

**CONTRACT DOCUMENTS**  
for  
**Laurel Springs Gravity  
Sanitary Sewer Replacement**

**VOLUME II OF II**  
**Front End and Technical Specifications**

**BID DOCUMENTS**  
**SEPTEMBER 2021**



**FORSYTH COUNTY**  
**DEPARTMENT OF WATER AND SEWER**  
**FORSYTH COUNTY, GEORGIA**

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# LAUREL SPRINGS GRAVITY SANITARY SEWER REPLACEMENT

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SECTION 01 01 00  
PROJECT LOCATION AND SITE ACCESS

**PART 1 GENERAL**

**1.01 PROJECT LOCATION**

- A. The work covered under this contract will be performed at the following locations:
1. Within easements behind residential homes on Redcliff Ct, Clifton Cir, Camberton Ln, Oakbury Ln, Somerset Ct, and Chatsworth Ln.
  2. Within a golf course.
  3. Within the right-of-way along Laurel Springs Parkway.
  4. The north end of the project is located behind a residential house at the Redcliff Court cul-de-sac and flows south to Welewyn Pump Station.

**1.02 SITE ACCESS**

- A. Access to the project will be granted from the Golf Course off Redcliff Ct (to be confirmed). Additionally access will be provided Westminister Ln West of Chatsworth Ln (shown on Plans).
- B. The Contractor's personnel will be required to park personal vehicles in the approved or designated areas to be determined by the Owner.
- C. The Laurel Springs Gravity Sanitary Sewer Replacement site shall be secured at the end of the construction work everyday per Owner's instructions. Refer to Spec Section 01 35 53 for additional security requirements.
- D. Contractor shall not access work areas from Clifton Cir, Camberton Ln, Oakbury Ln, Somerset Ct, or Chatsworth Ln (to be confirmed).

**1.03 ADJACENT PROPERTY OWNERS**

- A. Contractor shall be aware that the existing adjacent properties mainly consist of residential homes.

**1.04 COORDINATION WITH OTHER OWNER PROJECTS**

- A. If separate Owner construction contracts exist at the same time, the Contractor is responsible for coordinating work with the Owner.

**1.05 LIMITS OF CONSTRUCTION**

- A. All work performed under this contract, including storage, staging, and parking areas, shall be restricted to the locations shown on the Drawings. All storage and staging shall be where approved by the Owner.

**1.06 FLOODPLAIN AND FLOODWAY**

- A. This project includes work located inside of the floodplain (delineated on the plans), per FEMA Map Number 13117C0232F, March 4, 2013.

**PART 2 NOT USED**

**PART 3 NOT USED**

**END OF SECTION**

SECTION 01 11 00  
SUMMARY OF WORK

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. The work covered under this contract consists of installing approximately 3,000 feet of pipe bursting with 18-inch HDPE, 230 feet of 18-inch remove and replace in the same trench, and 1,500 feet of open cut with 18" DIP. The project include sewer by-pass pumping, seven new precast manholes, golf course access and restoration, and erosion and sediment control.

**1.02 DESCRIPTION OF OWNER'S PROJECT**

- A. The work for this project shall include, but not be limited to, furnishing all labor, material, incidentals, supervision and equipment to perform site work; construct structures; install, test of new piping; and provide erosion and sedimentation control in accordance with the Contract Documents.
- B. The overall project includes the following major components.
  - 1. Approximately 3,000' of pipe bursting and 1,500' of open cut installation with 18-inch HDPE, 230 feet of 18-inch remove and replace in the same trench, and 1,500 feet of open cut with 18" DIP.
  - 2. Sewer by-pass pumping, seven new precast manholes, golf course access and restoration, and erosion and sediment control.
  - 3. Provision of project record documents, including drawings, operations and maintenance manuals and other documents.

**1.03 QUANTITIES AND SCOPE OF WORK**

- A. The Owner reserves the right to alter the quantities and scope of work to be performed at any time when and as found necessary. The Contractor shall perform the work as altered, increased or decreased. Payment for such increased or decreased quantities and scope shall be made in accordance with contract documents.

**1.04 CONTRACTS**

- A. The Owner shall award the contract for this Work to a single prime contractor. The contractor shall be solely responsible for the timely completion of the work.

**1.05 CONSTRUCTION DOCUMENT LANGUAGE**

- A. Specifications are written mostly in imperative and streamlined form; this imperative language is directed to the Contractor. Additionally, the words "shall be" shall be included by inference where a colon (:) is used within sentences or phrases.

**1.06 PROTECTION OF WORK, PROPERTY AND PERSONS**

- A. The Contractor shall be responsible for the care of all Work until its completion and final acceptance; and the Contractor shall, at its own expense, replace damaged or lost

material and repair damaged parts of the Work, or the same may be done by the Owner, and the Contractor and its sureties shall be liable therefore.

- B. The Contractor shall make its own provisions for properly storing and protecting all material and equipment against theft, injury, or damage from any and all causes. Damaged material and equipment shall not be used in the Work.
- C. The Contractor shall take all risks from floods and casualties or for delays from such causes. The Contractor may, however, be allowed a reasonable extension of time on account of such delays, subject to the conditions herein before specified.
- D. The Contractor shall remove from the vicinity of the completed Work all plant, buildings, rubbish, unused material, concrete forms, sheeting or equipment belonging to the Contractor or used under its discretion during construction; and in the event of the Contractor's failure to do so, the same may be removed by the Owner at the expense of the Contractor, and the Contractor and its sureties shall be liable therefore.
- E. The Contractor shall adopt all practical means to minimize interference to traffic and inconvenience, discomfort, or damage.
- F. The Contractor shall protect against damage, any piling, duct or structures crossing trenching or encountered in the Work and shall be responsible for any damage done to such structures or damage therefrom. The Contractor shall support or replace any such structures without delay and without any additional compensation, to the entire satisfaction of the Owner.
- G. The Contractor shall be responsible for all damage to persons and property directly or indirectly caused by its operations, and under all circumstances the Contractor shall comply with the regulations of the Owner, and the laws and regulations of the State of Georgia, relative to safety of persons and property and the interruption of traffic and the convenience of the public within the respective jurisdiction, and the Contractor shall be solely responsible for any damages caused by failure to provide proper safety.
- H. The Contractor will be held responsible for and be required to make restitution, at its own expense, for all damage to persons or property caused by the Contractor or subcontractor, or the agents, or employees of either during the progress of the Work and until its final acceptance.

#### **1.07 NOISE CRITERIA**

- A. Unless otherwise specified, noise levels for all operating equipment shall not exceed 90 dB at 5 feet from the equipment when measured on the A scale of a calibrated sound level meter at slow response.
- B. Noise criteria shall be met without the use of special external barriers or enclosures.

#### **PART 2 PRODUCTS**

- A. All materials used in the work including equipment shall be new and unused.

**PART 3 NOT USED**

**END OF SECTION**

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SECTION 01 11 05  
MEASUREMENT AND PAYMENT

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. This section defines the Bid Items of Work listed on the Bid Form and how payment shall be determined. Payment shall be made for each Bid Item based on the description in this section.
- B. Bid Prices included on the Bid Form shall be full compensation for all materials, labor, equipment, tools, construction equipment and machinery, materials testing, heat, utilities, mobilization, demobilization, transportation, taxes, overhead, markup, incidentals and services necessary for the execution and completion of the Work in the Contract Documents to be performed under this Contract. For the Work described, the allowance and unit price, actual used and complete in place quantities of each Bid Item shall be measured in the field and certified by the owner upon completion of construction in the manner set forth for each item in this and other sections of the Specifications. Payment for all items listed on the Bid Form will constitute full compensation for all Work shown and specified to be performed.
- C. The Contractor shall assist and fully cooperate with the owner to determine proper measurement and payment for each item providing complete and reasonable backup documentation as requested by the owner to substantiate payment due.
- D. Any item of work shown on the Contract Drawings or called for in the Specifications but not specifically enumerated for separate measurement and payment in the various project bid items, or which is incidental, shall be included in the various contract bid items as determined by the Contractor.
- E. Any and all work required to complete the Work called for in the Contract Documents shall be included in the various Bid Items whether or not such work is specifically called for. The individual Bid Item descriptions are not exhaustive and do not detail each specific item need to complete the Work of that Bid Item. Any necessary labor, materials, equipment, tools, appurtenances or other items not mentioned but required to complete the Work shall be considered incidental to Contract, and as such, shall be included in the appropriate Bid Item prices.

**1.02 BID ITEMS**

- A. The following Bid Items, together with any supplemental Bid Items that may also be included, comprise the Bid Total as listed on the Bid Form.
  - 1. Bid Item #1, Mobilization and Demobilization
    - a. Measurement: Mobilization and demobilization shall be measured and paid for on a lump sum basis.
    - b. Payment: Payment for this item includes the expenses incurred by the Contractor for moving-in of minimum major equipment required for the project and moving out of the same after final acceptance of the work including cleaning-up. Fifty percent (50%) of the total amount shall be payable after mobilization activity

while the remaining fifty percent (50%) payable after acceptance of the completed project.

2. Bid Item #2, Record Drawings
  - a. Measurement: Record Drawings shall be measured and paid for on a lump sum basis.
  - b. Payment: Unit price bid shall include all incidental costs associated with preparing and submitting the Project Record Drawings, including addressing Owner comments.
3. Bid Item #3, NPDES Monitoring and Reporting
  - a. Measurement: NPDES monitoring and reporting shall be measured and paid for on a lump sum basis.
  - b. Payment: The unit price shall include all labor, equipment, and materials necessary for monitoring, sampling, reporting, and retention of records while complying with local and state guidelines. Payment will be based on the percent complete of the project.
4. Bid Item #4, Orange Barrier Fence (Tr)
  - a. Measurement: Orange barrier fence shall be measured per linear foot complete in place.
  - b. Payment: The unit price shall include all labor, equipment, and materials necessary for furnishing, placing, maintenance, inspection, monitoring, reporting, and removal of the orange barrier fence as specified in the contract documents. No additional payment shall be made for maintenance or replacement of orange barrier fence.
5. Bid Item #5, Construction Exit (Co)
  - a. Measurement: Construction exits shall be measured per each complete in place.
  - b. Payment: The unit price shall include all labor, equipment, and materials necessary for furnishing, placing, maintenance, inspection, monitoring, reporting, and removal of all construction exits as specified in the contract documents. No additional payment shall be made for re-application or maintenance of construction exits.
6. Bid Item #6, Silt Fence (Sd1-S)
  - a. Measurement: Silt fence shall be measured per linear foot of silt fence complete in place.
  - b. Payment: The unit price shall include all labor, equipment, and materials necessary for furnishing, placing, maintenance, inspection, monitoring, reporting, and removal of temporary silt fence as specified in the contract documents. No additional payment shall be made for maintenance or replacement of Silt Fence.
7. Bid Item #7, Inlet Sediment Trap (Sd2)
  - a. Measurement: Silt fence shall be measured per each complete in place.
  - b. Payment: The unit price shall include all labor, equipment, and materials necessary for furnishing, placing, maintenance, inspection, monitoring, reporting, and removal of temporary inlet sediment trap as specified in the contract documents.

8. Bid Item #8, Stone Riprap in Place
  - a. Measurement: Stone rip rap shall be measured and paid for per cubic yard complete in place as in the Contract Drawings or as otherwise directed by the owner.
  - b. Payment: The unit price shall include excavation and preparation of ground surface to the correct elevation, furnishing and placing rip rap to the specified depth and all other labor, materials, equipment, and incidentals required to complete the Work.
9. Bid Item #9, Rolled Erosion Control Blanket and Matting (RECP)
  - a. Measurement: Rolled erosion control blanket and matting shall be measured per square yard complete in place.
  - b. Payment: The unit price shall include all labor, equipment, materials necessary for furnishing, placing, maintenance, inspection, monitoring, and reporting of rolled erosion control blanket and matting in the contract documents. No additional payment shall be made for maintenance or replacement of rolled erosion control blanket and matting.
10. Bid Item #10, Permanent Seeding / Vegetation – Final Stabilization (Ds-3)
  - a. Measurement: Permanent seeding /vegetation (final stabilization) shall be measured and paid for on a lump sum basis.
  - b. Payment: The unit price shall include all labor, equipment, materials necessary for furnishing, placing, maintenance, inspection, monitoring, and reporting of permanent seeding / vegetation as required to meet local and state erosion control guidelines and regulations and per contract documents. Contractor shall be responsible for ground preparation, lime, fertilizer, seed, watering for permanent vegetation.
11. Bid Item #11, Sod – Final Stabilization (Ds-4)
  - a. Measurement: Sodding shall be measured and paid for per square yard.
  - b. Payment: The unit price shall include all labor, equipment, materials, lime, fertilizer, ground preparation, watering necessary for furnishing, placing, maintenance of sod only if approved in writing by the Owner. No additional payment shall be made for maintenance or replacement of sod.
12. Bid Item #12, Streambank Stabilization (Sb)
  - a. Measurement: Stream Stabilization shall be measured per each complete in place.
  - b. Payment: The unit price shall include all labor, equipment, and materials necessary for furnishing, placing, maintenance, and inspection of streambank stabilization per the contract documents.
13. Bid Item #13, Curb/ Combination Curb & Gutter Restoration
  - a. Measurement: The quantity to be paid under these items shall be the actual number of linear feet of curb and combination curb and gutter restored as specified, indicated on the Drawings, or as directed by FCDWS.
  - b. Payment: The Unit Prices Bid per linear foot (LF) length for curbs/curbs and gutter shall include the furnishing of all materials, labor, tools, and equipment necessary to complete the Work as specified, as indicated on the Drawings, or as directed by FCDWS.
14. Bid Item #14, Sidewalk / Golf Cart Path Restoration

- a. Measurement: The quantity to be paid under this item shall be the actual number of square yards of sidewalk or golf cart path restored in accordance with the Drawings, or as directed by FCDWS.
  - b. Payment: The Unit Prices Bid per square yard (SY) of sidewalks or golf cart path shall include the furnishing of all materials, labor, tools, and equipment necessary to complete the Work as specified, as indicated on the Drawings, or as directed by FCDWS.
15. Bid Item #15, Tree Replacement
- a. Measurement: The quantity to be paid under this item shall be the actual number of trees planted by type as shown on the Drawings or as directed by FCDWS.
  - b. Payment: Tree Replacement: The Unit Prices Bid for each tree (EA) planted shall include all necessary tools, equipment, labor and materials to complete the Work.
16. Bid Item #16, Landscaping Cash Allowance
- a. Measurement: The allowance amount for providing work not included in the Contract Documents or other Bid Items. Items included in the allowance shall be directed by the Owner and approved in a change directive or change order.  
Payment: Contractor shall furnish all labor, material, incidentals, supervision and equipment. The landscaping cash allowance covers only the invoice price of the landscaping items installed. It does not include any detailed design, submittal preparation, overhead or profit or other labor, all of which shall be included in the non allowance Bid Items.
17. Bid Item #17, Open Cut Ductile Iron Pipe (DIP)
- a. Measurement: DIP shall be measured in place and paid for at the unit price bid per linear foot along the centerline of the pipe installed, from center of manhole to center of manhole.
  - b. Payment: The unit price shall include all tools, labor, equipment, materials and all other incidentals necessary for complete installation of the pipeline as called for in the drawings and in the contract documents; including all tools, labor, equipment, materials and any incidentals necessary for the proper installation and testing. The unit price bid for DIP shall also include and cover all clearing and grubbing on the entire pipeline right-of-way; as well as, the clearing and preparation of any areas used for storage or for fabrication of materials; excavation (including rock excavation); excavation and removal of existing pipe, bypass pumping, bedding material; complete furnishing and placing of pipe; television inspection of the existing sewer lines; cleaning of the existing sewer lines, manhole repair for any damaged manholes in the course of the work; excavation, borrow, rock excavation, pipe bedding, furnishing and placing of pipe and fittings complete, jointing materials mastic fillers; all concrete work, poly wrap; making all required connections to either active or inactive lines, including service connections; backfilling traffic control in accordance with local and state regulations; temporary stabilization; and the disposal of all debris and dressing and finishing of the area after the pipe is installed.
18. Bid Item #18, Pipe Bursting with HDPE Pipe
- a. Measurement: HDPE shall be measured in place and paid for at the unit price bid per linear foot along the centerline of the pipe installed, from center of manhole to center of manhole.

- b. Payment: The unit price per linear foot for each size of pipe bursting shall include all tools, labor, equipment, materials, incidentals, temporary access roads, other required access provisions, clearing and preparation of any areas used for storage or for fabrication of materials or installation; excavation (including rock excavation); excavation and removal of existing pipe, bypass pumping; television inspection of the existing sewer lines and complete installation; cleaning of the existing sewer lines, manhole repair or replacement for any damaged manholes in the course of the work; manhole invert reconstruction, excavation, borrow, making all required connections to either active or inactive lines or manholes; backfilling, traffic control in accordance with local and state regulations; temporary stabilization; barricades, signs and all other incidentals necessary for complete installation of the pipeline as called for in the drawings and in the contract documents and the disposal of all debris and dressing and finishing of the area after the pipe is installed. ;
19. Bid Item #19, Connection of Service Laterals
- a. Measurement: The number of services laterals paid for shall be the actual number installed.
  - b. The Unit Prices Bid per each connections to the sewer line shall include locating and reconnecting house service connections, excavation, backfilling, testing, and inspections, and the furnishing of all labor, materials, tools, and equipment necessary to complete the Work.
20. Bid Item #20, Jack & Bore
- a. Measurement: The quantity to be paid under this item shall be the actual number of linear feet placed under the respective items for jacked steel casing as indicated on the Drawings, or as directed complete in place.
  - b. Payment: The Unit Prices Bid per linear foot (LF) of jacked steel casing shall be in full compensation for all excavation, rock excavation, dewatering, sheeting, shoring, jacking/auguring operations, receiving pits, concrete, grout, sand and screenings, brick masonry, steel casing pipe, welding, backfill and all other materials, labor, tools, and equipment necessary for the proper completion of the Work as specified, as indicated on the Drawings, or as directed. The unit price for each shall further include full compensation for furnishing barricades, warning signals, lights and traffic control. The carrier pipe shall be paid separately under the item titled for the specific pipe material.
21. Bid Item #21, Manhole Installation
- a. Measurement: Manholes will be measured per each complete in place.
  - b. Payment: The unit price shall include all tools, labor, equipment, materials, connections, cores, outside drops, manhole bases, reducers, risers, cones, tops, rings, covers, inverts all other incidentals necessary for the complete installation of each manhole and size as required.
22. Bid Item #22, Connection to Existing Manhole
- a. Measurement: Connection to existing manhole shall be measured in place and paid for at the unit price bid per each connection.
  - b. Payment: The unit price shall include all tools, labor, equipment, materials and all other incidentals necessary for coring and connecting to the existing manhole.

23. Bid Item #23, Remove Existing 12" PVC & Replace with 18" DIP

- a. Measurement: Shall be measured in place and paid for at the unit price bid per linear foot along the centerline of the pipe installed, from center of manhole to center of manhole.
- b. Payment: The unit price shall include all tools, labor, equipment, materials and all other incidentals necessary for complete installation of the pipeline as called for in the drawings and in the contract documents; including all tools, labor, equipment, materials and any incidentals necessary for the proper air pressure test. The unit price bid for DIP shall also include and cover all clearing and grubbing on the entire pipeline right-of-way; as well as, the clearing and preparation of any areas used for storage or for fabrication of materials; excavation (including rock excavation); excavation and removal of existing pipe, bypass pumping, bedding material; complete furnishing and placing of pipe; television inspection of the existing sewer lines; cleaning of the existing sewer lines, manhole repair for any damaged manholes in the course of the work; excavation, borrow, rock excavation, pipe bedding, furnishing and placing of pipe and fittings complete, jointing materials mastic fillers; all concrete work, poly wrap; making all required connections to either active or inactive lines, including service connections; backfilling traffic control in accordance with local and state regulations; temporary stabilization; and the disposal of all debris and dressing and finishing after the line is laid.

24. Bid Item #24, Raise Existing Manhole

- a. Measurement: Manhole risers will be measured per each vertical foot complete in place
- b. Payment: The unit price shall include all tools, labor, equipment, materials, and all other incidentals necessary for the complete installation of each manhole riser.

**PART 2 NOT USED**

**PART 3 NOT USED**

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SECTION 01 11 50

OWNER DIRECT PURCHASE OF MATERIAL AND EQUIPMENT

**PART 1 GENERAL**

**1.01 GENERAL**

- A. Owner's Status and Intent: Forsyth County Board of County Commissioners (Owner) is a political subdivision of the State of Georgia and is a Tax-Exempt Institution. As such, it is exempt from the payment of Sales and Use Tax on purchases of tangible property, materials, equipment, etc. (materials and equipment) necessary for the performance of Work under construction contracts, provided Owner determines it is to its best interest to do so and provided the purchase of such materials and equipment are handled in the manner hereinafter described.
- B. Summary: The Owner reserves the option to direct purchase certain materials and equipment necessary for the performance of the Contract, and thereby save the amount of the sales tax thereon by virtue of the Owner's status as a Tax-Exempt Institution.
- C. All monies which would have been payable as taxes, if not for Owner direct purchase under these procedures, will inure solely to the benefit of the Owner. The Owner's direct purchase of materials and equipment will not minimize or conflict with the Contractor's responsibility for the scheduling, installation, coordination, storage, protection, warranty, etc. of the materials and equipment as described herein and in the Contract Documents.
- D. **Base Bid: The Base Bid (and all Alternate Bids) submitted on the bid form SHALL INCLUDE the COST of all required taxes, including sales and use tax.**
- E. Materials and Equipment eligible for Owner Direct Purchase shall include:
1. Tangible Personal Property which does not become part of real property in accordance with O.C.G.A. 48-8-3.2 (4).
  2. Equipment in accordance with O.C.G.A. 48-8-3.2 (3)
  3. Machinery in accordance with O.C.G.A. 48-8-3.2 (7)
  4. Equipment and machinery which is used for the primary purpose of reducing or eliminating air or water pollution in accordance with O.C.G.A. 48-8-3 (36, A)
  5. Equipment and machinery which is incorporated into any qualified water conservation facility and used for water conservation in accordance with O.C.G.A. 48-8-3 (36.1, A)
  6. Transactions in which tangible personal property is furnished by the United States government or by a county or municipality of Georgia to any person who contracts to perform services for a governmental entity for the installation, repair, or extension of any public water, gas, or sewage system of the governmental entity when the tangible personal property is installed for general distribution purposes in accordance with O.C.G.A 48-8-3 (2), notwithstanding Code Section 48-8-63 or any other provision of this article.
- F. Designated Materials and Equipment: The Contractor shall notify the Owner of materials and equipment needed for the project specified below in Table 1 through a requisition form.

**Table 1**

Item	Primary Specification Section
HDPE Piping	33 05 36
Ductile Iron Piping	40 05 19
Precast Manholes	33 05 13.16

- G. For the purpose of these procedures, the Contractor will assign to Owner any rights the Contractor may have under quotes, contracts or commitments received from the particular vendor or supplier for the materials or equipment described in the requisition. Any materials and equipment direct purchased by Owner pursuant to these procedures shall be referred to as "Owner Direct Purchased Materials and Equipment," and the responsibilities of the Owner and Contractor relating to such Owner Direct Purchased Materials and Equipment shall be governed by the terms and conditions of these procedures, which shall take precedence over other conditions and terms of the Contract Documents where inconsistencies or conflicts exist. The invoiced amount of Owner Direct Purchased Materials and Equipment and applicable sales tax had the purchases not been tax exempt, once finalized through the Owner's Purchase Order and after confirmation of completed delivery and acceptance pursuant to this Procedure, will be deducted from the Contractor's Contract price via Change Order.
- H. Administrative Costs: Any and all administrative costs incurred by the Contractor administering the purchase in the name of the Owner shall be considered to be included in the base bid for the Work. No addition shall be added to the contract amount because of the service provided by Contractor in the purchase of materials and equipment in the name of the Owner.
- I. The Contractor, notwithstanding this direct purchase arrangement, shall be fully responsible for all matters relating to the receipt of Owner Direct Purchased Materials and Equipment under these procedures, including, but not limited to, preparation of shop drawings and submittals, verifying correct quantities, verifying documents of orders in a timely manner, coordinating purchases, providing and obtaining all warranties and guarantees required by the Contract Documents, inspection and acceptance of the goods at the time of delivery, loss or damage to materials and equipment due to the negligence of the Contractor, and otherwise be responsible for such materials and equipment the same as would have been the case if the tax savings procedure were not implemented. The Owner is responsible for payment only. The Contractor shall coordinate procurement and delivery schedules, sequence of delivery, loading orientation, and other arrangements normally required by the Contractor for the materials and equipment furnished. The Contractor shall provide all services required for the unloading, handling and storage of materials and equipment through installation. The Contractor agrees to indemnify and hold the Owner harmless from any and all claims of whatever nature resulting from nonpayment of goods to suppliers arising from the actions of Contractor.
- J. It is the Owner's intent to utilize open Purchase Orders with the Contractor's selected suppliers for the direct purchase of materials and equipment in which multiple orders or deliveries are required.

## 1.02 OWNER DIRECT PURCHASING REQUIREMENTS AND PROCEDURES

- A. For all materials and equipment included in Table 1 above, the Contractor shall prepare a requisition form, which shall, in detail, be acceptable to Owner, and specifically identify the materials and equipment which Owner may, at its discretion, elect to purchase directly. The requisition form shall be complete when submitted, and all information requested provided. Along with the requisition, or on the requisition, the Contractor must provide:
1. The name, address, telephone and fax number and contact person for the material and equipment supplier;
  2. Manufacturer or brand, model or specification number of the item(s);
  3. Quantity needed;
  4. The price quoted by the supplier for the materials and equipment identified therein;
  5. Any sales tax associated with such quote if it were not direct purchased by a tax-exempt entity;
  6. Shipping and handling cost, including associated insurance;
  7. Details regarding any prompt payment discounts or other price adjustments;
  8. Delivery dates as established by the Contractor.
- B. After receipt of each requisition, the Owner will determine whether the Owner will directly purchase the materials and equipment described in the requisition, and communicate consent or decline to directly purchase the materials and equipment to the Contractor within 72 hours. If the Owner consents to direct purchase the materials and equipment, the Owner shall issue the original Purchase Order, and shall deliver the Purchase Order to the Contractor. Forsyth Owner's Purchasing Division shall issue all Purchase Orders for Owner Direct Purchased Materials and Equipment. The Purchase Order shall require (1) that the supplier provide the required shipping, (2) that the supplier provide the required shipping and handling insurance, and that (3) delivery of the Owner Direct Purchased Materials and Equipment occur on the delivery dates provided by the Contractor with the requisition.
- C. The Contractor shall ensure that Owner Direct Purchased Materials and Equipment conform to the requirements of the Contract Documents, and determine prior to incorporation into the Work, if such Materials and Equipment are patently defective, and whether such materials and equipment are identical to the Material and Equipment ordered and match the description on the bill of lading. As Owner Direct Purchased Materials and Equipment are delivered to the job site, the Contractor shall inspect all shipments from the suppliers, and, if in conformance with the Purchase Order and the requirements of the Contract Documents, approve Owner's payment of the vendor's invoice for materials and equipment delivered. The Contractor shall assure that each delivery of Owner Direct Purchased Material and Equipment is accompanied by documentation adequate to identify the Purchase Order against which the direct purchase is made. This documentation may consist of an itemized delivery ticket, packing slip or invoice from the supplier conforming to the Purchase Order against which the direct purchase is made, together with such additional information as the Owner may require. The Contractor will then forward the documentation to the Owner.
- D. If the Contractor discovers defective or non-conformities in Owner Direct Purchased Material and Equipment upon inspection, the Contractor shall not use such non-conforming or defective Materials and Equipment in the Work and instead shall promptly

- notify the Owner in writing of the defective or non-conforming conditions and coordinate the repair or replacement of those Materials and Equipment without any undue delay or interruption to the Project. All repair, maintenance or damage-repair calls shall be forwarded to the Contractor for resolution with the appropriate supplier, vendor, or subcontractor. If the Contractor fails to perform such inspection, the condition of which the Contractor either knew or should have known by performance of an inspection, Contractor shall be responsible for all damages to the Owner resulting from Contractor's incorporation of such Materials and Equipment into the Project, including liquidated or delay damages.
- E. In order to arrange for the prompt payment to the supplier, the Contractor shall provide to the Owner a list indicating the acceptance of the materials and equipment within 15 days of receipt of said invoice for materials and equipment. The list shall reference the applicable purchase order and include a copy of the invoices, delivery tickets, written acceptance of the delivered items, and such other documentation as may be reasonably required by the Owner. Upon receipt of the appropriate documentation, the Owner shall prepare a check drawn to the supplier based upon the receipt of data provided. This check will be delivered directly to the supplier by the Owner.
  - F. If any discounts are available from the supplier or vendor, they shall accrue to the benefit of the Owner, and the amount quoted by the vendor, plus applicable tax, shall be deducted from the contract price via change order. The Contractor agrees to assist the Owner to immediately obtain partial or final release of waivers as appropriate.
  - G. Following performance of the Purchase Orders by the suppliers, inspection of delivered materials and equipment by the Contractor, and submittal of documentation confirming same to Owner with an invoice for payment by Owner, the Contractor shall execute and deliver to the Owner at the end of each month along with the Contractor's Periodic Pay Estimates, a Materials and Equipment Deduction Summary setting forth the full value of all Owner Direct Purchased Materials and Equipment, plus all taxes which would have been payable on the purchase of the Materials and Equipment had they not been Owner direct purchased. The Materials and Equipment Deduction Summary shall be signed by the Contractor and show all sums to be deducted via deductive change order. Upon concurrence of the Owner, the Owner will begin processing the corresponding change order.
  - H. The Contractor shall maintain records of all Owner Direct Purchased Materials and Equipment incorporated into the Work. These records shall be available for inspection by the Owner upon request.
  - I. Notwithstanding the delivery of Owner Direct Purchased Materials and Equipment to the Project Site for the Contractor's inspection, custody and incorporation into the Work, the Owner shall retain legal and equitable title to any and all Owner Direct Purchased Materials and Equipment. The transfer of possession of Owner Direct Purchased Materials and Equipment from the Owner to the Contractor shall constitute a bailment for the mutual benefit of the Owner and the Contractor solely for the purposes set forth herein. The Owner shall be considered the bailer and the Contractor the bailee of the Owner Direct Purchased Materials and Equipment. Owner Direct Purchased Materials and Equipment shall be considered returned to the Owner for purposes of their bailment at such time as they are incorporated into the Project or are returned to the vendor or supplier at the discretion of the Contractor prior to payment for the Purchase Order by Owner.

- J. The Builder's Risk Insurance provided by the Contractor shall be sufficient to protect against any loss or damage to Owner Direct Purchased Materials and Equipment.
- K. The Owner shall in no way be liable for any interruption or delay in the Project, for any defects or other problems with the Project, or any extra costs or time resulting from any delay in the delivery of, or defects in, Owner Direct Purchased Materials and Equipment.

**PART 2 NOT USED**

**PART 3 NOT USED**

**END OF SECTION**

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SECTION 01 29 73  
SCHEDULE OF VALUES

**PART 1 GENERAL**

**1.01 SCOPE**

- A. The work under this Section includes preparation and submittal of a schedule of values.

**1.02 GENERAL**

- A. Timing of Submittal: Submit to the Engineer, a schedule of values allocated to the various portions of the Work, within 21 days after Notice to Proceed. The first progress payment will not be made until the next pay cycle following the Engineer's approval of the Contractor's values.
- B. Supporting Data: Upon request of the Engineer, support the values with data which will substantiate their correctness.
- C. Use of Schedule: The schedule of values, unless objected to by the Engineer, shall be used only as a basis of the Contractor's Application for Payment.

**1.03 FORM AND CONTENT OF SCHEDULE OF VALUES**

- A. Form and Identification
1. Type schedule on 8 1/2 x 11 inch white paper.
  2. Contractor's standard forms and automated printout may be used.
  3. Identify schedule with:
    - a. Title of project and location
    - b. Engineer
    - c. Name and address of Contractor
    - d. Contract designation
    - e. Date of submission
- B. Schedule shall list the installed value of the component parts of the Work in sufficient detail to serve as a basis for computing values for progress payments during construction. Breakdown shall be by structure, then by CSI Format, for ease of field verification of quantities completed in each structure.
- C. Format
1. Follow the Table of Contents of the Contract Documents as the format for listing the component items.
  2. Identify each item with the number and title of the respective major section of the Specifications.
- D. For each major line item list sub values of major products or operations under the item.

- E. For the Various Portions of the Work:
  - 1. Each item shall include a directly proportional amount of the Contractor's overhead and profit.
  - 2. For items on which progress payments will be requested for stored materials, break down the value into:
    - a. The cost of the materials, delivered and unloaded, with taxes paid.
    - b. The total installed value, including Contractor's overhead and profit, less item a. above.
  
- F. The sum of all values listed in the schedule shall equal the Bid Total.

**PART 2 NOT USED**

**PART 3 NOT USED**

**END OF SECTION**

SECTION 01 31 19  
PROJECT MEETINGS

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Construction period meetings will be conducted at monthly intervals or at some other frequency as determined by the Owner and Engineer. These meetings shall be attended by the Owner's representative, Engineer, and the Contractor's Project Manager with appropriate staff, subcontractors, or suppliers. Meetings shall include a pre-construction meeting, construction progress meetings, and other meetings called by the Owner or Engineer in response to developments during the work.
- B. Contractor and Subcontractor representatives attending meetings must be qualified and authorized to act on behalf of their firms.

**1.02 PRECONSTRUCTION MEETING**

- A. Owner will schedule a meeting to be held prior to the Contractor mobilizing and beginning any Work. This meeting is to review Construction Documents, administration requirements and mobilization procedures.
- B. Meeting Location: To be determined.
- C. Participants shall include:
  - 1. Contractor's Project Manager, Superintendent, CQC Representative, Safety and Health Officer
  - 2. Owner
  - 3. Engineer
  - 4. Owner's Maintenance and Operation Staff, as appropriate
  - 5. Others, including major Subcontractors, as appropriate
- D. Engineer will:
  - 1. Administer the meeting
  - 2. Record and distribute copies of minutes within seven days of meeting to all meeting participants
- E. Agenda: Discussion will pertain to detailed information, such as:
  - 1. The Work – including, but not limited to:
    - a. Scheduling and phasing requirements
    - b. Contractor's use of premises
    - c. Special conditions and coordination
    - d. Security
  - 2. Communications – including, but not limited to:
    - a. Change and persons authorized to direct changes
    - b. Requests for Information (RFI), field decisions, and clarifications

- c. Non-Conformance Reports
  - d. Hazard communication
  - e. Project meetings
  - 3. Contractor's Site Specific Safety Plan
  - 4. Administrative and procedural requirements including, but not limited to:
    - a. Contract modification
    - b. Progress payment
    - c. Submittals - including Contractor's Construction Progress Schedule
    - d. Electronic Communications
    - e. Apprentice and Journey Level Worker Utilization Reporting, if required
  - 5. Owner testing and inspection
  - 6. Contractor Quality Control
  - 7. Temporary Facilities and Controls including, but not limited to:
    - a. Deliveries and storage
    - b. Temporary utilities and enclosures
    - c. Security procedures
    - d. Noise and vibration control
    - e. Cutting, patching, and field engineering
    - f. Utility shutdowns
    - g. Contractor parking
    - h. Housekeeping and waste management
  - 8. Closeout Procedures – including Project Record documents
- F. Contractor shall conduct a like meeting, covering the same body of information, with each Subcontractor's project manager and foreman supervising the Work prior to the performance of any work on site by that Subcontractor.
- 1. Provide Engineer copies of meeting minutes prepared by the Contractor with each Subcontractor, when requested by Engineer.

### **1.03 CONSTRUCTION PROGRESS MEETINGS**

- A. Frequency: Biweekly or at other intervals as appropriate throughout the duration of construction.
- B. Meeting Location: Field office, or as mutually agreed.
- C. Participants shall include:
  - 1. Contractor's Project Manager, Superintendent, CQC Representative, and Safety and Health Officer as appropriate
  - 2. Owner
  - 3. Engineer
  - 4. Owner's Operation and Maintenance Staff, as appropriate
  - 5. Others, as appropriate

- D. Contractor shall:
  - 1. Administer the meetings
  - 2. Provide schedules, logs and other construction activity data in support of the issues discussed and recorded in meeting minutes
  - 3. Record and distribute copies of the minutes within one week of the meeting
- E. Engineer will:
  - 1. Will review meeting minutes and ascertain that the Work is in accordance with the Construction Documents and the Construction Progress Schedule.
- F. Agenda: Discussion will pertain to items, such as:
  - 1. Review and approve minutes of previous meeting noting exceptions, if any
  - 2. Review Work progress since previous meeting, including contract time, contract time remaining, contract amount, percent spent, retainage and remaining amount.
  - 3. Review plans for progress during subsequent work period
    - a. Identify pending meetings
    - b. Discuss safety activities and Job Hazards Analysis
  - 4. Discuss field observations, problems, and conflicts
    - a. Identify problems impeding the Construction Progress Schedule
  - 5. Review Quality Control
    - a. Non-conformance reports - discuss corrective Work actions
  - 6. Review Submittal Schedules and RFIs - present methods to expedite as required
  - 7. Review off-site fabrication and delivery schedules
  - 8. Review proposed changes in the Work and substitution requests for:
    - a. Timely processing
    - b. Effect on Construction Progress Schedule and on completion date
    - c. Effect on any other contracts of the Project

#### **1.04 CHANGE ORDER MEETINGS**

- A. Change Order meetings shall be held to review and resolve any change order proposals, change order requests, or other change order issues pertaining to Contract Modification. Meetings shall be held bi-weekly, or as needed until all Change Order Proposals are resolved.
- B. Meeting Location: To be determined.
- C. Participants shall include:
  - 1. Contractor's Project Manager or cost estimator, as appropriate
  - 2. Owner
  - 3. Engineer
  - 4. Others, as appropriate.
- D. Contractor shall:
  - 1. Record and distribute copies of minutes within seven days.

- E. Owner will:
  - 1. Administer the meeting.
- F. Agenda: discussion will pertain to items such as:
  - 1. Review of Change Order Proposals, scope, estimated costs
  - 2. Negotiation of prices for Change Order Proposals.

#### **1.05 MONTHLY PROGRESS SCHEDULE UPDATE MEETINGS**

- A. In accordance with Section 01 32 16.

