuals, warranties, and certificates for review and approval.
- D. Within a reasonable time after receipt of such notice, the Construction Manager, the Contractor, and at its option, the County, will make an inspection to determine the status of completion.
- E. The Punch List submitted by the Contractor will be reviewed in detail, with items added or deleted to indicate Work to be corrected or completed.
  - 1. The Construction Manager reserves the right to issue a revised Punch List.
  - 2. The Construction Manager will reproduce and distribute all necessary copies of any revised Punch List to the Contractor and see that the items requiring correction or completion are given prompt attention by the Contractor.

3. The Construction Manager may withhold the issuance of the Certificate of Substantial Completion until corrections required by said Punch List are made or all parties are satisfied that they will be made.
- F. Should the Construction Manager determine that the Work is not substantially complete:
1. The Construction Manager will promptly notify the Contractor in writing, giving the reasons therefore.
  2. The Contractor shall remedy the deficiencies in the Work, and then send a second written notice of Substantial Completion to the Construction Manager.
- G. Paragraphs 2.B through 2.D will be repeated.
- H. Should it become necessary to perform more than one (1) re-inspection due to the inaccurate claims of the status of completion made by the Contractor, the Construction Manager may deduct the costs of such re-inspections from the final payment, including but not limited to costs incurred by the Construction Manager, and costs incurred by the Owner for payment of compensation to the Construction Manager, for services performed for the re-inspection(s). Also refer to General Requirements Section 01 400, *Quality Control*.
- I. When the Construction Manager concurs that the Work is substantially complete, the Construction Manager will:
1. Prepare a Certificate of Substantial Completion accompanied by the Contractor's Punch List of items to be completed or corrected, as verified and amended by the Construction Manager and the County. (Note: Contract responsibilities are not altered by inclusion or omission of required Work for the Punch List.)
  2. Sign the Certificate of Substantial Completion and submit it to the County and the Contractor for their written acceptance of the responsibilities assigned to them in the Certificate.

### 3. FINAL COMPLETION

- A. Reference the Definitions, regarding Final Completion.
- B. To attain Final Completion, the Contractor shall complete the activities pertaining to Substantial Completion Certificate and complete work on all Punch List items. Only then shall a written request to the Construction Manager for final inspection be submitted.
- C. When the Work is complete, the Contractor shall submit to the Construction Manager written certification, signed jointly with its Architect and Engineers of Record (as required), that:
1. The Contract Documents have been complied with in their entirety.
  2. The Work has been inspected for compliance with Contract Documents.
  3. The Work has been completed in accordance with Contract Documents.
  4. The Work is completed and ready for final inspection.
- D. The Construction Manager, Contractor and County will make an inspection to verify the status of completion with reasonable promptness after receipt of such certification.
- E. Should the Construction Manager determine that the Work is incomplete or defective:
5. The Construction Manager will promptly notify the Contractor in writing, listing the incomplete or defective Work.

6. The Contractor shall take immediate steps to remedy the stated deficiencies, and send a second written certification to the Construction Manager that the Work is complete.
- F. Paragraphs 3.B through 3.D will be repeated.
- G. Should it become necessary to perform more than one (1) re-inspection due to failure of the Work to comply with the claims of status of completion made by the Contractor, the Construction Manager may deduct the costs of such re-inspections from the final payment, including but not limited to costs incurred by the Construction Manager, and costs incurred by the Owner for payment of compensation to the Construction Manager, for services performed for the re-inspection(s). Also refer to General Requirements Section 01 400, *Quality Control*.
- H. When the Construction Manager finds that the Work is acceptable under the Contract Documents, the Contractor will be requested to make a final closeout submittal.

#### **4. CONTRACTOR'S CLOSEOUT SUBMITTALS**

- A. The Contractor shall provide to the Construction Manager the following documents in the quantity of one original and one copy unless otherwise noted. Note that with the exception of Subparagraphs 4.G, 4.H, 4.J, and 4.K below, submittal for approval shall have already been made prior to Substantial Completion. Submittal under this Paragraph would be for a final submittal should revisions or additional copies be required of previously submitted documentation.
- B. Evidence of Compliance with all requirements of governing authorities:
  1. Certificate(s) of Occupancy (as applicable)
  2. Certificates of Inspection, for Mechanical, Electrical, Plumbing, Fire Protection, and others as may be required.
- C. Project Record Documents: Refer to Section 01 720 of the General Requirements.
- D. Operation & Maintenance Manuals: Refer to Section 01 730 of the General Requirements.
- E. Subcontractor List: A complete listing of all subcontractors and their suppliers, indicating business addresses, telephone numbers, contact names, and items supplied by each.
- F. Manufacturer List: A listing of manufacturers of major materials, equipment and systems installed in the Work, and local contact addresses and phone numbers.
- G. Warranties: Refer to Section 01 740 of the General Requirements, and individual sections of the Technical Specifications.
- H. Payment of Debts and Claims and Consent of Surety: The Contractor shall submit adequate evidence that the Contractor has paid all obligations to date arising out of the Contract. Contractor shall also submit written consent of its Surety to final payment.
- I. Release of Claims and Liens: The Contractor and each subcontractor shall also submit a certified Release of Claims and Liens, indicating that the releases for waivers submitted are complete to the best of its knowledge and information.
- J. Final Approvals and Certificates:
  1. Plans and Certificates approved by the Fulton County Development Services Department which were maintained at the jobsite shall be amended to show construction changes and resubmitted as required by law.
  2. Contractors requiring filing shall complete all Fulton County inspections and permits records before Application for Final Payment. Submit all approvals and certificates required by the Specifications, Drawings and applicable codes and regulations of all

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relevant departments or agencies of Fulton County, State of Georgia, and local authority having jurisdiction.

- K. Shop Drawings, Manufacturer's Literature and Test Data (one copy only): The Contractor shall submit through the Construction Manager to the County, before final acceptance, all reviewed shop drawings (with all corrections noted), plus sets of all approved catalog cuts, equipment manuals, etc. All materials shall be indexed by Specification section. This submittal shall include a list of each room and its paint manufacturers and/or wall covering number (as applicable) for the County's use.
- L. Keys and Maintenance Materials: All keys, maintenance kits or stock, replacement parts or materials, spare construction materials, and equipment required under the Contract Documents shall be delivered or made available to the County. Also refer to Section 01 760 of the General Requirements.
- M. No partial submittals of the above items are to be made to the Construction Manager. All items of each category are to be collected by the Contractor and delivered at one time to the Construction Manager, together with a letter of transmittal listing all items. Where items are to be delivered to the County's representative, the Contractor shall include a copy of the transmittal letter listing all enclosures, signed by the County's representative acknowledging receipt.

UNCONDITIONAL WAIVER AND RELEASE  
UPON FINAL PAYMENT

STATE OF GEORGIA  
COUNTY OF \_\_\_\_\_

The undersigned mechanic and/or materialman has been employed by \_\_\_\_\_  
(name of contractor) to furnish \_\_\_\_\_ (describe materials and/or labor) for the  
construction of improvements known as \_\_\_\_\_ (title of the project or building)  
which is located in the City of \_\_\_\_\_,  
County of \_\_\_\_\_, and is owned by \_\_\_\_\_ (name of owner)  
and more particularly described as follows:

(DESCRIBE THE PROPERTY UPON WHICH THE IMPROVEMENTS WERE MADE BY  
USING EITHER A METES AND BOUNDS DESCRIPTION, THE LAND LOT  
DISTRICT, BLOCK AND LOT NUMBER, OR STREET ADDRESS OF THE PROJECT.)

Upon the receipt of the sum of \$ \_\_\_\_\_, the mechanic and/or materialman waives and releases any  
and all liens or claims of liens or any right against any labor and/or material bond it has upon the  
foregoing described property.

Given under hand and seal this \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_.

\_\_\_\_\_ (Seal)

\_\_\_\_\_  
\_\_\_\_\_  
(Witness)  
\_\_\_\_\_  
(Address)

**END OF SECTION # 01700**

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**S219 – Brookfield Country Club Sewer Lining**  
**SECTION NO. 01710**  
**CLEANING**

**PART 1 - GENERAL**

**1.01 SCOPE**

- A. This Section covers the general cleaning which the Contractor shall be required to perform both during construction and before final acceptance of the Project unless otherwise shown on the Drawings or specified elsewhere in these Specifications.

**1.02 QUALITY ASSURANCE**

- A. Daily, and more often if necessary, conduct inspections verifying that requirements of cleanliness are being met.
- B. In addition to the standards described in this Section, comply with all pertinent requirements of governmental agencies having jurisdiction.

**1.03 HAZARDOUS MATERIAL AND WASTE**

- A. The Contractor shall handle hazardous waste and materials in accordance with applicable local, state, and federal regulations. Waste shall also be disposed of in WFLA approved landfills as applicable.
- B. The Contractor shall prevent accumulation of wastes which create hazardous conditions.
- C. Burning or burying rubbish and waste materials on the site shall not be allowed.
- D. Disposal of hazardous wastes or materials into sanitary or storm waters shall not be allowed.

**1.04 DISPOSAL OF SURPLUS MATERIALS**

- A. Unless otherwise shown on the Drawings, specified or directed, the Contractor shall legally dispose off the site all surplus materials and equipment from demolition and shall provide suitable off-site disposal site, or utilize a site designated by the County.

**PART 2 - PRODUCTS**

**2.01 CLEANING MATERIALS AND EQUIPMENT**

- A. Provide all required personnel, equipment and materials needed to maintain the specified standard of cleanliness.

**2.02 COMPATIBILITY**

- A. Use only the cleaning materials, methods and equipment which are compatible with the surface being cleaned, as recommended by the manufacturer of the material or as approved by the Construction Manager.

**PART 3 - EXECUTION**

**3.01 PROGRESS CLEANING**

**A. General**

- 1. Do not allow the accumulation of scrap, debris, waste material and other items not required for construction of this Work.

2. At least each week, and more often if necessary, completely remove all scrap, debris and waste material from the job site.
3. Provide adequate storage for all items awaiting removal from the job site, observing all requirements for fire protection and protection of the environment.

B. Site

1. Daily and more often if necessary, inspect the site and pick up all scrap, debris and waste material. Remove all such items to the place designated for their storage.
2. Re-stack materials stored on site weekly.
3. At all times maintain the site in a neat and orderly condition which meets the approval of the Construction Manager.

C. Structures

1. Weekly and more often if necessary, inspect the structures and pick up all scrap, debris and waste material. Remove all such items to the place designated for their storage.
2. Weekly and more often if necessary, sweep all interior spaces clean. "Clean", for the purpose of this subparagraph, shall be interpreted as meaning free from dust and other material capable of being removed by using a hand-held broom.
3. As required preparatory to installation of successive materials, clean the structures or pertinent portions as recommended by the manufacturer of the successive material.
4. Following the installation of finish floor materials, clean the finish floor daily. "Clean", for the purpose of this paragraph, shall be interpreted as meaning free from all foreign material which, in the opinion of the Construction Manager, may be injurious to the finish floor material.
5. Schedule cleaning operation so that dust and other contaminants resulting from cleaning operations will not fall on wet, recently painted surfaces.

3.02 FINAL CLEANING

- A. Definitions: Unless otherwise specifically specified, "clean" for the purpose of this Article shall be interpreted as the level of cleanliness generally provided by commercial building maintenance subcontractors using commercial quality building maintenance equipment and materials.
- B. General: Prior to completion of the Work, remove from the job site all tools, surplus materials, equipment, scrap, debris and waste. Conduct final progress cleaning as described in 3.01 above.
- C. Site: Unless otherwise specifically directed by the Construction Manager, hose down all paved areas on the site and all sidewalks; rake clean other surfaces of the grounds. Completely remove all resultant debris.
- D. Structures
  1. Remove all traces of soil, waste material, splashed material, and other foreign matter to provide a uniform degree of exterior cleanliness. Visually inspect all exterior surfaces and remove all traces of soil, waste material, and other foreign matter. Remove all traces of splashed materials from adjacent surfaces. If necessary to achieve a uniform degree of exterior cleanliness, hose down the exterior of the structure. In the event of stubborn stains not removable with water, the Construction Manager may require light sandblasting or other cleaning at no additional cost to the County.

2. Visually inspect all interior surfaces and remove all traces of soil, waste material, smudges and other foreign matter. Remove all paint droppings, spots, stains and dirt from finished surfaces.
  3. Clean all glass inside and outside.
  4. Polish all surfaces requiring the routine application of buffed polish. Provide and apply polish as recommended by the manufacturer of the material being polished.
- E. Post-Construction Cleanup: All evidence of temporary construction facilities. Haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess or waste materials, or any other evidence of construction, as directed by the Construction Manager.
- F. Restoration of Landscape Damage: Any landscape feature damaged by the Contractor shall be restored as nearly as possible to its original condition at the Contractor's expense. The Construction Manager will decide what method of restoration shall be used.
- G. Timing: Schedule final cleaning as approved by the Construction Manager to enable the County to accept the Project.
- 3.03 CLEANING DURING COUNTY'S OCCUPANCY
- A. Should the County occupy the Work or any portion thereof prior to its completion by the Contractor and acceptance by the County, responsibilities for interim and final cleaning of the occupied spaces shall be as determined by the Construction Manager in accordance with the Supplementary Conditions of the Contract Documents.

**END OF SECTION # 01710**

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**S219 – Brookfield Country Club Sewer Lining**  
**SECTION NO. 01720**  
**PROJECT RECORD DOCUMENTS**

1.01 GENERAL

- A. The Contractor shall maintain at the site for the County one record copy of:
  - 1. Drawings.
  - 2. Specifications.
  - 3. Addenda.
  - 4. Change orders and other modifications to the Contract.
  - 5. Construction Manager field orders or written instructions.
  - 6. Approved shop drawings, product data, and samples.
  - 7. Field test records.
- B. Related Requirements:
  - 1. Section 01050: Construction Layout
  - 2. Section 01200: Project Meetings
  - 3. Section 01340: Shop Drawings, Product Data, and Samples
  - 4. Section 01500: Construction Facilities and Temporary Controls

1.02 MAINTENANCE OF DOCUMENTS AND SAMPLES

- A. The Contractor shall store record documents and samples in the field office apart from documents used for construction.
  - 1. Provide files and racks for storage of documents.
  - 2. Provide locked cabinet or secure storage space for storage of samples.
- B. Documents and samples shall be filed in accordance with Data Filing Format of the Uniform Construction Index.
- C. Documents shall be maintained in a clean, dry, legible condition and in good order. Record documents shall not be used for construction purposes.
- D. Documents and samples shall be available at all times for inspection by the Construction Manager.

1.03 MARKING DEVICES

- A. The Contractor shall provide felt tip marking pens for recording information in the color code designated by the Construction Manager.

1.04 RECORDING

- A. Each document shall be labeled "PROJECT RECORD" in large printed letters.
- B. Record information shall be kept current with construction progress.
- C. Record Drawings:
  - 1. The Contractor shall keep an accurate record of variations between the work actually provided and that shown on the Contract Drawings. The representation of such variations shall conform to standard drafting practice and shall include such supplementary notes, legends and details as may be necessary for legibility and clear portrayal of the construction.
  - 2. Do not conceal any work until required information is recorded.

3. Following the construction of the project, Contractor shall provide a Record Survey performed by a Registered Professional Land Surveyor. Survey shall accurately reflect installed location, depth, pipe size and other pertinent details. Cost for the survey shall be included in the price bid for pipe and no separate payment will be made for this survey.

1.05 SUBMITTAL

- A. Sketches showing the "Record" information shall be provided monthly to the Construction Manager and submitted with the partial pay request.
- B. The Contractor shall have the complete set of Record Documents certified as to their completeness and correctness by the Resident Inspector and shall deliver the certified Record Documents to the Construction Manager with the final pay estimate.
- C. Each submittal shall be accompanied by a transmittal letter in duplicate, containing:
  1. Date.
  2. Project title and number.
  3. Contractor's name and address.
  4. Title and number of each Record Document.
  5. Signature of the Contractor or his authorized representative.

**END OF SECTION # 01720**

**S219 – Brookfield Country Club Sewer Lining**  
**SECTION NO. 01740**  
**WARRANTIES AND BONDS**

**PART 1 - GENERAL**

**1.01 PROJECT MAINTENANCE AND WARRANTY**

- A. Maintain and keep in good repair the Work covered by these Drawings and Specifications until acceptance by County.
- B. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor, if required in the Contract Documents.
- C. The Contractor shall furnish to the County four (4) copies of bound and indexed notebook containing written warranties for equipment/products furnished under the contract, and a complete listing of such equipment/products. The equipment/products list shall state the specification section applicable to the equipment/product, duration of the warranty therefore; start date of the warranty, ending date of the warranty, and the point of contact for fulfillment of the warranty.
- D. The Contractor shall warrant for a period of one year from the date of County's written acceptance of certain segments of the Work and /or County's written final acceptance of the Project, as defined in the Contract Documents, that the completed Work is free from all defects due to deficient or faulty products or workmanship. The Contractor shall promptly make such corrections as may be necessary by reason of such defects at no additional cost to the County, irrespective of beneficial use of deficient or defective work the County has received through a portion of anticipated useful service lives.
- E. The County will give notice of observed defects with reasonable promptness. In the event that the Contractor should fail to make such corrections, the County may do so and charge the Contractor the cost thereby incurred. The Performance Bond shall remain in full force and effect throughout the warranty period.
- F. The Contractor shall not be obligated to make replacements which become necessary because of *Force Majeure* conditions, ordinary wear and tear, or as a result of improper operation or maintenance or as a result of improper work or damage by another Contractor or the County, or to perform work which is normally performed by a maintenance crew during routine maintenance and operation.
- G. In the event of malfunctions or failures prior to the expiration of the one year warranty described above, the County will notify the Contractor of the malfunctions or failures. The Contractor shall disassemble, inspect and modify or replace the affected unit, as necessary to prevent further occurrences. All related components which may have been damaged or rendered non-serviceable as a consequence of the failure shall be replaced. A new 12 month warranty against defective or deficient design, workmanship, and materials shall commence on the day that the item is reassembled and placed back into operation. As used herein, failure may include, but are not limited to, cracked or broken housings, piping, or vessels, excessive deflections, bent or broken shafts, broken or chipped gear teeth, premature bearing failure, excessive wear or excessive leakage around seals. Failures which are directly and clearly traceable to operator abuse, such as operations in

conflict with published operating procedures or improper maintenance, such as substitution of unauthorized replacement parts, use of incorrect lubricants or chemicals, flagrant over-or under-lubrication and using maintenance procedures not conforming with published maintenance instructions, shall be exempted from the scope of the one year warranty. Should multiple (two or more) failures occur in a given item, all products of the same size and type shall be disassembled, inspected, modified or replaced as necessary and re-warranted for one year.

- H. The Contractor shall, at Contractor's expense, furnish all labor, materials, tools, equipment and services, including packaging, handling and shipping, required and shall make such repairs and removals and shall perform such work or reconstruction as may be necessary by any structural or functional defect or failure resulting from deficiency, neglect, faulty workmanship or faulty materials, in any part of the Work performed by the Contractor. Such repair shall also include refilling of trenches, excavations or embankments which show settlement or erosion after backfilling or placement.
- I. Except as noted on the Drawings or as specified, all structures such as embankments and fences shall be returned to their original condition prior to the completion of the Contract. Any and all damage to any facility not designated for removal, resulting from the Contractor's operations, shall be promptly repaired by the Contractor at no cost to the County.
- J. The Contractor shall be responsible for all road and entrance reconstruction and repairs and maintenance of the same for a period of one year from the date of final acceptance. In the event of the repairs and maintenance are not made immediately and it becomes necessary for the County of the road to make such repairs, the Contractor shall reimburse the County of the road for the cost of such repairs.
- K. At no additional cost to the County, the Contractor shall provide temporary equipment, materials and services to adequately maintain the functionality of the system, as necessitated by the reason of defective or deficient Work by the Contractor. The Contractor shall provide the necessary provide temporary equipment, materials and services until the Contractor's defective or deficient Work has been corrected and the Contractor-provided temporary equipment, materials and services are no longer required to adequately maintain the functionality of the system.
- L. In the event the Contractor fails to proceed to remedy the defects upon notification within 15 days of the date of such notice, the County reserves the right to cause the required materials to be procured and the work to be done, as described in the Drawings and Specifications, and to hold the Contractor and the sureties on Contractor's bond liable for the cost and expense thereof.
- M. Notice to contractor for repairs and reconstruction will be made in the form of a registered letter addressed to the Contractor at Contractor's home office.
- N. Neither the foregoing paragraphs nor any provision in the Contract Documents, nor any special guarantee time limit implies any limitation of the Contractor's liability within the law of the place of construction.

