

SECTION FOUR

COBB COUNTY WATER SYSTEM SPECIFICATIONS

MEASUREMENT AND PAYMENT

GENERAL

Only those pay items identified in the bid schedule, or added by Addendum or Supplemental Agreement, will be measured for payment by the units listed in the bid schedule and/or supplemental agreement and paid for at the Contract prices.

The cost of all Work not directly covered by the pay items shall be considered incidental to the construction and is to be included and distributed among the bid unit prices of the pay items listed in the Contract.

Contract unit prices represent the installed, complete-in-place, tested and accepted cost, including, but not limited to:

- * All required labor, tools, and equipment, unless otherwise noted.
- * All materials, unless specifically noted to be furnished by the Owner or by others, or specifically identified for payment under another pay item.
- * All required excavation, dewatering, thrust blocking, rodding, sheeting/shoring/bracing, backfill, compaction and restoration to grade, and testing.
- * All required normal traffic control.
- * Acceptable bedding as detailed, specified, or as required by conditions encountered.
- * Disposal of all surplus or waste materials, unsuitable materials, and debris.
- * Protection of existing utilities, including but not limited to locating, diligent care in handling and working around, relocating, and repairing.
- * Miscellaneous associated work necessary to complete the work in place.
- * Minor meter, meter box, and valve box adjustments.
- * All temporary taps necessary for sterilization and testing.
- * Minor manhole adjustments.
- * Preconstruction staking.
- * Coordination of additional project access as may be desired.
- * Project Record Drawings

WATER MAIN

Unit price per linear foot is for each size of water main installed at a nominal depth of cover of 48 inches or less. Water main will be measured for payment in linear feet along the horizontal centerline of the pipe. The length of fittings and valves in the line will be included in the measurement of the water main. Fittings for Copper Water Main/Service Lines are included in the unit price for pipe. Fittings for ductile iron mains are separately measured and paid under MISCELLANEOUS FITTINGS.

EXTRA DEPTH

Unit price per linear foot in addition to the price per linear foot of WATER MAIN is for labor and equipment only to install any size water main at a depth exceeding the nominal depth. Extra Depth will be measured for payment in linear feet along the horizontal centerline of the pipe and paid at the unit price for each cut class included in the bid schedule. The length of fittings and valves in the line will be included in the measurement of the pipe. Pipe material is not included and will be paid for under WATER MAIN.

VALVE ASSEMBLY

Unit price each is for each assembly, including rodding, thrust blocking, valve box and lid, and concrete collar.

TAPPING ASSEMBLY

Unit price each is for materials only. Unit price includes tapping sleeve, tapping valve, rodding, thrust blocking, valve box and lid, and concrete collar. Labor will be paid under CONNECT TO EXISTING WATER MAIN - WET TAP.

MISCELLANEOUS FITTINGS

Unit price item includes, but is not limited to: bends, tees, crosses, plugs, solid sleeves, and reducers. Miscellaneous fittings will be measured for payment in tons for the manufacturer listed base weight of ductile iron compact fittings (without accessory kits) as shown in bid schedule.

WEDGE ACTION RETAINER GLANDS

Unit price each includes the furnishing and proper installation of the appropriate size of wedge action retainer gland in conjunction with other conventional thrust restraint devices (rodding, thrust blocking, etc.) where so directed during the course of construction.

TRANSITION COUPLINGS

Unit price each is for transition couplings installed where required.

FIRE HYDRANTS

Unit price each includes the fire hydrant with barrel height as necessary for proper standard setting at required nominal depth of Water Main. Anchor couplings, fittings, valve assembly and any necessary vertical or horizontal extension will be paid for under the corresponding bid items.

ANCHOR COUPLINGS

Unit price each is for anchor coupling installed at fire hydrant.

CONNECT TO EXISTING WATER MAIN - WET TAP

Unit price each is for equipment and labor only to complete a connection to an in-service existing water main as shown on the plans including location of existing water main, installing a manufactured tapping sleeve and valve, and tapping the existing main. Water main, tapping assembly, valves, and fittings required to complete connection to the new water main will be paid for under the corresponding bid items.