#### **1.06 COMMISSIONING MEETINGS**

- A. Commissioning meetings shall occur weekly during the facility start-up and commissioning phase of the Work.
- B. Meeting Locations: To be determined.
- C. Participants shall include:
  - 1. Contractor's Startup Manager, and Superintendent as appropriate
  - 2. Subcontractor(s) representative(s), as appropriate
  - 3. Owner
  - 4. Engineer
  - 5. Owner's Maintenance and Operation Staff, as appropriate
  - 6. Others, as appropriate.
- D. The Contractor shall:
  - 1. Record and distribute copies of minutes prior to the next meeting.
- E. The Engineer will:
  - 1. Administer the meeting
  - 2. Ascertain that the Project commissioning processes and information provided is in accordance with the Construction Documents.
- F. Agenda: Discussion will pertain to items such as:
  - 1. Coordination of Work of applicable trades, e.g. balancing, electrical, controls, communications wiring connectivity
  - 2. Scheduling of systems shut down(s) and switch over(s)
  - 3. Start-up and functional performance tests acceptance criteria
  - 4. Code and ordinance inspections/approvals.

#### **1.07 SPECIAL MEETINGS**

- A. Special meetings may be called at the discretion of the Owner, Engineer, or Contractor for the purpose of coordinating specific information or resolving special issues.
- B. Meeting Location: Engineer's field office, unless otherwise agreed.

C. Contractor shall record minutes and distribute copies within three days.

**1.08 POST CONSTRUCTION WARRANTY MEETING**

A. Meet with the Owner approximately 10 months after the date of Substantial Completion to inspect the Work and to prepare punch list of warranty items requiring appropriate manufacturers and subcontractors.

**1.09 OTHER MEETINGS**

A. Other meetings may be called by Owner or Engineer, as warranted by unforeseen developments during construction. All interested parties shall attend such called other meetings.

**PART 2 NOT USED**

**PART 3 NOT USED**

**END OF SECTION**

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SECTION 01 32 16  
CONSTRUCTION PROGRESS SCHEDULE

**PART 1 GENERAL**

**1.01 SCOPE**

- A. This section specifies the procedures for preparing and revising the critical path method construction schedule used for planning and managing construction activities. The schedule provides a basis for determining the progress status of the project relative to specific dates and completion time.

**1.02 DESCRIPTION**

- A. The Contractor shall provide a graphic construction schedule prepared by the critical path method of analysis. The critical path schedule shall be prepared from estimates of the required duration and sequence for each item of work and function to be performed. A general guide for preparing such a schedule is contained in "The Use of CPM in Construction, A Manual for Contractors," published by the Associated General Contractors of America. Tabulation and analysis of the work schedule shall be performed by computer using a commercially available critical path software program. In addition to the capability to produce tabular reports, the computer software shall plot the construction schedule after the Contractor has produced it in a draft form as required by paragraph 1.03 Submittal Procedures.
- B. The schedule shall depict all significant construction activities and all items of work listed in the breakdown of contract prices submitted by the Contractor in accordance with the General Conditions of the Contract Documents. The dependencies between activities shall be indicated so that it may be established what effect the progress of any one activity has on the schedule.
- C. Time for completion and all specific dates as specified in the Contract Documents and sequencing requirements shall be shown on the schedule. Activities making up the critical path shall be identified.
- D. No activity on the schedule shall have a duration longer than 21 days or assigned value greater than \$100,000, except activities comprising only fabrication, and delivery may extend for more than 21 days. Activities which exceed these limits shall be divided into more detailed components. The schedule duration of each activity shall be based on the work being performed during the normal 40-hour workweek with allowances made for legal holidays and normal weather conditions.

**1.03 SUBMITTAL PROCEDURES**

- A. Within 20 days after the date of Notice to Proceed, the Contractor shall complete a construction schedule conforming to paragraph 1.02 Description and representing in detail all planned procurement and on-site construction activities. The Contractor shall submit the schedule to the Engineer in accordance with Section 01 33 00.
- B. Within 7 days after receipt of the submittal, the Engineer shall review the submitted schedule and return one copy of the marked-up original to the Contractor. If the Engineer

finds that the submitted schedule does not comply with specified requirements, the corrective revisions will be noted on the submittal copy, returned to the Contractor for corrections and resubmitted as specified in Section 01 33 00.

#### **1.04 SCHEDULE REVISIONS**

- A. Revisions to the accepted critical path construction schedule may be made only with written approval of the Contractor and Owner. Changes in timing for activities which are not on the critical path may be modified with written agreement of the Contractor and Engineer. A change affecting the contract value of any activity, the timing of any activity on the critical path, the completion time and specific dates as specified in the Contract Documents, and work sequencing may be made only in accordance with applicable provisions of the General Conditions of the Contract Documents.

#### **1.05 PROJECT STATUS UPDATE**

- A. Project status review and update shall be provided each month and reviewed at the monthly Construction Progress Meeting.

**END OF SECTION**

SECTION 01 32 33  
PHOTOGRAPHIC DOCUMENTATION

**PART 1 GENERAL**

**1.01 PRECONSTRUCTION PHOTOGRAPHS AND VIDEO**

- A. The Contractor shall provide preconstruction photographs and video prior to commencement of work on the site.
- B. The documentation shall be digital, and shall indicate the date, name of project, direction in which the images were taken and the location where the images were taken.
- C. Photographs shall be taken prior to construction, along with a video of property / potential disturbed areas along all new water main routes and for the project.
- D. Before construction may start, digital copies of the documentation shall be delivered on a CD or DVD to the Engineer.
- E. The Contractor shall document the entire area of proposed construction and site entries and access roads from multiple perspectives.

**PART 2 NOT USED**

**PART 3 NOT USED**

**END OF SECTION**

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SECTION 01 33 00  
SUBMITTAL PROCEDURES

**PART 1 GENERAL**

**1.01 SUBMITTALS**

- A. Submittals covered by these requirements include manufacturers' information, shop drawings, test procedures, test results, samples, requests for substitutions, and miscellaneous work-related submittals. Submittals shall also include, but not be limited to, all mechanical, electrical and electronic equipment and systems, materials, reinforcing steel, fabricated items, and piping and conduit details. The Contractor shall furnish all drawings, specifications, descriptive data, certificates, samples, tests, methods, schedules, and manufacturer's installation and other instructions as specifically required in the contract documents to demonstrate fully that the materials and equipment to be furnished and the methods of work comply with the provisions and intent of the contract documents.

**1.02 CONTRACTOR'S RESPONSIBILITIES**

- A. General:
1. The Contractor shall be responsible for the accuracy and completeness of the information contained in each submittal and shall assure that the material, equipment or method of work shall be as described in the submittal. The Contractor shall verify that all features of all products conform to the specified requirements. Submittal documents shall be clearly edited to indicate only those items, models, or series of equipment, which are being submitted for review. All extraneous materials shall be crossed out or otherwise obliterated. The Contractor shall ensure that there is no conflict with other submittals and notify the Engineer in each case where his submittal may affect the work of another contractor or the Owner. The Contractor shall coordinate submittals among his subcontractors and suppliers including those submittals complying with unit responsibility requirements as specified in applicable technical sections.
  2. The Contractor shall coordinate submittals with the work so that work will not be delayed. He shall coordinate and schedule different categories of submittals, so that one will not be delayed for lack of coordination with another. No extension of time will be allowed because of failure to properly schedule submittals. The Contractor shall not proceed with work related to a submittal until the submittal process is complete. This requires that submittals for review and comment shall be returned to the Contractor stamped "No Exceptions Taken" or "Make Corrections Noted."
  3. The Contractor shall certify on each submittal document that he has reviewed the submittal, verified field conditions, and complied with the contract documents.
  4. The Contractor may authorize in writing a material or equipment supplier to deal directly with the Engineer or with the Owner with regard to a submittal. These dealings shall be limited to contract interpretations to clarify and expedite the work.

### 1.03 CATEGORIES OF SUBMITTALS

#### A. General:

1. Submittals fall into two general categories; submittals for review and comment, and submittals which are primarily for information only. Submittals which are for information only are generally specified as Product Data in Part 2 of applicable specification sections.

#### B. Submittals for review and comment:

1. All submittals except where specified to be submitted as product data for information only shall be submitted by the Contractor to the Engineer for review and comment.

#### C. Submittals (product data) for information only:

1. Where specified, the Contractor shall furnish submittals (product data) to the Engineer for Information only. Submittal requirements for operation and maintenance manuals are included in this category.

### 1.04 TRANSMITTAL PROCEDURE

#### A. General:

1. Unless otherwise specified, submittals regarding material and equipment shall be accompanied by Transmittal Form 01 33 00-A specified in Section 01 99 90. Submittals for operation and maintenance manuals, information and data shall be accompanied by Transmittal Form 01 78 23-A specified in Section 01 99 90. A separate form shall be used for each specific item, class of material, equipment, and items specified in separate, discrete sections, for which the submittal is required. Submittal documents common to more than one piece of equipment shall be identified with all the appropriate equipment numbers. Submittals for various items shall be made with a single form when the items taken together constitute a manufacturer's package or are so functionally related that expediency indicates checking or review of the group or package as a whole.
2. A unique number, sequentially assigned, shall be noted on the transmittal form accompanying each item submitted. Original submittal numbers shall have the following format: XX XX XX.XX.YY, where 'X' denotes the applicable specification section and 'Y' denotes the individual submittal number for that particular specification section, beginning with 01. The initial submittal shall be identified as "Revision" 000. Subsequent resubmittals shall be identified 001, 002, etc. Packages shall be identified as follows: XXXXXXXXAA; where 'X' denotes the applicable specification.

#### B. Deviation from contract:

1. If the Contractor proposes to provide material, equipment, or method of work which deviates from the project manual, he shall indicate so under "deviations" on the transmittal form accompanying the submittal copies.

#### C. Submittal completeness:

1. Submittals which do not have all the information required to be submitted, including deviations, are not acceptable and will be returned without review.

D. Submittal schedule and log:

1. Contractor shall prepare and maintain a submittal log/schedule that includes all specified submittals for the project. Copies of the submittal log shall be provided to the Owner and Engineer for review within 15 days of the notice to proceed. No progress payments will be made by the Owner until the submittal log/schedule is accepted and approved by the Engineer.
2. The schedule shall clearly delineate submittals for review and comment and product data (submittals) for information only.
3. Submittal schedule information shall be updated monthly with the Contractor's updated project schedule.
4. The Contractor shall identify as an activity in the project schedule specified in Section 01 32 16, all major equipment submittals as well as those involving complex reviews and long lead deliveries.

## 1.05 REVIEW PROCEDURE

A. General:

1. Submittals are specified for those features and characteristics of materials, equipment, and methods of operation which can be selected based on the Contractor's judgment of their conformance to the specified requirements. Other features and characteristics are specified in a manner which enables the Contractor to determine acceptable options without submittals. The review procedure is based on the Contractor's guarantee that all features and characteristics not requiring submittals conform as specified. Review shall not extend to means, methods, techniques, sequences or procedures of construction, or to verifying quantities, dimensions, weights or gages, or fabrication processes (except where specifically indicated or required by the project manual) or to safety precautions or programs incident thereto. Review of a separate item, as such, will not indicate approval of the assembly in which the item functions.
2. When the contract documents require a submittal, the Contractor shall submit the specified information as follows:
  - a. Three (3) hard copies of all submitted information plus one digital pdf copy of all information shall be transmitted with submittals for review and comment.
  - b. Unless otherwise specified, 3 copies of all sample data shall be transmitted with submittals (Product Data) for information only.

B. Submittals for review and comment:

1. Unless otherwise specified, within 30 calendar days after receipt of a submittal for review and comment, the Engineer shall review the submittal and return 1 copy of the marked-up copy. The marked-up copy /returned submittal will be retained by the Engineer. The returned submittal shall indicate one of the following actions:
  - a. If the review indicates that the material, equipment or work method complies with the project manual, submittal copies will be marked "NO EXCEPTIONS TAKEN." In this event, the Contractor may begin to implement the work method or incorporate the material or equipment covered by the submittal.
  - b. If the review indicates limited corrections are required, copies will be marked "MAKE CORRECTIONS NOTED." The Contractor may begin implementing the work method or incorporating the material and equipment covered by the submittal in

accordance with the noted corrections. Where submittal information will be incorporated in O&M data, a corrected copy shall be provided.

- c. If the review reveals that the submittal is insufficient or contains incorrect data, copies will be marked "AMEND AND RESUBMIT." Except at his own risk, the Contractor shall not undertake work covered by this submittal until it has been revised, resubmitted and returned marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED."
- d. If the review indicates that the material, equipment, or work method does not comply with the project manual, copies of the submittal will be marked "REJECTED - SEE REMARKS." Submittals with deviations which have not been identified clearly may be rejected. Except at his own risk, the Contractor shall not undertake the work covered by such submittals until a new submittal is made and returned marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED."

C. Submittals (product data) for information only:

1. Such information is not subject to submittal review procedures and shall be provided as part of the work under this contract and its acceptability determined under normal inspection procedures.

## **1.06 EFFECT OF REVIEW OF CONTRACTOR'S SUBMITTALS**

A. General:

1. Review of contract drawings, methods of work, or information regarding materials or equipment the Contractor proposes to provide, shall not relieve the Contractor of his responsibility for errors therein and shall not be regarded as an assumption of risks or liability by the Engineer or the Owner, or by any officer or employee thereof, and the Contractor shall have no claim under the contract on account of the failure, or partial failure, of the method of work, material, or equipment so reviewed. A mark of "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED" shall mean that the Owner has no objection to the Contractor, upon his own responsibility, using the plan or method of work proposed, or providing the materials or equipment proposed.

**PART 2 NOT USED**

**PART 3 NOT USED**

**END OF SECTION**

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## SECTION 01 35 29

### HEALTH, SAFETY AND EMERGENCY RESPONSE PROCEDURES

#### **PART 1 GENERAL**

##### **1.01 CONTRACTOR'S RESPONSIBILITY FOR SAFETY**

- A. The Contractor shall conduct its operations and perform all work safely and perform all work necessary to ensure the safety of its personnel and others and shall be solely and completely responsible for the conditions on the jobsite, including the safety of all persons and property, both public and private, during the Contract period. This protection shall be provided for all persons including but not limited to his employees, employees of other contractors or subcontractors, members of the general public, Owner's employees, Engineer's employees, and regulatory agencies' personnel that may be on or about the work. Protection of public and private property including but not limited to utilities, pipes, equipment, motor vehicles, and structures. These requirements shall apply continuously and not be limited to normal working hours.

#### **PART 2 SAFETY AND HEALTH REGULATIONS**

##### **2.01 GENERAL**

- A. Safety provisions shall conform to the Federal and State Departments of Labor Occupational Safety and Health Act (OSHA), and all other applicable federal, state, county, and local laws, ordinances, codes, the requirements set forth herein, and any regulations that may be specified elsewhere in these Contract Documents. Where any of these are in conflict, the more stringent requirement shall be followed. The Contractor's failure to thoroughly familiarize himself with the aforementioned safety provisions shall not relieve him from compliance with the obligations or relieve him of the penalties set forth therein.
- B. The Contractor shall comply with Safety and Health Regulations for Construction, promulgated by the Secretary of Labor under Section 107 of the Contract Work Hours and Safety Standards Act, as set forth in Title 29, C.F.R. and all other laws, codes and standards that apply. Copies of these regulations may be obtained from Labor Building, 14th and Constitution Avenue N.W., Washington, DC 20013.

#### **PART 3 EXECUTION**

##### **3.01 SAFE ACCESS TO THE WORK**

- A. The Contractor shall at all times provide proper facilities for safe access to the work by the Owner, the Engineer, their authorized representatives and by all authorized government officials.

##### **3.02 CONSTRUCTION SAFETY PROGRAM**

- A. Contractor shall develop a written job safety program specifically suited for this project. The Contractor shall appoint for the duration of this Contract a qualified supervisory employee to develop and supervise the Contractor's job safety program that will effectively implement the required safety provisions.

- B. Neither the Owner nor the Engineer shall be responsible for safety precautions and programs in connection with the construction work. However, the Contractor shall provide the Owner and Engineer with two copies of the Contractor's safety program within 15 working days after the Notice to Proceed.

### **3.03 EXCAVATION PLANS**

- A. In accordance with the governing state and federal requirements, the Contractor shall submit a detailed excavation plan to the Owner before excavation, showing the design of shoring, bracing, sloping or other provisions to be made for worker protection from the hazard of caving ground during the excavation of any trench or trenches five feet or more in depth. The excavation plan shall be prepared, sealed and signed by a licensed engineer registered in the state of Georgia.
- B. This submittal is for record purposes only and shall not be reviewed and approved by the Owner or Engineer. The plan is the complete responsibility of the Contractor and submitting it to the Owner and Engineer shall not relieve the Contractor for overall responsibility and liability for the work.
- C. It shall be understood that the above stipulated requirements are considered to be the minimum to be provided. It shall be the Contractor's responsibility to provide the additional strength required to support the side of the excavation against loads which may exceed those employed to derive the criteria set forth in the Industrial Safety Orders. The Contractor shall be solely responsible for any and all liabilities which may arise from his failure to provide adequate shoring, bracing, or sheeting as necessary to support the excavation under any or all of the conditions of loading which may exist, or which may arise during the construction of the project.

### **3.04 SAFETY EQUIPMENT**

- A. The Contractor shall maintain at the jobsite safety equipment applicable to the work as prescribed by the governing safety authorities and all articles necessary for giving first aid to the injured and shall establish the procedure for the immediate removal to a hospital or a doctor's care of persons who may be injured on the jobsite.
- B. The performance of all work and all construction, particularly with respect to ladders, platforms, structure opening, scaffolding, shoring, lagging, and machinery guards, shall be in accordance with the requirements of applicable governing safety authorities.

### **3.05 ACCIDENT REPORTS**

- A. If death or serious injuries or serious damages are caused, the accident shall be reported immediately by telephone or messenger to the Owner. In addition, the Contractor must promptly report in writing to the Owner all accidents in connection with work, giving full details, names, and statements of witnesses.
- B. If a claim is made by anyone against the Contractor or any subcontractor on account of any accident, the Contractor shall promptly report the facts in writing to the Owner, giving full details of the claim.

### **3.06 TRAFFIC SAFETY AND ACCESS TO PROPERTY**

- A. Comply with all rules and regulations of the City, State, and County authorities regarding closing or restricting the use of public street or highways. No public or private road shall be closed, except by express permission of the Owner. Conduct the work so as to assure the least possible obstructions within traveled roadways by installing approved signs, barricades, and lights where necessary for the safety of the public. The convenience of the general public and residents adjacent to the project, and the protection of the persons and property are of prime importance and shall be provided for in an adequate and satisfactory manner.

### **3.07 FIRE PREVENTION AND PROTECTION**

- A. The contractor shall execute all work in a fire-safe manner and shall supply and maintain on the site adequate fire-fighting equipment capable of extinguishing incipient fires. The Contractor shall comply with applicable federal, local, and state fire prevention regulations. Where these regulations do not apply, applicable parts of the National Fire Prevention Standards for Safeguarding Building Construction Operations, (NFPA No. 241) shall be followed.
- B. Sufficient number of fire extinguishers of the type and capacity required to protect the Work and ancillary facilities, shall be provided and maintained by the Contractor in readily accessible locations.

### **3.08 EMERGENCY PHONE NUMBERS**

- A. Emergency phone numbers (fire, medical, police) shall be posted at all telephone locations at the Site of the Work and their locations made known to all.

**END OF SECTION**

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SECTION 01 35 53  
SECURITY PROCEDURES

**PART 1 GENERAL**

**1.01 GENERAL**

- A. The Contractor shall provide any and all required security required to protect its equipment and materials.
- B. The Contractor's equipment and materials shall be stored in the approved or designated areas to be determined by the Owner.

**1.02 SECURITY PROGRAM**

- A. The Contractor shall execute a security program to protect the Work and existing premises from theft, vandalism, and unauthorized entry. Contractor shall maintain the program throughout construction period until Owner occupancy.

**1.03 TEMPORARY FENCES**

- A. Except as otherwise provided, the Contractor shall enclose the site of the Work with a fence adequate to protect the Work and temporary facilities against acts of theft, violence, or vandalism.
- B. In the event all or a part of the site is to be permanently fenced, this permanent fence or a portion thereof may be built to serve for protection of the Work site, provided however, that any portions damaged or defaced shall be replaced prior to final acceptance.
- C. Temporary openings in existing fences shall be protected to prevent intrusion by unauthorized persons. During night hours, weekends, holidays, and other times when no Work is performed at the site, the Contractor shall provide temporary closures or guard service to protect such openings. Temporary openings shall be fenced when no longer necessary.

**1.04 ENTRY CONTROL**

- A. The Contractor shall at all times monitor and control access of persons to the Project Site. Specifically, Contractor shall:
  - 1. Restrict entrance of persons and vehicles into Project site.
  - 2. Allow entrance only to authorized persons with proper identification.
  - 3. Maintain log of workmen and visitors, make available to Owner on request.
  - 4. Contractor shall control entrance of non-authorized persons and vehicles. Owner shall be allowed access to Project Site for work associated with operations and maintenance.

**END OF SECTION**

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SECTION 01 40 00  
QUALITY REQUIREMENTS

**PART 1 GENERAL**

**1.01 DESCRIPTION**

- A. This Section specifies administrative and procedural requirements for quality control services, field inspections and field testing of civil and structural constructs required for this project. Contractor is responsible for the quality assurance and quality control of their respective work.

**1.02 DEFINITIONS**

- A. Quality Control System (QCS): The quality control, assurance, and inspection system established and carried out to ensure compliance with the Plans and Specifications.
- B. QCS Supervisor: That person in responsible charge of the work occurring, as designated by the Contractor in the QCS Plan.
- C. QCS Inspector: Responsible, certified personnel inspecting the various constructs at specified milestones and during the project overall and designated by the Engineer. The Special Inspector is part of the QCS Inspector team.
- D. Factory Test: Tests made on various materials, products and component parts prior to shipment to the job site.
- E. Field Tests: Tests and analyses made at or in the vicinity of the job site in connection with the actual construction.
- F. Certified Inspection Report: Reports signed by approved inspectors attesting that the items inspected meet the specification requirements other than any exceptions included in the report
- G. Certificate of Compliance: Certificate from the manufacturer of the material or equipment identifying said manufacturer, product and referenced standard, and shall be signed by a designated officer of the manufacturer.
- H. Standard Compliance: Condition whereby specified materials or equipment must conform to the standards of organizations such as the American National Standard Institute (ANSI), American Society for Testing and Materials (ASTM), Underwriters Laboratories (UL) or similar organization.
- I. Quality Assurance: The day-to-day, in-process supervisory observations of work and materials conducted by the Contractor to assure that the proper methods and materials are being used and installed by tradesmen.
- J. Source Quality Control: The in-process testing and inspections conducted by the QCS Inspector(s) to verify that the materials, equipment, workmanship and shop manufactured constructs are in compliance with the Contract Documents, applicable Codes and standards.

- K. Field Quality Control: The testing and inspections conducted by the QCS Inspector(s) in the field during and at the completion of each construct to verify that the in-process and completed construction is in compliance with the Contract Documents, applicable Codes and standards.

**1.03 REFERENCES**

- A. This section contains references to the following documents. They are a part of this section as specified and modified. Where a referenced document contains references to other standards, those documents are included as references under this section as if referenced directly. In the event of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.
- B. Unless otherwise specified, references to documents shall mean the documents in effect at the time of Advertisement for Bids or Invitation to Bid (or on the effective date of the Agreement if there were no Bids). If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization, or if there are no replacement documents, the last version of the document before it was discontinued. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, regardless of whether the document has been superseded by a version with a later date, discontinued, or replaced.

Reference	Title
ASTM C102	Practice for Laboratories Engaged in the Testing of Building Sealants.
ASTM C802	Practice for Conducting an Inter-Laboratory Test Program to Determine the Precision of Test Methods for Construction.
ASTM C1093	Practice for Accreditation of Testing Agencies for Unit Masonry.
ASTM D3740	Practice for Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
ASTM D4561	Practice for Quality Control Systems for an Inspection and testing Agency for Bituminous Paving Materials.
ASTM E329	Practice for Use in the Evaluation of Inspection and Testing Agencies as Used in Construction.
IBC	2003 International Building Code, locally amended

**1.04 CONTRACTOR'S RESPONSIBILITIES**

- A. Monitor quality assurance over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Coordinate with, schedule specified inspections by, and provide normal and customary assistance to the QCS Inspectors.
- C. Comply fully with manufacturers' instructions, including each step in sequence.
- D. Should manufacturers' instructions conflict with Contract Documents, request clarification before proceeding from Engineer.

- E. Comply with specified standards as a minimum quality for the work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- F. Perform work by persons qualified to produce workmanship of specified quality.

## **1.05 REGULATORY REQUIREMENTS**

### **A. General:**

- 1. Comply with all Federal, State, and local Codes as referenced herein. Such regulations apply to activities including, but not limited to, sitework and zoning, building practices and quality, on and offsite disposal, safety, sanitation, nuisance, and environmental quality.

### **B. Special Inspection:**

- 1. Special Inspection shall be performed by the Special Inspector under contract with the Owner in conformance with the IBC. Special Inspection is in addition to, but not replacing, other inspections and quality control requirements herein. Where sampling and testing required herein conforms to Special Inspection standards, such sampling and testing need not be duplicated.

### **C. Structural Observation:**

- 1. Engineer shall make visual inspections of the work to assess general conformance with the Contract Documents at significant construction stages and at completion of the structural system. The QCS shall include a preliminary set of Structural Observations and what items are expected to be observed. Contractor shall request this preliminary set from Owner through Engineer and submit as part of their QCS submittal.
- 2. The following structural milestones shall be considered significant construction stages:
  - a. Structure fill and deep foundations including piling.
  - b. Foundations prepared for concrete placement, including grade beams, pile caps, strip, matt and pad footings, and monolithic slabs on grade.
  - c. Preparation of concrete, water-retaining walls prior to placement of concrete.
  - d. Completion of bearing walls prior to cover-up with nonstructural elements, including concrete, masonry, cold formed steel, and lumber.
  - e. Roof and floor framing, including framed and sheathed systems, slabs, and composite systems.
  - f. Completion of lateral force resisting system elements not included in the above categories including moment connections, bracing, diaphragms, or other.
  - g. Completion of structural system after all significant architectural, mechanical, plumbing, heating/ventilation equipment, electrical, and finish elements are installed.

## **1.06 FIELD SAMPLE PROCEDURES**

- A. When field samples are specified in a unit of work, construct each field sample to include work of all trades required to complete the field sample prior to starting related field work. Field samples may be incorporated into the project after acceptance by Engineer.

Remove unacceptable field samples when directed by Engineer. Acceptable samples represent a quality level for the work.

#### **1.07 CONTRACTOR DESIGNED STRUCTURAL SYSTEMS**

##### **A. Design Engineering:**

1. Contractor shall employ and pay for engineering services from a Professional Engineer registered in the State of Georgia for structural design of Contractor designed structural systems including but not limited to temporary shoring and bracing, formwork support, interior structural wall and ceiling systems, and support systems for fire sprinkler, plumbing, mechanical, and electrical systems and equipment

##### **B. Tests and Inspections of Contractor Designed Structural Systems:**

1. Contractor shall pay for preliminary testing of concrete, grout, and mortar mix designs where required by Code or the submittal process prior to start of such work. Contractor shall pay for required shop and site inspection of Contractor designed structural systems where required by Code or these specifications, to the extent such testing and inspection exceeds that required for the structural system on the drawings and in these specifications.

#### **1.08 MANUFACTURERS' FIELD SERVICES AND REPORTS**

- ##### **A.**
- When specified in individual specification sections, product suppliers or manufacturers shall provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance of equipment as applicable, and to provide instructions when necessary. Contractor shall submit qualifications of observer to Engineer 30 days in advance of required observations. QCS Inspector shall record observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

#### **1.09 JOB SITE CONDITIONS**

- ##### **A.**
- Schedule to ensure all preparatory work has been accomplished prior to proceeding with current work. Proceeding with the work constitutes acceptance of conditions. Allow adequate time for materials susceptible to temperature and humidity to "stabilize" prior to installation. Establish and maintain environmental conditions (i.e., temperature, humidity, lighting) as recommended by the various material manufacturers for the duration of the work.

#### **1.10 SUBMITTALS**

- ##### **A.**
- The following information shall be provided in accordance with Section 01 33 00:
1. A copy of this specification section, with addendum updates included, and all referenced and applicable sections, with addendum updates included, with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements. Check marks (✓) shall denote full compliance with a paragraph as a whole. If deviations from the specifications are indicated, and therefore requested by the Contractor, each deviation shall be underlined and denoted by a number in the margin to the right of the identified

paragraph, referenced to a detailed written explanation of the reasons for requesting the deviation. The ENGINEER shall be the final authority for determining acceptability of requested deviations. The remaining portions of the paragraph not underlined will signify compliance on the part of the Contractor with the specifications. Failure to include a copy of the marked-up specification sections, along with justification(s) for any requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no further consideration.

2. Written description of Contractor's proposed QCS plan in sufficient detail to illustrate understanding and approach. The QCS plan and submittal shall include a log showing anticipated inspections, Special Inspections, and source and field Quality Assurance procedures. Preliminary submittal of the QCS plan may be made prior to commencing field work. The preliminary submittal will illustrate the project's initial three (3) month's work, and be followed one month later by a final QCS plan submittal.
3. Contractor's proposed QCS Supervisor, qualifications, and if requested, references.
4. Preliminary structural observation set as described in paragraph 1.05 Structural Observation.
5. Complete structural system information describing Contractor designed structural systems, including sealed calculations, shop and erection drawings, product literature for the various components, ICBO Evaluation Reports for structural components, and a discussion of risk issues associated with the proposed system which could adversely impact overall project completion.
6. If requested by the Engineer during the work, manufacturer's field services and reports. If not so requested, treat same as Product Data.

## **PART 2 PRODUCTS**

### **2.01 SOURCE QUALITY CONTROL**

#### **A. Contractor Responsibilities:**

1. Provide source quality control according to the reviewed and accepted QCS plan and paragraph 1.04 herein. Coordinate with Engineer to facilitate the work of the Testing Laboratory specified in Section 01 45 23 and Special Inspector. Provide ready access to sampling and inspection locations and incidental labor customary in such sampling and inspections. Timely prepare and submit submittals, and revise as indicated by review comments. Comply with technical requirements in each specification Section that applies to the work.

#### **B. Engineer Responsibilities:**

1. Review Contractor's tracking of QCS activities at monthly meetings. Facilitate completion of submittal review per Section 01 33 00. Assist Contractor to ensure that Special Inspection occurs where and when specified.

#### **C. Acceptance Criteria:**

1. Acceptable characteristics and quality of a particular item or construct is defined in that item's or construct's specification Section.

## **2.02 PRODUCT DATA**

- A. The following product data shall be provided in accordance with Section 01 33 00.
  - 1. Manufacturers' field services and reports unless requested by Engineer to be submitted for review.
  - 2. Special Inspection reports, unless otherwise directed in each technical specification Section.

## **PART 3 EXECUTION**

### **3.01 FIELD QUALITY CONTROL**

- A. Field quality control responsibilities of the Contractor and Engineer are substantially the same as described in paragraph 2.01, with the exception that this work occurs primarily on the jobsite as the work progresses, and Special Inspection will occur more often than at the source.
- B. Acceptable characteristics and quality of a particular item or construct is defined in that item's or construct's specification Section.

### **3.02 REGULATORY COMPLIANCE – SPECIAL INSPECTIONS**

- A. The following types of work require Special Inspection according to Chapter 17 of the IBC and each system's specification Section:
  - 1. Structure Fill.
  - 2. Deep foundations including piling.
  - 3. Structural concrete and reinforcing.
  - 4. Anchor bolts and post-installed anchor systems.
  - 5. Masonry systems, complete.
  - 6. Structural steel and aluminum including connections.
  - 7. Cold formed structural steel including connections.
  - 8. Steel deck and wood sheathing.
  - 9. Structural lumber including sawn and manufactured including connections.
  - 10. All components of the lateral force resisting system not included in the above.
- B. Section 01 45 23 describes Testing Laboratory sampling, testing and reporting, much of which is conforming to Special Inspection requirements, and need not be replicated.
- C. Contractor designed structural systems are subject to the same Special Inspection requirements as all other work.

### **3.03 CORRECTION OF DEFECTIVE WORK**

- A. Remove and replace defective, rejected, and condemned work at Contractor's expense until such work meets the requirements of Contract Documents.

**END OF SECTION**

SECTION 01 45 23  
TESTING AND INSPECTION SERVICES

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. General Requirements: Comply with the testing and inspection and correction of nonconforming work provisions herein specified in this Section and elsewhere in the Construction Documents.
- B. The Owner will select and employ an independent Testing Agency to conduct the tests and inspections in accordance with applicable standard methods of American Society for Testing and Materials (ASTM) or other standards specified by the local governing authorities having jurisdiction (AHJ) as a requirement of the building permit.
- C. The Owner may require other special inspection services to inspect and verify the Work installed is in accordance with the Construction Documents and construction industry standards.
- D. This work does not include materials testing required in various sections of these Specifications to be performed by the manufacturer, e.g., testing of pipe.

**1.02 DESCRIPTION**

- A. Definition: For the purpose of this section, all references made herein to Testing Agency or special inspector or geotechnical consulting firm shall be referred to as those tests or inspections which will be conducted by an inspector provided by the Owner.

**1.03 QUALITY ASSURANCE**

- A. Qualifications: The inspector for all Work as hereinafter specified, except for geotechnical inspections, waterproofing and roofing, shall be a registered special inspector employed by a state-approved inspection and/or Testing Agency. All inspection personnel used on this Project are subject to being disapproved from the Project at the discretion of the Owner. Minimum levels of qualifications as required by the State of Georgia for various portions of the required inspections and testing must be complied with.
  - 1. The special inspector for waterproofing and roofing shall have the required technical knowledge and experience for the product being installed.
  - 2. Geotechnical inspection will be performed by a licensed geotechnical consulting firm.

**1.04 DUTIES OF OWNER'S TESTING AGENCY**

- A. General: The Owner's Testing Agency will conduct testing and inspection services, interpret them, and evaluate the results for compliance with the building permit, the site development permit, and the Construction Documents; agency will report findings to the Owner, Engineer Contractor, and AHJ. Testing and inspection services shall be in accordance with applicable standard methods of ASTM or other standards specified by AHJ, the Construction Documents, and construction industry standards. The Testing Agency will reasonably support overtime, second shift, and out-of-area activity if requested by the Contractor and approved at the Owner's sole discretion.

- B. Testing and Inspection: Materials to be tested are specified by the building permit and as required by the Construction Documents, as directed by Owner, or required by AHJ. Quantities and extent of tests and inspections shall be as specified and/or required by the Owner's Inspector or AHJ.
- C. Non-Conforming Work: The Owner's Inspector shall document and immediately notify the Contractor and Owner of any Work found defective or not in accordance with the requirements of the Construction Documents. Non-conforming Work shall be corrected or otherwise satisfactorily accepted by the Owner.
- D. The Owner's Inspectors are not authorized to do the following:
  - 1. Release, revoke, alter or enlarge on requirements of Construction Documents.
  - 2. Approve or accept any portion of the Work, except as allowed by the special inspection duties delegated by governing AHJ for building permit inspections and testing.
  - 3. Perform any duties of the Contractor.
  - 4. Stop Work.
- E. Unless otherwise provided in the Contract Documents, all specimens and samples for tests will be taken by the Owner's Inspectors or the Engineer.

#### **1.05 COSTS**

- A. The Owner's Testing Agency and special Inspector costs for initial testing and inspection as specified in the Construction Documents will be paid for by the Owner. Initial tests and inspections are defined as those required to complete the first tests and inspections specified.
- B. Additional tests and inspections not herein specified but requested by the Owner shall be paid for by the Owner. However, if the results of such tests or inspections are found to be not in compliance with Construction Documents, the Contractor will be back charged for all costs for initial testing as well as re-testing, re-inspection and Engineer's services.
- C. Costs for additional tests or inspections required because of Contractor changes to reviewed and accepted products or materials provided, or source, or supply shall be borne by the Contractor.
- D. Costs for any Work which is required to correct any deficiencies shall be borne by the Contractor.
- E. Costs of any testing which is required solely for the convenience of Contractor in its scheduling and performance of the Work shall be borne by the Contractor.
- F. Costs for verification testing of Work done without prior notice, with improper supervision, or contrary to construction practice shall be borne by the Contractor.
- G. Costs for testing of materials for which fabrication and mill reports are required but not furnished shall be borne by the Contractor.
- H. Standby costs due to the failure of the Contractor or their suppliers to be ready for the testing procedure so scheduled by the Contractor shall be borne by the Contractor.

## **1.06 TESTS AND INSPECTION REPORTS**

- A. Copies of Owner and Contractor test and inspection reports shall be distributed at weekly intervals. All reports will be signed by an authorized representative of the Testing Agency or Professional Engineer registered in the State or Georgia, as appropriate. Such reports shall include all tests made, regardless of whether such tests indicate that the material is satisfactory or unsatisfactory. Samples taken but not tested shall also be reported. Records of special sampling operations that are required shall also be reported. Test and inspection reports shall be electronically posted and distributed, with Testing Agency reports, by the Owner and Contractor. Contractor shall be responsible for providing copies of reports as required to the Authority Having Jurisdiction.

## **1.07 CONTRACTOR'S RESPONSIBILITIES**

- A. Coordination:
  - 1. It is the Contractor's responsibility to initiate, coordinate, and conform to the required tests and inspections of governing State and AHJ. Inspection of the Work by the Owner's special Inspectors and/or Testing Agency shall not relieve the Contractor from responsibility for compliance with the Construction Documents requirements. Owner's special Inspectors and/or Testing Agency and Owner shall have authority to reject Work whenever the provisions of the Construction Documents are not being complied with, and the Contractor shall instruct his employees accordingly.
  - 2. When changes of construction schedule are necessary during construction, coordinate all such changes of schedule with the testing laboratory as required.
- B. Access for the Purpose of Inspection: Ensure the Owner's special Inspectors and/or Testing Agency have free access to all parts of the Work and to the shops where the Work is in preparation; are provided proper facilities and safe access for such inspection, and; are reasonably furnished access, equipment, tools, samples, certifications, test reports, design mixes, storage, and assistance as requested by the Owner's Inspector.
- C. Storage Facilities: Furnish adequate storage facilities as approved by the Owner for the sole use of the Owner's Testing Agency for safe storage and curing of such specimens which must remain on the site prior to transport to the laboratory.
- D. Data: Furnish records, Contract Drawings and shop drawings, certificates, approved Change Orders, and similar data as required by Owner's Inspectors to perform their work to assure compliance with the Construction Documents.
- E. Notice: Furnish notice to Owner and coordinate with Owner's Inspectors a minimum of five (5) working days in advance of all required tests and a minimum of forty-eight (48) hours in advance of all required inspections, unless otherwise specified.
- F. Non-Conforming Work: Remove and replace Non-conforming Work at no additional cost to the Owner prior to Final Completion. Where Non-conforming Work requires design modifications, such re-design shall be performed by the Engineer of Record and costs shall be borne by the Contractor.
- G. Curing Box(es): Furnish climatically controlled curing box(es) for field storage of cast concrete cylinders or other samples. Multiple boxes shall be furnished when concrete placement activities are being performed at multiple locations across the project site.