#### 1.02 TRANSFER OF WARRANTIES TO OWNER

- A. The Contractor shall transfer all residual Coincidental Product Warranties to the Owner at the end of the warranty period required by the Contract Documents. Coincidental Product Warranty is a warranty which is not specifically required by Contract Documents (other than as specified in this Section), but which is available on a product incorporated into the Work, by virtue of the fact that manufacturer of product has published a warranty in connection with purchases and uses of product without regard for specific applications except as otherwise limited by terms of warranty.

**END OF SECTION # 01740**

**S219 – Brookfield Country Club Sewer Lining**

**SECTION NO. 02100**

**SITE PREP**

**PART 1 GENERAL**

1.01 Scope

- A. This Section described materials and equipment to be utilized and requirements for their use in preparing the work site for construction. The Contractor shall furnish all materials, equipment and labor necessary to complete the work.
- B. Comply with applicable codes, ordinances, rules, regulations and laws of local, municipal, state or federal authorities having jurisdiction.

1.02 Clearing and Grubbing

- A. Within the limits shown on the Drawings, the site will be cleared and grubbed to prepare for construction.
- B. Clearing
  - 1. All vegetable growth such as trees, shrubs, brush, logs, upturned stumps and roots of down trees, and other similar items shall be removed and disposed of properly by the Contractor as specified below. Cultivated growth shall be removed and trees felled as necessary within the construction work site and as indicated.
  - 2. Where the tree limb structure interferes with utility wires, or where the trees to be felled are in close proximity to utility wires, the tree shall be taken down in sections to eliminate the possibility of damage to the appropriate utility.
  - 3. All buildings, fences, lumber piles, trash and obstructions, except utility poles shall be removed and disposed of by the Contractor. Any work pertaining to utility poles shall comply with the requirements of the appropriate utility.
  - 4. All fences adjoining any excavation or embankment that may be damaged or buried shall be carefully removed, stored and replaced.
- C. All stumps, roots, foundations and planking embedded in the ground shall be removed and disposed of properly by the Contractor as specified below. Piling and butts of utility poles shall be removed to a minimum depth of two feet below the limits of excavation for structures, trenches and roadways or two feet below finish grade, whichever is lower.

1.03 Preliminary Grading

- A. Before beginning construction, the Contractor shall grade the entire work site to conform, in general, to the finish elevations shown on the Drawings. The Drawings show both existing contour elevations and finished contour elevations.

1.04 Testing and Inspection Services

- A. Soil testing will be performed by an independent testing laboratory selected by the Owner. Payment for soil testing shall be made by the Contractor from the “Soils And Concrete Testing” cash allowance.
- B. The soils testing laboratory is responsible for the following:
  - 1. Compaction tests in accordance with ASTM D 698.

- 2. Field density tests for each two feet of lift; one test for each 5,000 square feet of fill.
- 3. Inspecting and testing stripped site, subgrades and proposed fill materials.
- C. The Contractor's duties relative to testing include:
  - 1. Notifying the laboratory of conditions requiring testing.
  - 2. Coordinating with the laboratory for field testing.
  - 3. Providing representative fill soil samples to laboratory for test purposes. Provide 50 pound samples of each fill soil.
  - 4. Paying costs for additional testing performed beyond the scope of that required and for retesting where initial tests reveals non-conformance with specified requirements.
- D. Inspection:
  - 1. Earthwork operations, suitability of excavated materials for fill and backfill, and placing the compaction of fill and backfill is subject to inspection. The Engineer will observe earthwork operations.
  - 2. Foundations and shallow spread footing foundations are required to be inspected by a geotechnical engineer to verify suitable bearing and construction.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION**

3.01 Preparation

- A. Maintain bench marks, monuments and other reference points. Re-establish, at no cost to the Owner, any such reference points if disturbed or destroyed.

3.02 Clearing

- A. Clear areas required for access to site and execution of work.
- B. Remove trees and shrubs within the area to be cleared.
- C. Clear undergrowth and deadwood, without disturbing subsoil.

3.03 Disposal of Refuse

- A. The refuse resulting from the clearing and grubbing operation shall be hauled to a disposal site secured by the Contractor and shall be disposed of in accordance with all requirements of federal, state, county and municipal regulations. No debris of any kind shall be deposited in any stream or body of water, or in any street or alley. No debris shall be deposited upon any private property except with written consent of the property owner. In no case shall any material be left on the Project, shoved onto abutting private properties, or be buried in embankments or trenches on the Project.
- B. When approved in writing by the Engineer and when authorized by the proper authorities, the Contractor may dispose of such refuse by burning on the site of the Project provided all requirements set forth by the authorities are met. The authorization to burn shall not relieve the Contractor in any way from damages which may result from Contractor's operations. On easements through private property, the Contractor shall not burn on the site.

**END OF SECTION # 02100**

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**S219 – Brookfield Country Club Sewer Lining**  
**SECTION NO. 02110S**  
**SEWER EASEMENT CLEARING**

**PART 1 - GENERAL**

Definitions:

1. Light Clearing: This area requires “bush hog” equipment for tree and shrub removal.
2. Medium Clearing: This area requires “bush hog” and “chipper” equipment for tree and shrub removal.
3. Heavy Clearing: This area requires “timbering” equipment for tree and shrub material.

**1.01 SCOPE**

- A. Sewer Easement Clearing includes, but is not limited to removal from the project site of trees, stumps, roots, brush, structures, abandoned utilities, trash, debris, and all other materials found on or near the surface of the ground in the construction area and understood by generally accepted engineering practice not to be suitable for construction of the type contemplated. Precautionary measures to prevent damage to existing features to remain are considered part of the work.
- B. Sewer Easement Clearing Operations shall be coordinated with temporary and permanent erosion and sedimentation control procedures.

**1.02 QUALITY ASSURANCE**

- A. The Contractor shall comply with applicable codes, ordinances, rules, regulations, and laws of local, municipal, state or federal authorities having jurisdiction over the project. All required permits shall be obtained for construction operations by the Contractor.
- B. Open burning will not be permitted.

**PART 2 - PRODUCTS**

**2.01 EQUIPMENT**

- A. The Contractor shall furnish equipment with operators of the type normally used in clearing and grubbing operations including, but not limited to tractors, trucks, loaders, and root rakes.

**PART 3 - EXECUTION**

**3.01 SEWER EASEMENT CLEARING**

- A. Clear and grub the permanent easement, but not to exceed 10 feet on each side of the pipeline before initiating other items of work. Remove all trees, growth, debris, stumps and other objectionable matter, except as directed by the County.
- B. Materials to be cleared, grubbed and removed from the construction area include, but are not limited to the following: trees, stumps, roots, brush, trash, organic matter, paving, miscellaneous structures, debris, and abandoned utilities.
- C. Grubbing shall consist of completely removing roots, stumps, trash, and other debris from all graded areas so that topsoil is free of roots and debris. Topsoil is to be left sufficiently clean so that further picking and raking will not be required.

- D. All stumps, roots, foundations and planking embedded in the ground shall be removed and disposed of. Piling and butts of utility poles shall be removed to a minimum depth of two feet below the limits of excavation for structures, trenches and roadways or two feet below finished grade, whichever is lower.
- E. Landscaping features shall include, but are not necessarily limited to, fences, cultivated trees, cultivated shrubbery, property corners, man-made improvements, subdivision and other signs, and shall be moved off or removed from the easement. The Contractor shall take extreme care in moving landscape features and shall re-establish these features as directed by the County.
- F. Surface rocks and boulders shall be grubbed from the soil and removed from the site if not suitable as rip rap.
- G. Where tree limbs interfere with utility wires, or where the trees to be felled are in close proximity to utility wires, the tree shall be taken down in sections to eliminate the possibility of damage to the utility.
- H. Any work pertaining to utility poles shall comply with the requirements of the appropriate utility.
- I. All fences adjoining any excavation or embankment that, in the Contractor's opinion, may be damaged or buried, shall be carefully removed, stored and replaced. Any fencing that, in the County's opinion, is significantly damaged shall be replaced with new fence material.
- J. Stumps and roots shall be grubbed and removed to a depth not less than 2 feet below grade. All holes or cavities which extend below the subgrade elevation of the proposed work shall be filled with crushed rock or other suitable material, compacted to the same density as surrounding material.
- K. The Contractor shall exercise special precautions for the protection and preservation of trees, cultivated shrubs, sod, fences, etc. situated within limits of the construction area but not directly within excavation and/or fill limits. The Contractor shall be held liable for any damage his operations have inflicted on such property.
- L. The Contractor shall be responsible for all damages to existing improvements outside the permanent easement resulting from Contractor's operations.
- M. Burying of residual materials will not be allowed.

### 3.02 DISPOSAL OF DEBRIS

- A. The debris resulting from the clearing and grubbing operation shall be hauled to a disposal site secured by the Contractor and shall be disposed of in accordance with all requirements of federal, state, county and municipal regulations. No debris of any kind shall be deposited in any stream or body of water, or in any street or alley. No debris shall be deposited upon any private property except with written consent of the property owner. In no case shall any material or debris be left on the Project, shoved onto abutting private properties or buried on the Project.
- B. Open burning will not be permitted.

**END OF SECTION NO 02110S**

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**S219 – Brookfield Country Club Sewer Lining**  
**SECTION NO. 02125**  
**SOIL EROSION AND SEDIMENT CONTROL**

**PART 1 - GENERAL**

**1.01 SCOPE**

- A. The work specified in this Section consists of providing, maintaining and removing temporary erosion and sedimentation controls.
- B. Temporary erosion controls, include, but are not limited to, grassing, mulching, watering and reseeding on-site surfaces and spoil and borrow area surfaces, and providing interceptor ditches at ends of berms and at those locations which will ensure that erosion during construction will be either eliminated or maintained within acceptable limits as established by the Georgia Erosion and Sedimentation Act of 1975, as amended, Section 402 of the Federal Clean Water Act, and applicable codes, ordinances, rules, regulations and laws of local and municipal authorities having jurisdiction.
- C. Temporary sedimentation controls include, but are not limited to, silt dams, traps, barriers, filter stone and appurtenances at the foot of sloped surfaces which will ensure that sedimentation pollution will be either eliminated or maintained within acceptable limits as established by the Federal Clean Water Act of 1987, as amended.
- D. Land disturbance activity shall not commence until the Building Permit or Land Disturbance Permit (LDP) has been issued, which authorizes land disturbance activities.
- E. Basic Principles
  - 1. Conduct the earthwork and excavation activities in such a manner to fit the topography, soil type and condition.
  - 2. Minimize the disturbed area and the duration of exposure to erosion elements.
  - 3. Stabilize disturbed areas immediately.
  - 4. Safely convey run-off from the site to an outlet such that erosion will not be increased off site.
  - 5. Retain sediment on site that was generated on site.
  - 6. Minimize encroachment upon watercourses.
- F. Temporary Erosion and Sedimentation Control: In general, temporary erosion and sedimentation control procedures shall be directed toward:
  - 1. Preventing soil erosion at the source.
  - 2. Preventing silt and sediment from entering any waterway if soil erosion cannot be prevented.
  - 3. Preventing silt and sediment from migrating downstream in the event it cannot be prevented from entering the waterway.
- G. Permanent Erosion Control: Permanent erosion control measures shall be implemented to prevent sedimentation of the waterways and to prevent erosion of the Project site.

**1.02 QUALITY ASSURANCE**

- A. General: Perform all work under this Section in accordance with all pertinent rules and regulations including, but not necessarily limited to, those stated herein and these Specifications.
- B. Conflicts: Where provisions of pertinent rules and regulations conflict with these Specifications, the more stringent provisions shall govern.

## PART 2 - PRODUCTS

### 2.01 TEMPORARY EROSION AND SEDIMENTATION CONTROL MATERIALS

- A. Silt Fence: Silt fence shall meet the requirements of Section 171 - Temporary Silt Fence of the Department of Transportation, State of Georgia, Standard Specification, latest edition. Silt fence fabric must be on the Georgia DOT Qualified Product List.
- B. Hay bales shall be clean, seedfree cereal hay type.
- C. Netting shall be 1/2-inch, galvanized steel, chicken wire mesh.
- D. Filter stone shall be crushed stone conforming to Georgia Department of Transportation Table 800.01H, Size Number 3.
- E. Concrete block shall be hollow, non-load-bearing type.
- F. Plywood shall be 3/4-inch thick exterior type.
- G. Blanket and matting materials shall be in conformance with Georgia Department of Transportation Qualified Product List (QPL #62 for blankets, QPL #49 for matting).
- H. Dirtbag shall be a non-woven bag which is sewn with a double needle machine using a high strength thread. The dirtbag seam shall have an average wide width strength per ASTM D-4884.

### 2.02 RIP RAP

- A. Use sound, tough, durable stones resistant to the action of air and water. Slabby or shaley pieces will not be acceptable. Specific gravity shall be 2.0 or greater. Rip rap shall have less than 66 percent wear when tested in accordance with AASHTO T-96. Unless shown or specified otherwise, stone rip rap shall be Type 1 rip rap.
- B. Type 1 Rip Rap: The largest pieces shall have a maximum volume of two cubic feet. At least 35 percent of the mass shall be comprised of pieces that weigh 125 pounds or more. The remainder shall be well graded down to the finest sizes. Rock fines shall comprise a maximum of 10 percent of the total mass. Rock fines are defined as material passing a No. 4 sieve. Rip rap size shall conform to Georgia Department of Transportation Section 805.01 Stone Dumped Rip Rap, Type 1.
- C. Type 3 Rip Rap: The largest pieces shall have a maximum approximate volume of one cubic foot. At least 35 percent of the mass shall be comprised of pieces that weigh 15 pounds or more. The remainder shall be well graded down to the finest sizes. Rock fines shall comprise a maximum of 10 percent of the total mass. Rock fines are defined as material passing a No. 4 sieve. Rip rap size shall conform to Georgia Department of Transportation Section 805.01 Stone Dumped Rip Rap, Type 3.
- D. 200 Pound Rip Rap: Minimum weight of individual stones shall be 200 pounds.

### 2.03 FILTER FABRIC

- A. The filter fabric for use under rip rap shall be a monofilament, polypropylene woven fabric or a non-woven fabric meeting the specifications as established by Task Force 25 for the

Federal Highway Administration. The filter fabric shall have an equivalent opening size (EOS) of 70.

- B. Filter fabric under rip rap shall be equal to Mirafi, Amoco or Exxon.

## 2.04 CONCRETE

- A. Concrete shall have a compressive strength of not less than 3,000 psi, with not less than 5.5 bags of cement per cubic yard and a slump between 3 and 5-inches. Ready-mixed concrete shall be mixed and transported in accordance with ASTM C 94. Reinforcing steel shall conform to the requirements of ASTM A 615, Grade 60.

## PART 3 - EXECUTION

### 3.01 GENERAL

- A. Provide all materials and promptly take all actions necessary to achieve effective erosion and sedimentation control in accordance with the Georgia Erosion and Sedimentation Act of 1975, as amended, local enforcing agency guidelines, and these Specifications.

### 3.02 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Temporary erosion and sedimentation control procedures should be initially directed toward preventing silt and sediment from entering the creeks. The preferred method is to provide an undisturbed natural buffer, extending a minimal 25 feet from the top of the bank, to filter the run-off. Should this buffer prove infeasible due to construction activities being too close to the creek, or if the amount of sediment overwhelms the buffer, the Contractor shall place silt fences to filter the run-off and, if necessary, place permanent rip rap to stabilize the creek banks. When excavation activities disturb the previously stated preventative measures, or if they are not maintained, or whenever the construction activities cross the creeks, the check dams shall be installed downstream and within 200 feet of the affected area.
- B. Silt dams, silt fences, traps, barriers, check dams, appurtenances and other temporary measures and devices shall be installed as indicated on the approved plans and working drawings, or as directed by Construction Manager, shall be maintained until no longer needed, and shall then be removed. Deteriorated hay bales and dislodged filter stone shall be replaced with new materials. Detention ponds, if constructed, shall be maintained in a condition ensuring that unfiltered water will not leave the pond.
- C. Where permanent grassing is not appropriate, and where the Contractor's temporary erosion and sedimentation control practices are inadequate, the Construction Manager may direct the Contractor to provide temporary vegetative cover with fast growing seedings. Such temporary vegetative cover shall be provided by the Contractor in compliance with the Manual for Erosion and Sedimentation Control in Georgia, specifically in the selection of species, planting dates and application rates for seedings, fertilizer and mulching, with the exception that kudzu shall not be permitted.
- D. All erosion and sedimentation control devices, including check dams, shall be inspected by the Contractor at least weekly and after each rainfall occurrence and cleaned out and repaired by the Contractor as necessary.
- E. Temporary erosion and sedimentation control devices shall be installed and maintained from the initial land disturbance activity until the satisfactory completion and establishment of permanent erosion control measures. At that time, temporary devices shall be removed.

### 3.03 PERMANENT EROSION CONTROL

- A. Permanent erosion control shall include:

1. Restoring the work site to its original contours, unless shown otherwise on the Drawings or directed by the Construction Manager.
  2. Permanent vegetative cover shall be performed in accordance with Article 3.04 of this Section.
  3. Permanent stabilization of steep slopes and creeks shall be performed in accordance with Article 3.05 of this Section.
- B. Permanent erosion control measures shall be implemented as soon as practical after the completion of pipe installation or land disturbance for each segment of the Project. In no event shall implementation be postponed when no further construction activities will impact that portion or segment of the Project. Partial payment requests may be withheld for those portions of the Project not complying with this requirement.

### 3.04 GRASSING

- A. General
1. All references to grassing, unless noted otherwise, shall relate to establishing permanent vegetative cover as specified herein for seeding, fertilizing, mulching, etc.
  2. When final grade has been established, all bare soil, unless otherwise required by the Contract Documents, shall be seeded, fertilized and mulched in an effort to restore to a protected condition. Critical areas shall be sodded as approved or directed by the Construction Manager.
  3. Specified permanent grassing shall be performed at the first appropriate season following establishment of final grading in each section of the site.
  4. Permanent grassing shall be of a perennial species.
- B. Replant grass removed or damaged in residential areas using the same variety of grass and at the first appropriate season. Where sod is removed or damaged, replant such areas using sod of the same species of grass at the first appropriate season. Outside of residential or landscaped areas, grass the entire area disturbed by the work on completion of work in any area. In all areas, promptly establish successful stands of grass.
- C. Grassing activities shall comply with the Manual for Erosion and Sediment Control in Georgia, specifically for the selection of species, with the exception that kudzu shall not be permitted, planting dates and application rates for seeding, fertilizer and mulching. Where permanent vegetative cover (grassing) cannot be immediately established (due to season or other circumstances) the Contractor shall provide temporary vegetative cover. The Contractor must return to the site (at the appropriate season) to install permanent vegetation in areas that have received temporary vegetative cover.

### 3.05 RIP RAP

- A. Unless shown otherwise on the Drawings, rip rap shall be placed where ordered by the Construction Manager, at all points where banks of streams or drainage ditches are disturbed by excavation, or at all points where natural vegetation is removed from banks of the streams or drainage ditches. Carefully compact backfill and place rip rap to prevent subsequent settlement and erosion. This requirement applies equally to construction along side a stream or drainage ditch as well as crossing a stream or drainage ditch.