Curing box shall be manufactured and marketed for the specific purpose described herein and shall meet standards ASTM C31, C192 and C511. Curing box shall be used to maintain temperature and humidity of the concrete cylinder specimens for 48 hours. Cure box shall feature a digital thermometer, heat/cool indicator lights; temperature set buttons and a capacity of 22 standard 6" x 12" cylinders. Use of field constructed curing boxes will not be acceptable.

- H. Laboratory Tests: Where such inspection and testing are to be conducted by an independent laboratory agency, the sample(s) shall be selected by such laboratory or agency, or the Engineer, and shipped to the laboratory by the Contractor at Contractor's expense.
- I. Cancellations: Contractor shall give sufficient advance notice to Owner and Inspectors to allow rescheduling of their work load in the event of cancellation or time extension of any scheduled test or inspection. Any charges from an Inspector due to insufficient advance notice of cancellations or time extensions shall be borne by the Contractor, at the Owner's discretion.
- J. Code Compliance Testing: Inspections and tests required by codes or ordinances or by a plan approval authority, and made by a legally constituted authority, shall be the responsibility of, and shall be paid for by the Contractor, unless otherwise provided in the Contract Documents.
- K. Convenience Testing: Inspection or testing performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor.
- L. The Contractor shall provide and pay for other inspection and testing services where specified in the Construction Documents or required to obtain regulatory approval by State or other AHJ.

#### **1.08 TEST FAILURES**

- A. General: The Owner may require re-test of a sampled material when a sample or procedure has failed to pass the required tests. In such cases, two samples shall be tested and the material shall be rejected if either sample fails. In the event any test or inspection indicates failure of a material or procedure to meet requirements of Construction Documents, all costs for re-testing or re-inspection shall be borne by the Contractor.

#### **1.09 REPORTING TEST FAILURES**

- A. General: Immediately upon determination of a test failure, the Owner's Inspector shall telephone the test results to the Owner, Engineer and Contractor. On receipt of the formal report from the Testing Agency, by the end of the following day the Owner's Inspector shall send written test results to those named on the distribution list.
- B. Contractor shall similarly report test failures to Owner resulting from work of testing agencies provided by the Contractor.

**PART 2 NOT USED**

**PART 3 NOT USED**

**END OF SECTION**

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## SECTION 01 52 50

### CONTRACTOR'S FACILITIES, UTILITIES, AND STAGING AREAS

#### **PART 1 GENERAL**

##### **1.01 SCOPE**

- A. The Contractor shall furnish, install, and maintain an office (when required by the Contract Documents), staging areas and temporary utilities required for construction and remove upon completion of the work.

#### **PART 2 PRODUCTS**

##### **2.01 OFFICE AND STAGING AREAS**

- A. The Contractor shall establish a staging area for construction as required. Allowable staging areas will be designated by the Owner. Any required clearing, grading or other site work within the staging areas shall be the responsibility of the Contractor and shall be approved by Owner and Engineer. The Contractor shall be solely responsible for damages to equipment or materials due to heavy rains or flooding.
- B. An office is not required for the Contractor, Engineer or Owner.

##### **2.02 POWER AND LIGHTING**

- A. The Contractor shall provide and pay for temporary power for construction used by the Contractor. The Contractor shall make arrangements with the electrical utility and with the Owner for power takeoff points from the existing service, voltage and phasing requirements, transformers and metering and shall pay the costs and fees arising therefrom. The Contractor shall provide the special connections required for his work.
- B. The Contractor shall provide sufficient electrical lighting so that all work may be done in an efficient manner when there is not sufficient daylight. The Contractor shall remove all temporary lighting following installation and proper operation of permanent lighting.

##### **2.03 TELEPHONE**

- A. The Contractor shall provide telephone service for all construction site offices; cell phones are an acceptable substitute.

##### **2.04 WATER**

- A. All water for testing, flushing, and construction will be provided by the Contractor at No Cost to the Owner.

##### **2.05 SANITARY FACILITIES**

- A. The Contractor shall provide toilet and wash-up facilities for his workforce at the site of the work. The facilities shall comply with all applicable laws, ordinances and regulations pertaining to the public health and sanitation of dwellings.

## **PART 3 EXECUTION**

### **3.01 GENERAL**

- A. Contractor shall maintain and operate systems to assure continuous service. The Contractor shall remove temporary materials and equipment when no longer required for the work.

**END OF SECTION**

## SECTION 01 56 16

### DUST CONTROL

#### **PART 1 GENERAL**

##### **1.01 SCOPE**

- A. Limit blowing dust caused by construction operations by applying water or employing other appropriate means or methods to maintain dust control, subject to the approval of the Owner. 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 or out) from damage by dust, fumes, 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.

#### **PART 2 NOT USED**

#### **PART 3 NOT USED**

**END OF SECTION**

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## SECTION 01 65 00

### PRODUCT TRANSPORTATION AND HANDLING REQUIREMENTS

#### **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 PREPARATION FOR SHIPMENT**

- A. When practical, factory-assemble products. Matchmark or tag separate parts and assemblies to facilitate field assembly. Cover machined and unpainted parts that may be damaged by the elements with a strippable protective coating.
- B. Package products to facilitate handling and protect from damage during shipping, handling, and storage. Mark or tag outside of each package or crate to indicate its purchase order number, bill of lading number, contents by name, name of Project, and Contractor, Equipment number, and approximate weight. Include complete packing lists and bills of materials with each shipment.
- C. Spare Parts, Special Tools, Test Equipment, Expendables, and Maintenance Materials:
  - 1. furnish as required by the Specifications prior to:
    - a. starting functional testing, or
    - b. operation of the equipment by the Owner, or
    - c. 75 percent Project completion, whichever occurs first.
  - 2. Properly package to avoid damage, in original cartons insofar as possible. Replace parts damaged or otherwise inoperable.
  - 3. Firmly fix to, and prominently display on, each package.
    - a. Minimum 3-inch by 6-inch manila shipping tag with the following information:
      - 1) Manufacturer's part description and number.
      - 2) Applicable equipment description.
      - 3) Quantity of parts in package.
      - 4) Equipment manufacturer.
      - 5) Applicable Specification section.
      - 6) Name of Contractor.
      - 7) Project name.
  - 4. Deliver materials to project site and place at a location as determined by the Owner.

- D. Notify Engineer upon arrival.
- E. Protect equipment from exposure to the elements and keep thoroughly dry and dust-free at all times. Protect painted surfaces against impact, abrasion, discoloration, or other damage. Grease or oil all bearings and similar items.
- F. For major equipment items, request a minimum 7-day advance notice of shipment from manufacturers. Upon receipt of manufacturer's advance notice of shipment, promptly notify Engineer of anticipated date of equipment arrival.
- G. Factory Test Results: Reviewed and accepted by Engineer before product shipment as required in individual Specification sections.

### **1.03 TRANSPORTATION**

- A. All equipment shall be suitably boxed, crated or otherwise protected during transportation.
- B. Where equipment 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.
- C. Small items and appurtenances such as gauges, valves, switches, instruments and probes which could be damaged during shipment shall be removed from the equipment prior to shipment, packaged and shipped separately. All openings shall be plugged or sealed to prevent the entrance of water or dirt.

### **1.04 HANDLING**

- A. Handle products in accordance with the manufacturer's written instructions, and in a manner to prevent damage. Store products, upon delivery, in accordance with manufacturer's instructions, with labels intact and legible, in approved storage yards or sheds. Provide manufacturer's recommended maintenance during storage, installation, and until products are accepted for use by Owner.
- 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.

### **1.05 OWNER FURNISHED EQUIPMENT**

- A. Owner furnished equipment shall mean any Owner purchased equipment and such being required by these Specifications to be installed by the Contractor.

B. The Contractor shall off load and store all Owner furnished equipment per this Section of these Specifications.

**PART 2 NOT USED**

**PART 3 NOT USED**

**END OF SECTION**

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SECTION 01 66 00  
PRODUCT 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.
- B. The Contractor shall be responsible for selecting and securing a storage site or sites necessary for the construction of this Project.

**1.02 STORAGE AND PROTECTION**

- A. Storage:
  - 1. Maintain ample way for foot traffic at all times, except as otherwise approved by the Engineer. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions, and free from damage or deterioration. Keep running account of products in storage to facilitate inspection and to estimate progress payments for products delivered but not installed in the Work.
  - 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 weathertight storage sheds with raised floors shall be provided and maintained as may be required to protect adequately 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. All equipment shall be boxed, crated or otherwise completely enclosed and protected during shipment, handling, and storage. All equipment shall be protected from exposure to the elements and shall be kept thoroughly dry at all times. Compressors, blowers,

pumps, motors, valves, control panels, instrumentation, electrical equipment and other equipment having antifriction or sleeve bearings shall be stored in weathertight warehouses which are maintained at a temperature of at least 60 degrees F. Other equipment may be stored outside under cover. All equipment shall be stored above ground level and adequately supported on wood blocking or other approved support material. Printed storage instructions of the manufacturers shall be strictly adhered to.

- E. Painted, anodized or otherwise coated surfaces shall be protected against impact, abrasion, discoloration and other damage. All coated surfaces which are damaged prior to acceptance of equipment shall be cleaned and coated to the satisfaction of the Engineer with the same or equivalent coating used in the original application.
- F. Electrical equipment, motors, controls, and insulation shall be protected against moisture or water damage. All space heaters provided in the equipment shall be kept connected and operating at all times until equipment is placed in service. Electrical equipment stored without space heaters shall be provided with desiccants to protect against moisture damage. Desiccant shall be silica gel in porous bags at not less than 1 ounce per cubic foot of volume. Desiccant shall be replaced periodically.
- G. Electrical equipment and instrumentation shall be stored in a location that is free from excessive or injurious amounts of vibration.
- H. Rotating equipment such as pumps, motors, fans and compressors shall be rotated periodically. In the absence of specific exercising instructions by the equipment manufacturers, each item of rotating equipment shall be rotated a minimum of 10 revolutions at intervals not to exceed 20 days. When shafts are too difficult to rotate by hand, nonmetallic grips shall be used to turn the shafts.
- I. Vehicles such as trucks, forklifts, tractors, lawn mowers and other engine powered equipment shall be started up and operated at intervals not to exceed 15 days. Equipment shall be run until engine temperatures and pressures are in normal operating ranges. All lifting, lowering, tilting, loading and unloading accessories shall be operated at least once during the exercise period. Equipment shall be moved under power from the parked position and run a sufficient distance so as to ensure proper lubrication of drive train and suspension components. All operators employed to exercise the vehicles shall be qualified and thoroughly familiar with the proper operation of the equipment. Forklifts, tractors, lawn mowers and other small engine powered equipment shall be stored indoors in garages or other suitable structures. Trucks stored outdoors shall be washed using approved materials at intervals not to exceed 15 days. All exercising and storage of vehicular equipment shall be conducted in a manner acceptable to the Engineer.
- J. Interiors of gear and bearing cases housing oil lubricated gears and bearings shall be filled with a rust inhibiting oil prior to storage or, if extended storage is anticipated, coated periodically with a rust inhibiting oil mist at intervals of time acceptable to the Engineer. Interiors of large pumps and compressors shall be protected using vapor phase inhibitor paper or porous bags of rust inhibiting, vapor emitting crystals. Exposed shafts shall be coated with rust preventative compound, then wrapped with oil impregnated paper and polyethylene film and sealed with waterproof tape prior to shipment.

- K. Individually packaged, unpainted steel parts shall be protected by a wrapping of vapor phase inhibiting or oil impregnated paper and polyethylene film prior to shipment.
- L. Parts and equipment not requiring periodic inspection or maintenance shall be stored unopened in their original packaging until used.
- M. Parts, instruments, controls and small items of equipment shall be stored above ground or floor level on suitable shelves or racks in a heated, watertight warehouse.
- N. Flanged openings on equipment shall be covered with suitable solid wooden or metal blanks securely bolted to the flange using a minimum of four bolts and a suitable rubber gasket. Ends of threaded pipe and fittings shall be sealed watertight with metal or plastic caps. Threaded openings shall be sealed watertight with metal or plastic plugs. Other openings shall be sealed with two layers of 6 mil polyethylene securely taped in place with waterproof tape.
- O. A maintenance log on each item of mechanical and electrical equipment requiring periodic attention in storage shall be maintained by the Contractor. Oil and grease changes, exercising, desiccant replacement, nitrogen purge checks, heater checks, insulation checks and other periodic maintenance shall be entered in the log. The maintenance log shall be made available to the Engineer on request.
- P. A resistance test shall be performed on all motor windings and heater elements following storage and prior to installation as a check for insulation deterioration or moisture damage during storage.
- Q. Immediately prior to installation, equipment shall be cleaned of any protective coatings used during storage and any rust, dirt, grit or other foreign material shall be removed.
- R. After installation and prior to start up, all grease lubricated joints, shaft couplings and bearings shall be flushed out and regreased. All oil reservoirs and sumps shall be completely drained and flushed and refilled with the proper lubricant. Screens and filters shall be checked for contamination and replaced if necessary. The equipment shall then be tagged, signed and dated, indicating that the equipment has been properly lubricated for startup.
- S. After storage, rubber parts such as valve seats, diaphragms, expansion joints, gaskets, hoses and shaft couplings shall be checked for hardening or cracking. Deteriorated parts shall be replaced prior to start up by the Contractor at Contractor's own expense.
- T. Unless otherwise permitted in writing by the Engineer, building products and materials such as cement, grout, plaster, gypsumboard, 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.
- U. 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.

### **1.03 EXTENDED STORAGE**

- A. In the event that certain items of major equipment such as air compressors, pumps and mechanical aerators have to be stored for an extended period of time, the Contractor shall provide satisfactory long-term storage facilities which are acceptable to the Engineer.
- B. The Contractor shall provide all special packaging, protective coverings, protective coatings, power, nitrogen purge, desiccants, lubricants and exercising necessary or recommended by the manufacturer to properly maintain and protect the equipment during the period of extended storage.

### **1.04 OWNER FURNISH EQUIPMENT**

- A. Where required, the Contractor shall provide storage and protection for all Owner furnished equipment and materials, including extended storage as specified above.

**PART 2 NOT USED**

**PART 3 NOT USED**

**END OF SECTION**

## SECTION 01 71 33

### PROTECTION AND MAINTENANCE OF PROPERTY AND WORK

#### **PART 1 GENERAL**

##### **1.01 SUMMARY**

- A. This Section specifies protection and maintenance of underground and above ground utilities, structures, fences, parking strips, sidewalks, driveways, streets, and other improvements which may be affected by the work.

##### **1.02 SUBMITTALS**

- A. Procedures: Section 01 33 00.
- B. Action submittal items:
  - 1. Listing and schedule of all potholing.
  - 2. Listing of all utilities/facilities to be physically protected and relocated.
- C. Informational submittal items for this section:
  - 1. Shoring for all affected structures and utilities. Submit detail drawings of proposed methods to support, protect, and buttress utilities and structures where the depth of the excavation is greater than the horizontal distance from the structure or utility.

##### **1.03 LOCATION OF EXISTING UNDERGROUND FACILITIES**

- A. The Drawings indicate the existence of underground facilities known to the Owner within the site and right of way. Utilities are shown schematically on the plans and are not necessarily accurate in location as to plan or elevation.
- B. The Contractor shall familiarize himself with and comply with the provisions of O.C.G.A. Section 25-9-1 et. seq.
- C. The Contractor shall call, by law, the Utilities Protection Center, d/b/a Georgia 811 at "811" or 1-800-282-7411 and shall request that all owners of utilities, including gas companies, electric companies, telephone companies, cable television companies and governmental units, prior to starting any excavation of the project, locate and mark their respective facilities.
- D. Locate existing underground utilities. Review with the Owner the locations of existing utilities in relation to the new construction and evaluate areas of conflict.
- E. Excavate and expose all major and minor existing utilities prior to new construction to determine utility elevations in relation to the new facilities.
- F. Examine and repair all pipelines prior to pipelines being buried.

##### **1.04 EXISTING UTILITIES AND FACILITIES**

- A. Protect, modify, and/or relocate all existing utilities required to complete the work.

- B. The locations of existing major utilities, whether above ground or underground, are indicated on the Drawings. This information has been obtained from utility maps and field surveys. The Owner does not guarantee the accuracy or completeness of this information, and it is to be understood that other above ground or underground facilities not shown on the Drawings may be encountered during the course of the work.
- C. Contractor shall be responsible for damages resulting from any failure to contact utility owners for location, routing, and marking of a specific utility and its subsequent effects.
- D. The Drawings may show underground utilities which are to be relocated. Contractor shall be responsible for all these relocations prior to commencing work in the area.
- E. Protect, modify, or relocate existing utilities and facilities required to accommodate Contractor's means and methods. Specific means and methods to be utilized by the Contractor are not known to the Owner. Therefore, the Owner will not be liable for utility protection, modification, and relocation not shown on the Drawings that are required by the Contractor due to its means and methods. It is the Contractor's responsibility to determine the Work required by the Construction Documents and make provision for protection, modification, and relocation required. Coordinate all protection, modification, and relocation work through the affected utility. Complete Work to the utility owner's requirements and standards.
- F. Underground Utilities:
  - 1. For the purpose of this Section an underground utility will be defined as a transmission, collection, or distribution line where it would be customary to expect that drawings would exist for the line and the utility owner would be aware of the line.
  - 2. An existing underground utility is considered to be in conflict if it crosses or projects into the specified excavation at an elevation between the top and bottom of the new facility or when parallel to the new facility, and projects into the specified excavation.
  - 3. Contractor shall be responsible for all protection, affects, and damages on utilities not in conflict with the new construction, whether or not the utilities are shown on the Drawings.
  - 4. When not shown on the Drawings and in conflict with the new construction, meet and agree with the Owner on how to proceed.
  - 5. When not shown on the Drawings and no conflict with the new facility exists, no additional payment will be considered.
  - 6. When in a substantially different location and not in conflict with the new construction, no additional payment will be considered.
  - 7. When in a substantially different location and in conflict with the new construction, reimbursement for additional work per the Contract Requirements.
- G. Abandoned pipelines shown on the Drawings shall be removed and plugged per the local agency requirements when encountered.
- H. Locate existing underground utilities with the field staking. Review with the Owner the locations of existing utilities in relation to the new construction and evaluate areas of conflict

- I. Storm and Sanitary Sewers:
  - 1. Existing live sewers shall remain in service. Adequate provision shall be made for disposal of existing sewage flow. Immediately repair construction damage to the existing sewer system and manholes to a condition equal to or better than that existing prior to the damage. Repair all damage which results from the disturbance of the existing sewer.
  - 2. Remove water accumulating during construction from the new sewers and prevent it from entering existing lines. Flush existing pipes which were affected by the construction to the point of the next upstream connection and repair any pipelines or manholes damaged by gravel, rocks, or other debris that has entered the existing system during construction. The physical connection to an existing manhole or sewer line shall not be made until so authorized by the Owner.
  
- J. Aboveground Electrical, Cable, and Communication Facilities:
  - 1. Attention is called to all overhead items including, but not limited to, power and telephone lines, temporary traffic signals, traffic signal mast arms, overhead sign bridges, sign support span wires, signs, and street lights.
  - 2. Observe the location of these overhead facilities and plan and conduct work operations, accordingly.
  - 3. Take precautions to protect and avoid damage to all overhead facilities.
  - 4. Relocate facilities as required to meet the means and methods to be utilized.
  - 5. Observe and investigate the presence of facilities that may be affected by the work. Consult with and rely on the information given by utility owners and operators to determine the extent of any hazards and measures required. Determine the extent of any hazard created by facilities in all areas and follow approved safety procedures during the work.
  - 6. Support poles at risk of being undermined by the work.
  - 7.
  
- K. Underground Electrical, Cable, and Communication Facilities:
  - 1. Determine the protection necessary to proceed safely to protect these underground facilities.
  
- L. Gas:
  - 1. As required by the appropriate utility owner, protect, maintain, support in place, or relocate all gas mains crossing the pipeline trenches.
  - 2. Provide a minimum of 12 inches of clearance, measured from edge to edge, between gas mains or gas service lines and new facilities. If relocating either utility is not practical, a protective wrap shall be provided for the entire distance where less than 12 inches of vertical clearance and less than 6 inches of horizontal clearance are provided. Wrapping material shall consist of either a split polyvinyl chloride (PVC) pipe or PVC wrapping of at least 0.04 inch in thickness, and shall be applied to either one of the pipes.
  - 3. All abandoned gas mains encountered in the trench area shall be removed.
  - 4. All temporary gas service slack lines shall be protected and maintained during pipeline installation.

5. Notify the Owner and the utility at least two days (minimum of 48 hours) in advance of any excavation in the vicinity of any gas piping. The utility may require one of its inspectors to be onsite anytime work is conduct near gas lines.

M. Water:

1. As required by the appropriate utility, protect, maintain, support in place, or relocate all water pipelines affected by the work.
2. Maintain water service along the alignment of work at all times.
3. Thrust blocks are not shown on the Drawings and shall be assumed to be present at all water line deflections of 12.5 degrees or greater.
4. Notify the Owner in writing immediately of any damage. Begin repairs immediately, and work continuously until water service is restored.

N. Roadways:

1. Take adequate precautions to protect existing sidewalks, curbs, pavements, utilities, adjoining property, and structures, and avoid damage.
2. Traffic signage, paint striping, and channelization shall be protected and replaced if damaged.
3. Maintain the existing illumination pattern for signs and roads at all times.
4. Install temporary roadway lighting as necessary.
5. Access for emergency equipment shall be maintained at all times.

### **1.05 SHORING AND BRACING**

- A. Shore up, brace, under-pin, and protect as necessary, the foundations and other parts of existing structures adjoining the site of the work that may be affected by the work. Contractor is responsible for any damages because of settlements or the loss of lateral or subjacent support of adjoining property and from all loss and damages to adjoining and adjacent structures and their premises.
- B. Fully comply with the requirements of the authority having jurisdiction (AHJ) and the State of Georgia, as applicable.

### **1.06 EMERGENCIES**

- A. Whenever work endangers the safety of life or property, including adjoining property or property in the immediate proximity of the work, take all reasonable and prudent actions to prevent threatened loss or injury.

## **PART 2 NOT USED**

## **PART 3 EXECUTION**

### **3.01 GENERAL**

- A. Contact the Owner and the affected utilities prior to an excavation per the Contract Documents.
- B. Pothole to locate and expose all utility locations to be affected by the work prior to new construction in the area of the utility. Adjust work when location of utility is different than

shown on the Drawings and materially impacts construction. If the utility requires relocation not shown on the Drawings and the Contractor incurs additional cost, then the Owner will consider additional costs. Relocation of minor utilities such as irrigation lines less than 4 inches, water service lines, building drainage pipes will be considered incidental and not considered for additional costs.

- C. If damage to a utility occurs, repair damage to the requirements of the utility owner prior to backfilling said utility.

**END OF SECTION**

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SECTION 01 74 23  
CLEANING AND WASTE MANAGEMENT

**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 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 sewers shall not be allowed.

**1.04 DISPOSAL OF WASTE**

- A. The definitions contained in Georgia Environmental Protection Division Rules 391-3-4-.01 shall be applicable to this Project. The term waste shall include excess and surplus materials, and shall include liquid and solid wastes.
- B. Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
- C. Except as otherwise specified, do not allow waste materials that are to be disposed of to accumulate on-site.
- D. Remove and transport waste in a manner that will prevent spillage on adjacent surfaces and areas.
- E. Burning: Do not burn waste materials on site.

- F. Waste removed from the Project site shall be disposed of in sites permitted by the Georgia Environmental Protection Division for the acceptance of type of waste being disposed. The acceptable types of permitted disposal facilities are as follows:
  - 1. Inert Waste Landfills
  - 2. Municipal Solid Waste Landfills
  - 3. Municipal Solid Waste Landfills permitted to receive only construction and demolition wastes.
  
- G. Exceptions to Paragraph F are as follows:
  - 1. Hazardous waste shall be disposed of in accordance with Georgia Environmental Protection Division Rules 391-3-11.
  - 2. Asbestos-containing waste shall also be handled and disposed in accordance with Georgia Environmental Protection Division Rules 391-3-14.
  - 3. Excess earth material and excess excavated rock material may be placed on sites for which the Contractor provides to the Owner a signed affidavit from the property owner that the placement of such material is acceptable to the property owner. The Contractor and property owner shall be responsible for all permitting of such disposal.
  
- H. No waste shall be placed at a transfer station facility.
  
- I. The Contractor shall maintain records related to all waste removed from the Project site so as to allow the Owner or the Engineer to readily determine the following:
  - 1. Date waste removed from Project site.
  - 2. Name of hauler (company and driver) transporting such waste.
  - 3. General description of waste transported.
  - 4. "Truck tickets" indicating the waste disposal site and amount of waste disposed therein.
  
- J. For all wastes hauled to any landfill, the handler of such wastes must be licensed under Permit-by-Rule in accordance with Georgia Environmental Protection Division rules 391-3-4-06.

## **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 Engineer.

## **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. Restack materials stored on site weekly.
3. At all times maintain the site in a neat and orderly condition which meets the approval of the Engineer.

#### **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 handheld 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 Engineer, 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 Engineer, hose down all paved areas on the site and all public sidewalks directly adjacent to the site; 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 Engineer may require light sandblasting or other cleaning at no additional cost to the Owner.
  - 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, shall be removed as directed by the Engineer.
- 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. Restoration shall be performed to the satisfaction of the Engineer.
- G. Timing: Schedule final cleaning as approved by the Engineer to enable the Owner to accept the Project.

### **3.03 CLEANING DURING OWNER'S OCCUPANCY**

- A. Should the Owner occupy the Work or any portion thereof prior to its completion by the Contractor and acceptance by the Owner, responsibilities for interim and final cleaning of the occupied spaces shall be as determined by the Engineer in accordance with the Contract Documents.

**END OF SECTION**

SECTION 01 77 00  
CLOSEOUT PROCEDURES

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. This section specifies the following sequence and procedures for Project closeout:
1. Final Inspection (portions of the Work)
  2. Substantial Completion (portions of the Work per the Contract Documents)
  3. Final Completion (all Work per the Contract Documents)
  4. Final Acceptance (all Work per the Contract Documents)

**1.02 FINAL INSPECTION**

- A. Request for Final Inspection: complete the following actions prior to the Owner's Final Inspection.
1. Submit a written notice that the Project is ready for Final Inspection. Include a written plan and schedule outlining all actions necessary to achieve Substantial Completion.
  2. Preliminary Cleaning per Section 01 74 23.
- B. Final Inspection: Upon receipt of the Request for Final Inspection, the Owner will commence Final Inspection and, as necessary, provide a Corrective Work Items List. If a list of Corrective Work Items List is issued, make the required corrections and/or identify items that Contractor feels are not required by the Construction Documents; resolve these items with the Owner.
- C. Reinspection: After completing the Owner's Corrective Work Items List and providing a Final Inspection Report noting completion of each item, request a re-inspection. Items whose completion is delayed due to circumstances acceptable to the Owner will be exceptions. Owner will confirm completion of the Corrective Work Items List. If Owner is required to perform more than one re-inspection, costs for additional inspections may be borne by the Contractor, at Owner's sole discretion.

**1.03 SUBSTANTIAL COMPLETION**

- A. Prior to Substantial Completion: Substantial Completion is achieved when the portion of Work, other than incidental Corrective Work Items or Punch List items, is complete. Tasks to complete include, but are not limited to, the following:
1. Work is complete and correct to the satisfaction of the Owner.
  2. Removal of temporary facilities and controls not required in other areas.
  3. Final cleaning complete per Section 01 74 23.
  4. Completion of all testing, training, and commissioning per specifications.
  5. Certificate(s) of Occupancy submitted, as required.
- B. Substantial Completion: Upon satisfactory completion of all specified requirements, the Owner will issue a letter of Substantial Completion. The letter will identify the date of Substantial Completion and list any incomplete Work.

## **1.04 FINAL COMPLETION**

- A. Prior to Final Completion: Final Completion is achieved when all Work is fully complete in accordance with the Construction Documents. Tasks to complete include, but are not limited to, the following:
1. All Work is complete and correct to the satisfaction of the Owner.
  2. All temporary facilities and controls removed.
  3. All final cleaning complete per Section 01 74 23.
  4. Final Operation and Maintenance Manuals provision per specifications.
  5. Warranties and Bond Manual submission per Section 01 78 36.
  6. Submittal of the Project Record Documents per Section 01 78 39.
  7. Spare parts delivery and acceptance per specifications.
  8. Landscaping complete.
  9. All final permits submitted, including Certificates of Occupancy.
  10. All Change Orders are approved and signed by both parties.
  11. Draft Final Application for Payment submitted.
- B. Additional Contract Closeout Submittals: In addition to all other required specified above, Contractor shall provide the following submittals in accordance with Section 01 33 00.
1. Submittal of complete set of approved shop drawings and samples
  2. Two copies of all Special Bonds, Special Warranties, and Service Agreements.
  3. Consent of Surety to Final Payment
  4. Releases or Waivers of Liens and Claims
  5. Release from Agreements per Paragraph 1.04.
  6. Registry of training sessions conducted and list of attendees for all manufacturer's operation and maintenance training session.
  7. Registry of final maintenance and lubrication of filter and/or oil lube protected equipment.
  8. Final Application for Payment: Submit in accordance with procedures and requirements stated in Section 01 33 00.
  9. A final written tabulation, plus other documentation as may be required, of all taxes, including sales tax, paid by the CONTRACTOR to assist the OWNER in obtaining sales and/or use tax refunds for eligible machinery and equipment used for the primary purpose of reducing or eliminating air or water pollution as provided for in Chapter 48-8-3 (36) and (37) of the Official Code of Georgia.
- C. Final Completion: Upon satisfactory completion of all Construction Document requirements, the Owner will approve and process the Final Application for Payment and establish the date of Final Completion.

## **1.05 RELEASES FROM AGREEMENTS**

- A. Furnish Owner written releases from property owners or public agencies where side agreements or special easements have been made, or where Contractor's operations have not been kept within the Owner's construction right-of-way.

- B. In the event Contractor is unable to secure written releases, inform the Owner of the reasons:
  - 1. Inform Owner of the reasons.
  - 2. Owner or its representatives will examine the site, and Owner will direct Contractor to complete Work that may be necessary to satisfy terms of the side agreement or special easement.
  - 3. Should Contractor refuse to perform this Work, Owner reserves the right to have it done by separate contract and deduct the cost of same from the Contract Price, or require the Contractor to furnish a satisfactory Bond in a sum to cover legal claims for damages.
  - 4. When Owner is satisfied that Work has been completed in agreement with the Contract Documents and terms of side agreement or special easement, the right is reserved to waive the requirement for written release if:
    - a. Contractor's failure to obtain such statement is due to the grantor's refusal to sign, and this refusal is not based upon any legitimate claims that Contractor has failed to fulfill the terms of the side agreement or special easement, or
    - b. Contractor is unable to contact or has had undue hardship in contacting the grantor.

#### **1.06 FINAL ACCEPTANCE**

- A. Final Application for Payment approved, and payment made to Contractor.
- B. The Owner will establish the date of Final Acceptance and issue the Letter of Final Acceptance after the Contractor completes all Construction Document requirements.

#### **PART 2 NOT USED**

#### **PART 3 NOT USED**

**END OF SECTION**

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## SECTION 01 78 36

### WARRANTIES

#### **PART 1 GENERAL**

##### **1.01 SUMMARY**

- A. This Section specifies general administrative and procedural requirements for warranties required by the Construction Documents, including manufacturer's Standard Product Warranties and Special Warranties.
- B. Warrant for a period of minimum 1-year, unless otherwise specified in the Contract Documents, from the date of Owner's written acceptance of the Work and/or Owner's written final acceptance of the Project, as defined in the Contract Documents, that the completed Work is free from all defects due to faulty products or workmanship. Promptly make such corrections as may be necessary by reason of such defects. The Owner will give notice of observed defects with reasonable promptness. In the event that the Contractor should fail to make such repairs, adjustments or other work that may be made necessary by such defects, the Owner 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
- C. If there is any discrepancy in the Construction Documents regarding the warranty period or its date of commencement, the passage granting the Owner the longest warranty period ending on the latest date shall govern.
- D. Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and Subcontractors that are required to countersign Special Warranties with the Contractor.
- E. The warranty

##### **1.02 DEFINITIONS**

- A. Standard Product Warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.
- B. Special Warranties are written warranties required by or incorporated in the Construction Documents, either to extend time limits provided by Standard Product Warranties or to provide greater rights to the Owner. Refer to individual sections of the Specifications for Special Warranty requirements.

##### **1.03 WARRANTY REQUIREMENTS**

- A. All warranties begin at the date of Substantial Completion for the entire project, or, for Work associated with an interim milestone, on the date of Substantial Completion for that milestone.

- B. When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to access the failed, warranted Work.
- C. When Work covered by a warranty has failed and been corrected, replaced, retested, and recommissioned, reinstate the warranty by written endorsement. The reinstated warranty shall equal the original warranty with an equitable depreciation adjustment.
- D. Upon determination that Work covered by a warranty has failed, correct or replace the Work to an acceptable condition complying with requirements of Construction Documents. The Contractor is responsible for the cost of correcting, replacing, retesting, and recommissioning defective Work regardless of whether the Owner has benefited from use of the Work.
- E. Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, right and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.
- F. The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Construction Documents.
- G. The Owner reserves the right to refuse to accept Work for the Project where a Special Warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.
- H. Owner acceptance of warranties does not relieve the Contractor of the warranty requirements specified in the Contract Documents.
- I. Ensure all Standard Product Warranties and Special Warranties are transferrable to Owner.

#### **1.04 SUBMITTALS**

- A. Procedures: Section 01 33 00.
- B. Warranties and Bonds Manual: Assemble executed licenses, certificates, warranties, bonds, and any required service and maintenance contracts from the respective manufacturers, suppliers, and Subcontractors. Provide two (2) preliminary review copies, identified "Preliminary." Provide four (4) final signed copies of the Warranties and Bonds Manual following review and acceptance of the preliminary manual by the Owner.
  - 1. Out of the four final signed copies, one (1) shall be an original.
  - 2. Provide one (1) CD with scanned Adobe Acrobat (.pdf) files, including an index with hyperlinks to the individual sections.
- C. Include complete information for each of the following:
  - 1. Neatly typed Table of Contents, in a complete and orderly sequence.
  - 2. Product or work item, including applicable specification section number(s) per the Construction Documents

3. Firm, with name of principal, address, telephone number, email address, and web site address
  4. Scope of warranty
  5. Start date of warranty or service and maintenance contract
  6. Duration of warranty or service and maintenance contract
  7. Proper procedure in case of failure
  8. Instances which might affect validity of warranty or bond
  9. Contractor, name or responsible principal, address, and telephone number.
  10. For Special Warranties, prepare a written document containing all pertinent information and ready for execution by the required parties.
- D. Copies shall be bound in slant-D, 3 ring view binders with an insert accepting clear vinyl overlay on the front cover and spine.
1. Provide cover slip sheet typed with "WARRANTIES AND BONDS", Project name, Project number, Contractor, and blank field for the date. Label volumes consecutively.
  2. Each copy shall have a typewritten index and tabbed dividers between equipment categories or specification sections.
  3. The contents of the manual shall be printed on white 8-1/2" x 11" acid free, recycled copy paper and shall not exceed 75% capacity of the binder.

**PART 2 NOT USED**

**PART 3 NOT USED**

**END OF SECTION**

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SECTION 01 78 39  
PROJECT RECORD DOCUMENTS

**PART 1 GENERAL**

**1.01 DEFINITIONS**

- A. Record documents refer to those documents maintained and annotated by the Contractor during construction and are defined as:
  - 1. A neatly and legibly marked set of contract drawings showing the final location of piping, equipment, structures, electrical conduits, outlet boxes and cables
  - 2. Specifications annotated with addenda and change order items, by section
  - 3. Change order documents
  - 4. Submittals and product data
  - 5. Field test data
  - 6. Additional documents such as schedules, lists, drawings, and electrical and instrumentation diagrams included in the specifications
  - 7. Contractor layout and installation drawings
  - 8. As-built drawings by Georgia registered professional land surveyor (PLS), including digital version

**1.02 GENERAL REQUIREMENTS**

- A. Unless otherwise specified, record drawings shall be full size and maintained in a clean, dry, and legible condition.
- B. Accuracy of Records:
  - 1. Unless noted otherwise, Record Drawings shall provide dimensions, distances and coordinates to the nearest 0.1 foot.
  - 2. Unless noted otherwise, Record Drawings shall provide elevations to the nearest 0.01 foot for all pertinent items constructed by the Contractor.
  - 3. Coordinate changes within Record Documents, making legible and accurate entries on each sheet of Drawings and other documents where such entry is required to show change.
  - 4. Purpose of Project Record Documents is to document factual information regarding aspects of Work, both concealed and visible, to enable future modification of Work to proceed without lengthy and expensive site measurement, investigation, and examination.
- C. Make entries within 24 hours after receipt of information that a change in Work has occurred.
- D. Record documents shall not be used for construction purposes and shall be available for review by the Engineer during normal working hours.
- E. At the completion of the work, prior to final payment, all record drawings shall be submitted to the Engineer.

- F. The Contractor shall maintain on the Project site throughout the Contract Time an up-to-date set of Record Drawings.
- G. Prior to each request for partial progress payment, Owner or Engineer will review record drawings with Contractor.
- H. Progress payment requests shall not be processed unless record drawings are current.
- I. Prior to submitting each request for progress payment, request Engineer's review and approval of current status of Record Documents. Failure to properly maintain, update, and submit Record Documents may result in a deferral by Engineer to recommend the whole or any part of the Contractor's Application for Payment, either partial or final.

### **1.03 CONTRACTOR MARK-UPS AND DATA ENTRY REQUIREMENTS**

- A. Marking of the drawings shall be kept current and shall be done at the time the material and equipment are installed.
- B. Annotations to the record drawings shall be made with an erasable colored pencil conforming to the following color code:
  - 1. Additions – Red
  - 2. Deletions – Green
  - 3. Comments – Blue
  - 4. Dimensions – Graphite
- C. Legibly mark drawings to record actual construction, including changes of dimension and detail; and changes made by Requests for Information (RFI), field order, work change directives, clarification memorandums or by change order.
- D. Provide locations of and dimensions of roadways, driveways, and parking areas.
- E. Legibly mark to record actual depths, horizontal and vertical location of underground facilities, piping, taps, fitting, underground structures, equipment, raceways, cables, and appurtenances referenced to permanent surface improvements.
- F. Provide elevation of piping through vaults / structures, invert elevation of all pipes entering manholes, junction boxes, valves, clean outs, etc. Provide center of manholes, and corners of facilities or structures with northing, easting and bottom / top elevations.
- G. The Contractor shall provide offset staking for the centerline of pipelines every 100 feet along the pipe (including all fittings and bends) – as installation of the pipeline progresses. The staking shall identify the distance to the centerline of the pipe and the depth of cover to the top of pipe. At the completion of construction, the Contractor shall provide coordinates for the centerline of the pipe, include depth of bury, based on staked offsets.
- H. The locations of site improvements, including underground utilities, shall be referenced to at least two easily identifiable, permanent landmarks (e.g., power poles, valve markers, etc.) or benchmarks.

- I. GPS Coordinates for all manholes, piping and other structures and appurtenances installed (see 1.04).
- J. The Contractor shall obtain a set of signed/sealed as-built drawings from the Georgia registered surveyor and submit to the Engineer.
- K. Record Drawings shall be prepared using a survey that ties the site and improvements horizontally and vertically to the following state plane coordinate system or as amended by the Owner.

Horizontal Control: North American Datum 83 (NAD83) (HARN) 1994

Vertical Control: North American Vertical Datum of 1988 (NAVD88).

Grid Zone: Georgia West 1002 (US Survey feet)

- L. Record Drawings shall have a title block indicating that the drawings are Record Drawings, the name of the company preparing the Record Drawings, and the date the Record Drawings were prepared.

#### **1.04 GPS COORDINATES FOR WATER PROJECTS**

- A. At the completion of construction, the Contractor shall provide GPS coordinates for all newly installed and relocated fire hydrants, blow-offs, valves, valve vaults, master meter vaults, and dead ends. Coordinates shall be of survey grade quality (sub foot accuracy minimum) and provided in the Georgia State Plane Coordinates West Zone. Control shall be based on NAD 83 for horizontal and NAVD 88 for vertical. Coordinates shall be submitted in an ESRI shape file format.
- B. As installation of the utility pipeline progresses, the Contractor shall provide offset staking for the centerline of the utility pipe every 100 feet along the pipe. The staking shall identify the distance to the centerline of the pipe and the depth of cover to the top of pipe. At the completion of construction, the Contractor shall provide GPS coordinates for the centerline of the pipe, include depth of bury, based on staked offsets.

#### **1.05 SPECIFICATIONS**

- A. Legibly mark each section to record:
  - 1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
  - 2. Changes made by Requests for Information (RFI), field order, clarification memorandums, or by change order.

#### **1.06 SUBMITTAL**

- A. At contract closeout, deliver Record Documents to the Engineer for the Owner.
- B. Accompany submittal with 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 Contractor or Contractor's authorized representative

**END OF SECTION**

SECTION 01 99 90  
REFERENCE FORMS

**PART 1 FORMS**

**1.01 DESCRIPTION**

- A. The forms listed below and included in this section are referenced from other sections of the project manual:

Form No.	Title
01 33 00-A	Submittal Transmittal Form

**01 33 00-A. SUBMITTAL TRANSMITTAL FORM**

**Submittal Transmittal**

Submittal Description:	Submittal No: <sup>1</sup>	Spec Section:
------------------------	----------------------------	---------------

	Routing	Sent	Received
Owner:	Contractor/CM		
Project:	CM/Engineer		
	Engineer/CM		
Contractor:	CM/Contractor		

We are sending you:

- Attached
- Under separate cover via \_\_\_\_\_
- Submittals for review and comment
- Product data for information only

Remarks: \_\_\_\_\_

Item	Copies	Date	Section No.	Description	Review action <sup>a</sup>	Reviewer initials	Review comments attached

<sup>a</sup>Note: NET = No exceptions taken; MCN = Make corrections noted; A&R = Amend and resubmit; R = Rejected  
Attach additional sheets if necessary.

**Contractor**

Certify either a or b:

- a.  We have verified that the material or equipment contained in this submittal meets all the requirements, including coordination with all related work, specified (no exceptions).
- b.  We have verified that the material or equipment contained in this submittal meets all the requirements specified except for the attached deviations.

No.	Deviation

Certified by: \_\_\_\_\_

Contractor's Signature: \_\_\_\_\_

<sup>1</sup>See Section 01 33 00-1.04. A, Transmittal Procedure.

**END OF SECTION**

SECTION 02 41 13.23  
UTILITY LINE REMOVAL

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Section includes:
1. Pipe Removal/Abandonment
  2. Manhole Removal/Abandonment

**1.02 REFERENCES**

- A. Drawings and general provisions of the Contract and Division 1 Specification Sections, apply to this section.

**1.03 WORK INCLUDED**

- A. The Contractor shall furnish all labor, equipment, tools and materials necessary to remove and or abandon existing utility lines as required for the installation of proposed utility pipelines and related appurtenances under Contract and as directed by Owner.

**1.04 SUBMITTALS**

- A. The Contractor shall submit for approval to Owner, County DOT, and Georgia DOT when work is within a state road right-of-way, all working drawings and schedules of materials and methods proposed to follow in the execution of the Work under this item.
- B. The Contractor shall submit photographs and/or videotape, sufficiently detailed, of existing conditions of project site. These shall be used to evaluate project areas that might be misconstrued as damage, caused by debris, or construction material removal.
- C. The Contractor shall submit for approval by the Engineer and Owner:
1. Details of all caps or plugs to be installed on abandoned piping to remain in the ground.
  2. Details for restraining all existing water mains to remain in services where a portion of the main has been removed or modified.
  3. Location of disposal site for all materials removed with documentation from site owner stating acceptance of each type of material to be disposed of.

**PART 2 NOT USED**

**PART 3 EXECUTION**

**3.01 PIPE REMOVAL/ABANDONMENT**

- A. The Contractor shall be responsible for removal of any existing utility pipeline that is to be abandoned that interferes with the installation of the proposed pipelines. Prior to removing any portion of existing pipelines, the Contractor shall obtain approval from Owner.

- B. The Contractor shall isolate the portion of the pipeline to be removed by plugging manhole and utilizing bypass pumping. Any service connections on the pipeline to be removed shall be transferred to the new pipeline or an existing pipeline which will remain in service prior to isolation of the pipeline.
- C. The ends of piping to remain in the ground shall be suitably capped or plugged to prevent water or soil from entering the pipe.
- D. Any existing pipelines that have a portion of pipe removed and are to remain in service shall be properly restrained with thrust blocking to prevent movement of the remaining pipe.
- E. The Contractor shall follow all applicable codes and regulations for removal of hazardous materials, such as asbestos cement pipe, and dispose of in a legal and proper manner.
- F. The Contractor shall load, haul away, and dispose of in a satisfactory location any debris, trash, structures, piping, etc. removed from the worksite.

### **3.02 MANHOLE REMOVAL/ABANDONMENT**

- A. The Contractor shall be responsible for removal of any existing manhole that is to be abandoned per contract documents. Prior to removing any manholes, the Contractor shall obtain approval from Owner.
- B. Where manholes are to be removed, the Contractor shall excavate the manhole; remove the manhole and connecting piping, as required, and backfill and compact the void with approved material. If the manhole is located with a road, parking area, driveway or other paved area, the backfill shall be compacted to at least 95% of maximum dry density - Standard Proctor (ASTM D698). If the manhole is located in an unpaved area, the backfill shall be compacted to 85% of maximum dry density - Standard Proctor (ASTM D698), and slightly mounded to allow for settlement.
- C. Where manholes are to be abandoned in place, the Contractor shall grout seal the ends of all pipes entering the manhole, fracture the invert of the manhole to allow for drainage, cut the top of the manhole off to a minimum of three (3) feet below finished grade, fill the manhole with #57 stone, and backfill and compact with suitable fill material. If the manhole is located with a road, parking area, driveway or other paved area, the backfill shall be compacted to 95% of maximum dry density - Standard Proctor (ASTM D698). If the manhole is located in an unpaved area, the backfill shall be compacted to 85% of maximum dry density - Standard Proctor (ASTM D698), and slightly mounded to allow for settlement.

**END OF SECTION**

SECTION 02 42 11  
REMOVAL OF CONSTRUCTION MATERIALS

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Section includes:
  - 1. Workmanship

**1.02 REFERENCES**

- A. Drawings and general provisions of the Contract and Division 1 Specification Sections, apply to this section.

**1.03 WORK INCLUDED**

- A. The Contractor shall furnish all labor, equipment, and materials necessary to remove all unwanted construction material and debris, as directed by Owner

**1.04 SUBMITTALS**

- A. The Contractor shall submit for approval to Owner and County DOT, all working drawings and schedules of materials and methods proposed to follow in the execution of the Work under this item.
- B. The Contractor shall supply identification and license of company hauling/transporting material from the site.
- C. The Contractor shall submit photographs and/or videotape, sufficiently detailed, of existing conditions of project site. These shall be used to evaluate project areas that might be misconstrued as damage, caused by debris, or construction material removal.

**PART 2 NOT USED**

**PART 3 EXECUTION**

**3.01 WORKMANSHIP**

- A. The Contractor shall follow all federal, state, and local regulations related to removal, hauling, and disposal of trash and debris.
- B. The Contractor shall comply with local ordinances and regulations for hauling and disposal of all solid waste removed from the site for the duration of the Work.
- C. The Contractor shall load, haul away, and dispose of debris, trash, structures, automobiles, etc., that may be pre-existing on the Worksite, to a legally permitted location.

- D. The Contractor shall load, haul away, and dispose of construction material that is generated in execution of the Work, to a legally permitted location; including, but not limited to any debris, trash, structures, piping, etc.
- E. The Contractor shall remove and dispose of all unused construction materials prior to Final Acceptance of the Work by Owner and the Engineer.
- F. No additional payment shall be made for excavation or disposal of excavated material required for placement or removal of backfill placed above the foundation of the pavement; or for preparation of subgrade. The cost thereof shall be considered included in the lump sum or other unit prices.

**END OF SECTION**

SECTION 31 05 16  
CLASSIFIED STONE

**PART 1 GENERAL**

**1.01 SUMMARY**

A. Section includes:

<u>Section</u>	<u>Title</u>
1.02	References
1.03	Work Included
1.04	Definitions
1.05	Submittals
1.06	Quality Assurance
2.01	Materials
2.02	Geotextiles
3.01	Construction

**1.02 REFERENCES**

- A. Drawings and general provisions of the Contract, and Division 1 Specification Sections, apply to this section.
- B. The following references are included in this section:
1. National Stone Association, Aggregate Classification (NSA Classification).
  2. Georgia Department of Transportation Standards Specifications for Road and Bridge Construction, Section 800, latest edition.

**1.03 WORK INCLUDED**

- A. The Contractor shall furnish all labor, equipment, and materials necessary for hauling and properly placing classified stone at the locations and to the limits indicated on the Contract Drawings or as directed by Owner.

**1.04 DEFINITIONS**

- A. Classified Stones:
1. No. 3, No. 4, No. 5 and No. 57 Stones shall be per GDOT Section 800.
  2. Crusher Run shall be per Table B.1 below.
  3. Type 3 Riprap per Section 31 37 00
  4. Well Graded Riprap: mixture of clean coarse aggregate and riprap material in the following percentages by volume, unless otherwise specified per the design drawings:
    - a. 60% Type 3 Riprap.
    - b. 20% No. 3 Stone.
    - c. 20% No. 57 Stone.
  5. R-2 and R-3 per National Stone Association, Aggregate Classification

## 1.05 SUBMITTALS

- A. Action Submittals:
  - 1. Shop Drawings:
    - a. Description, location, and contact information for proposed sources of all Classified Stones.
    - b. Refer to applicable submittals in specifications.
  - 2. Samples:
    - a. General:
      - 1) Deliver samples to site at location designated by Owner.
      - 2) Incorporate approved samples into Work after material placement is near completion.
    - b. Classified Stones:
      - 1) No. 3 Stone.
      - 2) No. 4 Stone.
      - 3) No. 5 Stone.
      - 4) No. 57 Stone.
      - 5) Crusher Run.
      - 6) Well Graded Riprap.
      - 7) Each sample shall meet the gradation requirements specified for the corresponding Classified Stone type, include at least one piece of maximum size, and be representative of Material to be furnished for Work. See Table Part 2.1.
    - c. Refer to applicable samples in specifications.
- B. Informational Submittals:
  - 1. Certified Test Results:
    - a. All Classified Stones described in Section 1.04.A.
      - 1) Gradation.
      - 2) Abrasion resistance.
      - 3) Bulk density.
    - b. Geotextiles: Refer to applicable informational submittals in specifications.
  - 2. Trip tickets showing source, type, and weight of each load of material delivered to Site.
  - 3. Size of equipment to be used to install Classified Stone. Include bucket dimensions and the minimum clearance width required for equipment.

## 1.06 QUALITY ASSURANCE

- A. Source: Quarry that has produced Classified Stones and has performed satisfactorily on other projects for at least 5 years. Native, on-site Classified Stones may be used pending written approval from Owner.

## PART 2 PRODUCTS

### 2.01 MATERIALS

- A. Unless otherwise specified, material furnished for classified stone shall meet the requirements of the Georgia Department of Transportation Standards Specifications for Road and Bridge Construction, Sections 800 and 805, latest edition.
- B. Crusher Run Gradation:

**Table B.1**

Crusher Run Gradation*										
Percentage of Total by Weight Passing										
2"	1 1/2"	1"	3/4"	1/2"	#4	#8	#10	#16	#40	#200
-	100	79-97	-	55-80	35-55	-	25-45	-	14-30	4-12

\*Stone gradation from GDOT Table 1005-1 "Aggregate Gradation - Coarse Aggregate", for ABC (Aggregate Coarse Base) stone.

- C. Well Graded Riprap Gradation:

Stone Size	Percentage, %
Type 3 Riprap	60
No. 3 Stone	20
No. 57 Stone	20

- D. N.S.A. R-2 and R-3 Stone:
1. R-2 shall be 1.5" to 3.5" coarse aggregate.
  2. R-3 shall be 3" to 6" coarse aggregate.
- E. Classified Stone shall be free of unspecified sand and soil, roots and other organic or deleterious matter.

### 2.02 GEOTEXTILES

- A. Woven and non-woven geotextiles as specified.

## PART 3 EXECUTION

### 3.01 CONSTRUCTION

- A. Prepare the ground surface where the classified stone will be placed to conform with the correct grades before beginning the placement. Ground surface should be smooth and free of obstructions, depressions, or debris. Place woven geotextile on the prepared ground surface under all classified stone. Place classified stone to a uniform thickness as specified in the Contract Drawings.

**END OF SECTION**

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SECTION 31 10 00  
SITE PREPARATION

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract apply to this Section.

**1.02 SUMMARY**

A. Section Includes:

1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Removing above- and below-grade site improvements.
6. Disconnecting, capping or sealing, and removing site utilities
7. Temporary erosion and sedimentation control measures.

B. Related Sections:

1. Division 01
2. Division 02
3. Division 31

**1.03 DEFINITIONS**

A. Subsoil:

1. All soil beneath the topsoil layer of the soil profile and typified by the lack of organic matter and soil organisms.

B. Surface Soil:

1. Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

C. Topsoil:

1. Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow.
2. Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches (50 mm) in diameter; and free of subsoil and weeds, roots, toxic materials, or other nonsoil materials.

- D. Plant-Protection Zone:
  - 1. Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and indicated on Drawings.
- E. Tree-Protection Zone:
  - 1. Area surrounding individual trees or groups of trees to be protected during construction and defined by a circle concentric with each tree with a radius 1.5 times the diameter of the drip line unless otherwise indicated.
- F. Vegetation:
  - 1. Trees, shrubs, groundcovers, grass, and other plants.

#### **1.04 MATERIAL OWNERSHIP**

- A. Except for stripped topsoil and other materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

#### **1.05 SUBMITTALS**

- A. Existing Conditions:
  - 1. Documentation of existing trees and plantings, adjoining construction, and site improvements that establish preconstruction conditions that might be misconstrued as damage caused by site clearing.
    - a. Use sufficiently detailed photographs or videotape.
    - b. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.
- B. Record Drawings:
  - 1. Identifying and accurately showing locations of capped utilities and other structural, electrical, and mechanical conditions.

#### **1.06 QUALITY ASSURANCE**

- A. Preinstallation Conference:
  - 1. Conduct conference at Project site.

#### **1.07 PROJECT CONDITIONS**

- A. Traffic:
  - 1. Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
    - a. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
    - b. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

- B. Salvable Improvements:
  - 1. Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.
- C. Utility Locator Service:
  - 1. Utilize a utility locator service for area where Project is located before site clearing.
  - 2. Do not commence site clearing operations until temporary erosion and sedimentation control and plant-protection measures are in place.
  - 3. The following practices are prohibited within protection zones:
    - a. Storage of construction materials, debris, or excavated material.
    - b. Parking vehicles or equipment.
    - c. Foot traffic.
    - d. Erection of sheds or structures.
    - e. Impoundment of water.
    - f. Excavation or other digging unless otherwise indicated.
    - g. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
  - 4. Do not direct vehicle or equipment exhaust towards protection zones.
  - 5. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.
- D. Soil Stripping, Handling, and Stockpiling:
  - 1. Perform only when the topsoil is dry or slightly moist.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- A. Satisfactory Soil Material:
  - 1. Requirements for satisfactory soil material are specified in Section 31 23 00 – Excavation and Fill.
    - a. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.
- B. Antirust Coating:
  - 1. Fast-curing, lead- and chromate-free, self-curing, universal modified-alkyd primer complying with MPI #79, Alkyd Anticorrosive Metal Primer or SSPC-Paint 20 or SSPC-Paint 29 zinc-rich coating.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Locate and clearly identify trees, shrubs, and other vegetation to remain.

- C. Protect existing site improvements to remain from damage during construction.
  - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

### **3.02 TEMPORARY EROSION AND SEDIMENTATION CONTROL**

- A. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion and sedimentation control Drawings and requirements of authorities having jurisdiction.
- B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- C. Inspect, maintain, and repair erosion and sedimentation control measures during construction until permanent vegetation has been established.
- D. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

### **3.03 TREE AND PLANT PROTECTION**

- A. General:
  - 1. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by the Engineer.

### **3.04 EXISTING UTILITIES**

- A. Owner will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing, when requested by Contractor.
  - 1. Verify that utilities have been disconnected and capped before proceeding with site clearing.
- B. Locate, identify, disconnect, and seal or cap utilities indicated to be removed.
  - 1. Arrange with utility companies to shut off indicated utilities.
  - 2. Owner will arrange to shut off indicated utilities when requested by Contractor.
- C. Locate, identify, and disconnect utilities indicated to be abandoned in place.
- D. Interrupting Existing Utilities:
  - 1. Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
    - a. Notify Owner and Engineer not less than two days in advance of proposed utility interruptions.
    - b. Do not proceed with utility interruptions without Owner or Engineer's written permission.
  - 2. Excavate for and remove underground utilities indicated to be removed.
  - 3. Removal of underground utilities as included on the drawings.

### 3.05 CLEARING AND GRUBBING

- A. The sites of all excavation and grading shall be first cleared of all paving, trees, stumps, roots, brush, organic matter, crops, paving, structures, fences, sidewalks, rubbish, debris, etc., which shall be removed or disposed of in a satisfactory manner in a legally permitted location.
- B. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
  - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated. When it is necessary to cut tree roots on the surface of the ground, the ends shall be cut off smooth, without splitting or shattering and scars greater than one inch in diameter shall be sealed with an approved asphalt sealant tree paint. The trunks of the trees shall be carefully protected from damage, and if unavoidable damage occurs, the injured portions shall be neatly trimmed and covered with an application of an approved asphalt sealant tree paint. Excavating machinery, cranes, etc., shall be handled with care to prevent damage to trees, particularly to overhanging branches, and branches shall not be cut off except by permission of Owner.
  - 2. Grind down stumps and remove roots, obstructions, and debris to a depth of 18 inches below exposed subgrade.
  - 3. Use only hand methods for grubbing within protection zones.
  - 4. Chip removed tree branches and stockpile in approved areas or dispose of offsite, as directed by Owner.
- C. Grub and remove stumps and roots to a depth not less than two feet (2') below grade. Fill depressions caused by clearing and grubbing operations with proper backfill soil material, unless further excavation or earthwork is indicated by the Drawings or directed by Owner. Place fill material in horizontal layers or lifts, not exceeding a loose depth of eight (8) inches and compact each layer to 85% of maximum dry density – Standard Proctor (ASTM D698).
- D. Grub, stockpile, and/or place in embankments surface rocks and boulders from the soil in accordance with the Specifications.
- E. Grub the entire construction area with heavy tractors with root rakes. Generally, conduct raking along the contour rather than up and down slopes so as to inhibit soil erosion.
- F. 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.
- G. Burying of residual materials will not be allowed.
- H. All Contractors should be aware that the Georgia Environmental Protection Division has issued a burning ban for thirteen (13) Metro Atlanta Counties, including Forsyth. The ban went into effect in 1996 and shall continue each year from May 1 through September 30. This ban should be considered when bidding projects that require clearing and debris removal. It is the Contractor's responsibility to remove all construction debris from the jobsite. Any costs incurred as a result of the burning ban are the sole responsibility of the Contractor.

### **3.06 TIMBER**

- A. Salvage all timber within cleared area having a marketable value.
- B. The timber within the cleared area shall become the property of the Contractor and the Contractor shall be responsible for selling the timber.

### **3.07 DISPOSAL OF CLEARED AND GRUBBED MATERIALS**

- A. Dispose of the cleared and grubbed materials by burning or chipping. Burning shall be permitted during approved burning seasons only. During non-burning season periods, use chipping for debris disposal. Remove chipped material from the site or disposed of in areas approved by Owner.
- B. If burning is allowed, do not allow a fire to be unattended. The Contractor is responsible for damage occasioned by such fires. Do not bury burned and nonflammable materials.
- C. Disposal of materials in streams will not be permitted. Do not pile materials in stream channels or along the banks where it might be washed away by flood.
- D. Remove all fence material within the areas to be cleared from the job site. Fence materials become the property of the Contractor.

### **3.08 DISCING**

- A. After grubbing is complete, discing of the entire area is required. Perform discing in two directions at approximate right angles. Generally, perform the second discing along the contour.
- B. The construction area is to be left free-draining with a finished agricultural appearance.

### **3.09 TOPSOIL STRIPPING**

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to a depth of 6 inches (150 mm) in a manner to prevent intermingling with underlying subsoil or other waste materials.
  - 1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects more than 2 inches (50 mm) in diameter; trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.
  - 1. Limit height of topsoil stockpiles to 72 inches (1800 mm).
  - 2. Do not stockpile topsoil within protection zones.
  - 3. Dispose of surplus topsoil. Surplus topsoil is that which exceeds quantity indicated to be stockpiled or reused.
  - 4. Stockpile surplus topsoil to allow for respreading deeper topsoil.

### **3.10 SITE IMPROVEMENTS**

- A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
  - 1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
  - 2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.

### **3.11 DISPOSAL OF SURPLUS AND WASTE MATERIALS**

- A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.
- B. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other Project work.

**END OF SECTION**

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SECTION 31 23 00  
EXCAVATION AND FILL

**PART 1 GENERAL**

**1.01 SUMMARY**

A. Section Includes

<u>Paragraph</u>	<u>Title</u>
1.02	Submittals
1.03	Quality Assurance
1.04	Field Conditions
2.01	Bedding
2.02	Backfill
2.03	Top Soil
3.01	Initial Site Preparation
3.02	Protection of Trees and Shrubbery
3.03	Dewatering
3.04	Sheeting, Shoring, and Bracing
3.05	Excavation
3.06	Blasting
3.07	Unauthorized Excavations
3.08	Bedding
3.09	Backfilling
3.10	Fills and Embankments
3.11	Disposal of Waste and Unsuitable Materials/Debris Removal
3.12	Spoil Removal
3.13	Storage of Materials
3.14	Additional Excavation
3.15	Final Grading
3.16	Top Soil
3.17	Settlement
3.18	Access by the Owner's Material Testing Firm

B. Scope

1. The work covered by this section includes furnishing all labor, materials, and equipment required for all earthwork and earthwork related operations including, but not limited to, dewatering; excavating all classes of material encountered on the construction site; pumping, draining, and handling of water encountered in the excavations; handling, storage, transportation, and disposal of all excavated and unsuitable material; handling, storage, and transportation of all off-site borrow excavation; construction of fills and embankments; backfilling around structures and pipe; backfilling all trenches and pits; compacting; sheeting, shoring and bracing; preparation of subgrades; surfacing and grading, and all other appurtenant earthwork operations which may be necessary to complete the work as specified herein and as shown on the drawings.

C. General

1. The term “excavation” as used herein shall mean excavation of materials including earth, hardpan, rock, masonry, concrete – plain and reinforced, pavement, ashes, rubbish, muck, debris, etc.
2. Perform earthwork operations in a safe and proper manner with appropriate precautions being taken against all hazards.
3. Maintain all excavated and filled areas for structures, trenches, fills, topsoil areas, embankments and channels in good condition at all times until final acceptance by the Owner. Repair all damage caused by erosion or other construction operations using material of the same type as the damaged material.
4. Perform earthwork within the rights-of-way of the State Department of Transportation, the County Department of Transportation, and the respective cities in accordance with requirements and provisions of the permits issued by those agencies for the construction within their respective rights-of-way. Such requirements and provisions, where applicable, shall take precedence and supersede the provisions of these specifications.
5. Control grading in a manner to prevent water running into excavations. Avoid obstruction of surface drainage and provide means whereby storm water can be uninterrupted in existing gutters, other surface drains, or temporary drains. Provide free access to all fire hydrants, water valves, and meters.
6. No classification of excavated materials will be made. Excavation work includes the removal and subsequent handling of all materials excavated or otherwise removed in performance of the contract work, regardless of the type, character, composition, or condition thereof.
7. It is understood and agreed that the Contractor has made a thorough investigation of the surface and subsurface conditions of the site and any special construction problems which might arise as a result of nearby watercourses and flood plains, particularly in areas where construction activities may encounter water-bearing sands and gravels or limestone solution channels. Provide all services, labor, equipment, and materials necessary or convenient to complete the work within the time specified in these Contract Documents.

**1.02 SUBMITTALS**

- A. Submit for approval, in accordance with Section 01 33 00 SUBMITTAL PROCEDURES all working drawings and schedules of materials and methods proposed to be followed in the execution of the Work under this item.

**1.03 QUALITY ASSURANCE**

A. Regulatory Agency Requirements

1. Perform all earthwork operations in compliance with the requirements of OSHA Construction Standards, Part 1926, Subpart P, Excavations, Trenching, and Shoring, and Subpart O, Motor Vehicles, Mechanized Equipment, and Marine Operations.

B. Field Testing

1. An independent testing laboratory will conduct tests for compaction and density, in each fill layer at intervals of approximately three hundred feet (300'). Depending on field conditions and results of testing, frequency of testing may be increased or

decreased to ensure proper compaction. Make all necessary excavations and supply any samples of materials necessary for conducting compaction and density tests. Costs of compaction tests performed by an independent testing laboratory shall be paid by Owner. The cost of all retests made necessary by the failure of materials to conform to the requirements of these Contract Documents shall be paid by the Contractor.

#### 1.04 FIELD CONDITIONS

##### A. Existing Conditions

1. The elevations shown on the Drawings as existing are intended to give reasonable, accurate information about the relative elevations. They are not precise, and the Contractor should satisfy himself as to the exact quantities of excavation and fill required.

### PART 2 PRODUCTS

#### 2.01 BEDDING

- A. Unless otherwise specified, bedding material shall be angular, graded, crushed stone embedment and shall conform to Georgia DOT Specification Section 800 Gradation #57, varying in sizes 1/4" through 3/4".

#### 2.02 BACKFILL

- A. Provide materials for backfill conforming to the following requirements:

Select Earth Backfill	Fine, sound, loose earth containing optimum moisture content for compaction to 95 percent of maximum density (Standard Proctor ASTM D698), free from all wood, vegetable matter, debris, and other objectionable material, and having scattered clods, stones, or broken concrete less than 2 inches in maximum dimension except that the maximum particle size shall be 3/4 inch when used with PVC or other flexible thermoplastic pipe; provided material has been approved for such use by construction material testing firm.
Common Earth Backfill	Sound, loose earth containing optimum moisture content for compaction to 95 percent of maximum density (Standard Proctor ASTM D698), free from all wood, vegetable matter, debris, and other objectionable material, and having scattered clods, stones, or broken concrete and pavement less than 6 inches in maximum dimension.
Sand	Natural or imported sand conforming to ASTM D1073.
Graded Aggregate	Graded aggregate conforming to Sections 310 and 815.01, Class A, Georgia Department of Transportation Standard Specifications, Construction of Roads and Bridges.
Class A Concrete	Class A concrete as specified in the section entitled "Cast-in-Place Concrete" of these Specifications.

## **2.03 TOP SOIL**

- A. Top soil is defined as the surface layer of soil and sod that is suitable for use in seeding and planting. No refuse or any material toxic to plant growth is allowed in top soil.

## **PART 3 EXECUTION**

### **3.01 INITIAL SITE PREPARATION**

- A. Preparatory to the beginning of construction operations, remove from the project area all vegetable growth, trees, brush, stumps, roots, debris, and any other objectionable matter, including fences, buildings, and other structures shown on the Drawings in the construction areas which are designated for removal or which, if left in place, would interfere with the proper performance or completion of the contemplated work, would impair its subsequent use, or would form obstructions therein.
- B. Whenever the removal of pavements (other than gravel or surface treated types) is required, the Contractor shall outline the area to be removed by making straight saw cuts, and providing vertical cuts in straight lines in order to permit removal in a straight line. Should pavement breakage occur beyond original saw cut, Contractor will be required to make a new straight saw cut beyond the furthest point of breakage.
- C. Clear and grub the site in accordance with specifications – Clearing and Grubbing of these specifications.
- D. In all areas to be excavated, filled, paved, or graveled, strip the top soil to its full depth and store on site for subsequent reuse. Keep top soil separate from other excavated materials. Screen out and/or remove roots and other undesirable materials from top soil. Stored topsoil shall be used for finish grading in unpaved areas.
- E. Remove and dispose of all excess material resulting from clearing or site preparation operations. Dispose of such materials in a lawful manner and at a location where such materials can be lawfully disposed.

### **3.02 PROTECTION OF TREES AND SHRUBBERY**

- A. Contractor shall be responsible for protection of tops, trunks, and roots of existing trees that are to remain on the project site or in parks, lawns, or other improved areas. Do not disturb and provide protection, if necessary, for all trees in areas where there is no excavation or embankment. Box, fence, or otherwise protect existing trees, which may be subject to construction damage, before any work is started. Remove the boxing when directed or at the completion of the project. Heavy equipment or stockpiles will not be permitted within branch spread. Remove interfering branches without injury to trunks and cover the scars with tree paints.
- B. Do not remove a tree unless absolutely necessary for construction, as approved by the Engineer or Owner. In areas beyond construction, right-of-way, or easements do not remove trees or shrubbery without the written consent of the property owner and approval of the Owner.

- C. In open or improved lawn areas, excavation is to be done, if possible, utilizing a tractor mounted backhoe. Take extreme care to avoid any damage to adjoining lawn areas. In areas not readily accessible by machinery and where excavation is required near existing trees and shrubberies, which may be damaged by excavation equipment, excavate the trench with hand tools except as provided is in this section. As an alternate method, bores under landscaped areas may be approved by Owner to minimize disturbance of existing vegetation. This method of construction will be considered as convenience for the Contractor and shall be paid the same as an open-cut excavation.

### **3.03 DEWATERING**

- A. Provide and maintain at all times during construction ample means and devices with which to promptly remove and properly dispose of all water from any source entering the excavations or other parts of the work. Accomplish dewatering by methods which will ensure a dry excavation and preservation of the final lines and grades of the bottoms of excavations. Methods of dewatering may include sump pumps, well points, deep wells, or other suitable methods which do not damage or weaken structures, foundations, or subgrades. Shallow excavations may be dewatered using open ditches provided such ditches are kept open and free-draining at all times.
- B. Unless specifically authorized by the Engineer, do not place concrete or mortar in water nor allow water to rise over newly-placed concrete or mortar for at least 24 hours after placement. Do not expose concrete structures to unequal hydrostatic forces until the concrete has reached its specified 28-day strength. Ground water encountered within the limits of excavation shall be lowered to an elevation not less than twelve inches (12") below bottom of excavation before pipe laying or concreting is started. Exercise care to prevent damage to pipelines or structures resulting from flotation, undermining, or scour. Commence dewatering operations when ground or surface water is first encountered and continue until such times as water can safely be allowed to rise in accordance with the provisions of this section. Protect excavations from the entrance of surface water to the extent possible by the use of dikes and/or covers.
- C. Provide and maintain standby pumping equipment on the job site. Make available a minimum of one standby unit (a minimum of one for each ten in the event well points are used) for immediate installation should any pumping unit fail. Design and install well points or deep wells suitable for the accomplishment of the work and in compliance with all local codes.
- D. If foundation soils are disturbed or loosened by the upward seepage of water or an uncontrolled flow of water, excavate and replace the affected areas with crushed rock at no cost to the Owner.
- E. Dispose of the water from the work in a suitable manner without damage to adjacent property. Do not allow conveyance of the water to interfere with traffic flow or facilities operation. No water shall be drained into work built or under construction. The Contractor will be held responsible for the condition of any pipe or conduit which he may use for drainage purposes, and all such pipes or conduits shall be left clean and free of sediment.

- F. Provide sedimentation and desilting basins as necessary to prevent the entrance of excessive or injurious amounts of sand and silt from surface runoff or dewatering operations into storm drains or receiving waters. At a minimum, provide a baffled structure having not less than five minutes' detention time designed to have a "flow-through" velocity not exceeding 0.2 foot per second at the anticipated peak flow for desanding or desilting the water.
- G. Dispose of water in such a manner as not to be a menace to the public health and in accordance with applicable Environmental Protection Agency, Corps of Engineers, and State Environmental Protection Division standards and permits.
- H. Should sewage or any other odorous liquids be encountered during the Work, Owner shall be notified immediately. Owner will promptly notify appropriate regulatory agencies, if necessary. In addition, Owner will instruct Contractor as to any actions the Contractor can and cannot perform prior to any directives, which may be issued by the regulatory agencies. Any sewage will be pumped and hauled to an in-service manhole, pump station, or water reclamation facility, as directed by Owner. Any other liquids will be disposed of properly, as directed by Owner and/or any regulatory agencies having jurisdiction. Owner will then determine if actions taken by Contractor have caused the source of the odorous liquid to leak, and if so, Contractor shall be responsible for any fines and/or penalties levied by regulatory agencies having jurisdiction.

#### **3.04 SHEETING, SHORING, AND BRACING**

- A. Contractor shall sufficiently sheet, shore, and brace the sides of all excavations, as necessary, to prevent slides, cave-ins, settlement or movement of the banks, to maintain the excavation clear of all obstructions, and to provide safe working conditions. Use wood or steel sheeting of approved design and type in wet, saturated or flowing ground. Design all sheeting, shoring, and bracing with sufficient strength and rigidity to withstand the pressure exerted and to maintain shape and position under all circumstances.
- B. It is the Contractor's responsibility for correctly assessing the need for sheeting and analyzing the stresses induced. Since the Engineer does not dictate or determine the Contractor's sequence or limits of excavation, the Engineer assumes no responsibility for sheeting and shoring. The Contractor must employ or otherwise provide for adequate professional structural and geotechnical engineering supervision to assess the need for sheeting and shoring and design same. Submit the results of sheeting and shoring analysis and design to the Engineer on request.
- C. Adequately sheet, shore, or brace excavations adjacent to existing or proposed buildings and structures, or in paved streets or alleys to prevent undermining beneath or subsequent settlement of such structures or pavements. Underpin adjacent structures when necessary to maintain structures in safe condition. Repair any damage to structures or pavements occurring through settlements, water or earth pressures, slides, caves, or other causes; due to failure or lack of sheeting or bracing, or due to improper bracing; or occurring through negligence or fault of the Contractor in any other manner at his own expense.
- D. Do not leave sheeting, shoring, or bracing materials in place unless otherwise specified or shown on the Drawings or ordered by the Engineer in writing. Remove such materials in such manner that no danger or damage will occur to new or existing

structures or property, public or private, and so that cave-ins or slides will not take place. Leave trench sheeting in place until backfill has been brought to a level 12 inches above the top of the pipe. Then cut off and remove the upper portion. Leave sheeting for structures in place until backfill has been brought to a level of 12 inches above the top of the bottom footing. Then cut off and remove the upper portion.

- E. Where in the opinion of the Engineer or Owner the removal of sheeting would endanger the Work built under this Contract or any adjoining improvements, such sheeting will be ordered to be left in place and the tops cut off as directed. Any timber directed to be left in place will not be paid for as supplemental price. No additional payment will be made for sheeting when directed to be left in place.
- F. In quicksand or soft ground, drive sheeting to such depth below bottom of the trench to prevent upheaval, or as directed.
- G. Fill and thoroughly compact all holes and voids left in the work by the removal of sheeting, shoring, or bracing.
- H. It shall be the sole and exclusive responsibility of the Contractor to meet local and OSHA safety requirements in meeting the need and adequacy of sheeting, shoring, bracing, or other provisions to protect workers and equipment in a trench or other excavation.