- B. When trenching across a creek, place rip rap a distance of 10 feet upstream and 10 feet downstream from the top of the trench excavation. Place rip rap across creek bottom, across creek banks and extend rip rap placement five feet beyond the top of each creek bank.
- C. Preparation of Foundations: The ground surface upon which the rip rap is to be placed shall be brought in reasonably close conformity to the correct lines and grades before placement is commenced. Where filling of depressions is required, the new material shall be compacted with hand or mechanical tampers. Unless at creek banks or otherwise shown or specified, rip rap shall begin in a toe ditch constructed in original ground around the toe of the fill or the cut slope. The toe ditch shall be two feet deep in original ground, and the side next to the fill or cut shall have that same slope. After the rip rap is placed, the toe ditch shall be backfilled and the excess dirt spread neatly within the construction easement.
- D. Placement of Filter Fabric: The surface to receive fabric shall be prepared to a relatively smooth condition free from obstructions, depressions and debris. The fabric shall be placed with the long dimension running up the slope and shall be placed to provide a minimum number of overlaps. The strips shall be placed to provide a minimum width of one foot of overlap for each joint. The filter fabric shall be anchored in place with securing pins of the type recommended by the fabric manufacturer. Pins shall be placed on or within 3-inches of the centerline of the overlap. The fabric shall be placed so that the upstream strip overlaps the downstream strip. The fabric shall be placed loosely so as to give and therefore avoid stretching and tearing during placement of the stones. The stones shall be dropped no more than three feet during construction. The fabric shall be protected at all times during construction from clogging due to clay, silts, chemicals or other contaminants. Any contaminated fabric or any fabric damaged during its installation or during placement of rip rap shall be removed and replaced with uncontaminated and undamaged fabric at no expense to the County.
- E. Placement of Rip Rap
1. Rip rap shall be placed on a 6-inch layer of soil, crushed stone or sand overlaying the filter fabric. This 6-inch layer shall be placed to maximize the contact between the soil beneath the filter fabric and the filter fabric. Rip rap shall be placed with its top elevation conforming with the finished grade or the natural slope of the stream bank and stream bottom.
  2. Stone rip rap shall be dumped into place to form a uniform surface and to the thickness specified on the Drawings. The thickness tolerance for the course shall be -6-inches and +12-inches. If the Drawings or the Bid do not specify a thickness, the course shall be placed to a thickness of not less than 18-inches.

**END OF SECTION # 02125**

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**S219 – Brookfield Country Club Sewer Lining**  
**SECTION NO. 02126**  
**STREAM CROSS AND CONSTRUCTION EXITS**

**PART 1 GENERAL**

**1.01 SCOPE**

- A. The section shall apply to all temporary road construction, including stream crossings and access roads.
- B. Temporary road construction includes, but is not limited to, providing all construction exits, rip-rap, traffic control, and excavation work necessary to create vehicular access throughout the entire length of the project.

**1.02 DEFINITIONS**

- A. A “construction exit” is defined as a stone-stabilized pad located at any point where traffic will be leaving a construction site to a public right-of-way, street, alley, sidewalk, or parking area.
- B. A “stream crossing” is defined as a temporary structure installed across a flowing stream or watercourse for use by construction equipment.

**1.03 JOB CONDITIONS**

- A. Location of the Work: The area to be constructed as shown schematically on the Drawings or specified below.

**1.04 RELATED SECTIONS**

- A. Section 02125: Erosion and Sediment Control
- B. Section 02120: Site Prep

**PART 2 PRODUCTS**

**2.01 EQUIPMENT**

- A. The Contractor shall furnish equipment of the type normally used in temporary road construction operations, including, but not limited to, tractors, trucks, loaders, graders, bulldozers, and cranes.

**PART 3 EXECUTION**

**3.01 CONSTRUCTION EXIT**

- A. Provide temporary stone exit/entrance pad located at points of vehicular ingress and egress to the site and maintain in service until instructed otherwise by the Construction Manager. Minimum pad thickness shall be 6 inches; minimum length shall be 50 feet. Maintain in a condition that will prevent tracking or flow of mud onto public road. Construction Exits shall conform with the requirements set forth in the Manual for Erosion and Sediment Control in Georgia Fifth Edition (2000), Georgia Soil and Water Conservation Commission. Excerpts from the manual are included in this Specification.

**3.02 STREAM CROSSINGS**

- A. Provide temporary stream crossings located at points of vehicular crossings and maintain in service until instructed otherwise by the Construction Manager. Structures shall be protected from washout during periods of peak discharges by diverting water around the

structures. Structures shall be designed to withstand flows from a 10-year, 24 hour frequency storm or the storm specified in Title 12-7-1 of the Official Code of the Georgia Annotated. *Contractor shall obtain the services of a licensed Georgia Professional Engineer (P.E.) to size these structures and certify that the design has met the above referenced criteria.* Excerpts from the Manual for Erosion and Sediment Control in Georgia Fifth Edition (2000) are included in this specification for reference.

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**END OF SECTION # 02126**

**S219 – Brookfield Country Club Sewer Lining**

**SECTION NO. 02705**

**INTERNAL SEWER CONDITION**

**PART 1 GENERAL**

**1.01 SCOPE**

- A. The work of this Section includes providing CCTV (Closed Circuit Television) and/or sonar assessment of sanitary sewers to establish internal structural and service condition.

**1.02 DEFINITIONS**

- A. Silt: For the purposes of this Section, **SILT** shall be defined as any and all solid or semi-solid materials, including fine and granular material such as sand, grit, gravel and rock as well as grease, sludge, slime, debris or any other loose material or encrustation lodged in the manhole or sewer.
- B. Sewer Inspection: Viewing the sewer with the aid of CCTV and/or sonar equipment, and/or manually, to assess internal structural and/or service condition as well as assess the structural and/or service condition of laterals. *Data logging is required.*

**1.03 SUBMITTALS**

- A. The following shall be submitted:
  - 1. Listing of all cleaning, flow control, flow diversion, preconditioning, safety, traffic control, and CCTV and sonar equipment, including backup or standby equipment.
  - 2. Supply copy of CCTV and Sonar operational manuals.
  - 3. Location where debris from cleaning will be disposed. Manifest shall be required indicating location and amount of debris removed and a signed document identifying how and where debris was disposed.
  - 4. Schedule for inspecting, and cleaning each sewer reach as required.
  - 5. Daily Log in accordance with section 01320.
  - 6. Daily report on all confined space entry-see form attached.
  - 7. Monthly Report in accordance with section 01320.

**1.04 EXTENT OF /INSPECTION**

- A. The Contractor shall inspect pipelines with pan and tilt CCTV imagery and sonar and or combined CCTV/Sonar as specified so as to record all relevant features and to confirm their structural and service condition. Inspections of pipelines shall be carried out in accordance with the reporting format and defect description as defined by the project manager. A specimen report sheet is attached to this Section.
- B. All CCTV/sonar operators responsible for direct reporting of sewer condition shall have a minimum of 3 years previous experience in inspection, processing, and interpretation of data associated with CCTV and sonar inspections. The Contractor shall provide Project Manager with written documentation that all CCTV and sonar operators meet these experience requirements which shall include a list of projects undertaken and client name and telephone number for reference.

- C. All approved Contractors will be required to undergo training prior to undertaking internal condition assessment work in Fulton County. Defect coding used throughout the project will conform to specifications provided by Project Manager. Training will be carried out at the Contractor's expense though no charge will be levied for the training, which is expected to last one day.
- D. The Contractor shall complete a daily written record (Daily Log) detailing the work carried out and any small items of work which were incidental to the contract. The Contractor shall include in his daily record reference to:
1. Delays - e.g. traffic, lack of information, sickness, labor or equipment shortage;
  2. Weather conditions;
  3. Equipment on site;
  4. Equipment downtime;
  5. Personnel on site;
  6. Submissions to consultants;
  7. Accident report;
  8. Incident report;
  9. Major defects encountered, including collapsed pipe, if any;
  10. Visitors on site.
- E. Project Manager's representative on site shall certify receipt of the daily record noting any items and adding any observations with reference to claims for payment to the Contractor.

#### **1.05 INSPECTION UNITS**

- A. The Contractor shall provide sufficient inspection units and all relevant ancillary equipment, including standby units in the event of breakdown, in order to complete all sewer and manhole inspections as specified.

#### **1.06 INSPECTION VEHICLE**

- A. The inspection vehicle shall be comprised of two totally separate areas. One of these, shall be designated as the viewing area, shall be insulated against noise and extremes in temperature, include the provision of air conditioning, and shall be provided with means of controlling external and internal sources of light in a manner capable of ensuring that the monitor screen display is in accordance with the Specifications. Proper seating accommodation shall be provided by the Contractor to enable two people, in addition to the operator, to view clearly the on-site monitor which shall display the inspection as it proceeds.
- B. The working area shall be reserved for equipment, both operational and stored, and no equipment utilized within the sewer shall be allowed to be stored in the viewing area.
- C. In addition to the vehicle provided under Sub-clause 1.03 A, the Contractor shall also provide a vehicle together with a driver, when assisting with the visual inspections. The vehicle shall be suitable for carrying the team and laborers and shall be equipped with the following:
1. Equipment for easing and lifting manhole covers;
  2. Sewer safety equipment;

3. Road safety equipment;
4. Protective clothing for the inspection teams comprising coveralls, boots, gloves, hard hat etc.

#### 1.07 CCTV INSPECTION AND OPERATIONAL EQUIPMENT

- A The Contractor shall furnish all equipment and supplies necessary for properly executing the work described in this section and in accordance with the schedule contained in the Agreement.
- B The sewer line cleaning equipment shall be specifically designed and constructed for sewer line cleaning operations in line size 6 inches and above. The equipment shall be capable of providing both light and heavy line cleaning. The equipment shall be capable of removing dirt, grease, roots, rocks, sand and other obstructions or materials from the lines.
- C The CCTV inspection camera shall be specifically designed and constructed for sewer line inspections. It shall be operative in 100 percent humidity conditions and shall be capable of pan and tilt operation, producing a full-color picture at a remote monitor. Lighting and camera quality shall be suitable to allow a clear, in-focus picture of a minimum of 6 linear feet of the entire inside periphery of the sewer pipe. The camera shall have a Pierpoint Model P571 or approved equal.
- a. To ensure peak picture quality throughout all conditions encountered during the investigation, a variable intensity control of the camera lights and remote control adjustments for focus and iris shall be located at the monitoring station. Focal distance shall be adjustable through a range of 6 inches to infinity. Cameras shall have "self righting" heads/ lens.
- D Color camera monitors shall be located within a temperature-controlled studio that shall allow seating for two authorized viewing personnel in addition to the operator. All persons in the studio shall have a clear, comfortable view of the video monitor. Monitors shall have a resolution capability of no less than 650 lines. Continuously displayed on the monitors as recorded by the video camera shall be the date of the inspection, number designation of the manhole-to-manhole pipe segment being inspected, and a continuous forward and reverse readout of the camera distance from the referenced manhole. Audio descriptions of the operator's observations shall be recorded on CD-ROM. Cable, chains, and other devices used with the camera shall be secured so as not to obstruct the camera view or otherwise interfere with the proper documentation of the sewer conditions. Picture quality and definitions shall be to the satisfaction of the Project Manager. The camera lens shall be cleaned as needed. If the picture quality is unsatisfactory, the video equipment shall be replaced.
- E The camera and monitor shall be equipped so that continuous footage readout is seen on the monitor and recorded on the CD-ROM.
- F The inspecting equipment shall be capable of inspecting a length of sewer up to at least 1500 feet when entry onto the sewer may be obtained at each end, and up to 100 feet by rodding, or up to 750 feet where a self propelled unit is used, where entry is at one end only. The Contractor shall maintain this equipment in full working order and shall satisfy Project Manager at the commencement of each working shift that all items of equipment have been provided and are in full working order.
- G Each inspection unit shall contain a means of transporting the CCTV camera and/or sonar equipment in a stable condition through the sewer under inspection. Such equipment

shall ensure the maintained location of the CCTV camera or sonar equipment when used independently on or near the central axis of a circular shaped sewer when required in the prime position.

- H Where the CCTV camera and/or Sonar head are towed by winch and bond through the sewer, all winches shall be stable with either lockable or ratcheted drums. All bonds shall be steel or of an equally non-elastic material to ensure the smooth and steady progress of the CCTV camera and/or Sonar equipment. All winches shall be inherently stable under loaded conditions.
- I Each unit shall carry sufficient numbers of guides and rollers such that, when inspecting, all bonds are supported away from pipe and manhole structures and all CCTV/Sonar cables and/or lines used to measure the CCTV camera's/sonar head location within the sewer are maintained in a taut manner and set at right angles where possible, to run through or over the measuring equipment.
- J Each unit shall carry a range of flow control plugs or diaphragms for use in controlling the flow during the inspection. A minimum of one item of each size of plug or diaphragm ranging from 6 inches to 54 inch diameter inclusive shall be carried.
- K Each inspection unit shall have equipment available to carry out the flushing, rodding and jetting of sewers.

#### **1.08 FIELD SUPERVISION BY Contractor**

- A. The Contractor shall maintain on site at all times a competent field supervisor in charge of the inspection in addition to the safety supervisor. The field supervisor shall be approved in writing by the Project Manager prior to commencement of work. Any change of supervision must also be approved in writing by the Project Manager prior to the change. The field supervisor shall be responsible for the safety of all site workers and site conditions as well as ensuring that all work is conducted in conformance with these Specifications and to the level of quality specified.

#### **1.09 AMPLIFIED TECHNICAL SPECIFICATIONS BY TYPE**

- A. CCTV/Sonar - General Technical Specification;
- B. Man Entry - General Technical Specification;
- C. CCTV, Man Entry and Sonar Data Specifications;
- D. CCTV/Sonar Performance Specification.

#### **General Note Concerning Usage of CCTV/Sonar:**

- A. Generally, CCTV alone shall be used for internal condition assessment where the depth of flow of sewerage is less than 25% of overall sewer diameter.
- B. Generally, CCTV combined with sonar shall be used for internal condition assessment where depth of flow of sewage varies from 25% to 75% of overall sewer diameter. Where the sewer less than 24-inches in diameter and depth of flow of sewage exceeds 25% and is less than 75% of overall sewer diameter PROJECT MANAGER shall instruct CONTRACTOR to either: (a) continue using CCTV (where depth of flow is only marginally greater than 25% of overall diameter) or (b) use sonar (by damming or plugging the sewer so that depth of flow exceeds 75% of overall diameter).
- C. Generally, sonar alone shall be used where depth of flow in the sewer exceeds 75% of overall diameter.

### 1.10 CCTV/SONAR - GENERAL

- A. CCTV Camera/Sonar Head Prime Position: Wherever prevailing conditions allow, the CCTV camera/sonar head shall be positioned to reduce the risk of picture distortion. In circular sewers the CCTV camera lens and/or sonar head shall be positioned centrally (i.e. in prime position) within the sewer. In non- circular sewers, picture orientation shall be taken at mid-height, unless otherwise agreed, and centered horizontally. In all instances the camera lens/sonar head shall be positioned looking along the axis of the sewer when in prime position. A positioning tolerance of  $\pm 10\%$  of the vertical sewer dimension shall be allowed when the camera is in prime position.
- B. CCTV Camera/Sonar Head Speed: The speed of the CCTV camera in the sewer shall be limited to 8 inches per second for inspections to enable all details to be extracted from the CD-ROM recording. Similar or slightly higher speed as agreed by Project Manager shall be provided for inspections. The speed of scanning sonar shall be limited to 4 inches per second.
- C. CCTV Color Camera: The Contractor shall provide a color pan and tilt camera(s) to facilitate the and inspection of all laterals, including defects such as hydrogen sulfide corrosion in the soffit of sewers and benching or walls of manholes, where required by Project Manager. These will be carried out as part of the normal CCTV assessment as the inspection proceeds when instructed by Project Manager. A 360-degree rotational scan indicating general condition must be implemented at every 50 feet interval (min.) along sewers, and at manholes and any salient defect features. The tilt arc must not be less than 225 degrees.
- D. Linear Measurement
1. The CCTV/Sonar monitor display shall incorporate an automatically updated record in feet and tenths of a foot of the footage of the camera or center point of the transducer, whichever unit is being metered, from the cable calibration point. The relative positions of the two center points should also be noted.
  2. The Contractor shall use a suitable metering device which enables the cable length to be accurately measured; this shall be accurate to  $\pm 1\%$  or 6 inches whichever is the greater.
  3. The Contractor shall demonstrate that the tolerance in Sub-clause 1.10 D. is being complied with, using one or both of the following methods in conjunction with a linear measurement audit form which shall be completed each day during the inspection:
    - a. use of a cable calibration device;
    - b. tape measurement of the surface between manholes.
- E. If the Contractor fails to meet the required standard of accuracy Project Manager shall instruct the Contractor to provide a new device to measure the footage. Project Manager may at his discretion instruct the Contractor in writing, to re-inspect those lengths of sewer first inspected with the original measuring device using the new measuring device.

### 1.11 DATA DISPLAY, VIDEO RECORDING AND START OF INSPECTION

- A. At the start of each sewer length being inspected, the length of pipeline from zero footage up to the cable calibration point shall be recorded and reported in order to obtain a full record of the sewer length.
- B. The footage reading entered on to the data display at the cable calibration point must allow for the distance from the start of the/inspection to the cable calibration point such that the footage at the start of is zero.
- C. In the case of inspection through a manhole where a new header sheet is required, the footage shall be set at zero with the camera focused on the outgoing pipe entrance.

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- D. At the start of each manhole length a data generator shall electronically generate and clearly display on the viewing monitor and CD Rom recording a record of data in alpha-numeric form containing the following minimum information:
1. Automatic update of the camera's footage position in the sewer line from adjusted zero;
  2. Sewer dimensions;
  3. Manhole/pipe length reference numbers;
  4. Date of;
  5. Road name/location;
  6. Direction of;
  7. Time of start of;
  8. Sewer use (S-Sanitary Sewer etc).
- D. The size and position of the data display shall be such as not to interfere with the main subject of the picture.
- E. Once the inspection of the pipeline is under way, the following minimum information shall be continually displayed:
1. Automatic update of the camera's footage position in the sewer line from adjusted zero (see Sub-clause 1.10 D.);
  2. Sewer dimensions in inches;
  3. Manhole or pipe length reference number (PLR). General convention allows upstream manhole number to be designated PLR;
  4. Direction of, i.e., downstream or upstream.
- F. Correct adjustment of the recording apparatus and monitor shall be demonstrated by use of a test CD ROM or other device approved by the Contractor. Satisfactory performance of the camera shall then be demonstrated by the recording of the appropriate test device at the commencement of each day for a minimum period of 30 seconds.
- G. Footage shall be given throughout inspection or all relevant defects and construction features as encountered unless otherwise agreed.
- H. CD ROM capacity shall be adequate to record inspection of at least one complete pipe segment between manholes. No gaps shall be left in the recording of a segment between manholes
- I. Only segments between manholes on the same sewer reach shall be included on one CD ROM
- J. Two permanent labels are required, one on the CD ROM and the other in the jewel case. All CD ROM shall have jewel case

CD ROM Jewel Case Label Data				
Contractor's Name:		Location:		
Inspection Type:	[ ]	[ ] Pre Inspection	[ ] Post Inspection	
Tape No:	Date Recorded: _____		Date Submitted:	
Basin:	First Manhole No: _____		Last Manhole No:	
CD ROM FACE LABEL Data				
Upstream Manhole No.	Downstream Manhole No.	Direction	Pipe Diameter (inches)	Pipe Length (feet)

- L Defect coding used throughout the project will conform to the Fulton County Manual of Sewer Condition Assessment, which will be provided by the Project Manager.

**1.13 MAN ENTRY - GENERAL**

A. Photographic Camera Position - General Illustration of Sewer Interior

1. The hand held photographic camera or video camera shall be so positioned as to reduce the risk of picture distortion. In circular sewers the camera lens shall be positioned centrally looking along the axis of the sewer. In non-circular sewers picture orientation shall be taken at mid-height, unless otherwise agreed, and centered horizontally.
2. The hand held photographic camera or video camera shall be positioned so that the long side of the photograph or video tape is horizontal.

B. Photographic Camera Position - Laterals/Specific Defect

1. A means of accurately locating the photographic or video camera's footage and any recorded lateral or defect, along the sewer shall be provided, to an accuracy of ± 1% or 6 inches whichever is the greater.
2. When requested by Project Manager in writing at any time during an inspection, the Contractor shall demonstrate that the above tolerance is being complied with. The device used by the Contractor to measure the footage along the sewer will be compared with a standard tape measure. The results will be noted. If the Contractor fails to meet the required standard of accuracy Project Manager shall instruct the

Contractor to provide a new device to measure the footage. Project Manager may at his discretion instruct, in writing, the Contractor to re-inspect those lengths of sewer inspected with the original measuring device at no extra cost.

3. Photographic Quality: The in-sewer photographic camera or hand held video system and suitable illumination shall be capable of providing an accurate, uniform and clear record of the sewer's internal condition. In-sewer lighting standards shall meet the requirements of Project Manager and/or the County both in relation to safety and power.