### **3.05 EXCAVATION**

#### **A. General**

1. Excavation includes the removal of all material from an area necessary for the construction of a pipeline, structure, basin, flume, or building. Provide adequate working space and clearances in excavations for the work to be performed therein.
2. Except where otherwise shown on the Drawings or specified herein, replace all material excavated below the bottom of concrete walls, footings, and foundations, at the Contractor's expense, with Class A concrete to the lines and grades shown on the Drawings.
3. Where quicksand, soft clay, spongy, swampy or other materials unsuitable for subgrade or foundation purposes are encountered below the excavation limits, remove and dispose of such to the level of suitable material. Backfill areas so excavated with Class A concrete or with compacted layers of crushed rock, sand, or other approved material conforming to the requirements specified herein for backfill to the lines and grades shown on the Drawings.
4. Place barriers at each end of all excavations and at such places as may be necessary along excavations to warn all pedestrian and vehicular traffic of such excavations. Place lights along excavations from sunset each day to sunrise of the next day until the excavations are backfilled. Barricade all excavations in such a manner as to prevent persons from falling or walking into any excavation.

#### **B. Excavation Methods**

1. Use open-cut techniques for all excavation unless otherwise indicated on the Drawings or approved by the Engineer or Owner. In general, topsoil may be removed by machine methods. Excavation below topsoil may also be performed by machine, but shall be supplemented by such hand dressing or leveling as may be required to

conform to lines and grades as given by the Engineer or Owner. Use material so removed in backfill, making embankments, filling low areas, or as otherwise directed.

2. Use hand tool excavation where necessary to protect existing utilities and structures.
3. Carefully cut or grade all slopes to the grades as detailed on the Drawings, and/or required by the Engineer. Tamp or otherwise compact slopes to maintain the material in position.
4. It is the Contractor's sole and exclusive responsibility to have all excavation conform to local and OSHA safety requirements.

C. Rock Excavation

1. All excavation is considered unclassified. Include all cost of rock excavation (excavating, blasting, loading, hauling, crushing, backfilling, and/or disposing) in the lump sum or unit price bid amount for the associated work.
2. Uncover and strip all loose materials and/or rock encountered in the process of excavation for structures over the entire limits of excavation. Uncover rock encountered for removal in a trench section for a distance of not less than 50 feet.
3. Excavate rock and large boulders in trenches over the horizontal limits of excavation and to depths as follows:

<b>Size of Pipe (inches)</b>	<b>Depth of Rock Excavation Below Bottom of Pipe (inches)</b>
3 and smaller	4
4 to 6	6
8 to 18	8
18 to 30	10
32 and larger	12

4. Backfill the space below the bottom of the pipe to the proper grade with compacted layers of crushed rock or sand conforming to the requirements specified herein for backfill. Where pipe sewers are constructed on concrete cradles, excavate rock to the bottom of the cradle as shown on the Drawings.
5. Excavate rock under structures to lines and grades shown on the Drawings. Unless specified otherwise, where rock excavation has been carried below required grade, backfill to grade with bedding material.
6. Where rock foundation is obtained at grade for over 50 percent of the area of any one structure, excavate the portion of the foundation that is not rock below grade to reach a satisfactory foundation of rock. Backfill the portion below grade with bedding material.
7. Where rock foundation is obtained at grade for less than 50 percent of any one structure and satisfactory rock cannot be found over the remaining area by reasonable additional excavation, remove the rock for a depth of 12 inches below grade and backfill the space below grade to the proper grade with compacted layers of crushed rock conforming to the requirements specified herein for backfill.
8. Conduct drilling and blasting operations in accordance with the requirements of paragraph 3.6, below.

9. Complete rock excavation for all structures and adjacent trenches under this Contract and any other rock excavation before construction of any structure is started in the vicinity.

D. Borrow Excavation

1. When sufficient amount of suitable excavated material to complete the Work is not available on the project site; or wherever the backfill of excavated areas or the placement of embankments or other fills requires specified material not available at the site or material in excess of suitable material available from the authorized excavations, obtain such materials from other sources. This may require the opening of borrow pits at points not immediately accessible from the Work. In such cases make suitable arrangements with the property owner and pay all costs incident to the borrowed material including royalties, if any, for the use of the material. Before a borrow pit is opened, the quality and suitability of the material to be obtained from the borrow pit shall be approved by the Owner's materials testing Engineer. No borrow excavation shall be made within the bed limits of any existing or projected public highway.
2. Clear, grub, and finish grade borrow pits in accordance with the requirements specified herein.

E. Structural Excavation

1. Structural excavation consists of the removal of all materials necessary for the construction of structures, including tanks, foundations, footings, wet wells, dry wells, box culverts, flumes, channels, buildings, and other miscellaneous structures.
2. Make the bottom of structural excavations true to the lines and grades shown on the Drawings. Do not undercut faces of excavations for extended footings. Except as provided herein for excavation of unsuitable material or rock, where the excavation is carried below the grade elevation shown on the Drawings, backfill the void thus made to the proper grade with Class A concrete at the Contractor's expense.

F. Trench Excavation

1. Excavate trenches to the lines and grades shown on the Drawings with the centerlines of the trenches located on the centerlines of the pipes.
2. Make the sides of all trenches vertical to a minimum of one foot above the top of the pipe. From the bottom of the trench to twelve inches (12") above the pipe, the maximum width shall be as indicated on the Drawings. This distance will be measured at an elevation in trench which is 12 inches above the top of the pipe when laid to grade. Excavation of pipe trenches with side sloping to the bottom will not be permitted.
3. Wherever the prescribed maximum trench width is exceeded, use the next higher class (load factor) of embedment or encasement for the full trench width as actually cut, at no additional cost to the Owner.
4. Excavate the trenches to the required depth allowing for the placement of pipe bedding to the thickness shown on the Drawings.
5. Should the bottom of the trench become an unstable foundation for the pipe through the failure of the Contractor to adequately perform, remove the unstable material and fill the trench to the proper subgrade with crushed rock. No extra compensation will be allowed for this material or work. Should the trench be

inadvertently excavated to a greater depth than necessary, provide crushed rock fill to the proper subgrade at no additional cost to the Owner.

6. Should the undisturbed material encountered at the grade depth constitute, in the opinion of the Engineer, an unstable foundation for the pipe, remove such unstable material and fill the trench to the proper subgrade with crushed rock.
7. Contractor shall not have more than five hundred feet (500') of trench open at any one time. New trenching will not be permitted to be excavated if there are previously excavated trenches that require backfill or surface area restoration. **Cleanup and grassing shall follow a maximum of 500 feet of pipe installation.**
8. Control drainage in the vicinity of excavation so the ground surface is properly pitched to prevent water from running into the excavation.

### 3.06 BLASTING

#### A. Requirements

1. Blasting for removing rock for excavation shall be properly permitted.
2. Contractor shall use all possible precautions against accidents or damages due to use or storage of explosives, and Contractor assumes all responsibility/liability associated with blasting activities.
3. ONLY **LICENSED** EMPLOYEES OR SUBCONTRACTORS WILL BE ALLOWED TO CONDUCT BLASTING ACTIVITIES – PROOF OF SUCH PROPER LICENSING **MUST** BE PROVIDED TO Owner **PRIOR TO** ENGAGING IN ANY BLASTING ACTIVITIES.
4. Furnish all labor, equipment and materials required to drill, blast, loosen, excavate, and dispose material to complete the work shown on the Drawings and specified herein.
5. The work includes, but is not be limited to:
  - a. Blast round design.
  - b. Planning and execution of appropriate site-specific safety measures to be employed during all blasting operations, and the safe handling and storage of high explosives and blasting agents.
  - c. Drilling blast holes, loading blast holes with explosives, and wiring and safe detonation of blast rounds.
  - d. Removal from the site of all excess excavated soil, debris, and rock as indicated in the contract Documents, or as directed by the Engineer, and disposal of excess materials at a permitted disposal site.
  - e. Dewatering and maintenance of groundwater and surface water in all excavations.
  - f. Performance of all surveys necessary to establish and verify the lines and grades and to determine the amount of material removed.
  - g. Implementation of monitoring program to monitor condition of existing structures and utilities in vicinity of proposed blasting operations to insure existing features remain undamaged by blasting procedures.
6. Make all excavations in conformance with the lines, grades, and cross sections on the Drawings or established by the Engineer. Where blasting is required, blasting should ensure removal of six inches (6") of rock below proposed grade line. All overblast shall be removed and the resulting overexcavation backfilled and compacted with #57 gradation stone coarse aggregate.

7. Conduct all blasting operations, including transporting and storing of explosives in compliance with the Georgia State Fire Commissioner's Rules and Regulations for Explosives and Blasting Agents, latest edition and all applicable local codes.

B. Submittals

1. Submit the following in accordance with the procedures and requirements set forth in Section 01 33 00 Submittal Procedures, at least thirty (30) working days prior to beginning any blasting operations:
  - a. Names, addresses, telephone numbers, and qualifications of the blasting subcontractor(s) and explosives supplier(s) that will be used, including the designated Blaster-In-Charge.
  - b. Copies of Training Certificates for the designated Blaster-In-Charge, blasting foreman and any other key personnel that will be responsible for the work, showing that they have received specialized training in the proper handling of explosives.
  - c. A Blasting Plan, indicating the methods, materials and equipment to be used. The Blasting Plan should indicate the types of explosives to be used, drilling patterns, and a general layout and schedule for executing the work in accordance with state regulations.
  - d. A ground vibration and air blast monitoring plan, indicating structures that will be monitored, monitoring equipment that will be used, and personnel that will perform the monitoring.
2. At least 24 hours before each blast round, submit a detailed blast round design plan to the Engineer's or Owner's on-site representative. The blasting plan submitted is for quality control and record keeping purposes. Review by the Engineer does not relieve the Contractor of his responsibilities as provided herein. Include the following in the blast round design submittals:
  - a. Location (state, grid coordinates) and limits of the shot.
  - b. Number, diameter, and depth of blast holes to be detonated in the round, and a plan showing the drill hole pattern, spacing and distance to the free face.
  - c. Depth of overburden.
  - d. Total weight of explosives in the round and the types of explosives to be used.
  - e. Loading diagram showing the location of explosives, primers, and initiators; and location, depth, and type of stemming to be used in each hole.
  - f. Initiation sequence, including delay timer and delay system, total weight of explosive to be detonated on each delay, and a list of the timing of the delays.
  - g. Manufacturer's data sheet for all explosives, primers, and initiators to be used.
  - h. Planned seismic monitoring positions, distances from the blast round, and seismograph types to be used to monitor vibrations and air blast overpressures.
  - i. Type and amount of blasting mats and/or depth of soil cover to be used over the top surface of the shot.
  - j. Any other information required by applicable state and federal regulations.
3. Within 24 hours after each blast round, submit a blasting report to the Engineer. Include the following in the blasting report:
  - a. Date and time of shot.
  - b. Foreman's name.
  - c. Number and depth of holes detonated.

- d. Weather conditions at the time of detonation.
- e. Type of explosives and detonators used.
- f. Peak particle velocity of ground motion and primary frequency for all ground vibration monitoring stations.
- g. Peak air blast overpressure measured.
- h. Distance from the blast round to each monitoring station for vibrations and air blast.
- i. Amount of explosive used in each hole, and maximum weight of explosive detonated on any single delay in the blast round.

#### C. Pre-Blast Survey

1. Contractor shall have an approved vibration consultant conduct the pre-blast survey on the residences and facilities adjacent to the proposed rock blasting in accordance with the submitted survey and monitoring plan. The survey shall include, but not be limited to the following:
  - a. A site plan or drawing of the structure to be examined showing the structure in relationship to the proposed rock blasting area and a full description of the structure including type of materials and construction.
  - b. Examination of the structure (interior and exterior surfaces) by experienced and qualified personnel, noting any visible structural and aesthetic flaws in or on the structure. Note existing cracks and flaws, with significant cracks measured, and all cracks and flaws photographed.
  - c. Upon completion of the examination, ask the structure's owner to review the report, note any corrections or omissions, and sign a statement that to the best of his knowledge, the examination report reflects the conditions of the structure prior to any rock blasting. If the structure's owner refuses to sign said report, it should be noted in the report by the examiner.
  - d. Nothing contained herein shall relieve the Contractor of responsibility for claims arising from his construction operations. Failure to inspect any structure, whether or not required by these Contract Documents, or inadequacy of the inspections shall not relieve the Contractor of his responsibility. The Contractor shall indemnify the County from such claim.
  - e. In the event that any property owner denies access for the survey of structures and facilities, notify such property owner, by certified mail, stating that this is final notification. Submit to the Engineer, copies of all correspondence between the Contractor and the property owner(s). The Engineer, upon review of the submitted correspondence may waive requirements set forth above. However, the Contractor is fully responsible for claims and damage arising from his construction operations regardless of property location.
  - f. Submit two (2) sets of copies of the examination reports to the Engineer for their records.

#### D. Use of Explosives

1. When the use of explosives is necessary for the prosecution of the work, exercise the utmost care not to endanger life or property. Be responsible for any and all damage or injury to persons or property resulting from the use of explosives.
2. Store all explosives in a secure manner, in compliance with all laws, and clearly mark all such storage places "DANGEROUS EXPLOSIVES".

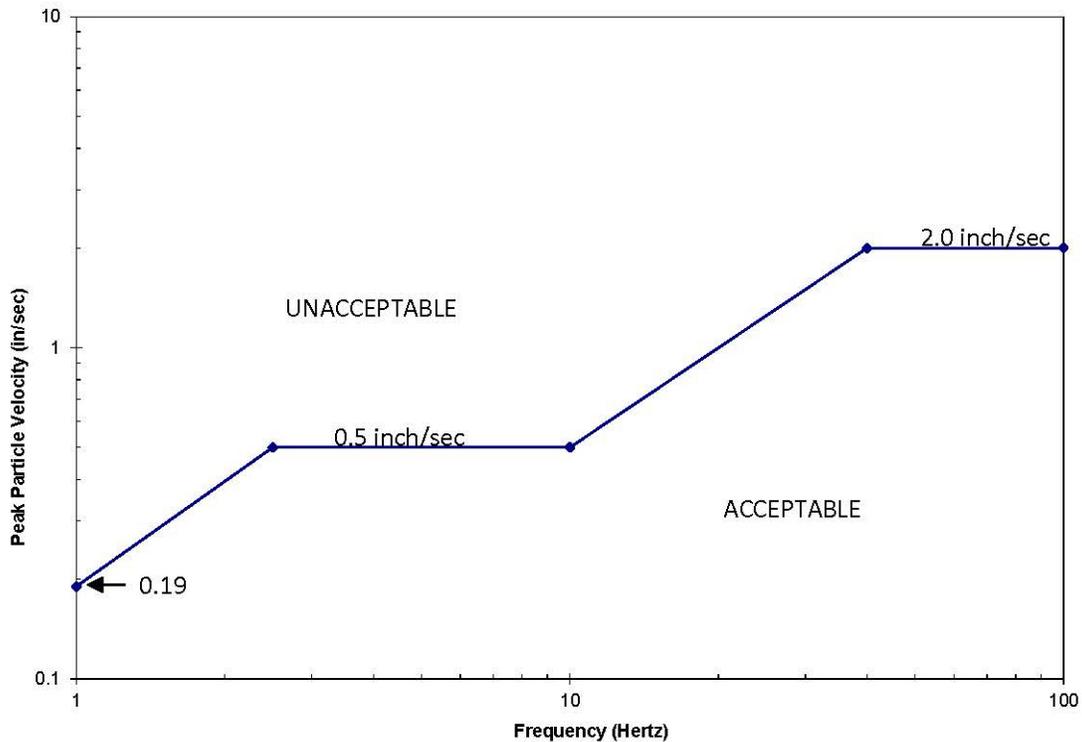
3. Notify any public utility company having facilities in close proximity to the site of the work of the intention to use explosives. Provide this notice sufficiently in advance to enable the utility companies to take whatever steps they may consider necessary to protect their property from injury. Also give the Engineer, all occupants of adjacent property, and all other Contractors working in or near the Project, notice of the intention to use explosives.
4. Only non-electric type initiators may be used.

E. Blasting Operations

1. Provide explosives of such quantity and power and use in such locations as will neither open seams nor otherwise disturb the material outside the prescribed limits of excavation. As the excavation approaches its final limits, reduce the depth of holes for blasting and the amount of explosives used for each hole so that the underlying or adjacent rock will not be disturbed or shattered.
2. Do not perform blasting within 100 feet of newly placed concrete that has cured less than 7 days. Do not perform blasting within 50 feet of any existing structure or any new structure in progress.

F. Blast Monitoring

1. Exercise the utmost care not to damage property on-site and off-site. Notify each adjoining property owner within 5,000 feet of the site of the anticipated ground vibrations and noise which will occur due to the blasting operations. Provide this notice 30 days in advance to enable the adjacent property owners to take whatever precautions they may consider necessary. Limit operations to minimize any disturbance to the adjacent property owners. Notify motorists on adjacent roadways in accordance with state regulations. Take responsibility for any damage to any structure or utility line, pipes, etc., on-site and off-site as a result of his operations.
2. For each blast round, monitor and record noise and air blast overpressures at the site perimeter nearest the blast location and at the on-site or off-site structure located nearest to the round. Peak air blast overpressure shall not exceed 0.018 psi, measured at the site perimeter.
3. Sufficiently cover the site of every blast round with blasting mats or other devices to prevent any flying debris. The number and type of blasting mats must be satisfactory to the Engineer. The Contractor will be fully responsible for any damage caused by flying debris, both to on-site and off-site properties.
4. Whenever blasting is to be performed within 2,500 feet of any structure, measure the peak particle velocities of ground vibration resulting from each blast at the structure. Monitor vibrations utilizing a seismograph capable of providing a record of particle velocity and frequency along three mutually perpendicular axes utilizing internal calibration. Measured peak particle velocity of ground motion at the monitored structure shall not exceed the values shown in the following graph:



G. Notification

1. Give twenty-four (24) hour notice to Engineer and adjacent residences and/or businesses prior to each blast.

H. Complaints

1. Submit notice of blasting complaints to Engineer in writing within twenty-four (24) hours of receipt thereof. Identify the origin of complaint in the notice and provide a brief description of alleged damages or other circumstances upon which the complaint is predicated. Assign a number to each complaint consecutively in the order of receipt. Assign each complaint a separate number and show in each letter complaint all previous complaint numbers registered by the same complainant. In addition, make a summary report each month to Engineer. Indicate date, time and name of person investigating the complaint and amount of damages (or an estimate thereof), if any, in the summary report.

I. Post Blast Survey

1. Contractor shall have the same vibration consultant who performed the pre-blast survey conduct the post-blast survey. The consultant shall examine all structures from which a complaint has originated after the blast. The survey shall include, but not be limited to the following:
  - a. A full description of the alleged damage caused by the blast. Where appropriate, provide a sketch to more fully describe the location and type of damage. Measure cracks and compare to any original measurements which may have been taken in the Pre-Blast Survey.
  - b. Take colored photographs of any alleged damage.

- c. Submit two (2) copies of the Post Blast Survey report to the Engineer. The report shall include the consultant's assessment of the alleged damage and an opinion as to its likely cause.

### **3.07 UNAUTHORIZED EXCAVATIONS**

- A. All excavations carried outside of the lines and grades given or specified, together with the disposal of such material and all excavations, and other work resulting from slides, cave-ins, swellings, or upheavals shall be at the Contractor's own cost and expense. All spaces beneath foundations resulting from unauthorized excavations, slides, or cave-ins shall be refilled at the Contractor's expense, with bedding materials or concrete, as directed. This is to include all landscaping outside of the lines and grades given or specified.

### **3.08 BEDDING**

- A. All pipe bedding requirements, as specified, are to be considered minimum requirements, and as such, do not relieve Contractor of the responsibility to provide additional bedding necessary for proper support of the pipeline and appurtenances, or as directed by the Engineer or Owner.
- B. Bell holes shall be provided in all classes of bedding, so as to relieve pipe bells of all loads, but small enough to ensure support is provided throughout length of the pipe.
- C. Trench shall be excavated to allow the placing of bedding material for the full trench width, and spread to form a uniform support (foundation cushion) for the pipe and appurtenances, and then compacted as specified on the Drawings so that the pipe is true to line and grade. Remaining bedding material shall be carefully placed such that bedding material fills and supports the haunch area and encases the pipe to the limits specified and compacted according to the bedding class specified, as indicated on the Drawings, or directed by the Engineer or Owner.
- D. Unless otherwise specified, at a minimum, Type IV Bedding shall be used for pressurized mains of ductile iron pipe material (sanitary sewer force main and water main).
- E. Unless otherwise specified, at a minimum, Type V Bedding shall be used for gravity sanitary sewer of ductile iron pipe material.
- F. Unless otherwise specified, at a minimum, gravity sanitary sewer of polyvinylchloride (PVC) pipe material shall be laid atop a minimum of six inches of No. 57 stone. No. 57 stone shall be extended to the top of pipe.
- G. All pipe installed within rock excavation, shall be laid upon a minimum of six inches (6") of #57 gradation stone coarse aggregate.
- H. Groundwater Flow Dams will be required under certain conditions. If there is a large volume of groundwater, which will follow the crushed stone bedding downhill due to the elevations involved, and builds adequate pressure to washout the stone bedding, Flow Dams will be required. Flow Dams shall consist of clay bedding three feet (3') long and spaced every one hundred feet (100') along the pipeline route.

### 3.09 BACKFILLING

#### A. General

1. Unless otherwise specified herein, compact earth backfill to specified maximum dry density as determined by Standard Proctor, ASTM D-698. Compact or consolidate crushed stone to specified maximum dry density as determined by Modified Proctor, ASTM D-1557; or as directed by Engineer or Owner Testing Materials Representative.
2. Prior to placement, add sufficient water to secure optimum moisture content to material that is too dry for adequate compaction. Do not place material having excessive water content at any time.
3. Unless otherwise specified herein, place backfill material required to be compacted in horizontal layers not to exceed six (6) inches in thickness (before compaction) and compacted in place by ramming, tamping, or rolling. Accomplish compaction by power driven tools and machinery wherever possible. Accomplish compaction and consolidation of sand and crushed rock backfill using vibrating equipment.

#### B. Backfilling Structures

1. Backfilling around structures consists of common earth backfill and shall be placed in 6-inch lifts and compacted to a minimum of 95 percent of the maximum density (determined by Standard Proctor D698) for the full depth of the excavation from the bottom to the finished grade. Do not place backfill against concrete structures until the concrete has reached its specified 28-day compressive strength. Where practical, accomplish compaction of structural backfill by power-driven compaction equipment.
2. Where crushed rock mats under slabs and foundations are called for on the Drawings, excavate below grade to the depth of the crushed rock mat as shown on the Drawings and install a compacted crushed rock bed. Finish the bed to a true line or plane and even with the subgrade of the concrete foundations, piers, footings, or slabs. Before placing any crushed rock, remove all loose earth or debris. Extend this crushed rock mat 12 inches beyond all slabs and foundations or to edges of sheet piling.
3. Construct crushed rock mats, 12 inches or less in thickness, of compacted layers of crushed rock conforming to Section 815.01 Class A, Georgia Department of Transportation Standard Specifications, Construction of Roads and Bridges.
4. Construct the top 12 inches of crushed rock mats of thickness greater than 12 inches of compacted layers of crushed rock as specified above. Construct that portion below the top 12 inches of compacted layers of crushed rock as specified, with a modified gradation of 6 inches to dust as received from the crusher.
5. Compact fill under slab-on-grade to 98% Standard Proctor Density ASTM D698, at moisture content between 2 percent below and 3 percent above the optimum moisture content.
6. Compact granular structural fill under foundation elements, i.e., footings and base slabs for tanks and basins to 100 percent Standard Proctor Density ASTM D698, at moisture content between 2 percent below to 3 percent above the optimum moisture content.
7. Unless otherwise shown on the Drawings, do not use earth backfill to support footings, foundations, and structures.

### C. Backfilling Trenches

1. Except as otherwise specified or directed, all forms, bracing, and lumber shall be removed before backfilling.
2. Backfill in paved areas shall include Initial, Final and Sub-base backfill; backfill in unpaved areas shall include Initial and Final backfill and final grading of ground surface; including areas damaged by the Contractor.
3. Trench bottoms of earth must be shaped or molded and compacted to the contour of the outside of the pipe, using bedding materials as specified, as indicated on the Drawings, to give full support of the pipe, such that the pipe is firmly supported in the excavation throughout its entire length, and in such a manner as to prevent any subsequent settlement of the pipe. Rocks larger than two inches (2") diameter will not be permitted in the trench bottom or in the Initial backfill, up to a depth of twelve inches (12") above the top of the pipe. Bottom of excavation which is of loose granular soil, shall be compacted prior to placing bedding or pipe.
4. Initial backfill in trenches where pipe has been laid shall be placed in lifts not exceeding six inches (6") in thickness, and carefully and thoroughly consolidated by compacting simultaneously on both sides of the pipe to a height of twelve inches (12") above the pipe. Initial backfill material shall be free of rocks larger than two inches (2") in diameter, clods, organic matter, rubbish, or other unsuitable material. Initial backfill must be properly placed before any fill is deposited in large quantities from a machine bucket or other vehicle. During Initial backfill, dumping from a bucket must not be allowed to fall upon a pipe from a height of more than one foot (1'), and in all cases the bucket must be lowered so that the shock of the falling earth will not injure the pipe or structure. Only after the Initial backfill has been placed and compacted to a point of twelve inches (12") above the top of the pipe, may Work proceed in placing Final backfill. All precautions must be taken to avoid future settlement in these areas. Compaction shall be performed by approved mechanical compaction devices.
5. Final backfill under paved areas shall be placed in lifts not to exceed eight inches (8"), and shall be compacted to a density of not less than 95% of maximum dry density, as determined by Standard Proctor (ASTM D698). Final backfill in unpaved areas within road right-of-way shall be placed in lifts not to exceed eight inches (8") and shall be compacted to a density of not less than 90% of maximum dry density, as determined by Standard Proctor (ASTM D698). Final backfill in unpaved areas outside of road right-of-way shall be placed in lifts not to exceed eight inches (8") and shall be compacted to a density of not less than 85% of maximum dry density, as determined by Standard Proctor (ASTM D698). Final backfill material shall be free of clods, organic matter, rubbish, or other unsuitable material. Rocks larger than four inches (4") in diameter must be placed to the sides of the trench. Rocks larger than twelve inches (12") are not allowed.
6. Sub-base backfill is comprised of the top twelve inches (12") of Final backfill in paved areas and shall be free of rocks larger than four inches (4") in diameter, clods, organic matter, rubbish, or other unsuitable material. Sub-base backfill shall be placed in lifts not to exceed six inches (6") and shall be compacted to 98% of maximum dry density, as determined by Standard Proctor (ASTM D698).
7. Backfilling shall not be performed in freezing weather (below 32° F) except by permission of Owner and shall not be done with frozen material or upon frozen material.

8. All Final backfilling in unpaved areas shall be left free of rock on the ground surface, with smooth, even surfaces, properly graded and shall be maintained in this condition until vegetation is established. Where directed by Owner, Final backfill shall be mounded slightly above the adjacent ground to account for settlement. In case of settlement after backfill, Contractor shall correct the cause of the settlement and supply sufficient material satisfactory to Owner to make up for deficiency. Contractor must provide Owner with any independent material testing reports performed on behalf of the Contractor.
9. Fill trenches under concrete slabs and footings of structures with dry sand or crushed stone and tamp in 6 inch layers. Encase piping under concrete slabs and footings in concrete (6 inches minimum).

### **3.10 FILLS AND EMBANKMENTS**

- A. Fills and embankments consist of all earth fills except backfills in trenches or around structures. Unless special material is specified or shown on the Drawings, material for fills and embankments consist of excavated material from structures or of a mixture of such excavated materials and materials borrowed from other sources by the Contractor. Provide all material used for fills and embankments free from wood, vegetable matter, debris, soft or spongy earth or clay, large rock, or other objectionable material. Do not allow rock over 2 inches in diameter to be used in conjunction with backfill material.
- B. Where the crown of a pipe extends above the surface of the ground or provides less than three feet (3') of cover over the pipe, the pipe shall be covered and protected by an embankment. Unless otherwise specified, indicated on the Drawings, or directed by the Engineer or Owner, embankment shall be at least three feet (3') deep over the top of the pipe, at least four feet (4') wide at the top, with side slopes of not less than two horizontal to one vertical (2H:1V) extending to the surface of the ground. Provision shall be made for surface drainage.
- C. Place materials in the fill or embankment in successive layers 6 inches or less in thickness before compaction, each layer being approximately horizontal and extending to the full limit of the required cross section. Compact the fill at optimum water content over the entire surface to not less than 95 percent of the maximum density as determined by Standard Proctor (ASTM D698). Repeat the process for each layer of material until the fill or embankment conforms to the plan lines, grades, and cross sections.
- D. Clear the area over which the fill or embankment is to be constructed of all vegetation, debris, and other objectionable material and, if the ground is in a loose, un-compacted condition, compact it to a minimum 95 percent of maximum density determined as specified herein.
- E. Do not place material beyond the sloping lines of embankment.
- F. Place material for embankments or roadway fills in 6-inch maximum lifts and compact by rolling with power rollers weighing not less than 10 tons, with sheep-foot rollers, with vibrating rollers, or with pneumatic tire rollers, as required to accomplish the work. While and as each layer is deposited, apply water in sufficient amount to ensure optimum moisture to secure the compaction specified.

- G. The use of trucks, carryalls, scrapers, tractors, or other heavy hauling equipment shall not be considered as rolling in lieu of rollers, but the traffic of such hauling equipment shall be distributed over the fill in such a manner as to make the use of the compaction afforded thereby as an addition to compaction by the use of rollers.
- H. Wherever a trench passes through a fill or embankment, place and compact the fill or embankment material to an elevation 12 inches above the top of the pipe before the trench is excavated.

### **3.11 DISPOSAL OF WASTE AND UNSUITABLE MATERIALS**

- A. Use all materials removed by excavation, which are suitable for the purpose, to the extent possible for backfilling pipe trenches, foundations, and footings and for making embankment fills or for such other purposes as may be shown on the Drawings. Consider all materials not used for such purposes as waste materials and dispose thereof in a lawful manner and at a location where such materials can be lawfully disposed.
- B. Spread waste materials in uniform layers and neatly leveled and shaped. Provide spoil banks with sufficient and adequate openings to permit surface drainage of adjacent lands.
- C. Remove unsuitable materials, consisting of wood, shot rock, vegetable matter, debris, soft or spongy clay, peat, and other objectionable material from the work site and dispose of in a lawful manner.
- D. Do not dump unsuitable or waste material on private property unless written permission is furnished by the owner of the property and unless a dumping permit is issued from the local jurisdiction.
- E. Immediately remove and cleanup any material, which may spill or drip from vehicles while being transported on public streets, drives, or other paved surfaces, to the satisfaction of the Engineer, Owner, or the proper officials of the municipality in which the hauling or work is being done.
- F. Leave the surface of all graded and spoil areas in a smooth and level or evenly sloped condition, free from stones, rubbish, or other debris.
- G. Leave disturbed areas in a neat and finished appearance and either temporarily stabilized with mulch only or temporary grassing and mulch, or permanently stabilized with grassing and mulch. Meet the requirements in the section titled Erosion and Sedimentation Controls.

### **3.12 SPOIL REMOVAL**

- A. The term Spoil Removal as used herein shall mean handling, hauling, and properly disposing of all surplus excavated earth material from the site as defined in the Contract Drawings from the bottom of the bedding to finished grade as directed by the Owner.

### **3.13 STORAGE OF MATERIALS**

- A. All salvageable materials, which may be removed from the site, together with all materials taken from the site, shall be stored in an approved, suitable place or as directed by Owner. The Contractor shall be responsible for any loss of or damage to salvageable materials through careless removal, neglectful or wasteful storage disposal, or use of such material.
- B. In the storing of excavated material, which is to be used as a backfill, the Contractor shall exercise care so as to avoid inconveniencing the public. If, in the opinion of the Owner, it is necessary to remove this excavated material from the streets or lots, the Contractor will be required to do so at no cost to the Owner.
- C. Stored materials shall be left in a neat, drainable condition and, if left for more than seven (7) days or in an anticipated rainfall event, the areas shall be temporarily stabilized with mulch only or with temporary grassing and mulch and must meet the requirements in the section titled Erosion and Sedimentation Controls.

### **3.14 ADDITIONAL EXCAVATION**

- A. It is expected that satisfactory foundations will be found at the elevations indicated on the Contract Drawings. However, should the Owner determine it necessary to go to additional depth, the excavation shall be carried to an additional depth as authorized and directed by Owner. Replacement will be with Foundation Backfill Material Type II or Classified Stone as directed by the Owner to the bottom of the standard bedding.

### **3.15 FINAL GRADING**

- A. After other earthwork operations have been completed, grade the site of all structures, roads, and embankments within the limits and to the elevations shown on the Drawings. Conduct grading operations so as not to remove or loosen materials beyond the required limits. Leave the finished surfaces in smooth and uniform planes such as are normally obtainable from the use of hand tools. If the Contractor is able to obtain the required degree of evenness by means of mechanical equipment, he will not be required to use hand labor methods. Neatly trim and finish slopes and ditches to slopes shown on the Drawings.
- B. Unless otherwise specified or shown on the Drawings, grade and dress all finished ground surfaces to present a surface varying not more than plus or minus 0.10 foot as regards local humps or depressions.

### **3.16 TOP SOIL**

- A. Prepare all areas to be sprigged or planted with grass as shown on the plans by grading to a smooth, even surface to a level 4 inches below the elevation of the finished grade shown on the Drawings. Bring the area to a neat finished grade by the addition of 4 inches of approved top soil.
- B. Top soil removed from the construction area may be stockpiled and reused or top soil may be obtained from approved borrow areas. If obtained from borrow areas, make suitable arrangements with the property owner and pay all costs incident to the borrowed material including royalties.

### **3.17 SETTLEMENT**

- A. The Contractor shall be responsible for all settlement of backfill, fills, and embankments which may occur within one year after final acceptance of the work by the Owner.
- B. Make all repairs or replacements made necessary by settlement within 30 days after receipt of written notice from the Engineer or Owner.

### **3.18 ACCESS BY OWNER'S MATERIAL TESTING FIRM**

- A. Contractor shall allow and accommodate both scheduled and unscheduled sampling of excavation materials and backfill which include, but are not limited to excavating and setting aside directed materials for sampling, providing description, properties, moisture content, dry density, sieve analysis, Atterberg limits, compaction testing, permeability, etc.
- B. All cost associated with initial material testing will be paid by Owner. The cost of retesting due to the failure of Contractor to meet specifications of initial required material testing requirements of the Contract Documents shall be the responsibility of the Contractor.
- C. For scheduled testing, the Contractor shall give a minimum of twenty-four (24) hour notice when scheduling testing and/or evaluations.
- D. For unscheduled testing, Contractor shall cooperate fully with providing access to, and/or setting aside as directed, construction materials for obtaining samples for testing and/or evaluation.

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## SECTION 31 23 19

### DEWATERING

#### **PART 1 GENERAL**

##### **1.01 SUMMARY**

- A. Scope: This Section specifies the design, installation, operation, and maintenance of the systems necessary to dewater structure and trench excavations.
1. During excavation, the Contractor may encounter perched water. The Contractor shall control groundwater seepage and surface run-off so as to prevent entry or collection of water in excavations.
  2. The Contractor shall divert stormwater flow around the work area for the duration required to perform excavation, stockpiling, and backfill activities. Erosion control and water pollution control requirements are shown on Contract Drawings.
  3. All sediment laden groundwater produced from excavations and surface run-off entering excavations shall be collected and conveyed to an approved onsite location and dissipated (i.e., no offsite discharge is allowed).
- B. Definitions: Terminology used in this Section conforms to the following definitions:
1. Control of Water: General term referring to the management of groundwater and surface water inflow into excavations.
  2. Control of Water System: General term referring the Dewatering Systems.
  3. Dewatering: General term referring to the process of removing accumulated water, including precipitation, water separated from excavated soils and seepage from the open excavation or from excavated soils.
  4. Dewatering System: System to collect and remove said accumulated water from the open excavation or from excavated soils.
  5. Watertight: Level of tightness required for installed barriers to minimize the groundwater seepage and inflow of water into excavations to accommodate design criteria.
  6. Groundwater Seepage: Groundwater entering an excavation as inflow or seepage from exposed soils in the excavation and installed watertight systems.
  7. Perched Water: A layer of saturated soil that results when an underlying impermeable layer, restricts the downward movement of water. This water table is usually above the regional water table.

##### **1.02 QUALITY ASSURANCE**

- A. Reference Standards:
1. This Section incorporates by reference the latest revisions of the following documents. They are part of this Section insofar as specified and modified herein. In the event of conflict between the requirements of this Section and those of the listed documents, the requirements of this Section shall prevail.
  2. Unless otherwise specified, references to documents shall mean the documents in effect on the effective date of the Agreement. If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if

there are no replacement documents, the last version of the document before it was discontinued.

### 1.03 SUBMITTALS

- A. Procedures: Section 01 33 00.
- B. Informational submittal items for this section:
  - 1. A copy of this Section, addendum updates included, with each paragraph check-marked to indicate compliance or marked to indicate requested deviations from Section requirements.
  - 2. Dewatering Plan: Dewatering Plan, prepared, sealed, and signed by a professional engineer registered in the State of Georgia, outlining the method and installation of the dewatering system, including details. The Plan shall include the following:
    - a. Indicate number and type of equipment and pipelines and other means of conveyance, including capacities.
    - b. Dewatering pit and sump locations and water discharge locations.
    - c. Dewatering well locations and water discharge locations.
    - d. Groundwater monitoring systems where necessary.
    - e. Filter systems and locations as necessary, and such other information to verify acceptable control and performance.
    - f. The Plan shall include the following excavation dewatering elements:
      - 1) Details of methods to maintain the excavations in a dewatered and hydrostatically relieved condition.
      - 2) Systems for control of groundwater inflow into excavations using watertight barriers, grouted soil masses, or other means.
      - 3) Method for the measurement of inflow into excavations.
    - g. The Plan shall include the following surface water flow elements:
      - 1) Method for prevention and removal of surface water flow entering the excavation.
  - 3. Contact Information and Reporting:
    - a. The Contractor shall submit contact information for a designated emergency contact. The contact shall be a responsible individual available at all times.
    - b. The Contractor shall resubmit components of the drawings and design data if the systems or any part thereof is significantly modified during installation or operation.
    - c. Before dewatering commences, the Contractor shall obtain the acceptance of the Owner for the method, installation, and details of the dewatering system proposed for use.
- C. Review by the Owner of the submitted Dewatering Plan shall not in any way relieve the Contractor from responsibility for errors therein or from the entire responsibility for a complete and adequate dewatering system. The Contractor shall bear sole responsibility for proper design, installation, operation, maintenance, and any failure of any component of the groundwater control system for the duration of this Contract.

## **1.04 PERFORMANCE REQUIREMENTS**

- A. Discharges of groundwater and surface water collected from excavations shall meet the discharge requirements of the State of Georgia, including discharges to infiltration facilities.
- B. Comply with State of Georgia standards for the drilling, installation, construction, and abandonment of all dewatering wells, well points, monitoring wells.

## **PART 2 NOT USED**

## **PART 3 EXECUTION**

### **3.01 GENERAL**

- A. Furnish, install, operate, maintain, and remove all necessary equipment to keep excavations free from water during construction as needed to perform the excavations and to divert water around work areas. The withdrawal, removal, or disposal of the water shall not cause injury to public or private property or nuisance to the public.
- B. Sufficient pumping and power equipment in good working condition shall be available at all times for all emergencies, including power outage, and competent workmen shall be available at all times for the operation of the dewatering and bypass system.
- C. Systems shall not be shut down between shifts, on holidays, or weekends, or during work stoppages.
- D. The Contractor has the option to install groundwater monitoring wells prior to excavating in order to verify adequacy of Contractor-designed dewatering system. However, if the system as designed is incapable of maintaining a dewatered excavation, the Contractor shall modify the system as required at no additional cost to the Owner. Any wells used for monitoring or dewatering shall be developed, drilled, and abandoned meeting the requirements of federal, state, and local codes.

### **3.02 DEWATERING SYSTEM OPERATION**

- A. The dewatering system shall be installed and operated so that the groundwater level outside the excavation or fill areas is not drawn down to the extent that would damage or endanger adjacent slopes, structure, underground installation, sidewalk, pavement, other improvement, or property.
- B. Configuration and sizing of the dewatering system shall take into account run-off from areas adjacent to the Work where existing drainage patterns are interrupted.
- C. During any backfill, filling, and compaction activities, control surface run-off so as to prevent entry or collection of water in excavations and fills. The static water level within excavations shall be drawn down a minimum of 1 foot below the bottom of the excavation so as to maintain the undisturbed state of the foundation soils and allow acceptable placement of any backfill to the required density.

- D. Discharge of water from the dewatering of the excavations shall be as shown on Contract Drawings. The Contractor may consider use of the stormwater pipeline to the existing on-site presettling pond and infiltration basin as a component of the dewatering system with the following provisions:
  - 1. The Contractor is responsible for verifying hydraulic requirements and capacity for coordination with the dewatering system.
  - 2. Identification and provision of any temporary facilities needed to connect to the pipeline are the Contractor's responsibility.
  - 3. Pipelines shall be cleaned and inspected, and the existing presettling pond shall be restored after dewatering system use.
  
- E. Immediate steps shall be taken including but not limited to the modification of excavation and ground support procedures and ground permeability modifications, to reduce the inflow of water entering an excavation, where the volume or inflow rate is at risk of causing the following:
  - 1. Drawdown of the groundwater level to an unacceptable level for the area outside the excavation.
  - 2. Damage or has the potential of causing loss or damage to adjacent property or structures.
  - 3. Adversely affects the performance of the work.
  
- F. Excavations shall be kept free of water to the extent required to perform the Work during excavation. Excavations shall be kept free of water for backfill, slope construction, and compaction.
  
- G. Control surface runoff so as to prevent entry or collection of water in excavations or in other isolated areas of the site.
  
- H. Discharge Points:
  - 1. All water discharged shall be as shown on Contract Drawings.
  - 2. Dewater and dispose of the water so as not to cause injury to public, private, or other property, or to cause a nuisance or a hazard to the public.

### **3.03 ELECTRICAL SUPPLY FOR DEWATERING SYSTEM**

- A. Supply two separate electrical services or sources to be used for dewatering, stormwater bypass, and construction stormwater collection and conveyance that are separate from each other and all other Contractor electrical requirements.

### **3.04 DEWATERING SYSTEM PROTECTION**

- A. Take all reasonable precautions necessary to ensure continuous operation of the system.
- B. Mark and signpost all pump and pipeline locations.
- C. Standby pumps are to be fueled and on-line, isolated from the primary system by a valve at all times.
- D. Test daily all standby pumps and generators to ensure their immediate availability.

- E. Wherever vacuum headers or discharge lines are to be crossed for access and egress, use physical bridging devices such as a ramp to protect and separate the system from vehicular traffic.
  - 1. Bridges shall be capable of supporting the heaviest equipment on site and shall provide at least 1 foot of clearance between the dewatering system element and the underside of the barrier.
  - 2. Clearly identify with brightly colored or flagged 8-foot-high poles on each side of the access point for all vehicular access points to be used across the dewatering system.
  - 3. All pipelines with vehicular crossing bridges, such as ramps, shall be equipped with valves on both sides of the ramp.

### **3.05 DAMAGES**

- A. Repair any damage to work in place that may result from inadequate or improper dewatering system installation, maintenance, and operation of the system, and any mechanical or electrical failure of the system. Work in place shall include but is not limited to:
  - 1. Structures, pipelines, and utilities.
  - 2. Other contractors' equipment.
  - 3. The excavation, including damage to the bottom due to heave and removal of material and pumping out of the excavated area.
- B. Immediately support any footings, slopes, foundations, basement or walls, concrete driveways, pipelines, utilities, or other structures that become unstable and vulnerable to settlement due to removal or disturbance of groundwater. Support shall include but not be limited to shoring, sheeting, bracing, grouting, underpinning, driving piles, excavation, backfilling, placing new structural concrete beneath or adjacent to the unstable structure, or other means necessary to rectify the particular problem involved.
- C. Contractor is responsible for all loss or damage arising from removal or disturbance of groundwater including, but not limited to, subsidence damage or the loss of structural support that may occur in the prosecution of the Work.

### **3.06 SOIL AND GROUNDWATER DATA**

- A. Soil and groundwater data: Contractor shall provide investigation.
- B. Use of any available information in no way relieves the Contractor from its responsibility for the operation of a properly functioning dewatering system.

**END OF SECTION**

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SECTION 31 25 00  
EROSION AND SEDIMENTATION CONTROL

**PART 1 GENERAL**

**1.01 SCOPE**

A. Related Sections

1. The following listed sections do not purport to be all inclusive, as it is the Contractor's responsibility to do all the Work in accordance with the Contract Documents.
  - a. Exploratory Excavation (02 32 19).
  - b. Excavation and Fill (31 23 00).
  - c. Grassing (32 92 00).

**1.02 REFERENCES**

- A. Drawings and general provisions of the Contract and Division 1 Specification Sections, apply to this section.
- B. Contractor shall be familiar with the following referenced documents and keep them at the construction site at all times. These documents must be complied with as applicable.
  1. NPDES General Permit No. GAR100001, No. GAR100002, or No. GAR100003 (whichever applies) State of Georgia Department of Natural Resources Environmental Protection Division Authorization To Discharge Under The National Pollutant Discharge Elimination System Storm Water Discharges Associated With Construction Activity For Infrastructure Construction Projects (the NPDES permit).
  2. Manual for Erosion and Sediment Control in Georgia (the "Green Book"), latest edition.
  3. State of Georgia Department of Transportation Standard Specifications, Construction of Roads and Bridges, (GDOT specifications), latest edition.
  4. National Stone Association, Aggregate Classification (NSA Classification).
  5. The Owner's, or local issuing authority Soil Erosion and Sediment Control Ordinance, latest edition.
  6. Stormwater Pollution Prevention Plan (SWP3) if included in the Contract Documents.
  7. Approved and permitted Erosion, Sedimentation, and Pollution Control Plan (ES&PC Plan) utilizing Best Management Practices (BMP), as required by Georgia Erosion and Sedimentation Act and NPDES General Permit.
  8. Comprehensive Monitoring Program (the CMP) as required by the NPDES General Permit.

**1.03 DEFINITIONS**

- A. Designer: For the purpose of this item, the term "Designer" means the person who has designed and stamped the Erosion Sedimentation and Pollution Control Plan, as used in language of permits, laws, rules, regulations, ordinances, and other soil erosion and sediment control references. This person has successfully obtained Georgia professional registration, met certain education requirements, and been certified as Level II Certified

Design Professional, as prescribed by the Georgia Soil and Water Conservation Commission in consultation with the Georgia EPD and the Stakeholder Advisory Board.

- B. Contractor: For the purposes of this item, the term “Contractor” is synonymous with Contractor, General Contractor, Discharger, Operator, and Primary Permittee, as used in language of permits, laws, rules, regulations, ordinances, and other soil erosion and sediment control references.
- C. Qualified Person: For the purposes of this item, the term “Qualified Person” means a person, as used in language of permits, laws, rules, regulations, ordinances, and other soil erosion and sediment control references, who has successfully met certain education requirements and been certified as Level 1A, as prescribed by the Georgia Soil and Water Conservation Commission in consultation with the Georgia EPD and the Stakeholder Advisory Board.
- D. Other Definitions: Definitions as listed in the NPDES General Permit shall apply in this section.

#### **1.04 WORK INCLUDED**

- A. The Contractor shall furnish all labor, equipment, and materials necessary for implementing best management practices (BMPs) to prevent and minimize erosion and resultant sedimentation in all disturbed areas (cleared and grubbed) during and after construction. This item covers the Work necessary for the installation of structures and measures for the prevention and control of soil erosion and sedimentation. The Contractor shall furnish all material, labor, and equipment necessary for the proper installation, maintenance, inspection, monitoring, reporting, and removal (where applicable) of erosion and sediment control measures, and to cause compliance with the referenced documents in Section 1.02B of this specification.
- B. The Work covered under this item shall include the furnishing, placement, maintenance, and removal of BMPs to include, but not limited to: check dams, construction exits, diversion dikes and ditches, temporary sediment barriers, inlet sediment traps, storm drain outlet protection, surface roughening, buffer zone, dust control; and all temporary and permanent vegetative and non-vegetative ground cover; and all labor, materials, and equipment necessary to complete the Work as specified, as indicated on the Drawings, required by the regulations or as directed by the Owner.
- C. Contractor shall provide information for, and sign the Notice of Intent and Notice of Termination; and be responsible for all monitoring, record keeping, and reporting per the Comprehensive Monitoring Program (the CMP) and the requirements of NPDES General Permit No. GAR100001, No. GAR100002, or No. GAR100003 (whichever applies).
- D. The Designer, Engineer, or the Owner, may at any time during the project, direct the Contractor to provide additional erosion and sediment control measures, as necessary, to adequately control erosion and sedimentation in order to comply with all permits.

#### **1.05 SUBMITTALS**

- A. Submit for approval, in accordance with Section 01 33 00 Submittal Procedures all working drawings and schedules of materials and methods proposed to be followed in the execution of the Work under this item.

- B. Contractor shall submit to Engineer the proposed schedule for installation, maintenance, and removal of all temporary, permanent erosion, and sediment control measures. The schedule shall reflect the requirements of the section titled, Sequence of Construction of Temporary Sediment Control Measures, and must show the anticipated starting and completion date for all land disturbance activities including:
1. Installation of temporary and permanent erosion and sediment control structures.
  2. Stormwater management facilities, if any.
  3. Timber salvage operations, Clearing, Grubbing, Demolition.
  4. Utility pipe installation.
  5. Rough and finished grading.
  6. Paving
  7. Landscaping, including all temporary mulching and seeding.
  8. Cleanup and restoration
  9. Landscaping, including all permanent seeding and sodding.
  10. Removal of temporary erosion and sediment control structures.

#### **1.06 NOTICE OF INTENT (NOI)**

- A. When land disturbance construction activities are equal to or greater than one (1.0) acre, and an Erosion Sediment & Pollution Control Plan has been approved by the governing jurisdiction, the Contractor, together with the Owner shall prepare a Notice of Intent. Contractor shall provide to the Owner and the Owner shall submit a properly executed NOI to Georgia EPD at least fourteen (14) calendar days prior to start of land disturbance activities.

#### **1.07 MONITORING AND REPORTING**

- A. Monitoring: The Contractor shall be responsible for the implementation of the Comprehensive Monitoring Program (CMP) as written by the Designer. The implementation must comply with EPD guidelines as set forth in the NPDES Permit referenced in Section 1.02B Sampling Requirements, Reporting, and Retention of Records.
- B. Reporting: The Contractor shall prepare and submit a summary of the monitoring results to the Engineer, the Designer and the EPD as required in the NPDES permit (Current Address: Northwest Georgia Regional Office, Georgia Environmental Protection Division, Suite 114, 4244 International Parkway, Atlanta, GA 30354). The Owner reserves the right to use its own resources to duplicate monitoring and verify the work required by the Contractor in this section.

#### **1.08 NOTICE OF TERMINATION (NOT)**

- A. When all construction activities have ceased, final stabilization has been certified, and the site is in compliance with the NPDES permit, the Contractor, together with the Owner shall submit a Notice of Termination.

## **1.09 SPECIFIC REQUIREMENTS**

- A. The requirements as specified, as indicated on the Drawings, are minimum requirements for the preventing or minimizing soil erosion and sediment transport. Contractor shall install and maintain soil erosion and sediment control measures in accordance with the requirements set forth in the Manual for Erosion and Sediment Control (latest edition) in Georgia, and said manual shall govern in case of conflicting information, unless an item is clearly identified on the Drawings as a deviation from the Manual.

## **1.10 REGULATORY COMPLIANCE**

- A. Land disturbance activities are not authorized to begin until after all required erosion and sediment control permits are obtained from the United States, the State of Georgia, and/or the local issuing authority, and fourteen (14) calendar days have passed since the Notice of Intent (NOI) has been properly filed with Georgia EPD. Contractor is the Primary Permittee and Operator under the provisions of the NPDES General Permit. As such, Contractor shall be required to sign certain certifications as described in the NPDES General Permit. Contractor shall comply with requirements specified in the Contract Documents, or as directed by the Engineer. Contractor shall also comply with all other laws, rules, regulations, ordinances, and requirements concerning soil erosion and sediment control established in the United States, the State of Georgia, and/or the local issuing authority. The referenced documents in Section 1.02B of this specification define the regulatory requirements for this item.

## **PART 2 EXECUTION**

### **2.01 GENERAL**

- A. Every effort shall reasonably be employed by the Contractor to control erosion with the use of, but not limited to, terraces, grassing, and silt fencing during the project. All erosion and sedimentation control measures or facilities, whether temporary or permanent, shall be continuously maintained by the Contractor so as to be effective, or as ordered by the Owner.

### **2.02 BUFFER ZONE**

- A. Buffer zone is an undisturbed zone or "green belt" surrounding the site, bordering streams or environmentally sensitive areas. Contractors shall not trespass on or in these areas unless he has prior acceptance by the Owner. Trespass in these areas will not be permitted unless there is no alternative method to accomplish the task. Cost shall not come into consideration in the evaluation of this type of request.

### **2.03 CONSTRUCTION EXITS**

- A. Locate construction exits as shown on the Drawings or as directed by Owner.
- B. Installation: Construction exits should be located at all points where traffic shall be leaving the construction site to a public or private right of way, street, alley, or parking area. All construction exits must be fully installed prior to the commencement of timber salvage, clearing, grubbing, grading, or construction operations.

- C. Maintenance: In accordance with the section titled Inspections and Maintenance, all construction exits shall be inspected and maintenance performed, if needed, within 24 hours of inspection once every 7 calendar days and within 24 hours of rainfall an event that has precipitation of ½ inch or greater. At the earlier of (1) thirty (30) calendar days since construction exit was installed or last maintained, or (2) geotextile liner is visible or if construction exit does not conform to specifications established in this section, construction exit pad shall be top dressed with NSA's R-2 (1-½ inch to 3-½ inch stone) such that liner is no longer visible and exit pad conforms to specifications.

## **2.04 ROCKS CHECK DAMS**

- A. Install rock check dams as shown on the Drawings or as directed by Owner.
- B. Installation: Install check dams in all ditches, channels, or swales draining disturbed areas of one acre or greater and which are not installed with permanent, non-erodible lining or a vegetative cover as specified in the section titled Temporary Soil Erosion Stabilization (Vegetative). The specifications for the design criteria, materials, installation, and maintenance of check dams are dependent on the upslope drainage area and are described below. A check dam shall not drain a disturbed area greater than two acres.
  - 1. Install rock check dams in ditches draining upgrade areas less than two acres. Construct check dam with Type 3 Riprap. Hand placement may be required to ensure complete coverage of the entire width of ditch.
- C. Maintenance: In accordance with the section titled Inspections and Maintenance, all check dams shall be inspected and maintenance performed, if needed, within 24 hours of inspection once every 7 calendar days and within 24 hours of a rainfall event that has precipitation of ½ inch or greater. Dress dams with appropriate sized stone or additional straw bales as necessary to maintain check dams in accordance with these specifications. At the earlier of (1) every 14 calendar days, or (2) when sediment reaches a depth of ½ the original check dam height, all soil, silt, sediment and other material captured by the dam should be removed and returned upgrade on the construction site.

## **2.05 SEQUENCE OF CONSTRUCTION OF TEMPORARY SEDIMENT CONTROL MEASURES**

- A. Install all erosion and sediment control structures specified herein and shown in the Contract Documents, or as directed by Owner, as the first item of Work within a given drainage area. Construction and installation of all sediment control structures shall begin downgrade of the area to be disturbed and precede upgrade. Contractor shall, at all times, maintain all soil erosion and sediment control structures and practices throughout construction and until permanent grass cover is established.
- B. Time: Land disturbance activities are not authorized to begin until after all required erosion and sediment control permits are obtained from the Local Issuing Authority.
- C. County Inspectors shall be contacted by the Contractor and given the date, time and location of the pre-construction meeting.

## **2.06 TEMPORARY STREAM CROSSING**

- A. A temporary structure installed across a flowing stream or watercourse for use by construction equipment.

- B. This standard provides a means for construction vehicles to cross streams or watercourses without moving sediment into streams, damaging the streambed or channel, or causing flooding.
- C. Temporary stream crossings should not be used on streams with drainage areas greater than one square mile, unless specifically designed to accommodate the additional drainage area by the design professional.
- D. The structure shall be large enough to convey the full bank flow of the stream, typically flows produced by a 2-year, 24-hour frequency storm, without appreciably altering the stream flow characteristic.
- E. The temporary stream crossing shall be perpendicular to the stream.
- F. Temporary Culvert Crossing:
  - 1. The invert elevation of the culvert shall be installed on the natural streambed grade.
  - 2. The culvert(s) shall extend a minimum of one foot beyond the upstream and downstream toe of the aggregate placed around the culvert. In no case shall the culvert exceed 40 feet in length.
  - 3. The culvert(s) shall be covered with a minimum of one foot of coarse aggregate. If multiple culverts are used, they shall be separated by a minimum of 12 inches of compacted coarse aggregate fill.
  - 4. Culverts may be CMP or HDPE pipe.
- G. The structure shall be inspected after every rainfall and at least once a week, whether it has rained or not, and all damages repaired immediately. The structure shall be removed immediately after construction is finished, and the streambed and banks must be stabilized.

## **2.07 CONCRETE TRUCK WASHOUT**

- A. Concrete truck washout practice allows for a sanitary location to capture waste after poured in place concrete activities are complete.
- B. The washout facility shall be located at least 50 ft. away from storm drains, open ditches and any water body.
- C. Excess, unused concrete shall not be emptied into the washout facility but properly disposed of at an off-site facility.
- D. The washout facility consists of a depression as detailed in the Drawings that has been fully lined with polyethylene plastic sheeting, minimum thickness of 10 mil.
- E. Sandbags, lath and flagging shall be installed on all sides.

## **2.08 TEMPORARY STOCKPILE AREA**

- A. Temporary stockpile shall be located in a flat location within project limits.
- B. Stockpile shall be bordered by silt fencing leaving a single opening for equipment to safely pass through.

- C. A minimum of 1 ft. of space shall exist between the stockpile base and silt fence.
- D. The opening shall face uphill so as any runoff is captured by the silt fence.
- E. Stockpile slope shall not exceed 1:1. Stockpile height shall not exceed 10 ft. The stockpile base length, or diameter, shall not exceed 50 ft.

## **2.09 DISTURBED AREA STABILIZATION**

- A. Vegetative cover will be placed on completed areas. This vegetative plan will be carried out on road cut and fill slopes, shoulders, and other critical areas created by construction. Plant grass seed as soon as construction in an area is completed. Planting will be made to control erosion, to reduce damage from sediment and runoff to downstream areas and to improve the safety and beauty of the development area.
- B. Due to grading and construction, the areas to be treated are mainly subsoil and substrate. Fertility is low and the physical characteristics of the exposed material are unfavorable to all but the most hardy plants.
- C. Conventional Seeding Equipment - Grade, shape and smooth where needed to provide for safe equipment operation at seeding time and for maintenance purposes. The lime and fertilizer in dry form will be spread uniformly over the area immediately before seedbed preparation. A seedbed will be prepared by scarifying to a depth of 1 to 4 inches as determined on site. The seedbed must be well pulverized, smoothed and firmed. Seeding will be by either a cultipacker-seeder, drill, rotary seeder, mechanical seeder, hand seeder or hydro-seeding. Seed will be distributed uniformly over a freshly prepared seedbed and covered lightly. Within 24 hours after seeding, with exception to hydro-seeding, straw or hay mulch will be spread uniformly over the area, leaving about 25 percent of the ground surface exposed. Mulch will be spread with blower-type mulch equipment or by hand and anchored immediately after it is spread. A disk harrow with the disk set straight or a special packer disk may be used to press the mulch into the soil.

## **2.10 DUST CONTROL ON DISTURBED AREAS**

- A. Dust raised from vehicular traffic will be controlled by wetting down the access road with water or by the use of a deliquescent chemical, such as calcium chloride, if the relative humidity is over 30%. Chemicals shall be applied in accordance with the manufacturer's recommendations. Calcium chloride, anionic asphalt emulsion, latex emulsion or resin-in-water emulsion may be used for dust control.

## **2.11 STONE PLACEMENT**

- A. The minimum thickness or depth of the stone layer shall be shown on the drawings or the detail with which the device is associated. When used with a plastic filter fabric, the stone placing shall begin in a trench at the bottom of the slope with the filter fabric wrapped in stone. The entire mass of stone shall be placed so as to be in conformance with the lines, grades, and thickness shown on the drawings.

## **2.12 RIPRAP**

- A. Riprap shall be placed in accordance with the notes on the drawings. Any riprap that shall be permanent shall have an underlayment of filter fabric.

## **2.13 STORM DRAIN OUTLET PROTECTION**

- A. Storm drain outlets shall be paved or have a rock or other energy dispersion device associated with it, as called for on the drawings. The length shall be a minimum of six (6) times the pipe diameter and placed on a 1% grade unless otherwise specified on the drawings.

## **2.14 SITE RESTORATION**

- A. The site shall be restored in a manner suitable to accommodate the erosion control device or system of devices for the use which they are intended.

## **2.15 TOPSOIL**

- A. If topsoil is stripped and stored on site to be used after construction, the stockpile side slopes shall be 2:1 or flatter. Stockpiled topsoil shall not obstruct natural drainage. Topsoil replacement shall be spread at minimum of 4" thickness.

## **2.16 SITE SAFETY**

- A. The Contractor shall incorporate and utilize all necessary fencing and other safety barriers as necessary, or directed by Owner, to prevent trespassing into potentially dangerous areas of the erosion control area.

## **PART 3 NOT USED**

**END OF SECTION**

SECTION 31 37 00

RIPRAP

**PART 1 GENERAL**

**1.01 SUMMARY**

A. Section includes:

<u>Section</u>	<u>Title</u>
1.02	References
1.03	Work Included
1.04	Definitions
1.05	Submittals
2.01	Materials
3.01	Riprap Construction

**1.02 REFERENCES**

A. Drawings and general provisions of the Contract and Division 1 Specification Sections, apply to this section.

**1.03 WORK INCLUDED**

A. The Contractor shall furnish all labor, equipment, and materials necessary for hauling and properly placing stone riprap at the locations and to the limits indicated on the Drawings or as directed by Owner.

**1.04 DEFINITIONS**

A. Riprap

1. Type 1 Riprap - aggregate stone which meet requirements of the Georgia Department of Transportation Standard Specification for Road and Bridge Construction, Section 805.
2. Type 3 Riprap - aggregate stone which meet requirements of the Georgia Department of Transportation Standard Specification for Road and Bridge Construction, Section 805.

**1.05 SUBMITTALS**

A. The Contractor shall submit for approval to Owner and GDOT, all working drawings and schedules of materials and methods proposed to follow in the execution of the Work under this item.

B. Submittals shall show in detail the type, size, and location of all riprap and accessories to be used in construction.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- A. Unless otherwise specified, stone furnished for riprap shall meet the requirements of the Georgia Department of Transportation Standard Specifications for Road and Bridge Construction, Sections 603 and 805, latest edition.
- B. Suitable rock from onsite excavation may be used as stone riprap. Rock shall meet the requirements identified above, as determined by Owner's materials testing firm and be subject to the Owner's approval.
- C. Plastic filter fabric shall conform to Section 31 32 19, Geotextiles.

## **PART 3 EXECUTION**

### **3.01 RIPRAP CONSTRUCTION**

- A. Prepare the ground surface where the riprap will be placed to conform to the correct lines and grades before beginning the placement. Ground surface should be smooth and free from obstructions, depressions, or debris. Place woven plastic filter fabric on the prepared ground surface under all riprap. Place riprap to a uniform thickness as specified in the Project Specific scope of work and/or Contract Drawings. If no thickness is specified, place riprap to a minimum of 18 inches thick.

**END OF SECTION**

SECTION 31 41 00  
SHEETING, SHORING AND BRACING

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract and Division 01 Specification Sections apply to this Section.

**1.02 SUMMARY**

- A. Section includes temporary excavation support and protection systems.
- B. Related Sections:
  - 1. Sections 01 32 33 "Photographic Documentation" for recording preexisting conditions.
  - 2. Section 31 23 19 - "Dewatering" for dewatering system for excavations.

**1.03 PERFORMANCE REQUIREMENTS**

- A. Design, furnish, install, monitor, and maintain excavation support and protection system capable of supporting excavation sidewalls and of resisting soil and hydrostatic pressure and superimposed and construction loads.
  - 1. Delegated Design: Design excavation support and protection system, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
  - 2. Prevent surface water from entering excavations by grading, dikes, or other means.
  - 3. Install excavation support and protection systems without damaging existing buildings, structures, and site improvements adjacent to excavation.
  - 4. Monitor vibrations, settlements, and movements.

**1.04 SUBMITTALS**

- A. Shop Drawings:
  - 1. For excavation support and protection system.
- B. Delegated-Design Submittal:
  - 1. For excavation support and protection system indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
  - 2. Coordinate first paragraph below with qualification requirements in Section 01 40 00 - "Quality Requirements" for qualified professional engineer.
- C. Other Informational Submittals:
  - 1. Photographs or Videotape: Show existing conditions of adjacent construction and site improvements that might be misconstrued as damage caused by the absence of, the installation of, or the performance of excavation support and protection systems. Submit before Work begins.

2. Record Drawings: Identifying and locating capped utilities and other subsurface structural, electrical, or mechanical conditions.
  - a. Note locations and capping depth of wells and well points.

## **1.05 QUALITY ASSURANCE**

- A. Preinstallation Conference:
  1. Conduct conference at Project site.
    - a. Review methods and procedures related to excavation support and protection system including, but not limited to, the following:
      - 1) Geotechnical report.
      - 2) Existing utilities and subsurface conditions.
      - 3) Proposed excavations.
      - 4) Proposed equipment.
      - 5) Monitoring of excavation support and protection system.
      - 6) Working area location and stability.
      - 7) Coordination with waterproofing.
      - 8) Abandonment or removal of excavation support and protection system.

## **1.06 PROJECT CONDITIONS**

- A. Interruption of Existing Utilities:
  1. Do not interrupt any utility serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:
    - a. Notify Construction Manager no fewer than two days in advance of proposed interruption of utility.
    - b. Do not proceed with interruption of utility without Construction Manager's written permission.
- B. Project-Site Information:
  1. A geotechnical report has been prepared for this Project and is available for information only. The opinions expressed in this report are those of geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by geotechnical engineer. Owner will not be responsible for interpretations or conclusions drawn from the data.
    - a. Make additional test borings and conduct other exploratory operations necessary for excavation support and protection.
    - b. The geotechnical report is referenced elsewhere in the Project Manual.
- C. Survey Work:
  1. Engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.
    - a. During installation of excavation support and protection systems, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations and

positions for comparison with original elevations and positions. Promptly notify Engineer if changes in elevations or positions occur or if cracks, sags, or other damage is evident in adjacent construction.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- A. General:
  - 1. Provide materials that are either new or in serviceable condition.
- B. Structural Steel:
  - 1. ASTM A36/A36M, ASTM A690/A690M, or ASTM A992/A992M.
- C. Steel Sheet Piling:
  - 1. ASTM A328/A328M, ASTM A572/A572M, or ASTM A690/A690M; with continuous interlocks.
- D. Wood Lagging:
  - 1. Lumber, mixed hardwood, nominal rough thickness of size and strength required for application
- E. Shotcrete:
  - 1. Comply with specifications for shotcrete materials and mixes, reinforcement, and shotcrete application.
- F. Cast-in-Place Concrete:
  - 1. ACI 301, of compressive strength required for application.
- G. Reinforcing Bars:
  - 1. ASTM A615/A615M, Grade 60 (Grade 420), deformed.
- H. Tiebacks:
  - 1. Steel bars, ASTM A722/A722M.
  - 2. Steel strand, ASTM A416/A416M.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during excavation support and protection system operations.
  - 1. Shore, support, and protect utilities encountered.
- B. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
  - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate

routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

- C. Locate excavation support and protection systems clear of permanent construction so that forming and finishing of concrete surfaces are not impeded.
- D. Monitor excavation support and protection systems daily during excavation progress and for as long as excavation remains open. Promptly correct bulges, breakage, or other evidence of movement to ensure that excavation support and protection systems remain stable.
- E. Promptly repair damages to adjacent facilities caused by installing excavation support and protection systems.

### **3.02 SOLDIER PILES AND LAGGING**

- A. Install steel soldier piles before starting excavation. Extend soldier piles below excavation grade level to depths adequate to prevent lateral movement. Space soldier piles at regular intervals not to exceed allowable flexural strength of wood lagging. Accurately align exposed faces of flanges to vary not more than 2 inches (50 mm) from a horizontal line and not more than 1:120 out of vertical alignment.
- B. Install wood lagging within flanges of soldier piles as excavation proceeds. Trim excavation as required to install lagging. Fill voids behind lagging with soil, and compact.
- C. Install wales horizontally at locations indicated on Drawings and secure to soldier piles.

### **3.03 SHEET PILING**

- A. Before starting excavation, install one-piece sheet piling lengths and tightly interlock to form a continuous barrier. Accurately place the piling, using templates and guide frames unless otherwise recommended in writing by the sheet piling manufacturer. Limit vertical offset of adjacent sheet piling to 60 inches (1,500 mm). Accurately align exposed faces of sheet piling to vary not more than 2 inches (50 mm) from a horizontal line and not more than 1:120 out of vertical alignment. Cut tops of sheet piling to uniform elevation at top of excavation.

### **3.04 TIEBACKS**

- A. Drill, install, grout, and tension tiebacks. Test load-carrying capacity of each tieback and replace and retest deficient tiebacks.
  - 1. Test loading shall be observed by a qualified professional engineer responsible for design of excavation support and protection system.
  - 2. Maintain tiebacks in place until permanent construction is able to withstand lateral soil and hydrostatic pressures.

### **3.05 BRACING**

- A. Locate bracing to clear columns, floor framing construction, and other permanent work. If necessary to move brace, install new bracing before removing original brace.
  - 1. Do not place bracing where it will be cast into or included in permanent concrete work unless otherwise approved by Engineer.
  - 2. Install internal bracing, if required, to prevent spreading or distortion of braced frames.
  - 3. Maintain bracing until structural elements are supported by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.

### **3.06 REMOVAL AND REPAIRS**

- A. Remove excavation support and protection systems when construction has progressed sufficiently to support excavation and bear soil and hydrostatic pressures. Remove in stages to avoid disturbing underlying soils or damaging structures, pavements, facilities, and utilities.
  - 1. Remove excavation support and protection systems to a minimum depth of 48 inches (1,200 mm) below overlaying construction and abandon remainder.
  - 2. Fill voids immediately with approved backfill compacted to density specified in Section 31 23 00.
  - 3. Repair or replace, as approved by Engineer, adjacent work damaged or displaced by removing excavation support and protection systems.

**END OF SECTION**

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SECTION 32 92 00

GRASSING

**PART 1 NOT USED**

**PART 2 PRODUCTS**

**2.01 MATERIALS GENERAL**

- A. The Contractor shall, at the time of delivery, furnish the Engineer invoices of all materials, received in order that the application rate of materials may be determined.

**2.02 FERTILIZER**

- A. A 10-10-10, commercial fertilizer of accepted type, conforming to state fertilizer laws.

**2.03 LIME**

- A. Lime shall be agricultural grade, ground limestone and shall conform to the requirements of the Georgia Department of Agriculture. Lime to be added based on soil tests.

**2.04 SEED**

- A. All seed shall conform to all State Laws and to all requirements and regulations of the Georgia Department of Agriculture.
- B. The several varieties of seed shall be individually packaged or bagged, and tagged to show name of seed, net weight, origin, germination, lot number, and other information required by the Department of Agriculture.
- C. The Engineer reserves the right to test, reject, or accept all seed before seeding.
- D. Mixtures of different types of seed called for in the seeding schedule shall be weighted and mixed in the proper proportions at the site of the work in the presence of the Engineer.

**2.05 SEEDING SCHEDULE**

- A. Hulled Bermuda Seeds are to be used at a rate of 40 pounds per acre, and at a depth of 1/4 to 1/8 inch. Pure line seed to be 82% by weight, with a maximum weed seed of 0.50%.
- B. In shaded areas, or other areas as directed by the Owner or Engineer, the Contractor shall use a mixture of hulled Bermuda seed at a rate of 25 pounds per acre and carpet seed at a rate of 30 pounds per acre.
- C. Temporary grassing shall consist of annual rye grass seed at a rate of 75 pounds per acre.
- D. In areas where existing grasses are to be matched, the Contractor shall sow the seed at the rate recommended by the seed distributor.

## **2.06 STRAW MULCH**

- A. Straw mulch material shall consist of straw or hay. Straw shall be stalks of wheat, rye, barley, oats, or other accepted straw. Hay shall consist of timothy, peavine, alfalfa, coastal bermuda or other grasses from accepted sources. These materials shall be reasonably dry and shall be reasonably free from mature seed-bearing stalks, roots, or bulblets or Johnson Grass, Nutgrass, Sandbur, Wild Garlic, Wild Onion, Wild Mustard, Crotolaria, Pigweed, Witchweed and Coclebur. The Contractor shall also comply with all State and Federal domestic plant quarantine regulations.

## **2.07 EXCELSIOR MULCH**

- A. Excelsior mulch shall consist of wood fibers cut from sound, green timber. The average length of the fibers shall be 4 to 6 inches. The cut shall be made in such a manner as to provide maximum strength of fiber, but at a slight angle to the natural grain of the wood so as to cause splintering of the fibers when weathering in order to provide adherence to each other and to the soil.

## **2.08 WOOD CELLULOSE FIBER MULCH**

- A. Wood cellulose fiber mulch shall be made from wood chips particles manufactured particularly for discharging uniformly on the ground surface when dispersed by a hydraulic water sprayer. It shall remain in uniform suspension in water under agitation and blend with grass seed and fertilizer to form a homogenous slurry. The mulch fibers shall intertwine physically to form a strong moisture holding mat on the ground surface and allow rainfall to percolate the underlying soil. The mulch shall be heat processed so as to contain no germination or growth-inhibiting factors. It shall be dyed (non-toxic) an appropriate color to facilitate metering of material.
- B. Suppliers shall be prepared to certify that laboratory and field testing of their project has been accomplished, and that it meets all of the foregoing requirements based upon such testing.
- C. Weight specifications for this material from suppliers and for all applications shall refer only to air dry weight of fiber material. Absolute air dry weight is based on the normal weight standard of the Technical Association of the Pulp and Paper Industry for wood cellulose and is considered equivalent to 10% moisture. Each package of the cellulose fiber shall be marked by the manufacturer to show the air dry weight content.

## **2.09 SOD**

- A. Sod shall be densely rooted, good quality centipede grass, free from noxious weeds. The sod shall be obtained from areas where the soil is reasonably fertile. The sod shall be raked free of all debris and the grass mowed to two inches before cutting. The sod shall contain practically all of the dense root system and not be less than one (1) inch thick. Sod shall be cut in uniform strips not less than twelve (12) inches in width and not less than twenty-four (24) inches in length.

## **2.10 PRODUCT REVIEW**

- A. The Contractor shall provide the Engineer with a complete description of all products before ordering. The Engineer will review all products before they are ordered.

## **PART 3 EXECUTION**

### **3.01 STAND OF GRASS**

- A. Before acceptance of the seeding performed for the establishment of permanent vegetation, the Contractor will be required to produce a satisfactory stand of perennial grass whose root system shall be developed sufficiently to survive dry periods and the winter weather and be capable of re-establishment in the spring.
- B. Before acceptance of the seeding performed for the establishment of temporary vegetation, the Contractor will be required to produce a stand of grass sufficient to control erosion for a given area and length of time before the next phase of construction or the establishment of permanent vegetation is to commence.
- C. Permanent vegetation shall meet the Notice of Termination requirements of NPDES General Permit No. GAR100001, No. GAR100002, or No. GAR100003 (whichever applies) State of Georgia Department of Natural Resources Environmental Protection Division Authorization To Discharge Under The National Pollutant Discharge Elimination System Storm Water Discharges Associated With Construction Activity For Infrastructure Construction Projects.

### **3.02 SEEDING DATES AND RATES OF APPLICATION**

- A. Seeding shall be performed during the periods and at the rates specified in the seeding schedules. Seeding work may, at the discretion of the Contractor, be performed throughout the year using the schedule prescribed for the given period. Seeding work shall not be conducted when the ground is frozen or excessively wet. The Contractor will be required to produce a satisfactory stand of grass regardless of the period of the year the work is performed.