#### C. CCTV, Man Entry and Sonar Data Specification

##### 1. Reporting

- a. The report shall be computer validated using Flexidata or approved equal software or equivalent and presented on CD-ROM to provide a summary listing of the number and type of features including defects found for each section of pipeline. The report format is shown in the attached specimen report. This specimen report sheet shall be accurately and fully adopted in style, format and in detail.
- b. Following completion of a pipeline inspection and no later than fourteen days following the , one copy of all required details, i.e. typed coding sheets, floppy diskette report, CD-ROMs, photographs and negatives shall be submitted to Project Manager. All the supplied data and information shall remain the property of Project Manager.
- c. The Contractor shall provide hard copy output or manually complete site coding sheets at the time of the and shall forward copies of these sheets to Project Manager, preferably each day, but at least every other day, together with a daily report on progress.

2. Site Coding Sheets: Each sewer length, i.e. the length of sewer between two consecutive manholes, shall be entered on a separate coding sheet. Thus where a Contractor elects to "pull through" a manhole during a CCTV and/or Sonar inspection or "walk through" during a Man Entry inspection he shall start a new coding sheet at the manhole "pulled or walked through" and shall re-set the footage to zero on the coding sheet. Where a length of sewer between consecutive manholes is inspected from each end (due to an obstruction) two coding sheets should be used.

- a. Where a length of sewer between two consecutive manholes cannot be inspected or attempted for practical reasons a (complete header) coded sheet shall be made out defining the reason for abandonment. At uncharted manholes it is not necessary to start a coding sheet or to re-set the footage to zero. The uncharted manhole location shall be annotated on the narrative of the CD-Rom and inspected per the specifications

3. Measurement Units: All dimensions shall be in feet and inches. Measurement of sewers shall be to the nearest inch.

##### 4. CCTV and Man Entry Photographs

- a. Photographs shall be taken of all laterals and pipeline defects. Where a defect is continuous or repeated the photographs shall be taken at the beginning of the defect and at not less than 10 foot intervals thereafter. Where photographs are not otherwise required a general condition photograph shall be taken not more than 50 feet after the previous photograph.

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- b. CCTV Photographs must clearly and accurately show what is displayed on the monitor, which shall be in proper adjustment.
  - c. Photographs, which shall be durable, shall be 3"x5" size and shall be supplied in a suitable album or CD-ROM the standard of which shall be to the entire satisfaction of Project Manager.
  - d. Still photographs shall be durable and clearly identified in relation to the street location, sewer dimensions, manhole start and finish numbers, direction, footage and date when the photograph was taken.
  - e. The annotation shall be clearly visible and in contrast to its background, shall have a figure size no greater than 1/4 inch, and be type printed.
  - f. The annotation shall be positioned so as not to interfere with the subject of the photograph.
  - g. The Contractor shall provide color photographs using digital format (high resolution) on CD-ROM plus a 4" X 6" print in a suitable album.
5. Control Sample Photographs and/or CD-ROMs: Project Manager may at his discretion issue a written instruction to the Contractor to provide a sample of the photographs and/or CCTV/Sonar tapes taken during the contract period. Project Manager shall give a written instruction and the Contractor shall provide the information within 5 working days of receiving the written instruction.
  6. CCTV/Sonar Performance
    - a. Color CCTV/Sonar: All CCTV and/or Sonar work shall use color CCTV/sonar reproduction.
    - b. CCTV Picture Quality: An approved test device shall be provided and be available on site throughout the Contract, enabling the tests specified in this clause to be checked. The test card shall be Marconi Regulation Chart No. 1 or its derivatives with a color bar, clearly differentiating between colors, with no tinting, to show the following:
      1. White
      2. Yellow
      3. Cyan
      4. Green
      5. Magenta
      6. Red
      7. Blue
      8. Black
    - c. At the start of each and every working shift, the camera shall be positioned centrally and at right angles to the test card at a distance where the full test card just fills the monitor screen. The Contractor shall ensure that the edges of the test card castellations coincide with the edges of the horizontal and vertical scan (raster). The card shall be illuminated evenly and uniformly without any reflection. The type of camera used is to be identified on the test recording. The recording must show the

camera being introduced into the test device and reaching its stop position. Other test devices may be used subject to approval by Project Manager.

- d. The electronic systems, television camera and monitor shall be of such quality as to enable the following to be achieved:
  1. Shades of Gray: The gray scale shall show equal changes in brightness ranging from black to white with a minimum of five clearly recognizable stages.
  2. Color: With the monitor adjusted for correct saturation, the six colors plus black and white shall be clearly resolved with the primary and complementary colors in order of decreasing luminance. The gray scale shall appear in contrasting shades of gray with no tint.
  3. Linearity: The background grid shall show squares of equal size, without convergence/divergence over the whole of picture. The center circle shall appear round and have the correct height/width relationship ( $\pm 5\%$ ).
  4. Resolution: The live picture must be clearly visible with no interference and capable of registering a minimum number of TV lines/pictures height lines. The resolution shall be checked with the monitor color turned down. In the case of tube cameras this shall be 600 lines.
  5. Color Constancy: To ensure the camera shall provide similar results when used with its own illumination source, the lighting shall be fixed in intensity prior to commencing the inspection. In order to ensure color constancy, generally no variation in illumination shall take place during the inspection.
  6. The Contractor shall note that Project Manager may periodically check both the live and video picture color consistency against the color bar. Any differences will necessitate re-inspect of the new length or lengths affected, at the Contractor's expense.
    - a. CD-ROM Playback: CD-ROM playback shall be capable of a resolution of a minimum of 250 lines recorded at standard speed.
    - b. CCTV Focus/Iris/Illumination: The adjustment of focus and iris shall allow optimum picture quality to be achieved and shall be remotely operated. The adjustment of focus and iris shall provide a minimum focal range from 6 inches in front of the camera's lens to infinity. The distance along the sewer in focus from the initial point of observation shall be a minimum of twice the vertical height of the sewer. The illumination must be such as to allow an even distribution of the light around the sewer perimeter without the loss of contrast, flare out of picture or shadowing.

## 7. Sonar Requirements

- a. Rates shall allow for:
  1. Complete structural and service assessment to the equivalent standard as that obtained for conventional CCTV imagery.
  2. The means of attenuating flow, where necessary, to facilitate appraisal of the full sewer cross section.
  3. Measurement of flow depth and silt depth.

- b. Rates shall also allow for continuous output on conventional annotated CD-ROM format of all sewers inspected, supported by complete defect code sheets. Additionally, silt levels shall be assessed as a percentage depth of sewers and longitudinal profiles submitted with the inspection report based on assessments made at 25 foot intervals for each pipeline inspected. To facilitate this requirement, and in addition, to assist in diametrical measurement particularly where a sewer is deformed and/or where a sewer has suffered hydrogen sulfide corrosion; screen graphic facilities shall be made available to enable measurements to be taken in any position across the diametrical profile of the sewer as the sonar inspection proceeds and where specifically directed by the Project Manager.
- c. Where combined CCTV and Sonar imagery is required the output shall similarly display combined CCTV and Sonar images of the sewer being inspected. The sonar image shall be superimposed on the real CCTV image as required. This shall be carried out as combined operation.
- d. Rates shall also allow for a comprehensive final report on the findings concerning major defects, including fractures, displaced joints, deformation, corrosion and lateral intrusions, as well as dominant surface features, including encrustation and silt depths.
- e. The monitor display resolution shall be a minimum of 800 X 600 pixels. The color palette shall have a minimum of 16 colors with text.
- f. The picture update speed shall be such that compliance with Sub-clause A (1) shall not be unduly compromised or result in unsatisfactory picture resolution.
- g. The range of resolution shall be  $\pm 1/10$  inch.
- h. The maximum beam width of sonar energy pulse shall be no greater than 2 degrees from the center of the transducer.
- i. The transducer shall be of the continuous scanning type.

#### 8. Contractor's Quality Control Procedure

- a. The Contractor shall operate a quality control system, to be approved by Project Manager, which will effectively gauge the accuracy of all inspection reports produced by the operator.
- b. The system shall be such that the accuracy of reporting should be a function particularly of:
  - 1. The number of faults not recorded (omissions);
  - 2. The correctness of the coding and classification of each fault recorded.
- c. The minimum levels of accuracy to be attained under the various headings are given below:

Header Accuracy	95%
Detail Accuracy	85%
Lowest Acceptable Tolerance	75%

- d. Project Manager shall be entitled to audit periodically the control system and be present when assessments are being computed.
- e. When requested by Project Manager in writing the Contractor shall forward to Project Manager sufficient details and information for this audit assessment.
- f. Should any report fail to achieve the specified percentages for a particular sewer length, Project Manager shall require the Contractor to re-code and re-submit the report. If the accuracy check fails, the Contractor shall repeat the full quality control check on 5 s either side of the inspection, which has failed. If any further failures are found to be outside the tolerances laid down in Sub-clause D 6B within these additional checks, the process will be repeated until the specified standard is reached. Any reports that have failed will be re-coded by another qualified or and submitted to Project Manager to replace those in his possession.

**PART 2 PRODUCTS**

**2.01 CLEANING PRIOR TO INTERNAL CONDITION INSPECTION**

- A. All sewers shall be cleaned in accordance with Section 02706.

**END OF SECTION # 02705**

**S219 – Brookfield Country Club Sewer Lining**  
**SECTION 02706**

**PRECONDITIONING MANHOLES AND SEWERS**

**PART 1 GENERAL**

**1.01 SCOPE**

- A. The objective of preconditioning is to maximize sewer and manhole service efficiency and effectiveness. Preconditioning involves removal of silt comprising any and all solid or semi-solid materials including fine and granular material, such as sand, grit gravel and rock as well as debris, grease, oil, sludge, slime or any other loose material or encrustation lodged in the manhole or sewer. Preconditioning also involves removal of invading roots, corroded concrete, corroded rungs, corroded ladders, intruding laterals and any other extraneous debris.
- B. Two levels of performance concerning preconditioning of manholes and sewers shall be adhered to in this contract, as directed:
  - 1. Preconditioning as a general level of service; which requires that manholes and sewers shall be considered preconditioning if:
    - a. not more than a nominal amount of 10% of the through flow channel depth in manholes, or sewer depth between manholes is obscured by silt, where the through flow channel or sewer has an equivalent diameter up to an including 2- feet, and
    - b. not more than a nominal amount of 5% of the through flow channel depth in manholes or sewer depth between manholes is obscured by silt, where the through flow channel or sewer has an equivalent diameter greater than 2- feet.
    - c. No surface or appurtenance in manholes including walls, cones, slabs, rungs and benchings and drop shafts shall have any remnant of silt, coating, loose bricks, unsound concrete or mortar or loose material.
    - d. All roots, corroded concrete, corroded rungs, corroded ladders, intruding laterals and any other extraneous debris are removed.
    - e. Fulfillment of the requirements (e.g., depth of silt or cleanliness of surface) is to be determined by internal manhole and sewer condition survey or inspection of each manhole and sewer length preconditioned as directed.
  - 2. Preconditioning prior to rehabilitation and repair; which requires that manholes and sewers shall be considered precondition if in addition to the requirements of 1) above, all silt has been removed from a minimum of 95% of the through flow channel and sewer cross section. Additionally, in the case of manholes, all surfaces shall be free of cleaning agents and their reactant products.

3. Fulfillment of these requirements is to be established by internal manhole and sewer condition survey or inspection of each manhole and sewer length preconditioned as directed.
- C. The Contractor shall precondition the manholes and sewers listed on the plans so as to remove all silt, debris, roots, corroded concrete, corroded rungs and ladders, intruding laterals etc. and dispose of such arisings to an approved dumpsite.
  - D. The manholes and lengths of sewers listed in the Bill of Quantities provide the Contractor with a basis for estimating the lengths and quantities of silt to be removed and preconditioning to be carried out. The Contractor must satisfy himself from a reconnaissance of the manholes and sewers as well as inspection of all or any relevant archival information in order to estimate quantities and types of silt to be removed as well as all preconditioning Work.
  - E. During preconditioning work and all other operations associated with these works, sewer services to the consumer shall be maintained at all times (this requirement may be relaxed at the discretion of the Construction Manager).
  - F. The manholes and sewers to be preconditioned convey foul, surface or combined flows. In some instances such sewers are subject to high flows either continuously or in a periodically varying cycle or due to rainfall, pumping operations. The Contractor shall include in his rates for dealing with such variations and where necessary, program the work to suit.
  - G. The Contractor shall submit a comprehensive equipment list to the Construction Manager before commencement of the work. The complete list, which shall include all backup and standby equipment, shall be broken down in to component parts at least in relation to:
    1. Safety equipment
    2. Manhole preconditioning equipment
    3. Sewer preconditioning equipment
    4. Flow diversion and flow control equipment
    5. Traffic control equipment
    6. All other equipment necessary for the completion of the work.

## 1.02 DEFINITIONS

- A. Silt: For the purposes of this specification silt shall be defined as any and all solid or semi-solid materials, including fine and granular material such as sand, grit, gravel and rock as well as grease, sludge slime, debris or any other loose material or encrustation lodged in the manhole or sewer.
- B. Manhole Structure: Reference to and all activities relevant to manhole structures throughout the text shall also be taken to include junction boxes, inspection chambers, drop shafts, sumps, CSO/Es and all other ancillary structures appurtenant to the sewerage system.

## 1.03 RELATED SECTIONS

- A. The work of the following Sections 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. Internal Sewer Condition Assessment
  - 2. Safety Requirements
  - 3. Standard Specifications
- B. Except as otherwise indicated in this Section of the Specifications, the Contractor shall comply with the latest edition of all relevant local, state and federal Standard Specifications for Public Works Construction

**1.04 REGULATORY REQUIREMENTS**

- A. The work of this Section shall comply with the current versions, with revisions, of OSHA 29 CFR 1910.146 (permit-required confined-space regulations).
- B. All work and testing shall comply with the applicable Federal codes, including Federal Occupational Safety and Health Act of 1970 and the Construction Safety Act of 1969, as amended, and applicable state and local codes and standards; and to the extent applicable with the requirements of the Underwriters Laboratories, Inc. and the National Electric Code.

**PART 2 EXECUTION OF THE WORK**

**2.01 GENERAL**

Preconditioning works shall be carried out from the downstream access manhole or chamber to the upstream access manhole or chamber and shall entirely comply with the performance requirements defined in the relevant sub-clause of clause 1.01 above.

**2.02 WORKING AREA**

- A. The working area in which machinery and equipment operates is to be kept to a minimum. Equipment not in use is to be removed from the works so as to minimize disruption to traffic and general public.
- B. The working area is to be free from silt and debris when the Contractor leaves the site at the end of each visit.
- C. Open manholes, machinery and standing equipment shall be protected at all times.

**2.03 LOCATION**

The location of sewers to be cleaned are detailed in the attached Tables and Drawings.

**2.04 PROGRAMMING OF WORKS**

The Contractor shall, after discussion with the Construction Manager, submit a program of work that will meet the requirements of the Owner. The Construction Manager will assist with the

works program, to ensure, where practicable, a continuity of labor and plant utilization, and the Contractor shall undertake to adhere to the agreed program in a manner set out in the General Conditions of Contract.

## 2.05 PROLONGED ABSENCE FROM SITE

If it is apparent that the Contractor will be absent from the site, or part of the site, for a prolonged period, he shall inform the Construction Manager, replace manhole covers and clear any highways of his equipment and materials including temporary traffic control measures he may be using.

## 2.06 OPERATIONAL REQUIREMENTS

- A. Each preconditioning unit and each CCTV/sonar unit shall carry sufficient numbers of guides and rollers such that, when cleaning and inspecting or surveying, all bonds are supported away from sewer and manhole structures.
- B. Each preconditioning and cleaning unit shall carry a range of flow control equipment, as opposed to overpumping equipment, for use in controlling the flow during the works. A minimum of one item of each size of equipment ranging from 6-inch to 42-inch diameter inclusive shall be carried.
- C. Equipment used to precondition manholes and sewers shall be operated in a manner to prevent overflows and result in spillage. Where flows in sewers are such that the overflow or spillage will occur during preconditioning and cleaning operations, the Contractor shall make arrangements to prevent the premature overflow or spillage or shall stop operations until such flows are reduced to allow cleaning to continue.
- D. In the event of accidental overflow or spill, the Contractor shall immediately stop the overflow and take action to clean up and disinfect spillage. The Construction Manager shall be notified immediately and in any event not less than 24 hours following the occurrence.
- E. Should fines be subsequently imposed as a direct result of the overflow or spillage and the Contractor is deemed to be partially or entirely responsible, the Contractor shall pay such fines in accordance with the General Terms of the Contract. No fine shall be paid by the Owner where it is shown that the Contractor was entirely responsible for any overflow or spillage.
- F. The system of silt and debris removal shall be capable of operating in such a way as to minimize the obstruction to sewer flows and preconditioning operations.
- G. Basement, homes and all other vulnerable property shall be prevented from being flooded where hydraulic preconditioning and cleaning methods are used to precondition manholes and sewers. The Construction Manager shall be notified of all vulnerable property before hydraulic preconditioning works commence.
- H. The Contractor shall make his own arrangements for the off-road overnight parking of his vehicles and plant and shall comply with all relevant statutory traffic regulations and local bylaws.

**2.07 ARISINGS**

- A. The Contractor shall remove all silt, debris, detritus, etc. resulting from all manhole and sewer preconditioning and cleaning activities at least once each working day. Such material shall be caught and collected in a suitable trap or weir or dam within the manhole or chamber being preconditioned and cleansed and/or at the downstream manhole from where the sewer is being preconditioned. The Contractor shall ensure that the capture method or methods adopted shall be wholly effective in the prevention of silt migration downstream. Such methods including details of the equipment used shall be provided to the Construction Manager on request.
- B. Arisings shall be deposited into suitable closed watertight containers such that the total amount removed can be easily measured if required. The Contractor is to give the Construction Manager such assistance as may be necessary in carrying out this measurement work.
- C. The type and capacity of containers to be employed for the holding and transport of the arising shall be stated by the Contractor. The Contractor shall not be allowed to accumulate debris silt and/or liquid waste, sludge on site and under no circumstances shall sewage, silt or solids be dumped on the ground surface, ditches, catch basins or storm drains.
- D. The method of working shall be such that sewer preconditioning work is not held up through a lack of an empty container in which to deposit the arisings.
- E. The Contractor shall bear in mind that it may not always be possible for the container to be sited immediately adjacent to the manhole from which arisings are being raised and should allow for the fact that double handling of the arising may be necessary. The Contractor shall provide for such double handling to be carried out safely and efficiently.
- F. The Contractor must make his own arrangements for the dumping of materials removed from the sewer. The dump must be licensed and approved by the Construction Manager prior to commencement of the works.
- G. All costs associated with dumping must be included in the Contractor's rates.
- H. The containers for the disposal of arisings shall be routed via an approved weighbridge and a copy of each weighbridge ticket submitted to the Construction Manager. Such tickets shall be used to assess the quantities of materials removed for payment.

**2.08 PRECAUTION AGAINST ADVERSE EFFECT ON FABRIC OF MANHOLE OR SEWER**

The Contractor shall take satisfactory precautions against improper use of the preconditioning equipment. The Contractor shall also take satisfactory precautions against adversely affecting the fabric and structural condition of the manhole or sewer being preconditioned. If in the Construction Manager's opinion damage was found to have been inflicted on the manhole or sewer being preconditioned by the Contractor then the Contractor shall repair the sewer at no additional cost to the Owner and to the complete satisfaction of the Construction Manager.

**PART 3 EXECUTION**

### 3.01 SEWERS

#### A. GENERAL

1. The Contractor shall certify that sufficient cleaning units can be provided, including standby units in the event of breakdown, in order to complete the work within the contract period. Further, the Contractor, shall certify that standby or back-up equipment can be delivered to the site within 48 hours in the event of equipment breakdown.
2. The cleaning unit(s) provided for cleaning purposes shall be capable of operating up to a minimum of 500-feet from the point of access to the sewer.
3. Each cleaning unit shall carry a mobile telephone to facilitate communication with the Construction Manager and to comply with safety requirements defined in the safe working procedures approved by the Construction Manager for the execution of the works.

B. CCTV and Sonar Inspection/Survey Units: All CCTV and sonar survey units shall comply with the specification set down elsewhere in the current edition of the "Specification for Internal Sewer Condition Assessment" unless otherwise determined.