### **3.03 PREPARATION**

- A. The areas to be seeded or sodded shall be made smooth and uniform and shall conform with the finished grade and cross section shown on the plans or as otherwise designated. Minor shaping and smoothing of uneven and rough areas outside the graded section shall be performed as directed by the Engineer in order to provide for more effective erosion control and for ease of subsequent mowing operations.
- B. The areas to be grassed, if not loose, shall be loosened to a minimum depth of 3 inches before agricultural lime, fertilizer, seed or sod is applied. The areas to be seeded shall be cleared of stones larger than 2 1/2 inches, in any dimension, roots, and other debris.

### **3.04 APPLYING LIME AND FERTILIZER**

- A. Following advance preparation and placing selected material for shoulders and slopes when called for in the contract, lime if called for based on soil tests and fertilizer shall be spread uniformly over the designated areas and shall be thoroughly mixed with the soil to a depth of approximately 2 inches. Fertilizer shall be applied at the rate of 500 pounds per acre for the initial application, unless otherwise directed by the Engineer. Lime shall be applied at the rate determined by the soil test. Unless otherwise provided, lime will not be applied for temporary seeding. In all cases where practicable, acceptable mechanical spreaders shall be used for spreading fertilizer. On steep slopes subject to

slides and inaccessible to power equipment, the slopes shall be adequately scarified. Fertilizer may be applied on steep slopes by hydraulic methods as a mixture of fertilizer and seed. When fertilizer is applied in combination seed and fertilizer drills, no further incorporation will be necessary. The fertilizer and seed shall be applied together when the method of seeding (Wood Cellulose Fiber Mulch) is used. Any stones larger than 2 1/2 inches in any dimension, larger clods, roots, or other debris brought to the surface shall be removed.

### **3.05 SEEDING**

- A. Seed shall be sown within 24 hours following the application of fertilizer and lime and preparation of the seedbed as specified in paragraph 3.04. Seed shall be uniformly sown at the rate specified by the use of acceptable mechanical seed drills. Rotary hand seeders, power sprayers or other satisfactory equipment may be used on steep slopes or on other areas that are inaccessible to seed drills.
- B. The seeds shall be covered and lightly compacted by means of a cultipacker or light roller if the drill does not perform this operation. On slopes inaccessible to compaction equipment, the seed shall be covered by dragging spiked chains, by light harrowing or by other satisfactory methods.
- C. Apply water with fine spray immediately after each area has been sown.
- D. Do not sow seed when ground is too dry, during windy periods or immediately following a rain.
- E. All seeded areas seeded with permanent grasses shall be uniformly mulched in a continuous blanket immediately following seeding and compacting operations, using at least 2 tons of straw per acre.

### **3.06 SEEDING (EXCELSIOR MULCH)**

- A. Seed shall be sown as specified in paragraph 3.05. Within 24 hours after the covering of seed, excelsior mulch shall be uniformly applied at the rate of 2 tons per acre. The mulch may be applied hydraulically or by other acceptable methods. Should the mulch be placed in a dry condition, it shall be thoroughly wetted immediately after placing. Light rolling of the mulch may be required to form a tight mat.

### **3.07 SEEDING (WOOD CELLULOSE FIBER MULCH)**

- A. After the lime has been applied and ground prepared as specified in paragraph 3.04, wood cellulose fiber mulch shall be applied at the rate of 1,500 pounds per acre in a mixture of seed and fertilizer. Hydraulic equipment shall be used for the application of fertilizer, seed and slurry of the prepared wood pulp. This equipment shall have a built-in agitation system with an operating capacity sufficient to agitate, suspend, and homogeneously mix a slurry of the specified amount of fiber, fertilizer, seed and water. The slurry distribution lines shall be large enough to prevent stoppage. The discharge line shall be equipped with a set of hydraulic spray nozzles which will provide an even distribution of the slurry on the various areas to be seeded. The slurry tank shall have a minimum capacity of 1,000 gallons.

- B. The seed, fertilizer, wood pulp mulch, and water shall all be combined into the slurry tank for distribution of all ingredients in one operation by the hydraulic seeding method specified herein. The materials shall be combined in a manner recommended by the manufacturer. The slurry mixture shall be so regulated that the amounts and rates of application shall result in a uniform application of all materials at rates not less than the amount specified. Using the color of the wood pulp as a guide, the equipment operator shall spray the prepared seedbed with a uniform visible coat. The slurry shall be applied in a sweeping motion, in an arched stream so as to fall like rain, allowing the wood fibers to build upon each other until an even coat is achieved.

### **3.08 SODDING**

- A. Sod shall be placed between March 1st and December 1st.
- B. Sod shall be placed within 48 hours of cutting.
- C. Sod shall be moist when laid and placed on moist ground. The sod shall be carefully placed by hand, beginning at the toe of slopes and working upwards. The length of the strips shall be at right angles to the flow of surface water. All joints shall be tightly butted and end joints shall be staggered at least 12 inches. The sod shall be immediately pressed firmly into the ground by tamping or rolling. Fill all joints between strips with fine screened soil. Sod on slopes shall be pegged with sod pegs to prevent movement. The sod shall be watered, mowed, weeded, repaired or otherwise maintained, to insure the establishment of a uniform healthy stand of grass until acceptance.

### **3.09 MAINTENANCE**

- A. Maintain seeded and sodded surfaces until final acceptance.
- B. Maintenance shall consist of providing protection against traffic, watering to ensure uniform seed germination and to keep surface of soil damp, and repairing any areas damaged as a result of construction operations or erosion.

### **3.10 ACCEPTANCE**

- A. Before release of the performance bond on the seeding and sodding performed for the establishment of permanent vegetation, the Contractor will be required to produce a satisfactory stand of perennial grass whose root system shall be developed sufficiently to survive dry periods and the winter weather and be capable of reestablishment in the spring.

**END OF SECTION**

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SECTION 33 01 30.50  
SEWER BYPASSING AND DEWATERING

**PART 1 GENERAL**

**1.01 DESCRIPTION**

A. Scope:

1. This section describes the conditions for temporary bypassing and dewatering of sewer mains and pumping facilities during construction in order to maintain operation of existing systems and connect to or install new facilities.
2. The Contractor shall provide bypass pumping whenever required during construction activities.

B. Requirements:

1. Contractor shall provide labor, materials, and supervision to temporarily bypass flow around the Contractor's work in accordance with the specific needs of the project and dewater the pipelines as needed. All references to the bypass pumping and/or bypass pumping system include, but are not limited to, all pumps, piping, plugs, valves and other equipment needed to move the intended flow from one location to another.
2. The actual design of the bypass arrangement and alignment shall be prepared by the Contractor, and shall be submitted to the Engineer to determine conformance to project objectives. Means and methods of accomplishing the bypassing shall be the responsibility of the Contractor.
3. Sanitary sewer mains shall remain in service at all times throughout the duration of the project. Contractor shall be responsible for diverting flow away from the limits of construction through the use of bypass pumping or flow diversions with prior written approval by the Engineer and Owner.
4. The bypass pumping system shall be designed to normally maintain the wastewater flow below the top of the pipe, without surcharging. The Contractor shall have the complete bypassing system in place and successfully pressure tested at least 1.5 times the maximum operating pressure of the system before bypassing any sewage.
5. The Contractor shall notify the Engineer and Owner three weeks prior to shutting down or bypassing. The bypassed flow shall be continuously monitored and maintained by the Contractor. Contractor shall keep a daily inspection checklist for each day that bypass pumping is performed.
6. Contractor is responsible for immediate and proper cleanup should any spill occur, regardless of amount.

C. Experience:

1. Contractor shall utilize staff and/or a subcontractor that has been directly responsible for completion of a project that required the bypass pumping of sewage flows in excess of 5.0 mgd.

## 1.02 SUBMITTALS

- A. The Contractor shall submit, in accordance with Section 01 33 00, a detailed bypass pumping plan including drawings and complete design data showing methods and equipment he proposes to utilize in sewer bypassing for approval by the Engineer. Plan shall be submitted no less than three weeks prior to the planned event. The submittal shall include the following information:
  - 1. Drawings indicating the scheme and location of temporary sewer plugs and bypass discharge lines. The drawings shall also show the method and location for discharging the bypass lines.
  - 2. Capacities of pumps, prime movers, and standby equipment.
  - 3. Design calculations proving adequacy of the system and selected equipment.
  - 4. Standby power source.
  - 5. Staffing plan.
  - 6. Show suction and discharge points with elevations & stationing on the design plans.
  - 7. Provide pump performance curves.
  - 8. Submit calculations to verify suction lift of pumps has not been exceeded.
  - 9. Contractor shall submit proposed noise control and exhaust control plans for pumping equipment.
  - 10. Contractor shall submit bypass piping inspection plan.
- B. The actual design of the bypass arrangement shall be prepared by the Contractor or Subcontractor performing the work, and shall be submitted to the Engineer to determine conformance to project objectives. The Contractor shall be responsible for any Subcontractors design (if used) on this Project. Means and methods of accomplishing the bypassing shall be the responsibility of the Contractor.
- C. Bypass pumping shall not commence without approval of the Owner and Engineer. Approval of submitted plans for sewer bypassing shall in no way relieve the Contractor of their responsibility for the protection of adjacent properties, downstream drainage systems and water tributaries against sewage spill. Any litigation, claims, fines, etc. associated with any sewage spill shall be the responsibility of the Contractor.

## 1.03 JOB CONDITIONS

- A. Protection:
  - 1. In areas where flows are bypassed, all bypass flows shall be discharged as approved by the Engineer. No bypassing to the ground surface, receiving waters, storm drains, or bypassing which results in soil or groundwater contamination or any potential health hazards shall be permitted.
- B. Scheduling:
  - 1. The bypassing system shall not be shut down between shifts, on holidays or weekends, or during work stoppages without written permission from the Engineer. The bypass system will be monitored and maintained at all times until the bypassing of that specific pipeline is no longer required.

## **PART 2 PRODUCTS**

### **2.01 ACCEPTABLE PUMPING SYSTEM PROVIDERS**

- A. Acceptable bypass pumping system suppliers include Godwin, Rain for Rent, or Engineer-approved equal.

### **2.02 PUMPING SYSTEMS**

- A. Contractor shall maintain on site, the following minimum requirements for all bypass pumping systems:
  - 1. Sufficient equipment and materials to ensure continuous and successful operation of the bypass and dewatering systems. The COMPLETE bypass system, including all piping, shall be continuously monitored by Contractor personnel at the site of the work.
  - 2. A system of pumps and piping operating on site to maintain a minimum capacity equal to the firm capacity of the existing facility (see Paragraph 3.01). In addition, the Contractor shall have a standby pumping system equal in capacity to the primary system ready for operation. Standby pumps shall be fueled and operational at all times.
  - 3. The Contractor shall maintain on site a sufficient number of valves, tees, elbows, connections, tools, sewer plugs, piping, hoses and other parts of system hardware to ensure immediate repair or modification of any part of the system as necessary.
  - 4. Pumps shall have sound-attenuating enclosures suitable for reducing noise levels from the proposed equipment to 70 dBa or less at a distance of 30 feet from the equipment.
  - 5. Pumping systems shall include a RACO type radio telemetry system that notifies the Contractor and Owner of an alarm condition with the bypass pumping system.

## **PART 3 EXECUTION**

### **3.01 ESTIMATED FLOWS**

- A. Flow Data:
  - 1. The Contractor is responsible for obtaining current flow condition information at the time of construction. The Owner is not responsible for any deviations in quantity of sewage flow at any time during the construction period. Higher flows may be encountered depending on weather and other upstream conditions.
- B. Pumping Head Conditions
  - 1. The Contractor shall be responsible for determining the required head conditions for all proposed bypass pumping scenarios employed in the performance of the work. Required calculations documenting the adequacy of all proposed systems shall be submitted as specified in Paragraph 1.02.

### **3.02 INSPECTION**

- A. When a pump station or pipeline is completely bypassed, the Contractor shall man the bypass system 24-hours per day with competent workmen and shall continuously monitor system and shall regularly inspect the entire bypass pumping and piping system

for leaks for spills. The Contractor shall also create an inspection log and shall enter the time of the inspections and the condition of the piping and the name of the inspector into the log for review by the Engineer.

### **3.03 DAMAGES AND FINES**

- A. The Contractor shall repair, without cost to the owner, any damage that may result from his negligence, inadequate or improper installation, maintenance and operation of bypassing system, including mechanical or electrical failures.
- B. Contractor shall be responsible for all fines levied for sewage spills that are caused by the Contractor.

**END OF SECTION**

SECTION 33 01 30.73

PIPE BURSTING

**PART 1 GENERAL**

**1.01 SUMMARY**

A. Section includes:

<u>Section</u>	<u>Title</u>
1.02	General Description
1.03	Quality Assurance
1.04	Submittals
1.05	Delivery, Storage, and Handling
1.06	Restoration
2.01	Materials
2.02	Material Handling
2.03	Sewer Pipe Bursting Method
2.04	Sewer Service Connection
3.01	Sewage Bypass
3.02	Construction Method
3.03	Pipe Joining
3.04	Manholes
3.05	Television Inspection

B. Related Sections

1. The following listed sections do not purport to be all inclusive, as it is the Contractor's responsibility to do all the Work in accordance with Contract Documents.
  - a. Rehabilitation of Sewer Utilities (33 01 30.71).
  - b. Sanitary Utility Sewerage Piping (33 31 00)

**1.02 GENERAL DESCRIPTION**

A. This specification includes requirements to furnish all labor, materials, transportation, and equipment necessary to rehabilitate various sanitary sewer pipelines by pipe bursting methods. This method fragments/splits the existing sewer pipe and immediately installs a new polyethylene pipe. The scope includes the complete installation, reconnection of existing sewer connections and site restoration. Only pneumatically operated equipment with either front or rear expanders providing for the proper connection to the polyethylene pipe will be allowed for use. The pneumatic tool must be used in conjunction with a constant tension hydraulic twin capstan winch of 5, 10, or 20 tons; the size of the winch depends on the diameter of the pipe to be replaced. In no case is the constant tension on the winch to exceed 20 tons.

**1.03 QUALITY ASSURANCE**

A. The Contractor shall be certified by the Pipe Bursting System Manufacturer, as a fully-trained, licensed installer of Manufacturer's bursting system, and shall possess all pertinent certificates to that effect.

- B. Polyethylene pipe joining shall be performed by personnel trained in the use of thermal butt-fusion equipment and recommended methods for new pipe connections. Personnel directly involved with installing the new pipe shall be certified-trained in the proper methods for handling and installing the polyethylene pipe. The Contractor shall provide a certification of training for each member.

#### **1.04 SUBMITTALS**

- A. Submit for approval, in accordance with Section 01 33 00 Submittal Procedures, all working drawings and schedules of materials and methods proposed to be followed in the execution of the Work under this item.
- B. The Contractor shall submit the following information in accordance with Section 01 33 00 Submittal Procedures:
  - 1. Shop drawings, catalog data, and manufacturer's technical data showing complete information on material composition, physical properties, dimension of new pipe and fittings, manhole gaskets, hydraulic cement/grout, and manhole rehabilitation/repair materials. Include manufacturer's recommendation for handling, storage, and repair of damage to pipe and fittings.
  - 2. Method of construction, grouting process and restoration of existing sewer house connections. This shall include detail drawings for information only showing excavation location, dimensions, sheeting and shoring, method of dewatering and other utilities that may be affected; width and length of working area, access pit, and portion of existing sewer to be removed to conduct the work; and sewage flow bypass. Design of sheeting and shoring for excavations and dewatering shall be the Contractor's responsibility.
  - 3. Certificate test reports for the polyethylene pipe fusion joint test or certificate of compliance.
  - 4. Prior to beginning work, the Contractor shall submit a work plan describing the installation procedures including equipment staging area requirements, means of sewer access, location and number of access pits, dewatering method, methods of maintaining sewage flow, method used to reactivate service laterals, method used to rehabilitate service connections and whether access to private property, pits or other excavations is required.

#### **1.05 DELIVERY, STORAGE, AND HANDLING**

- A. The Contractor shall transport, handle, and store pipe and fittings as recommended by manufacturer.
- B. If pipe and fittings become damaged before or during installation, it shall be repaired or replaced as recommended by the manufacturer, at the Contractor's expense, before proceeding any further.

#### **1.06 RESTORATION**

- A. The Contractor shall provide complete restoration, including, but not limited to all backfilling, grassing and sodding, and routine site restoration. Items for bursting not covered elsewhere in the Bid Schedule shall be included in the cost for this item.

## PART 2 PRODUCTS

### 2.01 MATERIALS

- A. Polyethylene pipe shall be High Density Polyethylene (HDPE) pipe and shall meet the applicable requirements of ASTM F714 Polyethylene Plastic Pipe (SDR-PR) based on outside diameter, ASTM D1248, ASTM D3550. Material designation shall be PE3408 with UV Stabilizer of 2 to 3% carbon black in accordance with ASTM D-1603.
- B. Size of the insertion to be used shall be such to renew the sewer pipe to its original or greater flow capacity.
- C. All pipes shall be made of virgin material. No rework except that obtained from the manufacturer's own production of the same formulation shall be used.
- D. The pipe shall be homogenous throughout and shall be free of visible cracks, holes, foreign material, blisters, or other deleterious faults.
- E. Dimension Ratios: The minimum wall thickness of the polyethylene pipe shall meet the following:

<u>Depth of Cover (feet)</u>	<u>Minimum SDR of Pipe</u>
0 to 16.0	17
>16.1	17

- F. The interior of the main sewer pipe shall be a light reflective color to facilitate closed circuit television (CCTV) inspection, such as Philips Opticore or approved equal.
- G. Test for compliance with this specification shall be made as specified herein and in accordance with applicable ASTM Specifications. A certificate with this specification shall be furnished by the manufacturer for all material furnished under this specification. Polyethylene plastic pipe and fittings may be rejected if any requirements of this specification are not met.
- H. Backfill material and compaction shall meet the requirements of Section 31 23 00 Excavation and Fill.
- I. For manhole adapter water seal, use three (3) PIPECONX Manhole Adapter seals, model number PCX MA, or an approved equal.
- J. Connections to the existing sewer service pipe at the property line shall be made using flexible connections. All flexible connections shall conform to ASTM C- 425 and shall be manufactured by Fernco #1056 Series Joint Sealer, or an approved equal. For connections made under pavement, a stainless steel Shear ring shall also be installed.

### 2.02 MATERIAL HANDLING

- A. Pipe shall be stored on level ground, preferably turf or sand, free of sharp objects, which could damage the pipe.
- B. Stacking of the polyethylene pipe shall be limited to a height that will not cause excessive deformation of the bottom layers of pipe under anticipated temperature conditions.

- C. Where necessary due to ground conditions, the pipe shall be stored on wooden sleepers, spaced suitably and of such width as not to allow deformation of the pipe at the point of contact with sleeper or between supports.
- D. Ropes, fabric, or rubber-protected slings and straps shall be used when handling pipes. Chains, cables, or hooks inserted into the pipe ends shall NOT be used.
- E. Care shall be exercised when lowering pipe into the trench to prevent damage or twisting of the pipe.
- F. The handling of the joined pipeline shall be in such a manner that the pipe is not damaged by dragging it over sharp and cutting objects.
- G. Sections of the pipe with deep cuts and gouges shall be removed and the ends of the pipeline rejoined.

## **2.03 SEWER PIPE BURSTING METHOD**

### **A. Pipe Bursting Equipment**

1. The pipe bursting tool shall be designed and manufactured to force its way through existing pipe materials by fragmenting/splitting the pipe and compressing the old pipe section into the surrounding soil as it progresses. The bursting unit shall be pneumatic or Engineer approved equivalent and shall generate sufficient force to burst and compact the existing pipeline. Use manufacturer's specifications for the size tool to be used with each size of pipe. Parameter for size tool percentage for upsizing is allowed.
2. The pipe bursting tool shall be pulled through the sewer by a winch located at the destination manhole. The bursting unit shall pull the polyethylene pipe with it as it moves forward. The bursting head shall incorporate an expander to prevent pipe collapse of the hole ahead of the polyethylene pipe insertion. The pipe bursting unit shall be remotely controlled.
3. The bursting action of the tool shall increase the external dimension sufficiently, causing breakage of the pipe and at the same time expanding the surrounding ground. This action shall not only break the pipe, but also create a void into which the bursting head can be winched, enabling forward progress to be made. At the same time, polyethylene pipe, directly attached to the sleeve on the rear of the bursting head, shall also move forward.
4. A hydraulic winch shall give the bursting head tension, by which it can be moved forward. To form a complete operating system, the bursting head must be matched to a constant tension twin captain engine hydraulic winch system.

### **B. Winch Unit**

1. A winch cable shall be attached to the front of the bursting unit. The winch shall provide a constant tension to the bursting head so that it operates in an efficient manner. The winch shall ensure directional stability in keeping the unit on line.
2. The winch shall be hydraulically operated, providing a constant tension throughout the operation. The winch shall be of the constant tension type, and be fitted with a direct reading load gauge to measure the winching load. The winch must automatically maintain a constant tension at a set tonnage reading.

3. The constant tension winch shall supply sufficient cable in one continuous length so that the pull may be continuous between winching points.
4. The winch, cable, and cable drum must be provided with safety cage and supports so that it may be operated safely without injury to persons or property.
5. The Contractor shall provide a system of guide pulleys and bracing at each manhole to minimize cable contact with the existing sewer between manholes.
6. The supports to trench shoring in the insertion pit shall be completely separate from the winch boom support system, and shall be so designed that neither the pipe nor winch cable shall be in contact with them.

## **2.04 SEWER SERVICE CONNECTION**

- A. All sewer service connections shall be identified and located prior to the pipe insertion to expedite excavation and reconnection. Contractor shall excavate and make the reconnection, replace the service pipe, and tie-in to the existing service pipe at the right-of-way or easement. Excavation may be made by mechanical means, if damage to property is minimal; otherwise hand excavation is required. Excavated material shall be placed on plywood or plastic to facilitate restoration. Upon commencement, pipe insertion shall be continuous and without interruption from one manhole to another, except as approved by the Engineer. Upon completion of insertion of the new pipe, the contractor shall expedite the reconnection of services to minimize any inconvenience to customers.
- B. Any substitution in the sewer service saddle, due to any reason, must be approved by the Engineer or FC. Sewer service connection shall be connected to the new sewer pipe by one of the following methods:
  1. Conventional Schedule 40 PVC saddles with gaskets, held into place by stainless steel bands and adhered to the main pipe with "3M Brand marine Adhesive Sealant 5200 (white), Part no. 05135-06500", or equal.
  2. Neoprene flexible saddle, DFW model DFW-6TC, or equal; complete with stainless steel clamps, secured to the main pipe with Devcon Polystrate Plastic welder, or equal; and two (2) stainless steel bands on the main, and one (1) band to secure the lateral PVC piping.
  3. When connecting PVC to HDPE, use transition coupling, "Plastic trends" PTI 657, 4" SDR 35, PVC x 4.5 or 6.625 O.D. HDPE pipe coupling.
- C. Service connections replaced via "Open Trench Method" shall be a minimum of six inch (6") diameter or larger, if pre-existing. For service connections replaced via "Trenchless Methods", including pipe bursting, ground piercing, or slip lining a modified Siamese connection, the existing size shall be replaced to maintain or increase flow capacity. Any size deviations shall be reviewed and approved by the Engineer and FC.
- D. If the sewer has instances where multiple sewer services join to a main service line, and are connected to the main sewer line with one connection, the Contractor shall separate the joined service into individual service connections regardless of depth of bury of the main sewer line.

## **PART 3 EXECUTION**

### **3.01 SEWAGE BYPASS**

- A. The Contractor shall bypass sewage flow around the section or sections of sewer main that are to be rehabilitated, cleaned, or televised, to the requirements of Section 33 01 30.50 Bypass Pumping.
- B. The pump and bypass mains shall be of adequate capacity and size to handle the flow.
- C. Where pump discharge lines cross streets or alleys, they shall be covered with wooden or metal ramps designed and installed in such manner that they do not unreasonably impair vehicular traffic traveling said streets or alleys. All pumping or bypassing work shall be approved by FC prior to the Work being started.
- D. Whenever the bypassing operation is complete, any stored flow shall be released gradually to avoid a surge in flow that could flood or overload receiving pipes.

### **3.02 CONSTRUCTION METHOD**

- A. Equipment used to perform the work shall be located so as not to create an unacceptable noise impact. Contractor shall provide a silent engine compartment with the winch and compressor to reduce machine noise as required to meet local noise requirements.
- B. The Contractor shall install all pulleys, rollers, bumpers, alignment control devices, and other equipment required to protect existing manholes, and to protect the pipe from damage during installation. Lubrication may be used as recommended by the manufacturer. Under no circumstances shall the pipe be stressed beyond its elastic limit. Winch line shall be centered in the pipe to be burst with adjustable boom.
- C. The installed pipe shall be allowed the manufacturer's recommended time, for cooling and relaxation due to tensile stressing prior to any reconnection of service lines, sealing of the annulus, or backfilling of the entry/retrieval pits. Sufficient excess length of new pipe, but not less than four inches (4") shall be allowed to protrude into the manhole to provide for relaxation, sealing, and trimming.
- D. Following the relaxation period, the new pipe shall be sealed at the manhole. Provide three (3) flexible water stops centered in the existing manhole wall. Comparable water stops, such as a flexible boot, that offer improved sealing may be substituted for the three (3) flexible water stops, as directed by the Engineer. Grout flexible connector in the manhole, filling all voids the full thickness of the manhole wall, to provide a smooth uniform watertight joint. Alternative methods achieving equal or better results may be considered by the Engineer, and shall not be used unless approved in writing by the Engineer.
- E. Restore manhole bottom and inverts to the original.
- F. Line obstructions, dropped joints, protruding service taps, or unacceptable sags in the existing sanitary sewer line which would prevent pipe bursting, shall be corrected by the Contractor, when directed by the Engineer, and will be handled as a Remove and Replace point repair.

- G. The Contractor and work crews shall understand and be responsive to FC safety and project outreach initiatives. Interaction with customers should be handled in a professional and courteous manner. Contractor shall cooperate with FC personnel to maintain a high level of overall customer satisfaction.

### **3.03 PIPE JOINING**

- A. The HDPE pipe shall be assembled and joined at the site using butt-fusion method to provide a leak-proof joint. Threaded or solvent-cement joints and connections are not permitted.
- B. All equipment and procedures shall be used in strict compliance with the manufacturer's recommendations. Fusing shall be accomplished by personnel certified as fusion technicians by the manufacturer of the supplied HDPE pipe and/or fusion equipment.
- C. The butt-fused joint shall be properly aligned and shall have uniform roll-back beads resulting from the use of proper temperature and pressure. The joint shall be allowed to adequately cool before removal of pressure. The fused joint shall be water tight and shall have tensile strength equal to, or greater than, that of the pipe.
- D. All joints shall be subject to acceptance by the Engineer prior to insertion. All defective joints shall be cut out and replaced at no cost to FC. Any section of the pipe with a gash, blister, abrasion, nick, scar, or other deleterious fault greater in depth than ten percent (10%) of the wall thickness, shall not be used and must be removed from the site. However, a defective area of the pipe may be cut out and the joint fused in accordance with the procedures stated above. In addition, any section of the pipe having other defects such as concentrated ridges, discoloration, excessive spot roughness, pitting, variable wall thickness or any other defect of manufacturing or handling shall be discarded and not used.
- E. Pipe that is not butt-fused, that needs to be joined within a pit, as result of a point repair or other circumstances approved by the Engineer, shall be connected with a water main grade, stainless steel, full circle repair clamp or approved equivalent.

### **3.04 MANHOLES**

- A. Manhole frames and covers shall be replaced if damaged during pipe bursting operations, at the Contractors expense. There shall be no separate payment for this item.
- B. Any work required to rehabilitate, modify, or replace manholes and frames and covers shall be in compliance with Section 33 05 16.13 Precast Manholes Frames and Covers.

### **3.05 TELEVISION INSPECTION**

- A. The Contractor shall conduct a preliminary CCTV inspection of the existing sewer prior to beginning rehabilitation work. The videotape and report shall clearly identify location, size, and condition of the pipe, elevations, material types, and location of all lateral connections. All CCTV work and cleaning performed by the Contractor is incidental to the pipe bursting task. The Contractor shall advise the Engineer and FC of any existing pipe conditions which may result in unacceptable pipe conditions post pipe bursting.

- B. The Engineer will advise the Contractor as to the suitability to proceed with the pipe bursting. Prior to beginning CCTV work in a neighborhood, the Contractor in coordination with FC, shall distribute project outreach door hangers to the affected homes and/or businesses.
- C. After the existing sewer is completely replaced, the new line shall be internally inspected using CCTV by the Contractor. The finished video tape shall be continuous over the entire length of sewer between two manholes and prove the new line to be free from visual defects. FC, at its option, may perform a post installation CCTV inspection for project acceptance and follow up inspections during the Warranty Period. The Contractor shall notify the Engineer and FC in writing, forty-eight (48) hours prior to conducting post CCTV inspections.
- D. Defects including damage, sags, faulty service connections, leaks, etc., which may affect the integrity or strength of the sewer system shall be corrected at the Contractor's expense. Conditions such as sags that were shown to be pre-existing on the preliminary CCTV inspection, and not corrected sufficiently via pipe bursting shall be brought to the attention of the Engineer and FC for review.

**END OF SECTION**

SECTION 33 05 13.16  
PRECAST MANHOLES, FRAMES AND COVERS

**PART 1 GENERAL**

**1.01 SCOPE OF WORK**

- A. Furnish all labor, materials and equipment required to install precast concrete manholes, grade rings, frames and covers, and appurtenances as shown on the Drawings and as specified herein.

**1.02 SUBMITTALS**

- A. Shop drawings, product data, materials of construction, and details of installation shall be submitted in accordance with Section 01 33 00. Submittals shall include the following:
  - 1. Design calculations, sealed by a Professional Engineer licensed in the State of Georgia, indicating adequate strength to resist the vertical and lateral loadings including "H-20" wheel loadings, and buoyancy forces.
  - 2. Base sections, riser sections, eccentric and concentric conical top sections, flat slab tops, grade rings with notarized certificate indicating compliance with ASTM C478.
  - 3. Concrete mix design.
  - 4. Detail of pipe connection(s) to manhole.
  - 5. Manhole frame and cover style and finish with notarized certificate indicating compliance with ASTM A48, Class 30.
  - 6. Method of repair for minor damage to precast concrete sections.
- B. Design data for precast concrete structures: sectional plan(s) and elevations showing dimensions, reinforcing steel placement, manhole covers, steps, baffle plates, and accessories.
- C. Test reports for precast concrete structures: concrete test cylinder reports from an approved testing laboratory certifying conformance with specifications.
- D. Manufacturers Installation (or Application) Instructions
- E. Operation and Maintenance Data

**1.03 REFERENCE STANDARDS**

- A. New and replacement manholes shall be constructed and installed per Forsyth County Department of Water and Sewer standard specifications and the Contract Drawings.
- B. Occupational Safety and Health Administration (OSHA).

**1.04 QUALITY ASSURANCE**

- A. All material shall be new and unused.

- B. Materials' quality, manufacturing process and finished sections are subject to inspection and approval by Owner or other Owner's representative. Inspection may be made at place of manufacture, at work site following delivery, or both.
- C. Materials will be examined for compliance with ASTM specifications, these Specifications and approved manufacturer's drawings. Additional inspection criteria shall include: appearance, dimensions(s), blisters, cracks and soundness.
- D. Materials shall be rejected for failure to meet any Specification requirement. Rejection may occur at place of manufacture, at work site, or following installation. Mark for identification rejected materials and remove from work site immediately. Rejected materials shall be replaced at no cost to Owner.
- E. Repair minor damage to precast concrete sections by approved method, if repair is authorized by Owner.

## **1.05 WARRANTY**

- A. All materials supplied under this section shall be warranted for a period of 2-years by the manufacturer and the Contractor. Warranty period shall commence upon formal acceptance of the project by the Owner.
- B. The materials shall be warranted to be free from defects in workmanship, design and materials. If the materials should fail during the warranty period, it shall be replaced or restored to service at no expense to the Owner.
- C. The manufacturer's warranty period shall run concurrently with the Contractor's warranty period. No exception to this provision shall be allowed.

## **PART 2 PRODUCTS**

### **2.01 GENERAL**

- A. Reference to a manufacturer's name and model or catalog number is for the purpose of establishing the standard of quality and general configuration desired.
- B. Like items of materials/equipment shall be the end products of one manufacturer in order to provide standardization for appearance, operation, maintenance, spare parts and manufacturer's service.
- C. Provide lifting lugs or holes in each precast section for proper handling.

### **2.02 PRECAST CONCRETE MANHOLE SECTIONS**

- A. Precast concrete base sections, riser sections, transition top sections, flat slab tops and grade rings shall conform to ASTM C478, Forsyth County Department of Water and Sewer standard specifications and meet the following requirements:
  - 1. Bottom slab thickness shall equal the riser wall thickness or flat slab top thickness, whichever is greater.
  - 2. Unless otherwise specified, top section shall be eccentric cone where cover over pipe exceeds 4 feet; top section shall be flat slab where cover over top of pipe is 4 feet or less, or where shown.

3. Base, riser and transition top sections shall have tongue and groove joints.
4. Sections shall be cured by an approved method.
5. Ship precast concrete only after concrete has attained 3,000 psi compressive strength.
6. Design precast concrete base, riser, transition top, flat slab top and grade ring for a minimum H-20 loading plus earth load. Calculate earth load with a unit weight of 130 pcf. Calculate buoyancy forces based on groundwater depth 1-foot below the ground surface.
7. Mark date of manufacture, name and trademark of manufacturer on the inside of each precast section.
8. Construct and install precast concrete base as shown on the Drawings.
9. Portland cement shall be ASTM C150, Type V.

### **2.03 MANHOLE FRAME AND COVER**

- A. Manhole frames and covers shall be of good quality, strong, tough, even grained cast iron, smooth, free from scale, lumps, blisters, sand holes and defects of any kind which render them unfit for the service for which they are intended. Manhole covers and frame seats shall be machined to a true surface. Castings shall be thoroughly cleaned and subject to hammer inspection. Cast iron shall conform to ASTM A48, Class 30, and Forsyth County Department of Water and Sewer standard specifications.
- B. Manhole covers shall be Vulcan, U.S. Foundry, or equal. Manhole shall be Tindall Concrete, Foley Products, or equal. See manhole cover drawing at the end of this specification. [See Figure 1].
- C. The letters "SEWER", of size and letter type acceptable to the Owner, shall be cast into each manhole lid.

### **2.04 JOINTING PRECAST MANHOLE SECTIONS AND STRUCTURES**

- A. Seal tongue and groove joints of precast manhole and structure sections with preformed flexible joint sealant. Preformed flexible joint sealant shall be Kent Seal No. 2 as manufactured by Hamilton-Kent, or equal.
- B. Completed joint shall withstand 15 psi internal water pressure without leakage or displacement of gasket or sealant.

### **2.05 PIPE CONNECTIONS TO MANHOLE**

- A. Connect pipe to manhole in the following ways:
  1. Precast manhole connections shall be watertight in accordance with ASTM C-923.
  2. Flexible Sleeve, i.e., Rubber Boot
    - a. Integrally cast sleeve in precast manhole section or install sleeve in a formed or cored opening. Fasten pipe in sleeve with stainless steel clamp(s). Coat stainless steel clamp(s) with bituminous material to protect from corrosion. Flexible sleeve shall be Lock Joint Flexible Manhole Sleeve; Kor-N-Seal connector; PSX Press-Seal Gasket or equal.

## **2.06 LINER / LININGS**

- A. If the manhole is receiving discharge from a sanitary sewer force main, interior of manhole shall be coated with 125 mils of Tnemec 436 and 15 mils of 435.

## **PART 3 EXECUTION**

### **3.01 GENERAL**

- A. All excavation, temporary shaft supports, sheeting and shoring, foundation cushion, concrete and grout required to support the walls of shafts and necessary to construct the manholes as shown on the Contract Drawings shall be provided.
- B. All sheeting and shoring inclusive of liner plates shall be cut off 2 feet below ground surface and left in place, the cost of which shall be included in the various lump sum prices stipulated in the Bid.
- C. Excavated materials shall be disposed of by the contractor as described in Section 31 23 00 of the specifications and the cost of which shall be included in the various lump sum prices stipulated in the bid.

### **3.02 PRECAST MANHOLES**

- A. Precast concrete manhole riser sections shall be installed plumb and true on the precast concrete base sections as shown on the Contract Drawing. Before placing the preformed flexible joint sealant in the spigot groove, the preformed flexible joint sealant and all bearing surfaces of the tongue and groove shall be wiped clean. Care shall be taken when lowering any precast unit into the trench that no dirt gets on the preformed flexible joint sealant or into the joint. Top sections of precast manholes shall be flat slab-type or eccentric cone sections cast to the proper dimensions to receive the manhole casting shown on the Contract Drawings.
- B. All manhole riser section joints shall be sealed with an exterior 6" EPDM rubber seal wrap installed according to the manufacturer's recommendations. All joints shall be grouted both on the interior and the exterior.
- C. The top of the wall of all manholes shall be properly leveled off with mortar so as to form a flat surface upon which the manhole rim is to rest, and manholes shall be carried to such height above the sewer as shown, as necessary to meet grade or as ordered, but shall not be left in a depression to act as an area drain.
- D. When there is not enough room for a full length of precast concrete riser section to be installed under the manhole frame, precast reinforced concrete grade rings with flexible EPDM rubber seal shall be used for sanitary manholes. The use of brick masonry on sanitary manholes is prohibited.
- E. In order to allow for a future adjustment of roadway grade or widening of existing roadway, shorter lengths of riser sections when used should be installed immediately below the cone section. Also, a minimum of one precast concrete grade ring will be required on top of the cone or flat slab top section to effect the proper elevation for the manhole rim. The total height of precast concrete grade rings and mortar shall not exceed 12 inches.

- F. Precast bottom sections with integral bases when used shall be set plumb on a firm foundation in the trench. Height of the bottom section shall be provided to admit the various pipes at the elevations shown on the drawings and still contain sufficient material for structural integrity across the top of these openings. Pipe openings shall be cast into the unit at the time of manufacture. All pipe connections to precast concrete manholes shall be made with resilient connectors conforming to ASTM C923.
- G. Cast-in-place non-reinforced concrete manhole bottom sections shall be built in accordance with the dimensions indicated on the Contract Drawings. Forming and finishing shall be done per Forsyth County Department of Water and Sewer standard specifications.
- H. Manholes shall have steps (rungs) built into the precast and cast-in-place concrete manhole sections and shall be securely embedded in the precast concrete manhole wall at the time of manufacture. Steps shall be placed as shown on the Contract Drawings. The Contractor shall arrange the various components that will become part of the manhole so that the vertical step spacing is consistent and the frame and cover is situated as oriented in plan on the Contract Drawings.
- I. The manhole frames shall be properly set in place in a full bed of mortar and so adjusted as to make the top of the rim a few inches higher than the surrounding ground so as not to act as a surface drain, or flush with paved surfaces.

### **3.03 CLEANING**

- A. Thoroughly clean all new manholes of all silt, debris and foreign matter of any kind, prior to final inspections.

### **3.04 LEAKAGE TESTING**

- A. Contractor shall meet Forsyth County Department of Water and Sewer standards for leakage test.

**END OF SECTION**

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SECTION 33 05 31

DUCTILE IRON PIPE

**PART 1 GENERAL**

**1.01 DESCRIPTION**

A. Scope:

1. This section specifies ductile iron pipe, ductile fittings and gaskets.

B. Definition:

1. Where cast iron pipe is specified, the term and symbol shall mean ductile iron pipe.

**1.02 REFERENCES**

- A. This section contains references to the following documents. They are a part of this section as specified and modified. Where a referenced document contains references to other standards, those documents are included as references under this section as if referenced directly. In the event of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.
- B. Unless otherwise specified, references to documents shall mean the documents in effect at the time of Advertisement for Bids or Invitation to Bid (or on the effective date of the Agreement if there were no Bids). If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, regardless of whether the document has been superseded by a version with a later date, discontinued or replaced.

<b>Reference</b>	<b>Title</b>
ANSI A21.14	Ductile-Iron Fittings 3 In. Through 24 In., for Gas
ANSI A21.52	Ductile-Iron Pipe, Centrifugally Cast, in Metal Molds or Sand Lined Molds for Gas
ANSI B16.1	Cast Iron Pipe Flanges and Flanged Fittings Class 25, 125, 250, and 800
ANSI B16.5	Pipe Flanges and Flanged Fittings
ASTM A716	Ductile-Iron Culvert Pipe
ASTM C150	Portland Cement
AWWA C104 (ANSI A21.4)	Cement-Mortar Lining for Ductile- Iron and Gray-Iron Pipe and Fittings for Water
AWWA C110 (ANSI A21.10)	Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In., for Water and Other Liquids
AWWA C111 (ANSI A21.11)	Rubber-Gasket Joints for Ductile- Iron and Gray-Iron Pressure Pipe and Fittings
AWWA C115 (ANSI A21.15)	Flanged Ductile-Iron and Gray-Iron Pipe with Threaded Flanges
AWWA C116 (ANSI A21.16-09)	Protective Fusion-Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings
AWWA C150 (ANSI A21.50)	Thickness Design of Ductile-Iron Pipe

Reference	Title
AWWA C151 (ANSI A21.51)	Ductile-Iron Pipe, Centrifugally Cast, in Metal Molds or Sand-Lined Molds, for Water or Other Liquids
AWWA C153 (ANSI A21.53)	Ductile-Iron Compact Fittings, 3 In. Through 12 In. for Water and Other Liquids
AWWA C600	Installation of Ductile-Iron Water Mains and Their Appurtenances
AWWA C606	Grooved and Shouldered Type Joints

### 1.03 SUBMITTALS

- A. The following information shall be provided in accordance with Section 01 33 00:
1. A copy of this specification section, with addendum updates included, and all referenced and applicable sections, with addendum updates included, with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements. Check marks shall denote full compliance with a paragraph as a whole.
  2. If deviations from the specifications are indicated, and therefore requested by the Contractor, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph, referenced to a detailed written explanation of the reasons for requesting the deviation.
  3. The Engineer shall be the final authority for determining acceptability of requested deviations. The remaining portions of the paragraph not underlined will signify compliance on the part of the Contractor with the specifications.
  4. Failure to include a copy of the marked-up specification sections, along with justification(s) for any requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no further consideration.

## PART 2 PRODUCTS

### 2.01 GENERAL

- A. Pipe design, materials and manufacture shall comply with the following documents:

Item	Document
Thickness design	AWWA C150
Manufacturing requirements	
• Water or other liquid	AWWA C151
• Gas	ANSI A21.52
Gravity service pipe	ASTM A716
Joints	
• Rubber gasket	AWWA C111
• Threaded flange	AWWA C115
Fittings	
• Water or other liquid	AWWA C110/AWWA C153
• Gas	ANSI A21.14
Cement mortar lining	AWWA C104

## 2.02 PIPE

- A. Unless otherwise specified, ductile iron pipe shall be supplied as follows:

Diameter	Minimum Pressure Class
4" through 14"	350
16" and greater	250

- B. Unless otherwise specified, pipe shall have nominal laying lengths of 18 or 20 feet.
- C. All pipe shall be manufactured in the United States of America.

## 2.03 GASKETS

- A. Unless otherwise specified, gasket stock shall be a synthetic rubber compound in which the elastomer is nitrile or neoprene. The compound shall contain not less than 50 percent by volume nitrile or neoprene and shall be free from factice, reclaimed rubber and other deleterious substances. Gaskets shall, in addition, comply with AWWA C111 for push-on and mechanical joints and with AWWA C606 for grooved end joints.

## 2.04 FITTINGS

- A. Unless otherwise specified, fittings shall conform to AWWA C110. Ends shall be flanged, restrained mechanical joint, restrained push-on, or grooved to suit the conditions specified. The AWWA C153 compact ductile iron fittings in sizes 3 through 12 inches are an acceptable substitute for standard fittings unless otherwise specified. Long-radius elbows shall be provided where specified. To assure uniformity and compatibility of piping components, fittings and couplings for grooved end piping systems shall be furnished by the same manufacturers.

## 2.05 JOINTS

- A. Unrestrained Joints:

1. Push-On Joints: Unrestrained joints, where specified, shall be the rubber ring compression, push-on type joint suitable for buried service. Unrestrained joints shall be the Fastite Joint as manufactured by American Cast Iron Pipe Company, the Tyton Joint as manufactured by U.S. Pipe, or equal. This joint is not permitted on fittings or specials, unless otherwise specified. Unless otherwise specified, joints shall have an allowable deflection up to 5 degrees at specified pressures. Joint assembly and field cut joints shall be made in strict conformance with AWWA C600 and manufacturer's recommendations.
2. Mechanical Joints: Where specified, mechanical joints for above or below ground service shall meet the requirements of ANSI/AWWA A21.10/C110 and ANSI/AWWA A21.11/C111. Gaskets and bolts and nuts shall comply with paragraphs 2.03 and 2.05 Bolts and Nuts, respectively.

- B. Restrained Joints:

1. General: Unless otherwise specified, restrained joints are required for all exposed and buried piping. Unless otherwise specified, restrained joints shall be flanged or grooved end for exposed service and restrained push-on for buried service.

2. Push-On Joints:
  - a. Restrained push-on joints shall be as specified in paragraph 2.05 Push-On Joints, modified for restraint.
  - b. Joints shall be the Flex-Ring or Lok-Ring Joint as manufactured by American Cast Iron Pipe Company, TR Flex Joint as manufactured by US Pipe, or equal. Restrained joints shall be capable of being deflected after full assembly.
  - c. For buried straight runs of pipe 16" and smaller (or where specifically noted on the drawings), American Cast Iron Pipe "Fast Grip", U.S. Pipe "Field-Lok" or equal shall be allowed for restraint.
  - d. Joint assembly shall be in strict conformance with AWWA C600 and manufacturer's recommendations.
  - e. No field cuts of restrained pipe are permitted without prior approval of the Engineer.
3. Mechanical Joints:
  - a. Where specified, restrained mechanical joints shall be the positive restraint type.
  - b. Mechanical joints with retainer glands are acceptable for buried fittings and valves.
  - c. Locked mechanical hydrant tees, bends and adapters are an acceptable substitute for anchoring fire hydrants and valves to the pipe main.
4. Flange Assemblies: Unless otherwise specified, flanges shall be ductile iron and shall be threaded-on flanges conforming to ANSI/AWWA A21.15/C115 or cast-on flanges conforming to ANSI/AWWA A21.10/C110. Flanges shall be adequate for 250 psi working pressure. Bolt circle and bolt holes shall match those of ANSI B16.1, Class 125 flanges and ANSI B16.5, Class 150 flanges. Where specified, flanges shall be threaded-on or cast-on flanges conforming to ANSI B16.1, Class 250.
  - a. Bolts:
    - 1) Flange assembly bolts shall be ANSI B18.2.1 standard square or hexagon head bolts with ANSI B18.2.2 standard hexagon nuts. Threads shall be ANSI B1.1, standard coarse thread series; bolts shall be Class 2A, nuts shall be Class 2B. Bolt length shall conform to ANSI B16.5.
    - 2) Except where high strength bolts are specified, flange bolts for exposed flanges shall be carbon steel machined bolts with hot pressed hexagon nuts, ASTM A307, Grade B8. Where high strength bolts are specified in the PIPESPEC, flange bolts for exposed flanges shall be carbon steel hex cap screws, ASTM A449, Type 1 or Type 3. All nuts and bolts for non-submerged service shall be hot-dip galvanized.
    - 3) Bolts for submerged service shall be made of Type 316 stainless steel in conformance with ASTM F593, marking F593F. Nuts for submerged service shall be Type 316 stainless steel conforming to ASTM F594, with a minimum proof stress equal to or greater than the tensile strength of the bolts. Assemble stainless steel flange hardware using an anti-seize lubricant suitable for the installed conditions. Lubricant shall be Bostik Never Seez.
    - 4) Bolts and nuts for buried service shall be made of noncorrosive high-strength, low-alloy steel having the characteristics specified in ANSI/AWWA C111/A21, regardless of any other protective coating. Where washers are required, they shall be of the same material as the associated bolts.

- b. Gaskets:
  - 1) Gasket material shall be as specified in paragraph 2.03.
  - 2) Gaskets for plain faced flanges shall be the full face type. Thickness shall be 1/16 inch for pipe 10 inches and less in diameter and 1/8 inch for pipe 12 inches and larger in diameter. Unless otherwise specified, gaskets for raised face flanges shall match the raised face and shall be 1/16 inch thick for pipe 3-1/2 inches and less in diameter and 1/8 inch thick for pipe 4 inches and larger.

5. Thrust Restraint

- a. Two forms of thrust restraint shall be installed at all hydrants, valves, plugs, caps, tees, bends deflecting 11 ¼ degrees or more and other fittings.
- b. Thrust restraints at hydrants and valves shall be accomplished by installing eyebolts on the hydrant or valve and tying to an adjacent fitting or concrete tie-back using the appropriate quantity and size of treaded rods per drawings (Deadman for Plug Detail indicates rod size and quantity per pipe size). Thrust restraint shall also include one of the following:
  - 1) Restrained joint pipe and fittings
  - 2) Mega-Lugs or equal
- c. Thrust restraint at plugs, caps, tees, bends deflecting 11 ¼ degrees or more and other fittings shall be accomplished by cast-in place concrete blocking installed to dimensions as shown on thrust block details (see drawings), and shall be placed against undisturbed soil. Thrust restraint shall also include one of the following:
  - 1) Restrained joint pipe and fittings
  - 2) Mega-Lugs or equal

C. Ball and Socket Flexible Joint Pipe:

- 1. Ball and socket flexible joint pipe shall be the boltless type and shall allow a maximum joint deflection of 15 degrees. Each joint shall be provided with a retainer lock to prevent rotation after assembly. Joints shall be the Flex-Lok Joint as manufactured by American Cast Iron Pipe Company, USiflex as manufactured by U.S. Pipe, or equal.

D. Bolts and Nuts:

- 1. Corrosion-resistant bolts and nuts for use with ductile iron joints shall be Type 316 stainless steel.”

**2.06 PIPE COATING**

- A. Pipe and fittings shall be furnished with a metallic zinc coating (mass of 200 g/m<sup>2</sup>) applied directly to the pipe, as specified in ISO 8179.
- B. Additionally, pipe and fittings shall be coated with asphaltic material as specified in AWWA C151.
- C. Where within 20 linear feet of an existing steel gas line, or corrosive soils or soils with electrical currents are encountered that may, or in the judgment of the Owner, cause a deleterious effect on the piping system shall be wrapped with 8-mil polyethylene sleeves in accordance with the manufactures recommendations to a minimum distance of 20

lineal feet beyond such conditions. All elements of the piping system shall be wrapped entirely in polyethylene tubing and secured with polyethylene tape to completely prevent the entrance of foreign matter. Such encasement shall be carried out in accordance with ANSI/AWWA C105/A21.5.

## **2.07 PIPE LINING**

### **A. Cement Mortar Lining:**

1. Pipe:
  - a. Cement mortar lining shall be to Standard thickness in accordance with ANSI/AWWA C104/A21.4.
2. Fittings:
  - a. Cement mortar lining shall be to Double thickness in accordance with ANSI/AWWA C104/A21.4.

## **2.08 PRODUCT DATA**

### **A. The following information shall be provided in accordance with Section 01 33 00:**

1. Shop drawings.
2. Alignment drawings.
3. Certifications specified in the following documents:
  - a. ANSI A21.14, paragraph 14-4.2
  - b. ANSI A21.52, paragraph 52-4.2
  - c. ASTM A716, paragraph 4.2
  - d. AWWA C110, paragraph 10-5.3
  - e. AWWA C111, paragraph 11-7.1
  - f. AWWA C115, paragraph 15-4.2
  - g. AWWA C151, paragraph 51-5.2
  - h. AWWA C153, paragraph 53-6.3
  - i. AWWA C606, paragraph 4.1.1.1

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

#### **A. General:**

1. Piping runs specified on the drawings shall be followed as closely as possible. Proposed deviations shall be submitted in accordance with Section 01 33 00.
2. Pipe shall be installed in accordance with AWWA C600.
3. Connections to existing structures and manholes shall be made so that the finished work will conform as nearly as practicable to the requirements specified for the new manholes, including necessary concrete work, cutting and shaping. Concrete mortar shaping within any structure and manhole shall be as specified.
4. Coatings and linings shall be inspected for damage during installation, and damage shall be repaired according to the coating manufacturer's recommendations.

B. Unloading and Laying

1. Unload ductile iron pipe, fittings and accessories with hoists or by skidding. Under no circumstances are pipe to be dropped. Do not skid or roll pipe handled on skid ways against pipe already on the ground. Do not damage casting and linings; but, in the event should damage occur, make repairs or replacement to satisfaction of the Engineer/Inspector.
2. Use proper, suitable tools and appliances for the safe and convenient handling and laying of the pipe and fittings. Take care to prevent the pipe coating from being damaged, particularly on the inside of the pipe and fittings.
3. Pipe may not be "strung" along the job within highway right-of- ways without the approval of the Engineer/Inspector.
4. Carefully examine all pipe and fittings for defects just before laying and lay no pipe or fitting which is known to be defective. In the event that defective pipe is discovered after having been laid, remove and replace with a sound pipe or fitting in a satisfactory manner at Contractor's expense.
5. Thoroughly clean all pipe and fittings before being laid. Plug open ends of pipe with an approved plug during construction.

C. Insulating Sections:

1. Where a metallic nonferrous pipe or appurtenance is connected to ferrous pipe or appurtenance, an insulating section of rubber or plastic pipe shall be provided. The insulating section shall have a minimum length of 12 pipe diameters. Dielectric unions as specified below may be used instead of the specified insulating sections. Where copper pipe is supported from hangers, it shall be insulated from the hangers, or copper-plated hangers shall be used. Dielectric unions shall be EPCO, Capitol Manufacturing, or equal.

D. Anchorage:

1. Anchorage shall be provided as specified. Calculations and drawings for proposed alternative anchorage shall be submitted in accordance with Section 01 33 00.

**3.02 ACCEPTANCE TESTING**

- A. The contractor should follow Forsyth County standards for television inspection and leak testing of sewer gravity mains.

**3.03 GUARANTEE**

- A. The Contractor shall guarantee for a period of twelve (12) months from the final acceptance, all water mains, appurtenances, trenches, roadways, landscaping, and other areas disturbed by the construction of the project.
- B. The Contractor shall be responsible for repairs to any leaking pipe, fittings, etc. should trenches settle, he/she shall promptly furnish and place fill to original grade. Should any leaks or trench settlement occur under the new pavement, the Contractor will be held responsible for the cost of all repairs, including pavement replacement. No bell clamps or wrap around corsets are allowed as a means of repair on new pipelines.
- C. Within the guarantee period, where no loss of customer service or property damage is involved, the Contractor shall begin work on requested repairs or corrective measures

with 24 hours following notification by Owner. If property damage or loss of customer service is involved, the Contractor shall begin work with four (4) hours of notification by Owner.

### **3.04 INSPECTION**

- A. Furnish to Owner copies of the Manufacturer's Sworn Certificate of Inspection and Testing of all ductile iron pipe and ductile iron fittings provided on the Work. All ductile iron pipe and cast iron fittings will be subject to inspection and approval by Owner after delivery of material to the site. Do not use broken, cracked, misshaped, imperfectly coated, unsatisfactory, or otherwise damaged pipe or fittings.
- B. Such inspection by Owner does not relieve the Contractor of full responsibility for the material installed.

**END OF SECTION**

SECTION 33 05 36  
HIGH-DENSITY POLYETHYLENE (HDPE) PIPE

**PART 1 GENERAL**

**1.01 DESCRIPTION**

A. Scope:

1. This section specifies high density polyethylene (HDPE) pipe, fittings, and appurtenances for piping 4 inches to 63 inches in nominal diameter.

B. Characteristics:

1. The piping system shall conform with the following:

Dimension ratio (DR)	17
Pressure Class in accordance with AWWA C906	100

**1.02 QUALITY ASSURANCE**

A. References:

1. This section contains references to the following documents. They are a part of this section as specified and modified. Where a referenced document contains references to other standards, those documents are included as references under this section as if referenced directly. In the event of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.
2. Unless otherwise specified, references to documents shall mean the documents in effect at the time of Advertisement for Bids or Invitation to Bid (or on the effective date of the Agreement if there were no Bids). If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, regardless of whether the document has been superseded by a version with a later date, discontinued or replaced.

References	Title
ANSI/AWWA C906	Polyethylene (PE) Pressure Pipe and Fittings, 4-inch through 63-inch, for Water Distribution
ASTM D2321	Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
ASTM D2657	Heat Joining Polyolefin Pipe and Fittings
ASTM D3350	Polyethylene Plastics Pipe and Fittings Material
PPI TR 31	Underground Installation of Polyolefin Piping

B. Inspection and Testing:

1. All HDPE materials, pipe and fittings shall be inspected and tested in accordance with the requirements of AWWA C906.

C. Affidavit of Compliance:

1. The manufacturer shall furnish an affidavit of compliance conforming to the requirements of AWWA C906, Section 1.5, affirming that the piping components comply with the requirements of AWWA C906 and this section. The affidavit shall be signed under penalty of perjury by an officer of the pipe manufacturer's company.

### 1.03 SUBMITTALS

- A. The following submittals shall be provided in accordance with Section 01 33 00:
1. A copy of this specification section, with addendum updates included, and all referenced and applicable sections, with addendum updates included, with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements. Check marks (✓) shall denote full compliance with a paragraph as a whole. If deviations from the specifications are indicated, and therefore requested by the Contractor, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph, referenced to a detailed written explanation of the reasons for requesting the deviation. The Construction Manager shall be the final authority for determining acceptability of requested deviations. The remaining portions of the paragraph not underlined will signify compliance on the part of the Contractor with the specifications. Failure to include a copy of the marked-up specification sections, along with justification(s) for any requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no further consideration.
  2. Detail drawings which show the type and location of all fittings, joints, and connections to structures and manholes.

## PART 2 PRODUCTS

### 2.01 GENERAL

- A. HDPE materials, pipe and fittings shall be manufactured, inspected, sampled and tested in accordance with the requirements of AWWA C906 and this section. In case of conflict between the requirements of this section and AWWA C906, the requirements of this section shall prevail.

### 2.02 MATERIALS

- A. HDPE piping components shall be manufactured from materials that meet or exceed the requirements of the Plastic Piping Institute designation PE4710 and that conform to the requirements of ASTM D3350 for a cell classification of PE 445574C/E[SA1].
- B. Bolts and nuts for buried mechanical joining components such as flanges shall be made of noncorrosive, high-strength, low-alloy steel having the characteristics specified in ANSI/AWWA C111/A21, regardless of any protective coating.

### 2.03 PIPE

- A. Pipe shall have the nominal dimensions shown with a DIPS outside diameter basis and the dimensions and tolerances specified in AWWA C906. DR rating and pressure class shall be as specified in paragraph 1.01 Characteristics.

## **2.04 FITTINGS**

- A. Fittings shall conform to the applicable requirements of AWWA C906 for the joining methods specified in paragraph 3.02 Joining.

## **2.05 PIPE MARKINGS**

- A. Pipe marking shall conform to the requirements of AWWA C906.

## **2.06 PRODUCT DATA**

- A. The following product data shall be provided in accordance with Section 01 33 00:
  - 1. Affidavit of Compliance specified in paragraph 1.02 Affidavit of Compliance.
  - 2. A report containing a copy of all manufacturers' test results for all tests conducted in accordance with paragraph 1.02 Inspection and Testing.

## **2.07 NOT USED**

## **PART 3 EXECUTION**

### **3.01 PIPE HANDLING AND STORAGE**

- A. The Contractor shall use care in handling and storage of the pipe. Pipe shall be stored on clean, level ground to prevent undue scratching or gouging of the pipe. If the pipe must be stacked for storage, such stacking shall be done in accordance with the pipe manufacturer's recommendations. The handling of the pipe shall be done in such a manner that it is not damaged by dragging over sharp objects or cut by chokers or lifting equipment.
- B. Sections of pipe with cuts, gouges, or scratches on the outside diameter (OD) surface that exceed 10-percent of the wall thickness of the pipe shall be removed completely and the ends of the pipeline rejoined. The inside diameter (ID) surface shall be free of cuts, gouges, and/or scratches.

### **3.02 INSTALLATION**

- A. General:
  - 1. Unless otherwise specified, the piping system shall be installed in accordance with ASTM D2321, AWWA C906 and the manufacturer's recommendations.
  - 2. When pipe is used for air conveyance, Contractor shall install drain connections at all low points in the ductwork and at all locations shown on the Drawings. Drain shall be run to nearest convenient drain.
- B. Joining:
  - 1. Pipe and fittings shall be joined into continuous lengths on the job site above ground. Unless otherwise specified, joining shall be by the butt-fusion method performed in accordance with the pipe manufacturer's recommendations and ASTM D2657. Socket fusion, extrusion welding and hot gas welding shall not be used.
  - 2. The pipe supplier shall be consulted to obtain machinery and expertise for the joining by butt-fusion of HDPE pipe and fittings. No pipe or fittings shall be joined by fusion by any of the Contractor's personnel unless they are adequately trained and qualified

in the techniques involved. Butt fusion joining shall yield a joint strength equal to or greater than the tensile strength of the pipe.

3. Flanged joining, or other mechanical joining methods specified, may be used to make connections to differing piping materials, to equipment, valves and other appurtenances, and where specified.

C. Location and Alignment:

1. Pipe and fittings shall be placed in the trench with the invert conforming to the elevations, slopes, and alignments shown.

D. Bedding and Backfill:

1. Materials used for bedding and backfill shall be as specified in Section 31 23 00 and as shown.
2. Place materials by methods that will not disturb or damage the pipe. All HDPE pipe shall be at the temperature of the surrounding soil at the time it is backfilled and compacted. Work in and tamp the bedding material in the area under the pipe and up to the spring line before placing and compacting the remainder of the embedment. Blocking under the pipe shall not be permitted.
3. Use compaction equipment and techniques that are compatible with materials specified and location in the trench. Before using heavy compaction or construction equipment directly over the pipe, place sufficient backfill to prevent damage, excessive deflections, or other disturbances of the pipe.

### 3.03 TESTING

A. General:

B. Testing:

1. The contractor should follow Forsyth County standards for television inspection and leak testing of sewer gravity mains.

**END OF SECTION**

SECTION 40 05 22  
BORING AND JACKING / STEEL CASING

**PART 1 GENERAL**

**1.01 DESCRIPTION**

- A. This section specifies boring and jacking casings and specifies steel casings.
- B. The work in this section includes pipe boring and jacking for the installation of a casing, within which a carrier pipe will be installed for the conveyance of water or wastewater.
- C. The Contractor shall provide all equipment, labor, materials and services required to complete the work specified in this Section.

**1.02 QUALITY ASSURANCE**

- A. This section contains references to the following Codes and Standards. They are a part of this section as specified and modified. Where a referenced document contains references to other standards, those documents are included as references under this section as if referenced directly. In the event of conflict between the requirements of this section and those of the Codes and Standards, the requirements of this section shall prevail.

AASHTO – American Association of State Highway and Transportation Officials  
AREMA – American Railway Engineering and Maintenance-of-Way Association  
ASTM – American Society for Testing and Materials  
AWPA – American Wood Preservers Association  
AWS – American Welding Society  
NUCA – National Utilities Contractors Association  
NSCE-8 – Specification for Pipeline Occupancy of NS Corporation Property  
GDOT – Georgia Department of Transportation

**1.03 DESIGN REQUIREMENTS**

- A. Design casing pipe for leak proof construction. The casing length shall be as shown on the Drawings. The Contractor may extend the casing length if approved by the Engineer.
- B. Road Crossings:
  - 1. Design casing for earth and other pressure loads present, plus AASHTO H20 live loading.
- C. Railroad Crossings:
  - 1. Design casing for earth and other pressure loads present, plus railroad E80 live loading with 50 percent added for impact.
- D. Design bracing, backstops, and use jacks of sufficient rating for continuous jacking without stoppage, except for adding pipe sections and as conditions permit, to minimize tendency of ground material to "freeze" around casing pipe.

- E. Perform work in accordance with GDOT Standards, NUCA Trenchless Excavation Construction Equipment & Methods Manual, NUCA Pipe Jacking & Microtunneling Design Guide, AREMA, and Norfolk Southern guidelines, as applicable.
- F. Verify invert elevations of existing work prior to excavation and installation of casing.

#### **1.04 QUALIFICATIONS**

- A. The installer shall be a company specializing in performing work of this section with a minimum of 5 years of documented experience of projects of similar magnitude and conditions.
- B. The Contractor's field supervisor and equipment operator shall have a minimum of 1 year experience in the operation of the equipment being used. The field supervisor shall be on-site at all times during the preparation and execution of the boring and jacking operation.

#### **1.05 SUBMITTALS**

- A. The Contractor shall prepare a written procedure for the bore and jacking method that will include the following items:
  - 1. Shop Drawings: Prepare scaled shop Drawings to supplement Contract Drawings, signed and sealed by Professional Engineer.
  - 2. Include details of casing, jacking head, sheeting, and other work for trenches and pits, and support, field sketches, and other details, to complete the work.
  - 3. Show relation of proposed installation to facilities and natural features over installation, angle of installation, right-of-way lines and general layout of built facilities.
  - 4. Show cross section or sections from field survey, showing installation in relation to actual profile of ground.
  - 5. Design Data: Submit casing design calculations and manufacturer's data on casing pipe, end seal details, grout materials and casing spacers.
  - 6. Submit history of previous work completed of equivalent nature and scope. Include qualification and experience of key personnel.
  - 7. Installation Plan: Submit description of proposed construction plan, dewatering plan, and plan to establish and maintain vertical and horizontal alignment.
  - 8. Submit emergency response procedures to handle situations when conduit is compromised and jeopardizes integrity of installation or safety.
- B. Manufacturer's Certificate:
  - 1. Certify the products meet or exceed the specified requirements.
- C. Project Record Documents:
  - 1. Record actual locations of casing, carrier pipe, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

D. Coordinations:

1. Convene a pre-installation meeting with the Owner, Engineer, Contractor, GADOT district engineer and railroad district engineer a minimum of two weeks prior to commencing work of this section.

E. Delivery, Storage, and Handling:

1. Provide temporary end caps and closures on piping and fittings, and maintain in place until installation.
2. Protect piping systems from entry of foreign materials and water by using temporary covers, completing sections of work, and isolating parts of completed system.
3. Accept system components on site in manufacturer's original containers or configuration. The Contractor shall periodically inspect for damage.
4. Use wooden shipping braces between layers of stacked pipe. Stack piping lengths no more than 3 layers high.
5. Store field joint materials indoors in dry area in original shipping containers. Maintain storage temperature of 60 to 85 degrees F.
6. Support casing and carrier pipes with nylon slings during handling.

F. Environmental Requirements:

1. Conduct operations so as not to interfere with, interrupt, damage, destroy, or endanger integrity of surface or subsurface structures or utilities, and landscape in immediate or adjacent areas.
2. Perform and maintain erosion, sedimentation and dust control in accordance with the specifications.

## PART 2 PRODUCTS

### 2.01 CASING AND JACKING PIPE MATERIALS

- A. Furnish materials in accordance with the GDOT and railroad company standards.
- B. Steel casing pipe shall conform to ASTM Designation A-139, Grade B, electric fusion welded steel pipe. The pipe shall have a minimum yield strength of 35,000 psi. The exterior and interior of the pipe shall have a coal tar varnish coating.
- C. The steel casing pipe shall have a minimum wall thickness as shown in the following tables and on the Drawings. These thicknesses are the minimum, and may need to be increased depending on actual site conditions that may impact forces exerted on the pipe. The Contractor may opt to use a steel casing pipe with a larger wall thickness if approved by the Engineer and at no additional cost to the Owner.

Carrier Pipe Diameter (in)	Casing Pipe Diameter (in)	Casing Pipe Wall Thickness (in)
6	12	0.375
8	16	0.375
10	16	0.375
12	18	0.375
14	22	0.500
16	24	0.500

Carrier Pipe Diameter (in)	Casing Pipe Diameter (in)	Casing Pipe Wall Thickness (in)
18	30	0.500
20	30	0.500
24	36	0.500
30	42	0.500

## 2.02 CARRIER PIPE MATERIALS

- A. Carrier piping shall be as specified in Div. 40.

## 2.03 GROUT AND COVER MATERIALS

- A. Soil backfill for trench approaches and pits to finish grade shall be as specified.
- B. Fill and seal grout at pipe ends using the following method:
1. End seals constructed of 1/8" thick neoprene rubber with 1/2" thick T304 stainless steel bandings and 100% non-magnetic worm gear mechanisms. Casing end seals shall be Advance Products & Systems, Inc. Model AW.

## 2.04 ACCESSORIES

- A. Casing Spacers:
1. Casing spacers shall be a two-piece shell fabricated from T-304 stainless steel of a minimum 14-gauge thickness. Each shell section shall be lined with a 0.090-inch thick, ribbed PVC extrusion with a retaining section overlapping the edges of the shell. Bearing surfaces (runners) shall be attached to support sections at positions to properly support the carrier pipe with the casing. The runners, made from UHMW polymer, shall be mechanically bolted to the riser. Risers shall be made of T-304 stainless steel of a minimum of 14-gauge thickness. All risers shall be welded to the shell (MIG welding). All welds shall be fully passivated. All fasteners shall be made from T-304 stainless steel.
- B. Settlement Markers:
1. In paved areas, surface settlement markers shall be p.k. nails. Outside paved areas, wooden hubs shall be used as surface settlement markers.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. The Contractor shall verify existing conditions before starting work. Verify connection to existing piping system, size, location, and invert elevations are in accordance with the Drawings.
- B. The Contractor shall be responsible for interpreting subsurface investigation reports, determining the site soil conditions and investigating the site prior to Bid. The Contractor shall be responsible for obtaining permits and permissions for conducting site investigations. The Contractor shall not be entitled to additional compensation if rock and/or water is encountered.

### **3.02 PREPARATION**

- A. The Contractor shall identify required lines, levels, contours, and datum locations. Establish elevations of casing with not less than 4-feet of cover.
- B. The Contractor shall locate, identify, and protect utilities indicated to remain from damage. Utility companies shall be notified to locate existing utilities.
- C. Plant life, lawns, and other features remaining as portion of final landscaping shall be protected during the execution of work.
- D. The Contractor shall protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
- E. The Contractor shall notify the Engineer in the event of utility conflicts and when minimum separation from existing utilities is not possible.

### **3.03 DEWATERING**

- A. The Contractor shall intercept and divert surface drainage precipitation and groundwater away from excavation through use of dikes, curb walls, ditches, pipes, sumps or other means.
- B. Develop a substantially dry sub-grade for prosecution of subsequent operations.
- C. Comply with State Health and Environmental Control requirements for dewatering to any watercourse, prevention of stream degradation, and erosion and sediment control.
- D. Dewatering operations shall be maintained continuously during the operation.

### **3.04 PROTECTION OF EXISTING FACILITIES**

- A. The Contractor shall comply with all permits obtained to conduct the work. This shall include prior coordination with highway or railroad personnel.
- B. Access shall be maintained to existing buildings, roadways, railways and other facilities requiring access. Modify installation as necessary to maintain access.
- C. Excavated materials and equipment shall not be stored inside rights-of-way without prior permission from the necessary agency.
- D. Casing installation shall not interfere or create hazardous conditions within roadways or railways. Ground stabilization shall be performed to minimize loss of ground at the pits or around the face of the casing. The Contractor shall be responsible for any settlement resulting from the casing installation activities, at no additional cost to the Owner.
- E. Blasting shall only be conducted upon full authorization from the Owner, Engineer and highway agency. No blasting will be conducted with railroad rights-of-way.
- F. Excavation, trenching and shoring operations shall be conducted in accordance with current Occupational Safety and Health Act (OSHA) regulations, and ANSI A10.16.

- G. Unless otherwise directed by the Engineer, settlement markers shall be placed at 25 foot intervals along the centerline of the casing when outside of paved areas and at 15 foot intervals when inside paved areas. Each centerline marker shall have markers offset 15 feet on each side. When set, the settlement markers shall be tied to construction benchmarks and shall not be disturbed during construction activities.
- H. Measurements to the settlement markers, to the nearest one-thousandth foot, shall be made at regular intervals during construction. If the measurement indicates settlement or heaving in excess of 1-inch, the Contractor shall cease work, and consult the Engineer, highway district engineer, and/or railroad authority to determine the best method for corrective action. Corrective action shall be conducted immediately, prior to resuming casing installation, and at no additional cost to the Owner.

### **3.05 PITS OR APPROACH TRENCHES**

- A. Excavate approach trenches or pits in accordance with installation plan, shop drawings and as site conditions require.
- B. The pits shall be generally rectangular in shape, with adequate space for the equipment and operating personnel. Sides shall be shored with sheeting or trench boxes as needed.
- C. Ensure casing entrance face is as near perpendicular to alignment as conditions permit.
- D. Establish a vertical entrance face at least 1 foot above top of casing.
- E. Dewatering measures and excavation supports shall be installed as required. Keep floor of pit dry during the execution of work.
- F. The floor of the pit shall be firm and stabilized, establishing a solid foundation for which to work. If necessary, over-excavate the floor and place a base of gravel or concrete as stabilization material.

### **3.06 CASING PIPE INSTALLATION**

- A. The boring and jacking activities shall be conducted in a pit at one end of the line segment, preferably at the downstream end, boring upstream.
- B. Jacking rails shall be set at the proper alignment and grade within the pit, and secured to avoid movement during the operation. The rails shall hold the casing pipe at true line and grade during installation.
- C. The jacking rails shall be secured at the rear of the pit, with the backing supported to withstand the loads and forces during the operation.
- D. Push casing pipe into ground with boring auger rotating within pipe to remove spoil. Do not advance cutting head ahead of casing pipe except for distance necessary to permit cutting teeth to cut clearance for the pipe. No unsupported excavation shall be permitted ahead of the casing pipe.
- E. Arrange the machine bore and cutting head to be removable from within pipe. Arrange face of cutting head to provide barrier to free flow of soft material.

- F. The bored hole shall have a diameter nearly equal to the outside diameter of the casing pipe.
- G. The Contractor shall regularly check the alignment, horizontal and vertical, of the casing pipe during installation. Adjustments shall be made as needed to maintain the specified alignment.
- H. Segment lengths for the casing pipe shall be as long as practical, based on field conditions. Joints between pipe segments shall be fully welded in accordance with AWS standard practices and procedures.
- I. When within the railroad right-of-way, the boring operation shall be progressed continuously on a 24-hour basis without stoppage (except for adding segments of pipe) until the leading edge has reached the receiving pit.
- J. When unstable soil is encountered during boring retract cutting head into casing to permit balance between pushing pressure and ratio of pipe advancement to quantity of soil.
- K. When voids develop greater than outside diameter of pipe by approximately one inch, grout to fill voids.
- L. When boring is obstructed, the casing pipe shall be abandoned in place, and filled with grout. The Contractor shall relocate the bore as directed by the Engineer, with the approval of the agency maintaining the right-of-way.
- M. Casing pipe damaged by the Contractor during the operation shall be removed and replaced at no additional cost to the Owner.

### **3.07 ROCK EXCAVATION**

- A. In the event that rock is encountered during the installation of the casing pipe which cannot be overcome or removed through the casing, a second casing pipe shall be bored at a location designated by the Engineer.
- B. The obstructed casing shall be left in place, filled with grout and capped before moving to the second boring site. Payment for the first casing shall be made based on the unit price for the quantity installed prior to reaching the obstruction. No additional payment shall be made for filling the abandoned casing with grout.
- C. Payment for the installation of the second casing shall be made at the unit price bid for casing installation. Payment for realigning the pipeline to the location of the second casing will be made at the unit prices given for water sewer main and fittings.
- D. If the second casing installation cannot be completed due to rock, a third attempt shall be made to complete the casing installation. Consideration will be given for additional compensation in the event a third installation attempt is necessary.

### **3.08 CARRIER PIPE INSTALLATION**

- A. After the casing pipe has been installed, the alignment and elevations shall be verified and submitted to the Engineer for approval, prior to the installation of the carrier pipe.

- B. The carrier pipe shall be installed centered within the casing pipe, and shall be supported by casing spacers, centered on 10-foot intervals and as shown on the Drawings.
- C. The Contractor shall exercise care to prevent damage to pipe joints when carrier pipe is placed in casing.
- D. Support the pipeline within casing so no external loads are transmitted to carrier pipe. Attach supports to barrel of carrier pipe; do not rest carrier pipe on bells. A minimum clearance of 1 inch shall be maintained between the pipe bell and casing pipe.
- E. The ends of the casing shall be sealed by either grouting or installing casing end seals.

**END OF SECTION**