#### C. WINCHING EQUIPMENT

1. The winching equipment used shall be sufficient for the purposes of attaining the degree of cleanliness specified in the relevant sub-clause of clause 1.01.
2. The Contractor shall provide conventional power winching equipment together with ancillary equipment, winching buckets, balls, breakers, kites, scooters, scrapers, tires, etc. tools and safety apparatus. Complete and full details of equipment proposed shall be provided to the Construction Manager before work commences.
3. Dredging of sewer shall be undertaken by passing various sized buckets, balls, breakers, kites, scooters, scrapers, tires, etc, through the sewers to physically remove accumulated silt, sludge and other debris. Where conditions dictate, power boring equipment and/or winching equipment shall be used to loosen the silt prior to its removal. All necessary equipment including cables, lines, props, tools must be available at all times as required.
4. The equipment shall be capable of operating efficiently and effectively in the sizes of sewers and depth stated and in sewers up to minimum distances of 500-feet between adjacent manholes.
5. The sewers convey storm water, foul or combined sewage flows. Certain sections of sewer may be flowing entirely full or in a surcharged condition and the Contractor should be prepared at all times to use manual pushing rods, mechanical boring equipment or other methods to pass a leading line through the sewer prior to commencing dredging operations with winching.
6. Any item of plant or equipment associated with the work which may cause obstruction to the flow in the sewer shall be removed from the sewer at the close of work each day. It shall be permitted to leave a line or winching cable through the sewer during breaks in the work.

7. Dredging operations in a particular section of sewer will generally proceed in a downstream direction, working between consecutive manholes using winch buckets of sizes stated below.
8. The size of winch bucket used in sewers from 12" to 48" shall be 90% of the sewer bore up to a maximum of 24". It is anticipated that for sewers greater than 48" that scooters, kites and other alternative means of silt removal will be pursued.
9. It is anticipated that buckets of smaller sizes than those stated will need to be winched through sections of sewer prior to the use of the maximum sizes. The maximum size bucket as stated may be varied at the discretion of the Construction Manager but on no account shall buckets larger than these maximum sizes be used without the approval of the Construction Manager.
10. The Contractor's attention is drawn to sizes of manhole covers and access restrictions. It should be noted that the maximum sizes of buckets listed above may not be practical due to restricted access. The Contractor shall ensure that his working procedure will not be unduly affected by such restrictions and shall include for all such restrictions in his rates.
11. The winches used to draw buckets, balls, breakers, scooters, scrapers or tires shall be power driven. They shall incorporate a torque limiting device so as to prevent the breaking of winching lines in the event of the line becoming jammed by obstructions.
12. Where the operational equipment is towed by winch and bond through the sewer, all winches shall be stable with either lockable or ratcheted drums. All bonds shall be steel or of an equally non-elastic material to ensure the smooth and steady progress of the equipment. All winches shall be inherently stable under loaded conditions.

#### D. PRESSURE JETTING EQUIPMENT

1. The pressure jetting equipment used shall be sufficient for the purposes of attaining the degree of cleanliness specified in the relevant sub-clause of clause 1.01.
2. The jetting unit must be capable of jetting a minimum distance of 500-feet either upstream or downstream from a manhole. Minimum nominal hose size shall be one-inch diameter.
3. The cost of jetting shall be included in the unit rates for Sewer Preconditioning and shall be for jetting both upstream and downstream.
4. Successive passes using the pressure jetting technique shall be used with the silt removed at manholes until such time that the sewer is cleaned to the level specified. No silt shall be allowed to pass beyond the section of sewer being cleaned.
5. Pass rates (rewind speed) for the jetting head shall be at a consistent speed avoiding jerking and excessive variations, typical pass rates being 4-inch to 8-inch per second. The hose reel shall be power driven in the rewind direction.

6. The Construction Manager shall be notified in the bid documents of the jetting equipment proposed by the Contractor. The proposed equipment shall be categorized from the table below:

Category	Machine Type	Min. & Max. Capacity (gal/min)	Man. & Max. Pressure (Bar)
Manholes	1 High Pressure/Low Volume – Trailers	1-35	200-700
	2 High Pressure/Low Volume – Mini	9-35	200-700
	3 High Pressure/Low Volume – Non HGV/HGV Jetter/ Combination	9-35	200-350
Sewers	4 Low Pressure/High Volume – HGV	30 mins. – 50	100 – 140
	5 Low Pressure/High Volume – Combination	30 min.- 75	100 – 200
	6 Low Pressure/High Volume – Super Combination	75 – 175	140 – 175
	7 Low Pressure/High Volume – Separate Jumbo Jetter/ Suction Units	75 – 200	140 – 175

Note: The categories listed are typical only of the equipment for use in the present contract. Exceptions to the duty and equipment shown above will be allowed subject to appropriate notification approval. The Contractor is required to complete the table with details of any other equipment proposed.

7. Where a jetting is fitted with an airflow suction unit for removal of detritus from the sewer, it shall be capable of removing materials such as sludge, silt and brick from depths up to 32-feet with minimum suction of 2500-cfm. A tank with a minimum capacity of 175-cf shall be provided and be capable of decanting off collecting liquors back to the sewer. The suction hose of such a system shall have a minimum internal diameter of 6-inches.
8. Jetting equipment shall be calibrated on an annual basis for an approved body and calibration certificates made available for inspection by the Construction Manager as requested. Such equipment shall also be maintained on a regular basis in accordance with the manufacturer’s specification. The Contractor shall make available to the Construction Manager, copies of his maintenance certificates and/or schedules as required.
9. An automatic pressure relief valve shall be incorporated on the pump discharge chamber to prevent the pressure exceeding the safe maximum for the whole system. This may take the form of a pressure relief valve of bursting disc type in holder; or an automatic pressure regulating valve (unloading valve). The maximum working pressure is the lowest value of the maximum working pressure ratings of all individual components of the system.
- E. Air Driven, Electromechanical and/or Mechanical Precondition Tools: Where necessary, and additional to winching and pressure cleaning equipment, appropriate air driven, electrically driven and/or mechanical tools may be used to needle hammer or scrape or grind of corroded concrete, scarify and remove compacted silt, chip-off spilt grout, detach encrustations, trim and cut laterals and roots, etc., with prior notification being given to the Construction Manager.

- F. Ventilation of Confined Spaces: The Contractor shall provide, operate, maintain and subsequently remove on completion, adequate ventilation apparatus in the form of blowers and/or fans. The ventilation apparatus shall introduce a fresh air supply to support a safe environment for work in sewers, manholes, and all other confined spaces which shall be kept free from dangerous, toxic and/or explosive gases whether generated from sewage, soil strata or otherwise.

### 3.02 MANHOLES

#### A. PRECONDITIONING AS A GENERAL LEVEL OF SERVICE

1. With the exception of the through flow channel, all surfaces shall be thoroughly preconditioned using high pressure water with sufficient pressure (minimum force of 3500 psi (240 bar)) to achieve the specified level of preparation. Preconditioning shall include the removal of all roots, corroded concrete, corroded rungs, intruding laterals and any other extraneous, loose material, debris or foreign matter using air driven, electrically driven or mechanical equipment as specified.
2. Silt, sand and debris traps shall be installed at the entrance to the downstream sewer to retain all silt and debris material before preconditioning work commences.

#### B. PRECONDITIONING PRIOR TO REHABILITATION AND REPAIR

1. All concrete and masonry surfaces to be rehabilitated or repaired shall be meticulously preconditioned by water blasting utilizing a 210 ° F steam unit and appropriate nozzles to provide a contamination-free and sound surface. Other methods such as wet or dry sand blasting, acid wash, concrete cleansers, degreasers or mechanical means may be required to completely clean the manhole surface prior to rehabilitation or repair.
2. All surfaces on which preconditioning methods outlined in 3.02A above have been used, shall be thoroughly rinsed, scrubbed, and neutralized to remove cleaning agents and their reactant products before rehabilitation commences. Concrete surfaces shall be declared satisfactory for the purpose of rehabilitation when they are sound, surface dry, porous and free from dust, dirt, oil, grease, fat efflorescence, concrete hardening or sealing chemicals, previous coatings, rush, form-release agents, laitance, other penetrating contaminants, fins, surface projections, thin crusts, bridging voids, and loosely adhering concrete and dirt particles.
3. All manhole infiltration type leaks, including gushers and runners, shall be sealed in areas where linings are to be installed. The Contractor will not be allowed to commence rehabilitation work until leaks have been satisfactorily sealed.
4. Where required by the relevant manhole rehabilitation system manhole surfaces to be rehabilitated shall have a pH of 7 to 10. Accordingly surfaces shall be tested in accordance with ASTM D4262.

5. Where instructed by the Construction Manager the Contractor shall test prepared surfaces by Swiss impact hammer or other physical method to determine soundness,

### 3.03 QUALITY CONTROL/PRECONDITIONING REPORT

#### A. GENERAL

1. A quality control inspection or survey of preconditioned sewers shall be carried out as directed, immediately following completion of preconditioning work. If a sewer or pipe line has not been preconditioned as specified (by visual inspection, tape review of field analysis) in the sole opinion of the Construction Manager, the sewer shall be re-preconditioned and cleaned in accordance with the specification at no cost to the Owner.
2. The Contractor shall supply one copy of survey/inspection CD for each reach of sewer completed. No more than five surveys/inspections segments will be allowed on each video cassette.
3. When required by the Construction Manager, the Contractor shall supply one copy of the full internal sewer condition assessment report, completed in accordance with the requirements of the "Specification for Internal Sewer Condition Assessment". This specification includes a sample report sheet also reproduced at the end of this specification. The sample report sheet shall be accurately and fully adopted in format and in detail and submitted by the Contractor immediately following the QA/AC inspection.

#### B. DAILY LOG

1. On daily completion of the works the Contractor shall provide a report. The report shall be submitted to the Construction Manager no later than 24 hours following completion of the work. The report shall comprise separate sheet for each manhole and sewer reach preconditioned. Blank report sheets shall be provided by the Construction Manager or his representative on site.
2. The Contractor shall immediately draw the Construction Manager's attention to any material such as brickwork, concrete or clayware appearing in the arisings from preconditioning and cleaning activities.

**END OF SECTION**

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**S219 – Brookfield Country Club Sewer Lining**  
**SECTION NO. 02709**  
**REPORTING**

**PART 1 GENERAL**

**1.01 SCOPE**

- A. The objective of Monthly Report and the Daily Log is to insure that the County has proper and documented communications with the Contractor. That the Contractor is meeting the objectives of the requirements of this contract and the Program Plan. That the condition of the cleaned and inspected sewer and manholes is being proper documented by the Contractor. The Contractor shall accomplish this assessment in accordance with this specification.
- B. Administration of this contract shall be the responsibility of the Deputy Director of Public Works for Maintenance, who shall designate a Project Manager as the point of contact for the Contract in all matters relating to the performance of work, payment for work accomplished, and for submission of reports (verbal and written)
- C. The level of performance concerning assessment of manholes and sewers shall be adhered to in this contract:

**1.03 RELATED SECTIONS**

- A. The work of the following Sections 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.
  - a. Cleaning Manholes and Sewers Section 02706(A)
  - b. CCTV/Sonar Inspection of Sewer and Manholes Section 02706(B)
  - c. Internal Sewer Condition Assessment Section 02706(C)
  - d. Safety Requirements
  - e. Standard Specifications
- B. Except as otherwise indicated in this Section of the Specifications, the Contractor shall comply with the latest edition of all relevant local, state and federal Standard Specifications for Public Works Construction.

**PART 2 EXECUTION OF THE WORK**

**2.01 GENERAL**

- A. Detailed Work Plan
  - a. The work plan for the CCTV Inspection and defect code analysis, including any support activities must be carefully thought out and provided with the bid package. It must be clearly feasible and demonstrate a high probability that the work can be accomplished within the desired time frame. An outlined schedule listing field activities, the duration of those activities, and the number of crews and equipment to be mobilized for those activities must be described in writing and submitted with the Work Plan.
- B. The Work Plan shall incorporate descriptions of methods to be used:
  - a. To reduce environmental impact (e.g. noise, air and water quality pollution);

- b. To minimize and mitigate disruptions to the community (e.g. impact on traffic and impact on sewer easements in private property).
- c. To provide service excellence to the members of the public, private property owners, and private property occupants, impacted by the CCTV activities.
- C. The Work Plan shall adequately describe how the various components of the CCTV Project will be carried out, commencing with Manhole Condition Assessments, and how data from the study shall be QA/QC'd in a manner that addresses format, all errors and omissions, establishes connectivity, and ensures coherence between the various components of the work schedule.
- D. The Work Plan shall indicate how, when, and in what format QA/QC'd data is to be submitted to the County. A QA/QC schematic must be included in the Work Plan. The efficiency, effectiveness and terms within which the raw CCTV Data is obtained, QA/QC'd and transferred to the County are important characteristics that should be reflected in the work plan.
- E. Timelines of submissions, following raw data acquisition, and tracking of data between the CCTV contractor and the County shall also be incorporated into the Work Plan.
- F. The Work Plan must also demonstrate the manner and ability to provide staffing and management personnel to the project satisfactory to the County.

**2.02 PROGRAMMING OF WORKS**

- A. The Contractor shall submit within 30 days after execution of this contract a written program for cleaning, inspection, assessment and report for sewers and manholes that meet the requirements of the County as presented in Section 01010. The Project Manager will assist with the works program, to ensure, where practicable, a continuity of labor and plant utilization, and the Contractor shall undertake to adhere to the agreed programmed in the manner set out in the General Conditions of Contract.

**2.03 REPORTING**

**A. Monthly Report**

The Contractor shall submit a monthly report by the 10<sup>th</sup> of each month. This report shall contain the following:

- Summary of all sewers cleaned during the past calendar month.
- Summary of all sewers inspected during the past calendar month. This shall cross reference the enclosed CDs of the inspected sewers.
- The sewer assessment reports for sewers inspected during the past calendar month.
- A listing of work accomplished during the past calendar month compared to the work schedule for accomplishment from the previous Monthly Report.
- A schedule of work to be accomplished (cleaning and inspection) during the current month.
- A status of work-accomplished year to date compared with the required written program. Section 2.02.
- Copies of the Daily Log
- A catalog of enclosed CDs.
- The copies of the inspection CDs

**B. Daily Log**

- a. The contract shall maintain a daily log of all sewers and manholes cleaned and inspected each day. This log shall be kept current and on the job site at all times. This log will be available for inspection by the Project Manager at all times.

**C. Sewer Assessment Reports**

- a. The contractor shall fill out a sewer assessment report for each section of sewer and each manhole inspected. This report shall be in accordance with the requirements and instructions of Section 02705.
- b. The intention of the County for CCTV and/or Sonar Inspection is that the sewer shall be successfully and properly inspected and reported. The method of inspection (either Sonar or CCTV) is left to the Contractor as long as the method chosen conforms to the specification for that method contained in the bid documents.

**D. Immediate Reports**

The contractor shall keep a record of all immediate reports made to the project manager of serious or dangerous situations. These reports shall include the nature of the situation, the time discovered, the person's name contacted, the time contacted and any corrective action that the contractor was directed to take

**END OF SECTION # 02709**

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**SECTION NO. 02730**  
**SEWER & ACCESSORIES**

**PART 1 - GENERAL**

**1.01 SCOPE**

- A. This Section describes products to be incorporated into sewers and accessories and requirements for the installation and use of these items. Furnish all products and perform all labor necessary to fulfill the requirements of these Specifications.
- B. General: Supply all products and perform all work in accordance with applicable American Society for Testing and Material (ASTM), American Water Works Association (AWWA), American National Standards Institute (ANSI), or other recognized standards. Latest revisions of all standards are applicable.

**1.02 QUALIFICATIONS**

If requested by the Engineer, submit evidence that manufacturers have consistently produced products of satisfactory quality and performance for a period of at least two years.

**1.03 SUBMITTALS**

If required by the County or Engineer, Complete product data and engineering data, including shop drawings, shall be submitted to the Engineer in accordance with the requirements of Section 01340 of the Contract Documents.

**1.04 TRANSPORTATION AND HANDLING**

- A. Unloading: Furnish equipment and facilities for unloading, handling, distributing and storing pipe, fittings, valves and accessories. Make equipment available at all times for use in unloading. Do not drop or dump materials. Any materials dropped or dumped will be subject to rejection without additional justification.
- B. Handling: Handle pipe, fittings, valves and accessories carefully to prevent shock or damage. Handle pipe by rolling on skids, forklift, or front loader. Do not use material damaged in handling.
- C. Lined pipe shall be handled and transported to prevent damage to linings.

**1.05 STORAGE AND PROTECTION**

- A. Store all pipe which cannot be distributed along the route. Make arrangements for the use of suitable storage areas.
- B. Stored materials shall be kept safe from damage. The interior of all pipe, fittings and other appurtenances shall be kept free from dirt or foreign matter at all times.
- C. Pipe shall not be stacked higher than the limits recommended by the manufacturer. The bottom tier shall be kept off the ground on timbers, rails or concrete. Pipe in tiers shall be alternated: bell, plain end; bell, plain end. At least two rows of timbers shall be placed between tiers and chocks, affixed to each other in order to prevent movement. The timbers shall be large enough to prevent contact between the pipe in adjacent tiers.
- D. Store joint gaskets in a cool location, out of direct sunlight. Gaskets shall not come in contact with petroleum products. Gaskets shall be used on a first-in, first-out basis.

**1.06 QUALITY ASSURANCE**

- A. Product manufacturers shall provide the Engineer with written certification that all products furnished comply with all applicable provisions of these Specifications.
- B. If ordered by the Engineer, each pipe manufacturer shall furnish the services of a competent factory representative to supervise and/or inspect the installation of pipe. This service will be furnished for a minimum of five days during initial pipe installation.

**PART 2- PRODUCTS**

**2.01 DUCTILE IRON PIPE (DIP)**

- A. Ductile iron pipe shall be utilized where shown on the Drawings.
- B. Ductile iron pipe shall be manufactured in accordance with AWWA C151. All pipe, except specials, shall be furnished in nominal lengths of 18 to 20 feet. Sizes will be as shown on the Drawings. All pipe shall have a minimum pressure rating as indicated in the following table, and corresponding minimum wall thickness, unless otherwise specified or shown on the Drawings. Pipe wall thickness shall be determined based on dead loads indicated on the Drawings and the anticipated live loads, assuming a minimum HS 20 live load.

Pipe Sizes (inches)	Pressure Class (psi)
4 - 12	350
14 - 20	250
24	200
30 - 60	150

- C. Fittings and Accessories
  - 1. Fittings shall be ductile iron and shall conform to AWWA C110/ANSI A21.10 or AWWA C153/ANSI A21.53 with a minimum rated working pressure of 250 psi.
  - 2. Flanged elbow fittings shall be ANSI pattern using short radius elbows except where noted differently on the Drawings. Special fittings, ductile iron wall pipes and sleeves shall conform to the dimensions and details as shown on the Drawings.
- D. Joints for Ductile Iron Pipe and Fittings
  - 1. General
    - a. Joints for ductile iron pipe and fittings shall be mechanical joint, flanged joint or push-on joint as shown on the Drawings or specified herein.
    - b. Unless otherwise shown on the Drawings, specified or directed, all ductile iron pipe laid underground shall be joined using push-on type joints.
    - c. In all cases, gaskets shall be made of material that will not be damaged by the fluid being transported nor by the environment in which the pipe is installed.
    - d. Provide the necessary bolts for connections. All bolts and nuts shall be threaded in accordance with ANSI B1.1, Coarse Thread Series, Class 2A external and 2B internal fit. All bolts and nuts shall be made in the U.S.A.

2. Mechanical Joints
  - a. Joints shall conform to AWWA C111/ANSI A21.11.
  - b. Bolts and nuts shall be Tee Head Bolts and nuts of high strength low-alloy steel in accordance with ASTM A 242 to the dimensions shown in AWWA C111/ANSI A21.11.
  - c. Gaskets shall be in accordance with AWWA C111/ANSI A21.11 and shall be constructed of plain rubber.
  - d. Mechanical joint glands shall be ductile iron.
3. Push-On Joints: Push-on joints and gaskets shall conform to AWWA C111/ANSI A21.11. Details of the joint design shall be in accordance with the manufacturer's standard practice such as ACIPCO "Fastite", McWane (Clow) "Bell-Tite", or U.S. Pipe "Tyton" joints.
- E. Cement Linings: Pipe and fittings shall be cement lined in accordance with AWWA C104/ANSI/AWWA C104/A21.4. Seal coat is not required.
- F. Polyethylene Encasement: Polyethylene film shall meet the requirements of AWWA C 105.
- G. Wall Sleeves and Wall Pipes
  1. Where piping passes through concrete structures, furnish and install wall sleeves unless wall pipes or other provisions are specifically shown on the Drawings. Wall sleeves shall be accurately located and securely fastened into position before concrete is poured.
  2. Wall Sleeves
    - a. For pipe sizes smaller than 3-inches, wall sleeves shall be steel oversize sleeves furnished with a full circle, integral, or continuously welded waterstop collar. The sleeve seal shall be the mechanically expanded, synthetic rubber type. Provide all associated bolts, seals and seal fittings, pressure clamps, or plates necessary to achieve a watertight installation. Sleeves shall extend the full thickness of the concrete. Sleeves and seal shall be Link Seal.
    - b. For larger pipe sizes, wall sleeves shall be ductile iron mechanical joint wall sleeves. Unless specified or shown otherwise for a specific situation, wall sleeves shall be mechanical joint bell-plain end type with waterstop/thrust collar. The collar shall be capable of withstanding a thrust force caused by a 250 psi dead end load from either direction on that size pipe. Sleeves shall be constructed with studs and mechanical joint retainer gland on the air side of the concrete structure. Provide retainer gland where shown on the Drawings. Where the concrete structure is exposed to dirt on one side and is wet on the other side, construct with studs and glands on the dirt side. Wall sleeves shall be equal to ACIPCO A-10771.
  3. Wall Pipes
    - a. Wall pipes shall be either ductile iron with integral waterstop/thrust collar or centrifugally cast ductile iron with a continuously welded waterstop/thrust collar. The welded on collar shall be attached to the pipe by the manufacturer. The collar shall be capable of withstanding a thrust force caused by a 250 psi dead end load from either direction on that size

pipe. Wall pipes shall be furnished uncoated on the outside and cement lined on the inside. Unless specified or shown otherwise, wall pipes shall be flange end type.

- b. Wall pipes shall be cast and/or fabricated and lined in one manufacturer's facilities and delivered to the job site ready for use.

## 2.02 VITRIFIED CLAY PIPE (VCP)

- A. Pipe: All vitrified clay pipe shall be extra strength pipe conforming to ASTM C 700. Acceptance shall be on the basis of crushing strength, absorption, hydrostatic, and acid resistance requirements as described in Paragraph 4 of ASTM C 700, and inspection for compliance with design and freedom from defects. Vitrified clay pipe shall be furnished in minimum lengths of four feet.
- B. Joints: Pipe joints shall be sleeve type joints and shall conform to the applicable provisions of ASTM C 425. Sleeve type joints of PVC or similar materials shall be handled and jointed in strict conformance with the pipe manufacturer's recommendations.
- C. Acceptance
  1. Acceptance shall be on the basis of plant load-bearing tests, material tests, and inspection of manufactured pipe for visual defects and imperfections.
  2. Provide results of tests on pipe, joint material, and made-up joints performed by an independent testing laboratory approved by the Engineer. Include materials, absorption, crushing, and hydrostatic leakage tests on pipe of each size in accordance with applicable specifications.
  3. Inspect pipe after delivery for shape, cracks, uniformity, blisters and imperfect surfaces, hammer test, damaged ends, and gasket grooves. Do not accept or use repaired or patched pipe or pipe with repaired or patched gasket grooves or shoulders.

## 2.03 REINFORCED CONCRETE PIPE (RCP)

- A. Pipe
  1. Pipe shall be bell and spigot reinforced concrete conforming to ASTM C 76 for Class III, IV and V pipe as shown on the Drawings. Wall thickness design shall correspond to Wall C.
  2. In addition, the pipe and materials shall meet the following requirements:
    - a. Concrete shall have a minimum compressive strength of 5,000 psi for Class III and IV and 6,000 psi for Class V;
    - b. Cement shall meet the requirements of ASTM C 150, Type II;
    - c. Absorption shall not exceed six percent when tested in accordance with ASTM C 497.
  3. Reinforced concrete pipe shall be supplied in lengths of at least eight feet, except for specials.
- B. Joints: Pipe shall have concrete and rubber O-ring gasket type joints conforming to ASTM C 361. A rectangular groove shall be supplied in the spigot end to receive the rubber O-ring gasket, and it shall be so formed that when the joint is complete the gasket will be deformed to a rectangular shape and confined on all four sides. Bell and spigot

surfaces shall be accurately formed and smooth to provide a close sliding fit with a nominal clearance of 1/16-inch.

- C Fittings and Specials: Reinforced concrete pipe fittings and specials shall meet all requirements for reinforced concrete pipe, including materials of construction, structural strength, linings, and joints. Provide special adapters or transition pieces for connection to pipe of different materials where shown on the Drawings.
- D Acceptance
  - 1. Acceptance of pipe shall be on the basis of plant load-bearing tests for the load to produce 0.01-inch crack, material tests, and inspection of manufactured pipe for visual defects and imperfections as described in Paragraph 5.1.1 of ASTM C 76.
  - 2. Provide results of tests on pipe, pipe materials, joint material, and made-up joints performed by an independent testing laboratory approved by the Engineer. Include materials, absorption, crushing, and hydrostatic leakage tests on pipe of each size in accordance with applicable specifications.
  - 3. Each length of pipe shall be stamped by a regular employee of the approved testing laboratory.
  - 4. Inspect pipe after delivery for laboratory stamp, shape, cracks, uniformity, blisters and imperfect surfaces, hammer test, damaged ends, and gasket grooves. Do not accept or use pipe with repaired or patched gasket grooves or shoulders. Any pipe repaired or patched is subject to rejection if such repairs or patches, in the opinion of the Engineer or County, are not sound and properly finished.
  - 5. The County shall, at its own discretion, select another independent testing laboratory to confirm those tests performed by the manufacturer's testing laboratory. This testing laboratory shall observe the tests conducted by the laboratory selected by the manufacturer, or, as necessary, conduct its own tests. The manufacturer shall provide the necessary facilities for the performance of these tests at the plant site. These test specimens shall be provided in accordance with paragraph 11 of ASTM C 76.
  - 6. No pipe shall be shipped before it has been cured for a minimum of 14 days.

**2.04 POLYVINYL CHLORIDE (PVC) GRAVITY SEWER PIPE**

A. Acceptability of PVC pipe for gravity sewers is indicated in the following table:

<b>Standard Minimum Thickness Type PVC<sup>1</sup></b>	<b>Wall</b>	<b>Acceptable Manufacturers</b>	<b>≤ 6</b>	<b>8 to 15</b>	<b>18</b>	<b>21</b>	<b>24</b>
ASTM D 3034 SDR 35 12454B	Solid Wall	Open	Yes	Yes	No	No	No

<sup>1</sup> As specified in ASTM D 1784

B. All pipe shall have a minimum pipe stiffness of 46 psi at five percent deflection as determined by ASTM D 2412.

- C. PVC gravity sewer pipe shall be supplied in lengths not longer than 13 feet.
- D. Fittings
  - 1. Fittings 15 inches in diameter and less shall be manufactured in accordance with ASTM D 3034. PVC compound shall be 12454B or 12454C as specified in ASTM D 1784.
    - a. For sizes 8-inches and less in diameter, fittings shall be molded in one-piece with no solvent welded joints. Minimum socket depths shall be as specified in ASTM D 3034, Table 2.
    - b. For sizes 10-inches and larger in diameter, fittings shall be fabricated from pipe conforming to ASTM D 3034 using solvent welding. No field fabrication of fittings will be allowed. All such fabrication shall be performed at the factory and the fittings shall be delivered ready for use.
  - 2. Fittings 18 inches in diameter and larger shall be fabricated from pipe conforming to ASTM F 679 using solvent welding. No field fabrication of fittings will be allowed. All such fabrication shall be performed at the factory and the fittings shall be delivered ready for use.
- E. Joints: Joints for pipe and fittings shall be of the integral bell and spigot type with a confined elastomeric gasket having the capability of absorbing expansion and contraction without leakage, when tested in accordance with ASTM D 3212. Gaskets shall meet the requirements of ASTM F 477. The joint system shall be subject to the approval of the Engineer and shall be identical for pipe and fittings.
- F. Manhole Connections - Solid Wall Pipe: The sewer shall be connected to manholes utilizing a boot connection.
- G. Acceptance: Acceptance will be on the basis of the Engineer's inspection and the manufacturer's written certification that the pipe and fittings were manufactured and tested in accordance with the applicable standards.

## 2.05 MANHOLES AND PRECAST CONCRETE PRODUCTS

- A. Precast Concrete Sections
  - 1. Precast concrete sections shall meet the requirements of ASTM C 478 or ASTM C 913. The minimum compressive strength of the concrete in precast sections shall be 4,000 psi.
  - 2. Wall thickness shall be as shown on the Drawings.
  - 3. Transition slabs or cones which convert bases larger than four feet in diameter to four foot diameter risers shall be designed by the manhole manufacturer to carry the live and dead loads exerted on the slab.
  - 4. Seal joints between precast sections by means of rubber O-ring gaskets or flexible butyl rubber sealant. Butyl rubber sealants shall meet the requirements of AASHTO M-198. Sealant shall be pre-formed type with a minimum nominal diameter of 1-inch. Butyl rubber sealant shall be equal to Kent Seal No. 2 or Concrete Sealants CS202.
- B. Brick and Mortar: Brick shall be whole and hardburned, conforming to ASTM C 32 Grade MS. Mortar shall be made of one part Portland cement and two parts clean sharp sand. Cement shall be Type 1 and shall conform to ASTM C 150. Sand shall meet ASTM C 144.

**C. Iron Castings**

1. Cast iron manhole frames and covers shall meet the requirements of ASTM A 48 for Class 30 gray iron and all applicable local standards. All castings shall be tough, close grained, smooth and free from blow holes, blisters, shrinkage, strains, cracks, cold shots and other imperfections. No casting will be accepted which weighs less than 95 percent of the design weight. Shop drawings must indicate the design weight and provide sufficient dimensions to permit checking.
2. Manhole frames and covers shall be as shown on the Standard Details.
3. All frames and covers shall have machined horizontal bearing surfaces.
4. All manholes shall have standard frames and covers except where specifically shown otherwise on the Drawings.
5. Watertight covers shall be bolt-down type and shall be equipped with four 1/2-inch stainless steel bolts and a 1/8-inch red rubber or rubber O-ring gasket. Covers shall be able to be rotated and interchangeable. Bolt holes shall be bored through so that debris entering the bolt hole will fall into the manhole. Bolt holes shall have the full 360 degree circle within the cover's radius when bored through the cover.

**D. Ductile Iron Castings**

1. Manhole frames and covers shall be manufactured from ductile iron, in accordance with the requirements of ASTM A356 Grade 80-55-06 (55ksi), in accordance with ISO 1083 as well as all applicable local standards. The iron material used in products provided shall have a minimum recycled materials content of 75%. Covers shall be hinged and incorporate a 90 degree blocking system. Covers shall be one man operable using standard tools. Frames shall be circular with a 24 inch clear opening and shall incorporate a 360 degree mechanically attached elastomer seating gasket. The hinge box shall include a self cleaning, dual wiper infiltration plug. The frame depth shall not exceed 4 inches. The flange shall incorporate bedding slots, bolt holes and lifting eye. Castings shall be of uniform quality, free from sand holes, gas holes, and shrinkage. Cracks and other surface defects. For traffic service castings, bearing surfaces between manhole rings and covers shall be cast or machined with such precision to prevent rocking. Casting dimensional tolerances shall be +/- 1/16 inch per foot and casting weights shall not vary more than +/- 5 percent. No casting will be accepted which weighs less than 95 % of the design weight. Each casting shall be identifiable and show, at a minimum, the following: name of the producing foundry, country of manufacture, ASTM material designation, recycle symbol, individual part number and the cast or heat date.

E. Steps: Manhole steps shall be polypropylene molded around a steel rod as detailed on the Drawings and shall be equal to products of M.A. Industries.

F. Boots: Provide preformed rubber boots and fasteners equal to those manufactured by Kor-N-Seal or Press Seal Gasket Corporation. Boots may be mechanically attached to the manhole or cast into the walls of the manhole.

**2.06 MISCELLANEOUS ACCESSORIES****A. Flexible Adapter Couplings**

1. Couplings for pipe sizes 15-inches in diameter and less shall be elastomeric plastic sleeves designed to connect pipes of dissimilar materials. Adapters shall provide a positive seal against infiltration and exfiltration and remain leak proof and root

proof up to 4.3 psi. The adapter manufacturer shall provide all stainless steel clamps and required accessories.

2. Couplings shall be products of Fernco and shall be installed in accordance with the manufacturer's recommendations.

### PART 3 - EXECUTION

#### 3.01 EXISTING UTILITIES AND OBSTRUCTIONS

- A. The Drawings indicate utilities or obstructions that are known to exist according to the best information available to the County. The Contractor shall call the Utilities Protection Center (UPC) (1-800-282-7411) as required by Georgia law (O.C.G.A. §§25-9-1 through 25-9-13) and all utilities, agencies or departments that own and/or operate utilities in the vicinity of the construction work site, at least 72 hours (three business days) prior to construction, to verify the location of the existing utilities.
- B. Existing Utility Location: The following steps shall be exercised to avoid interruption of existing utility service.
  1. Provide the required notice to the utility owners and allow them to locate their facilities according to Georgia law. Field utility locations are valid for only ten days after original notice. The Contractor shall ensure, at the time of any excavation that a valid utility location exists at the point of excavation.
  2. Expose the facility to verify its true location and grade for a distance of at least 200 feet in advance of pipeline construction to verify its true location and grade. Repair, or have repaired, any damage to utilities resulting from locating or exposing their true location.
  3. Avoid utility damage and interruption by protecting it with means or methods recommended by the utility owner.
  4. Maintain a log identifying when phone calls were made, who was called, area for which utility relocation was requested and work order number issued, if any. The Contractor shall provide the Engineer an updated copy of the log bi-weekly, or more frequently if required.
- C. Conflict with Existing Utilities
  1. Horizontal Conflict: Horizontal conflict shall be defined as when the actual horizontal separation between a utility, main, or service and the proposed water main does not permit safe installation of the sewer by the use of sheeting, shoring, tying-back, supporting, or temporarily suspending service of the parallel or crossing facility. The Contractor may change the proposed alignment of the sewer to avoid horizontal conflicts if the new alignment remains within the available right-of-way or easement and complies with regulatory agency requirements after a written request to and subsequent approval by the Engineer. Where such relocation of the sewer is not approved by the Engineer, the Contractor shall arrange to have the utility, main, or service relocated.
  2. Vertical Conflict: Vertical conflict shall be defined as when the actual vertical separation between a utility, main, or service and the proposed sewer does not permit the crossing without immediate or potential future damage to the utility, main, service, or the sewer. The Contractor may change the proposed grade of the sewer to avoid vertical conflicts if the changed grade provides minimum required capacity, maintains adequate cover and complies with regulatory agencies

requirements, after written request to and subsequent approval by the Engineer. Where such relocation of the sewer is not approved by the Engineer, the Contractor shall arrange to have the utility, main, or service relocated.

- D. Electronic Locator: Have available at all times an electronic pipe locator and a magnetic locator, in good working order, to aid in locating existing pipe lines or other obstructions.
- E. Water and Sewer Separation
  - 1. Sewers should maintain a minimum 10 foot edge-to-edge separation from water mains. Where the sewer crosses a water main, an 18-inch vertical separation shall be maintained where possible. Where possible, a full joint of sewer pipe shall be centered over the water main. Any deviation shall be requested in writing to the Engineer.
  - 2. No water main shall be permitted to pass through or come in contact with any part of a manhole.

### 3.02 CONSTRUCTION ALONG HIGHWAYS, STREETS AND ROADWAYS

- A. Install pipe lines and appurtenances along highways, streets and roadways in accordance with the applicable regulations of, and permits issued by, the Department of Transportation and Fulton County with reference to construction operations, safety, traffic control, road maintenance and repair.
- B. Traffic Control
  - 1. The Contractor shall provide, erect and maintain all necessary barricades; suitable and sufficient lights and other traffic control devices; provide qualified flagmen where necessary to direct traffic; take all necessary precautions for the protection of the work and the safety of the public. Flagmen shall be certified by a Georgia DOT approved flagman training program.
  - 2. Construction traffic control devices and their installation shall be in accordance with the current Manual on Uniform Traffic Control Devices for Streets and Highways.
  - 3. Placement and removal of construction traffic control devices shall be coordinated with the Georgia Department of Transportation and Fulton County a minimum of 48 hours in advance of the activity.
  - 4. Placement of construction traffic control devices shall be scheduled ahead of associated construction activities. Construction time in street right-of-way shall be conducted to minimize the length of time traffic is disrupted. Construction traffic control devices shall be removed immediately following their useful purpose. Traffic control devices used intermittently, such as "Flagmen Ahead", shall be removed and replaced when needed.
  - 5. Existing traffic control devices within the construction work zone shall be protected from damage. Traffic control devices requiring temporary relocation shall be located as near as possible to their original vertical and horizontal locations. Original locations shall be measured from reference points and recorded in a log prior to relocation. Temporary locations shall provide the same visibility to affected traffic as the original location. Relocated traffic control devices shall be reinstalled in their original locations as soon as practical following construction.
  - 6. Construction traffic control devices shall be maintained in good repair, and shall be clean and visible to affected traffic for daytime and nighttime operation. Traffic control devices affected by the construction work zone shall be inspected daily.

7. Construction warning signs shall be black legend on an orange background. Regulatory signs shall be black legend on a white background. Construction sign panels shall meet the minimum reflective requirements of the Department of Transportation and Fulton County. Sign panels shall be of durable materials capable of maintaining their color, reflective character and legibility during the period of construction.
  8. Channelization devices shall be positioned preceding an obstruction at a taper length as required by the current Manual on Uniform Traffic Control Devices for Streets and Highways, as appropriate for the speed limit at that location. Channelization devices shall be patrolled to insure that they are maintained in the proper position throughout their period of use.
- C. Construction Operations
1. Perform all work along highways, streets and roadways to minimize interference with traffic.
  2. Stripping: Where the pipe line is laid along road right-of-way, strip and stockpile all sod, topsoil and other material suitable for right-of-way restoration.
  3. Trenching, Laying and Backfilling: Do not open the trench any further ahead of pipe laying operations than is necessary. Backfill and remove excess material immediately behind laying operations. Complete excavation and backfill for any portion of the trench in the same day.
  4. Shaping: Reshape damaged slopes, side ditches, and ditch lines immediately after completing backfilling operations. Replace topsoil, sod and any other materials removed from shoulders.
  5. Construction operations shall include cleanup and utility exploration.
- D. Excavated Materials: Do not place excavated material along highways, streets and roadways in a manner which obstructs traffic. Sweep all scattered excavated material off the pavement in a timely manner.
- E. Drainage Structures: Keep all side ditches, culverts, cross drains, and other drainage structures clear of excavated material. Care shall be taken to provide positive drainage to avoid ponding or concentration of runoff.
- F. Landscaping Features: Landscaping features shall include, but are not necessarily limited to: fences; property corners; cultivated trees and shrubbery; manmade improvements; subdivision and other signs within the right-of-way and easement. The Contractor shall take extreme care in moving landscape features and promptly re-establishing these features.
- G. Maintaining Highways, Streets, Roadways and Driveways
1. Maintain streets, highways, roadways and driveways in suitable condition for movement of traffic until completion and final acceptance of the work.
  2. During the time period between pavement removal and completing permanent pavement replacement, maintain highways, streets and roadways by the use of steel running plates. The edges of running plates shall have asphalt placed around their periphery to minimize vehicular impact. The backfill above the pipe shall be compacted, as specified elsewhere up to the existing pavement surface to provide support for the steel running plates.
  3. Furnish a road grader or front-end loader for maintaining highways, streets, and roadways. Make the grader or front-end loader available at all times.

4. Immediately repair all driveways that are cut or damaged. Maintain them in a suitable condition for use until completion and final acceptance of the work.

**3.03 PIPE DISTRIBUTION**

- A. Pipe shall be distributed and placed in such a manner that will not interfere with traffic.
- B. No pipe shall be strung further along the route than 1,000 feet beyond the area in which the Contractor is actually working without written permission from the County. The County reserves the right to reduce this distance to a maximum distance of 200 feet in residential and commercial areas based on the effects of the distribution to the adjacent property owners.
- C. No street or roadway may be closed for unloading of pipe without first obtaining permission from the proper authorities. The Contractor shall furnish and maintain proper warning signs and obstruction lights for the protection of traffic along highways, streets and roadways upon which pipe is distributed.
- D. No distributed pipe shall be placed inside drainage ditches.
- E. Distributed pipe shall be placed as far as possible from the roadway pavement, but no closer than five feet from the roadway pavement, as measured edge-to-edge.

**3.04 LOCATION AND GRADE**

- A. The Drawings show the alignment and grade of the sewer and the position of manholes and other appurtenances. The slope shown on the profile and/or called for in the Specifications is the slope of the invert of the pipe.
- B. Prior to clearing and grubbing, construction staking shall be performed.
- C. Construction shall begin at the low end of the sewer and proceed upstream without interruption. Multiple construction sites shall not be permitted without written authorization from the Engineer for each site. As a minimum, cut sheets between construction sites shall be submitted and approved before multiple construction sites will be permitted.
- D. The Contractor shall be responsible for any damage done to reference points, base lines, center lines and temporary bench marks, and shall be responsible for the cost of re-establishment of reference points, base lines, center lines and temporary bench marks as a result of the operations.

**a. LAYING AND JOINTING PIPE AND ACCESSORIES**

- A. Lay all pipe and fittings to accurately conform to the lines and grades established by the Engineer.
- B. Pipe Installation
  1. Proper implements, tools and facilities shall be provided for the safe performance of the Work. All pipe, fittings and valves shall be lowered carefully into the trench by means of slings, ropes or other suitable tools or equipment in such a manner as to prevent damage to sewer materials and protective coatings and linings. Under no circumstances shall sewer materials be dropped or dumped into the trench.
  2. All pipe, fittings and appurtenances shall be examined carefully for damage and other defects immediately before installation. Defective materials shall be marked and held for inspection by the Engineer, who may prescribe corrective repairs or reject the materials.

3. All lumps, blisters and excess coating shall be removed from the socket and plain ends of each pipe, and the outside of the plain end and the inside of the bell shall be wiped clean and dry and free from dirt, sand, grit or any foreign materials before the pipe is laid. No pipe which contains dirt shall be laid.
4. Foreign material shall be prevented from entering the pipe while it is being placed in the trench. No debris, tools, clothing or other materials shall be placed in the pipe at any time.
5. As each length of pipe is placed in the trench, the joint shall be assembled and the pipe brought to correct line and grade. The pipe shall be secured in place with approved backfill material.
6. It is common practice to lay pipe with the bells facing the direction in which work is progressing, however, it is not mandatory.
7. Applying pressure to the top of the pipe, such as with a backhoe bucket, to lower the pipe to the proper elevation or grade shall not be permitted.
8. Polyethylene Encasement: Installation shall be in accordance with AWWA C105 and the manufacturer's instructions. All ends shall be securely closed with tape and all damaged areas shall be completely repaired to the satisfaction of the Engineer.

C. Alignment and Gradient

1. Lay pipe straight in alignment and gradient or follow true curves, where shown on the Drawings, as nearly as practicable. Do not deflect any joint more than the maximum deflection recommended by the manufacturer.
2. Maintain a transit, level and accessories on the job to lay out angles and ensure that deflection allowances are not exceeded.
3. The Contractor shall check the invert elevation at each manhole and the pipe invert elevation at least three times daily, start, mid-day and end of day. Elevations shall be checked more frequently if more than 100 feet of pipe is installed in a day or if the pipe is being constructed at minimum slope.
4. The Contractor shall check the horizontal alignment of the sewer at the same schedule as for invert elevations.

D. Expediting of Work: Excavate, lay the pipe, and backfill as closely together as possible, as determined by the Engineer. Do not leave un-jointed pipe in the trench overnight. Backfill and compact the trench as soon as possible after laying and jointing is completed. Cover the exposed end of the installed pipe each day at the close of work and at all other times when work is not in progress. If necessary to backfill over the end of an uncompleted pipe or accessory, close the end with a suitable plug, either push-on, mechanical joint, restrained joint or as approved by the Engineer.

E. Joint Assembly

1. Joints shall be assembled in accordance with the manufacturer's recommendations.
2. The Contractor shall internally inspect each pipe joint to insure proper assembly for pipe 30-inches in diameter and larger after the pipe has been brought to final alignment.
3. On reinforced concrete pipe, diameters 30-inches and larger, the Contractor shall fill the voids, on the pipe joint interior, with grout.

- F. Cutting Pipe
1. Cut ductile iron pipe using an abrasive wheel saw.
  2. Cut PVC pipe using a suitable saw.
  3. Remove all burrs and smooth the end before jointing.
  4. The Contractor shall cut the pipe and bevel the end, as necessary, to provide the correct length of pipe necessary for installing the fittings, valves, accessories and closure pieces in the correct location. Only push-on or mechanical joint pipe shall be cut.
- G. House Connections: Install wyes or tees in locations designated by the Engineer for future connection of service lines. Plug the branch of the wye or tee. Record the location of fittings installed on a copy of the Contract Drawings to be submitted as Record Drawings, and on the report form supplied by the County.
- a. MANHOLE AND PRECAST CONCRETE PRODUCT CONSTRUCTION**
- A. Construct manholes as shown on the Drawings.
- B. Precast Concrete: Handle sections carefully to prevent cracking or chipping. Provide uniform bedding of the bottom section to prevent uneven loading. Install gaskets and joint sealants in accordance with manufacturer's recommendations to produce a watertight structure.
- C. Brick: Bed the bottom and sides of every brick in mortar. Apply a smooth coat of mortar, 3/4-inch thick, on the inside and outside.
- D. Pipe Connections: Seal the connection between the pipe and the manhole as follows:
1. Pipe 36-Inch Diameter and Less: Connect pipe to manhole utilizing rubber boots.
  2. Pipe 42-Inch Diameter and Larger: Construct manhole collars as shown on the Drawings after the pipe has been sealed into the manhole.
  3. If rubber boots are damaged, replace Type I boots with a new boot and repair Type II boots by constructing a manhole collar.
  4. If preformed openings must be enlarged or altered, or if new openings must be made in the field, minimize the amount of material removed to provide closely matched surfaces for grouting.
- E. Inverts: Form channels as shown on the Drawings, rounded, and troweled smooth with brick faces exposed. Maintain consistent grade through the invert.
- F. Top Elevations: Build manholes outside of paved areas to 18-inches above finished grade unless otherwise shown on the Drawings or directed by the Engineer. Build manholes in paved areas to existing grades.
- G. Drop Connections: Manholes requiring drop connections are shown on the Drawings. Construct drop connections of the same materials as the upstream sewer and in accordance with the details shown on the Drawings.
- H. Frames and Covers: Unless frame and cover is at grade, the frame shall be cast into the cone section.
- I. Seal all manhole joints and lift holes, both inside and out, with grout. Between precast sections, this is in addition to joint sealant.

**b. CONCRETE COLLARS**

- i. Construct collars as shown on the Drawings.

**c. INSPECTION AND TESTING**

- A. Clean and test lines before requesting final acceptance. Where any obstruction is met, clean the sewers by means of rods, swabs, or other instruments. When requested by the Engineer, flush out lines and manholes before final inspection.
- B. Alignment: Pipe lines shall be straight and show a uniform grade between manholes. Correct any discrepancies discovered during inspection.
- C. Water tightness: All sewers constructed shall be tested for water tightness to the maximum extent feasible. Infiltration tests and exfiltration tests shall be performed on all new sewers constructed as indicated below, except for those new sewers constructed which have active services tied into it as the pipe is being installed. In such cases the water tightness of the sewers less than or equal to 24-inches shall be based on a visual inspection, and for sewers 30-inches and larger based on the individual joint test as specified below. All visible leaks, including those found via television inspection, shall be repaired.
- D. Infiltration Tests
  1. Install suitable weirs in manholes selected by the Engineer to determine the leakage of ground water into the sewer. The maximum length of line for each infiltration test shall be 5,000 feet. Install weir for a minimum of four hours before measuring flow. If leakage in any section of the sewer line exceeds 100 gpd/inch diameter/mile, locate and repair leaks. Repair methods must be approved by the Engineer. After repairs are completed, re-test for leakage.
  2. Furnish, install, and remove the necessary weirs, plugs, and bulkheads required to perform the leakage tests.
  3. Weirs shall be V-notch type equal to Pollard (800/437-1146).
- E. Exfiltration Tests
  1. Low-Pressure Air Test: Sewer diameters less than or equal to 24-inches.
    - a. Prior to air testing, the section of sewer between manholes shall be thoroughly cleaned and wetted. Immediately after cleaning or while the pipe is water soaked, the sewer shall be tested with low-pressure air. At the Contractor's option, sewers may be tested in lengths between manholes or in short sections (25 feet or less) using inflatable balls pulled through the line from manhole to manhole. Air shall be slowly supplied to the plugged sewer section until internal air pressure reaches approximately 4.0 psi. After this pressure is reached and the pressure allowed to stabilize (approximately two to five minutes), the pressure may be reduced to 3.5 psi before starting the test. If a 1.0 psi drop does not occur within the test time, then the line has passed the test. If the pressure drops more than 1.0 psi during the test time, the line is presumed to have failed the test, and the Contractor will be required to locate the failure, make necessary repairs, and retest the line. Minimum test time for various pipe sizes and types is as follows:

Nominal Pipe Size, inches	Time (Min/100 feet)	
	VCP, RCP	DIP, PVC
6	0.7	5.7
8	1.2	7.6
10	1.5	9.4
12	1.8	11.3
15	2.1	14.2
18	2.4	17.0
21	3.0	19.8
24	3.6	22.8

- b. Required test equipment, including inflatable balls, braces, air hose, air source, timer, rotameter as applicable, cut-off valves, pressure reducing valve, 0-15 psi pressure gauge, 0-5 psi pressure gauge with gradations in 0.1 psi and accuracy of + two percent, shall be provided by the Contractor. Testing equipment shall be equal to Cherne Air-Loc Testing Systems.
  - c. The Contractor shall keep records of all tests made. Copy of such records will be given to the Engineer or the County. Such records shall show date, line number and stations, operator, and such other pertinent information as required by the Engineer.
  - d. The Contractor is cautioned to observe proper safety precautions in performance of the air testing. It is imperative that plugs be properly secured and that care be exercised in their removal. Every precaution shall be taken to avoid the possibility of over-pressurizing the sewer line.
2. Individual Joint Test: Pipe joints for sewers 30-inches in diameter and larger shall be air tested individually. The joint tester assembly shall be placed over the joint and shall pressurize the joint area to 4 psi. The pressure shall not drop more than 2 psi in 10 seconds. The joint tester assembly shall be equal to Cherne Industries, Inc.
- F. Deflection Test: All polyvinyl chloride pipe gravity sewers.
- 1. Test PVC gravity sewer for excessive deflection by passing a mandrel through the pipe. Deflection of the pipe shall not exceed five percent.
  - 2. The mandrel size shall be based upon the maximum possible inside diameter for the type of pipe being tested, taking into account the allowable manufacturing

tolerances of the pipe. The mandrel shall have an odd number of legs, or vanes, with a quantity of such equal to or greater than nine. The legs of the mandrel shall be permanently attached to the mandrel. A mandrel with variable sizes shall not be allowed. The mandrel shall be constructed of steel, aluminum or other material approved by the Engineer, and shall have sufficient rigidity so the legs of the mandrel will not deform when pulling through a pipe. The mandrel dimensions shall be checked by the Engineer before use by the Contractor.

- 3. Excavate and install properly any section of pipe not passing this test. Re-test until results are satisfactory.
- 4. This test shall be performed twice:
  - a. once within the first 30 days of installation, and
  - b. once during final inspection, but no sooner than 30 days after pavement backfill done, at the completion of this contract.

G. Closed Circuit Television: The interior of the gravity sewers shall be subjected to a televised inspection. The audio/video tape shall provide an audio description of what is being viewed; provide a continuous running footage indicator between manholes; and be prepared in the presence of the County's Inspector. Prior to Final Acceptance the County shall be provided with one copy of the TV inspection report and video cassette showing the entire length of gravity sewer being tested. The report shall contain the condition of pipe, type of pipe, depth, location of services, length, type joint, roundness, and distance between manholes. Any pipe found to be cracked, leaking, misaligned, bellied or otherwise defective shall be removed and replaced.

H. Manholes

- 1. Prior to testing manholes for water tightness, all lift holes shall be plugged with a non-shrink grout, all joints between precast sections shall be properly sealed and all pipe openings shall be temporarily plugged and properly braced.
- 2. Vacuum Tests: The manhole, after proper preparation as noted above, shall be vacuum tested prior to or after backfilling. The test head shall be placed at the inside of the top of the cone section and the compression head inflated to 40 psi to effect a seal between the vacuum base and the manhole structure. Connect the vacuum pump to the outlet port with the valve open. A vacuum of 10-inches of mercury shall be drawn and the vacuum pump shut off. With the valves closed, the time shall be measured for the vacuum to drop to 9-inches. The manhole shall pass if the time is greater than that specified in the table below. If the manhole fails the initial test, necessary repairs shall be made with non-shrink grout while the vacuum is still being drawn. Retesting shall proceed until a satisfactory test is obtained. Vacuum testing equipment shall be equal to that as manufactured by P.A. Glazier, Inc.

<b>MINIMUM TEST TIMES FOR VARIOUS MANHOLE DIAMETERS AND DEPTHS</b>	
	<b>Diameter, feet</b>
<b>Depth (feet)</b>	

	<b>4</b>	<b>5</b>	<b>6</b>
8	20	28	33
10	25	33	41
12	30	39	49
14	35	48	57
18	40	52	67
18	45	59	73
20	50	65	81
22	55	72	89
24	59	78	97
26	64	85	105
28	69	91	113
30	74	98	121

**d. PROTECTION AND RESTORATION OF WORK AREA**

- A. General: Return all items and all areas disturbed, directly or indirectly by work under these Specifications, to their original condition or better, as quickly as possible after work is started.
  - 1. The Contractor shall plan, coordinate, and prosecute the work such that disruption to personal property and business is held to a practical minimum.
  - 2. All construction areas abutting lawns and yards of residential or commercial property shall be restored promptly. Backfilling of underground facilities, ditches, and disturbed areas shall be accomplished on a daily basis as work is completed. Finishing, dressing, and grassing shall be accomplished immediately thereafter, as a continuous operation within each area being constructed and with emphasis placed on completing each individual yard or business frontage. Care shall be taken to provide positive drainage to avoid ponding or concentration of runoff.
  - 3. Handwork, including raking and smoothing, shall be required to ensure that the removal of roots, sticks, rocks, and other debris is removed in order to provide a neat and pleasing appearance.
  - 4. The Department of Transportation's engineer shall be authorized to stop all work by the Contractor when restoration and cleanup are unsatisfactory and to require appropriate remedial measures.
- B. Man-Made Improvements: Protect, or remove and replace with the Engineer's approval, all fences, walkways, mail boxes, pipe lines, drain culverts, power and telephone lines and

cables, property pins and other improvements that may be encountered in the work. Fences crossing the easement shall be gated.

- C. Cultivated Growth: Do not disturb cultivated trees or shrubbery unless approved by the Engineer. Any such trees or shrubbery which must be removed shall be heeled in and replanted under the direction of an experienced nurseryman.
- D. Cutting of Trees: Do not cut trees for the performance of the work except as absolutely necessary. Protect trees that remain in the vicinity of the work from damage from equipment. Do not store spoil from excavation against the trunks. Remove excavated material stored over the root system of trees within 30 days to allow proper natural watering of the root system. Repair any damaged tree over 3-inches in diameter, not to be removed, under the direction of an experienced nurseryman. All trees and brush that require removal shall be promptly and completely removed from the work area and disposed of by the Contractor. No stumps, wood piles, or trash piles will be permitted on the work site. The Contractor may chip and grind vegetation and spread over the disturbed area if approved by the County.
- E. Disposal of Rubbish: Dispose of all materials cleared and grubbed during the construction of the project in accordance with the applicable codes and rules of the appropriate county, state and federal regulatory agencies.
- F. Swamps and Other Wetlands
  1. The Contractor shall not construct permanent roadbeds, berms, drainage structures or any other structures which alter the original topographic features within the easement.
  2. All temporary construction or alterations to the original topography will incorporate measures to prevent erosion into the surrounding swamp or wetland. All areas within the easement shall be returned to their original topographic condition as soon as possible after work is completed in the area. All materials of construction and other non-native materials shall be disposed by the Contractor.
  3. The Contractor shall provide temporary culverts or other drainage structures, as necessary, to permit the free migration of water between portions of a swamp, wetland or stream which may be temporarily divided by construction.
  4. The Contractor shall not spread, discharge or dump any fuel oil, gasoline, pesticide, or any other pollutant to adjacent swamps or wetlands.

**END OF SECTION NO. 02730**

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**S219 – Brookfield Country Club Sewer Lining**  
**SECTION NO. 02735**  
**SEWER SERVICE CONNECTIONS**

**PART 1 - GENERAL**

**1.03 SCOPE**

- A The work covered by this Section shall consist of furnishing and installing service connections in the sewers, of the size and type shown on the Drawings and specified herein.

**PART 2- PRODUCTS**

**2.01 MATERIALS**

- A. Service connections shall be made at the top or from the side at 45 degrees of the sewer line using 6-inch diameter pipe as shown on the Drawings. Service pipe shall be of the same material and quality as the main sewer line.
- B. The service connection shall extend from the sewer line to the edge of the permanent easement or right-of-way and be plugged with a vertical cleanout of the same material. The cleanout shall be sealed with a threaded cap set in a service box.
- C. If the service connection ends in rock, the Contractor shall excavate the rock an additional 10 feet beyond the plugged end.
- D. Connection of service lines or risers to sewer line shall be by means of standard tees or wyes, or as indicated on the Drawings.

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

- A. Laying of service connection lines shall be in accordance with Section 02730 of these Specifications.

**END OF SECTION # 02735**

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**S219 – Brookfield Country Club Sewer Lining**  
**SECTION NO. 02920**  
**LANDSCAPING**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. The Drawings and general provisions of the contract, including General Conditions and Division 1 Specification Sections (if any), apply to this section.

**1.02 SUMMARY**

- A. Install, establish and maintain landscaping as indicated in the Contract Documents.

**PART 2 - PRODUCTS**

**2.01 Plants:**

- A. Grade Standards and Conformity with Type and Species: Only use nursery grown plant materials purchased from Fulton County Nature Center or other approved nursery that comply with all required inspection, grading standards, and plant regulations.
- B. The minimum grade for all plants is \_\_\_\_\_ or better. All plants must be the specific size and grade at the time of delivery to the site and the minimum grade maintained throughout the project construction period and plant establishment period.
- C. Use only plants that are true to type and species. Prior to planting furnish certification to the Construction Manager that all plant materials have been purchased from Fulton County Nature Center or approved nursery.
- D. A minimum of two plants of each species on each shipment must be shipped with tags stating the botanical nomenclature and common name of the plant. Should discrepancies between botanical nomenclature and common name arise, the botanical name will take precedence.

**2.02 Inspection and Transportation:**

- A. Move nursery stock in accordance with all federal and state regulations and accompany each shipment with the required inspection certificates for filing with Construction Manager.

**PART 3 - EXECUTION**

**3.01 Planting Requirements**

- A. Delivery: All material must be available for inspection before installation and will be subject to approval or rejections.
- B. Layout: Mark proposed planting beds and individual locations of trees and bushes as shown in the Contract Documents for the Construction Managers review, prior to excavation of planting. The Construction Manager may request to review all proposed construction and maintenance practices before the start of the operation's. Make no changes to the layout, materials or any variations of plant materials from the Contract Documents without the Construction Manager written approval.
- C. Soil Drainage: All planting holes and beds must drain sufficiently prior to installing any plants. Immediately notify the Construction Manager of drainage or percolation problems before plant installation.

- D. Installations of Plants: For installation of the plants as identified in the Contract Documents, comply with the requirements of the **Design Standard, Index 544.**
- 3.02 Conditions of the Plantings
- A. Begin maintenance of all plants immediately after each planting
- B. Keep all plants watered, fertilized, mulched, pruned and staked and guyed as necessary to assure specified minimum grade throughout the duration of the project construction period and establishment period. During the establishment period, keep the individual planting locations and planting beds free of litter and undesirable vegetation. Ensure that the plants are maintained so that they are healthy, vigorous, and undamaged throughout the duration of the project construction period and establishment period. For the duration of the establishment period operate and maintain in good operating condition, all complements of any irrigations system installed in compliance with the Contract documents.
- C. During the establishment period, replace any plants that fall below specified minimum grade. Using replacement plants of the same species, size and planting medium as the plant being replaced as specified in the contract documents.
- 3.03 Inspection Requirements
- A. Certify monthly on a form provided by the Construction Manager that the plants have been installed and are being maintained per the contract documents.
- B. The Contractor's Landscape Quality Control representative must perform montly inspections of planting areas and submit findings in report form to the Construction Manager. Information to be included as a minimum:
- a. Date of Inspection
  - b. Description of Project
  - c. Location of Inspection
  - d. Weather Conditions
  - e. Condition of plants—identify by species, location, number of plants
  - f. Condition of planting beds(including mulching, nowing, weeding, fertilizer, watering and staking/guying).
- C. Submit the inspection report to the Construction Manager within three calendar days after performing the inspection. Any corrections to the inspection report must be revised/corrected and resubmitted within three calendar days after notification by the Construction Manager. Any deficiencies noted on the inspection report must be corrected within 10 days of notification.
- 3.04 Disposal of Surplus Material and Debris
- A. Remove from the jobsite any surplus excavated material from plant holes unless otherwise directed by Construction Manager. Surplus is defined as material not needed after installation of plants per contract documents. Upon commencement of the plant installation, remove daily all landscape installation debris fro the landscape locations described in the Contract Documents. Remove all excess staking and guying materials from the jobsite.
- 3.05 Plant Establishment Period and Contractor's Warranty

- A. Mowing as part of landscape work will be identified in the Contract Documents. Continued any mowing of the landscape areas specified in the contract documents throughout the establishment period.
- B. The Contractor shall provide a warranty/maintenance guarantee for all plants. The warranty/maintenance period shall be the establishment period as specified in the contract documents. During the warranty/maintenance period the Contractor shall be responsible for replacing any plants, trees, shrubs that were installed per the contract documents if those plants, trees, or shrubs fail to meet the minimum specifications of this section

**END OF SECTION # 02920**

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**S219 – Brookfield Country Club Sewer Lining**  
**SECTION NO. 02930**  
**GRASSING**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. The Drawings and general provisions of the contract, including General Conditions and Division 1 Specification Sections (if any), apply to this section.

**1.02 SUMMARY**

- A. The extent of grassing consists of those areas which are defined in the contract documents as shown on the Drawings or areas that are disturbed by operations of the Contractor and are not covered over by improvements or those areas authorized by the Construction Manager.
- B. Types of work required include following:
  - 1. Fine grading and preparing of lawn areas.
  - 2. Furnishing and applying new topsoil.
  - 3. Furnishing and applying soil amendments.
  - 4. Furnishing and applying fertilizers.
  - 5. Seeding lawn areas.
  - 6. Sodding lawn areas.
  - 7. Planting lawn areas with sprigs.
  - 7. Planting lawn areas with plugs.
  - 8. Reconditioning existing lawn areas.
  - 9. Replanting unsatisfactory or damaged lawns.
- C. Refer to earthwork sections in this Division for requirements of general excavation, filling, and grading in areas to receive grassing. Topsoil has (or will be) stockpiled for reuse in grassing. If quantity of stockpiled topsoil is insufficient, provide additional topsoil to complete grassing. Topsoil for grassing is not available at site. Furnish topsoil as specified under "Materials."

**1.03 SUBMITTALS**

- A. General: Submit the following in accordance with Conditions of the Contract and Division 1 Specification Sections.
- B. Certification of Grass Seed: Submit seed vendor's certified statement for each grass seed mixture required, stating botanical and common name, percentage by weight, and percentages of purity, germination, and weed seed for each grass seed species.
- C. Topsoil Analysis Report: Submit soil analysis report for proposed new topsoil.
  - a. Before delivery of topsoil, furnish Construction Manager a written statement giving location of properties from which topsoil is to be obtained, names and addresses of owners, depth to be stripped, and crops grown during the past 2 years.

- b. Before delivery of topsoil, furnish Construction Manager a soil analysis made by an acceptable soil testing laboratory stating percentages of silt, clay, sand, and organic matter, pH, and mineral and plant nutrient content of topsoil. In soil analysis report, indicate suitability of topsoil for lawn growth. If not suitable, state recommended quantities for nitrogen, phosphorus, and potash and any limestone, aluminum sulphate, or other soil amendments to be added to make topsoil suitable.

- D. Sod Analysis: Notify Construction Manager of sod source, including name and telephone number of supplier, and seed mix of sod.

#### 1.04 JOB CONDITIONS

- A. Planting Time: Sow lawn seed only during normal planting seasons for each type of lawn work required. Correlate planting with specified maintenance periods to provide required maintenance from date of substantial completion.
- B. Specified work is minimum required, and any and all necessary materials and operations including reworking, must be performed to obtain specified results.

#### 1.05 SPECIAL PROJECT WARRANTY:

- A. Warranty grassing through specified maintenance period and until final acceptance or as defined in the contract documents.

### PART 2 - PRODUCTS

#### 2.01 NEW TOPSOIL:

- A. Provide topsoil that is fertile, friable, naturally loamy, surface soil; reasonably free of subsoil, clay lumps, brush, weeds, and other litter; and free of roots, stumps, stones larger than 2 inches in any dimension, and other extraneous or toxic matter harmful to plant growth.
- B. Obtain topsoil from local sources or from areas having similar soil characteristics to that found at site of work. Obtain topsoil from naturally well-drained sites where topsoil occurs at least 4 inches deep; do not obtain from bogs or marshes.

#### 2.02 SOIL AMENDMENTS

- A. Lime: Natural limestone containing at least 85 percent of total carbonates, ground to such fineness that at least 90 percent passes a 10-mesh sieve and at least 50 percent passes a 100-mesh sieve. Provide lime in form of dolomitic limestone.
- B. Fertilizer: Standard commercial grade fertilizer conforming to the standards of the Association of Official Agricultural Chemists. Provide either grade 4-12-12, 6-12-12 or 5-10-15 at Contractor's option.
- C. Nitrogen: Standard commercial grade nitrogen conforming to state fertilizer laws. Provide in either granular or liquid form at Contractor's option.
- D. Peat Humus: Finely divided or granular texture and with pH of 6.0 to 7.5 composed of moss peat (other than sphagnum), or peat humus, or reed-sedge peat.
- E. Sawdust or Ground Bark: Provide type that is nontoxic to plants, of uniform texture, and subject to slow decomposition when mixed with soil. Provide nitrogen-treated sawdust or ground bark, or provide untreated and mix at site with at least 0.15 lbs. of ammonium nitrate or 0.25 lbs. of ammonium sulfate per cu. ft. of loose sawdust or ground bark.

#### 2.03 GRASS MATERIALS

- A. Grass Seed: Provide fresh, clean, new-crop seed complying with the tolerance for purity and germination established by the Official Seed Analysts of North America. Provide seed of the grass species, proportions and minimum percentages of purity, germination, and maximum percentage of weed seed, as detailed on the Drawings.
- B. Sod: Provide machine-cut, strongly rooted, certified turfgrass sod, at least 2 years old and free of weeds and undesirable native grasses. Provide sod capable of vigorous growth and development when planted (viable, not dormant) and complying with the following requirements:
- Type: Kentucky Bluegrass (*Poa pratensis*).
  - Type: Bermuda grass (*Cynodon dactylon*).
  - Type: St Augustinegrass (*Stenotaphrum secundatum*).
  - Type: Centipedegrass (*Eremochloa ophiuroides*).
- Sod Pad Size: Uniform thickness of 5/8 inch, plus or minus 1/4 inch, measured at time of cutting and excluding top growth and thatch. Provide in supplier's standard size of uniform length and width with maximum 5 percent allowable deviation in either length or width. Broken or torn pads with uneven ends are not acceptable.
  - Sod Strength: Provide sod pads capable of supporting their own weight and retaining size and shape when supplier's standard size pad is suspended vertically from a firm grasp on upper 10 percent of the pad.
- C. Sod Plugs: Provide strongly rooted certified sod at least 2 years old, free of weeds and undesirable native grasses and capable of growth and development when planted (viable, not dormant). Provide in form suitable for cutting into plugs at least 4 inches thick. Provide sod plugs composed principally of the following:
- Manilagrass (*Zoysia matrella*).
  - Carpetgrass (*Axonopus officinis*).
  - Centipedegrass (*Eremochloa ophiuroides*).
- D. Sod Sprigs: Provide healthy living stems with attached roots of following grasses:
- Bermuda grass (*Cynodon dactylon*).
  - Carpetgrass (*Axonopus officinis*).
  - Centipedegrass (*Eremochloa sphiuoides*).
  - St. Augustinegrass (*Stenotaphrum secundatum*).
  - Manilagrass (*Zoysia matrella*).

#### 2.04 MULCH AND WATER

- A. Antierosion Mulch: Provide clean, seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.
- B. Seed Mulch: Provide peat moss in natural, shredded, or granulated form, of fine texture, with a pH of 4.0 to 6.0 and a water-absorbing capacity of 1,100 to 2,000 percent.
- C. Water used to produce grass is to be free of excess and harmful chemicals, acids, alkalies and all other substances which are harmful to plant growth.

- D. Asphalt: Homogeneous emulsified asphalt meeting ASTM D 977 which contains no agents harmful or toxic to plant growth.

## PART 3 - EXECUTION

### 3.01 GENERAL

- A. Minimum Operations: These Specifications set forth minimum operations and material applications which are acceptable. However, a satisfactory stand of grass must be obtained by using supplemental methods and/or materials as may be required.
- B. Grassing By Private Property: Where grassing is required between curbs and sidewalks or behind sidewalks in areas adjacent to private residential or commercial property, the Construction Manager may change the type of grassing specified to match any type of grass which may be planted and growing on the adjacent lawn. No modifications of the Contract Unit Price will be made for this substitution.

### 3.02 SOIL PREPARATION

- A. Limit preparation to areas that will be planted in immediate future.
- a. Loosen subgrade to a minimum depth of 4 inches. Remove stones bigger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter.
  - b. Clean topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful to toxic to plant growth.
  - c. Mix soil amendments and fertilizers with topsoil at rates specified. Delay mixing of fertilizer if planting will not follow placing of topsoil mixture within a few days. Either mix soil before spreading or apply soil amendments on surface of spread topsoil and mix thoroughly into top 4 inches of topsoil before planting.
  - d. Mix lime with dry soil before mixing in fertilizer.
  - e. Apply phosphoric acid fertilizer (other than that constituting a portion of complete fertilizers) directly to subgrade before tilling.
  - f. Spread topsoil mixture to depth required to meet thickness, grades, and elevations shown, after light rolling and natural settlement. Do not spread if material or subgrade is frozen.
  - g. Place approximately 1/2 of total amount of topsoil mixture required. Work into top of loosened subgrade to create a transition layer, and then place remainder of topsoil mixture.
  - h. Allow for sod thickness in areas to be sodded.
- B. Preparation of Unchanged Grades: Where lawns are to be planted in areas that have not been altered or disturbed by excavating, grading, or stripping operations, prepare soil for lawn and grass planting as follows: Till to a depth of at least 6 inches. Apply soil amendments and initial fertilizers as specified and mix thoroughly into top 4 inches of soil. Remove high areas and fill in depressions; till soil to a homogenous mixture of fine texture, free of lumps, clods, stones, roots, and other extraneous matter.
- a. Before preparing of unchanged areas, remove existing grass, vegetation, and turf. Dispose of such material outside of Owner's property; do not turn over into soil being prepared for lawns.

- b. Grade lawn and grass areas to a smooth, even surface with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted within immediate future. Remove trash, debris, stones larger than 1-1/2 inches diameter, and other objects that may interfere with planting or maintenance operations.
- c. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface to dry off before planting lawns. Do not create muddy soil.

Restore prepared areas to specified condition if eroded or otherwise disturbed after fine grading and before planting.

C. Lime and Fertilizer Application:

- a. Spread lime uniformly over the ground surface at the rates detailed on the Drawings.
- b. Spread fertilizer uniformly over the ground surface at the rates detailed on the Drawings.

### 3.03 SEEDING LAWNS

- A. Sow seed with a spreader or a seeding machine. Do not seed when wind velocity exceeds 5 miles per hour. Distribute seed evenly over entire area by sowing equal quantity in 2 directions at right angles to each other.
  - a. Do not use wet seed or seed that is moldy or otherwise damaged in transit or storage.
  - b. Sow no less than the quantity of seed specified.
- B. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.
- C. Protect seeded slopes against erosion with jute mesh erosion netting or other similar coverings acceptable to Construction Manager.
- D. Protect seeded areas against erosion by spreading specified lawn mulch after completion of seeding operations. Spread uniformly to form a continuous blanket at least 1-1/2 inches loose measurement over seeded areas. Spread by hand, blower, or other suitable equipment.
  - 1. Anchor mulch by spraying with asphalt emulsion at the rate of 10 to 13 gallons per 1,000 sq. ft. Take precautions to prevent damage or staining of structures or other plantings adjacent to mulched areas. Immediately clean such areas where damage occurs.
- E. Protect seeded areas against hot, dry weather or drying winds by applying specified mulch within 24 hours after completion of seeding operations. Presoak and scatter evenly to a depth of 1/8 inches to 3/16 inches thick and roll to a smooth surface. Do not mound.

### 3.04 HYDROSEEDING LAWNS

- A. Mix specified seed, fertilizer, and pulverized mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogenous slurry suitable for hydraulic application.
- B. Apply slurry uniformly to all areas to be seeded. Rate of application as required to obtain specified seed sowing rate.

### 3.05 SODDING LAWNS

- A. Lay sod within 24 hours of stripping. Do not lay dormant sod or if ground is frozen.
- B. Lay sod to form solid mass with tightly fitting joints. Butt ends and sides of sod strips; do not overlap. Stagger strips to offset joints in adjacent courses. Work from boards to avoid damage to subgrade or sod. Tamp or roll lightly to ensure contact with subgrade. Work sifted soil into minor cracks between pieces of sod; remove excess to avoid smothering adjacent grass.
- C. Anchor sod on slopes with wood pegs as required to prevent slippage.
- D. Water sod with fine spray immediately after planting. During first week, water daily or more frequently as necessary to maintain moist soil to depth of 4 inches.

### 3.06 PLUG SODDING LAWNS

- A. Cut plugs 2 inches to 4 inches square, retaining maximum amount of soil on roots. Do not tear or rip plug from sod mass. Keep roots moist and plant plugs immediately after cutting.
- B. Plant plugs in holes on furrows. On slopes (if any), contour furrows to near level to prevent washing in heavy rains. Space plugs 12 inches apart in both directions.

### 3.07 SPRIG PLANTING LAWNS

- A. Plant individual root clusters with roots and portions of stem buried in the soil, but do not cover growing tips. Firm soil around sprigs after planting. Space sprigs 12 inches apart in both directions.
- B. Water sprigs immediately after planting and keep moist by frequent watering until well rooted.
- C. Overseeding: As soon as sprigging has been completed, uniformly spread seed over the entire sprigged area. Immediately after overseeding, cover seed by rolling. Perform rolling at right angles to the direction of slope incline. Overseed at the rates detailed on the drawings.

### 3.08 RECONDITIONING LAWNS

- A. Recondition existing lawn areas damaged by Contractor's operations including storage of materials or equipment and movement of vehicles. Also recondition lawn areas where settlement or washouts occur or where minor regrading is required.
  - a. Recondition other existing lawn areas where indicated.
- B. Provide fertilizer, seed or sod, and soil amendments as specified for new lawns and as required to provide satisfactorily reconditioned lawn. Provide new planting soil as required to fill low spots and meet new finish grades.
- C. Cultivate bare and compacted areas thoroughly to provide a good, deep planting bed.
- D. Remove diseased or unsatisfactory lawn areas; do not bury into soil. Remove topsoil containing foreign materials resulting from Contractor's operations including oil drippings, stone, gravel, and other construction materials; replace with new topsoil.
- E. Where substantial lawn remains (but is thin), mow, rake, aerate if compacted, fill low spots, remove humps, cultivate soil, fertilize, and seed. Remove weeds before seeding. If weeds are extensive, apply selective chemical weed killers as required. Apply a seedbed mulch, if required, to maintain moist condition.

F. Water newly planted areas and keep moist until new grass is established.

3.09 APPLICATION OF NITROGEN

- A. Make two applications of nitrogen to all grassed areas using mechanical spreading equipment. Apply at a uniform rate of not less than 70 pounds per acre per application. Make both applications only when weather conditions will permit uniform and even distribution and when moisture conditions will not cause harm to grass.
- B. Place first application of nitrogen when young grass reaches a height of at least one inch. Make the second application of nitrogen between 30 and 45 days after the first application.

3.10 PROTECTION

- A. Erect barricades and warning signs as required to protect newly planted areas from traffic. Maintain barricades throughout maintenance period until lawn is established.

3.11 MAINTENANCE

- A. Begin maintenance of lawns immediately after each area is planted and continue for the periods required to establish acceptable lawns, but no less than the following:
  - 1. Seeded lawns, at least 60 days, after date of substantial completion.
    - i. If seeded in fall and not given full 60 days of maintenance, or if not considered acceptable at that time, continue maintenance during following spring until acceptable lawn is established.
  - 2. Sodded lawns, at least 30 days after date of substantial completion.
  - 3. Sod plug lawns, at least 30 days after date of substantial completion.
  - 4. Sod sprigged lawns, at least 30 days after date of substantial completion.
- B. Maintain lawns by watering, fertilizing, weeding, mowing, trimming, and other operations such as rolling, regrading, replanting as required to establish a smooth, acceptable lawn, free of eroded or bare areas.
- C. Remulch with new mulch in areas where mulch has been disturbed by wind or maintenance operations sufficiently to nullify its purpose. Anchor as required to prevent displacement.
- D. Replant bare areas with same materials specified for lawns.
- E. Watering: Provide and maintain temporary piping, hoses and lawn watering equipment to convey water from sources and to keep lawn areas uniformly moist as required for proper growth.
- F. Lay out temporary lawn-watering system and arrange watering schedule to prevent puddling, water erosion, and displacement of seed or mulch (if any). Lay out temporary watering system to avoid necessity of walking over muddy or newly seeded areas.
- G. Mow lawns as soon as there is enough top growth to cut with mower set at specified height for principal species planted. Repeat mowing as required to maintain specified height. Remove no more than 40 percent of grass leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Time initial and subsequent mowings to maintain following grass height:  
  
Mow grass from 1-1/2 inches to 2 inches high. Do not mow to less than 1-1/2 inches.

H. Apply second fertilizer application after first mowing and when grass is dry.

Use fertilizer that will provide at least 1.0 lb. of actual nitrogen per 1,000 sq. ft. of lawn area.

3.12 REQUIRED COVERAGE

- A. Grassed areas will be considered acceptable when a viable stand of grass covers at least 98 percent of the total area with no bare spots exceeding one square foot and the ground surface is fully stabilized against erosion.

3.13 ACCEPTANCE

- A. When work is substantially completed, including maintenance, Construction Manager will, upon request, make an inspection to determine acceptability.
- B. Lawn work may be inspected for acceptance in parts agreeable to Construction Manager, provided work offered for inspection is complete, including maintenance.
- C. Repaint rejected work and continue specified maintenance until reinspected by Construction Manager and found to be acceptable.
- D. Seeded lawns will be acceptable provided requirements, including maintenance and coverage, have been met and healthy, uniform close stand of specified grass is established free of weeds, bare spots, and surface irregularities.
- E. Sodded lawns will be acceptable provided requirements, including maintenance and coverage, have been met and required number of plugs are established as well-rooted, viable patches of grass and areas between plugs are free of weeds and other undesirable vegetation.
- F. Plugged lawns will be acceptable, provided requirements, including maintenance and coverage, have been met and required number of plugs are established as well-rooted, viable patches of grass and areas between plugs are free of weeds and other undesirable vegetation.
- G. Sprigged lawns will be acceptable provided requirements, including maintenance and coverage, have been met and required number of sprigs are established as well-rooted, viable plants and areas between sprigs are free of weeds and other undesirable vegetation.

3.14 CLEANUP

Promptly remove soil and debris created by lawn work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto surface of roads, walks, or other paved areas.

**END OF SECTION # 02930**