CONNECT TO EXISTING WATER MAIN - CUT IN

Unit price each is for equipment and labor only to complete a connection to an in-service existing water main as shown on the plans including location of existing water main, temporary water shut down, and cutting in a tee and/or elbow as required on the plans. Water main, valves, and fittings required to complete connection to the new water main will be paid for under the corresponding bid items.

SERVICE LINE REPLACEMENT LONG/SHORT SIDE- 2 INCH AND UNDER

Unit price each is for all materials and labor required to replace the service line from the water main to the meter assembly including the service line, connections to the main and meter assembly, and boring with casing as necessary. Service line replacement for pipe sizes greater than 2-inches in diameter will be measured and paid for under the appropriate separate corresponding bid items.

The Cobb County Water System will furnish new meter boxes to replace damaged or unserviceable units found during construction, or the new meter boxes will be purchased by the Contractor and paid for from the utility allowance at the direction of the Project Engineer.

Where so indicated, existing water meters shall be replaced by the Contractor with new meters supplied by the Owner. A record of these meters change-outs shall be maintained and transmitted to the Owner on a weekly basis for updating of customer account information.

RELOCATE EXISTING WATER METER

Unit price each is for all required labor, tools, equipment, and materials to relocate an existing water meter and vault or meter box including extension of the service line, miscellaneous fittings, testing, and disinfection as required. Water meter size shall be as indicated in the Bid Schedule.

ABANDON EXISTING WATER MAIN IN PLACE

Unit price each is for equipment and labor only to remove a five (5) foot section of pipe. Necessary plugs, valves, miscellaneous fittings, and concrete trench cap and/or asphalt pavement trench patch as may be required to complete the abandonment will be paid for under the corresponding bid items.

ABANDON EXISTING VALVE BOX - IN PAVEMENT

Unit price each is for all materials and labor required to remove valve box lid and to fill valve box with concrete flush with existing pavement.

ABANDON EXISTING VALVE BOX - OUT OF PAVEMENT

Unit price each is for all materials and labor required to remove the complete valve box and concrete collar, backfill with suitable materials, and replace landscaping in kind.

REMOVE EXISTING FIRE HYDRANT

Unit price each is for all required labor, tools and equipment to remove the fire hydrant from bonnet to boot and return the hydrant to the Water System storage yard. Item includes the removal of the hydrant-locator reflector in roadway adjacent to hydrant.

ADJUST EXISTING VALVE BOX TO GRADE

Unit price each is for all required labor, tools, equipment, and material to adjust (and align for proper valve operation) an existing valve box to grade including replacement of concrete collar, if necessary.

ADJUST EXISTING MANHOLE TO GRADE

Unit price each is for all required labor, tools, equipment, and material to adjust an existing manhole ring and cover to grade.

UTILITY ALLOWANCE

Utility allowance will only be utilized at the direction of the Project Engineer, and the scope and cost must be approved prior to performance of the work.

EXPLORATORY EXCAVATION ALLOWANCE

The Owner may direct the Contractor to perform exploratory excavations and additional work to investigate the extent and arrangement of existing water lines. When so directed an assigned maximum crew cost of \$250.00 per hour shall be utilized against this allowance. This "crew" is defined as to include capable superintendent/foreman, equipment operator, 3 additional crewmen, pick-up truck, crew truck, rubber-tired backhoe, and necessary hand tools. Any necessary removal / replacement of pavement, sidewalk, curb and gutter, grass, sod, etc. shall be paid for under the corresponding bid items.

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SPECIAL CONDITIONS

The following project specific Special Conditions take precedent over plans and specifications. Section numbers shown refer to the appropriate section of the Cobb County Water System Contract Documents. All other requirements remain in full effect.

1. If additional work is required and the bid unit prices are not applicable to the necessary additional work, the Contractor shall be compensated as follows. If the additional work is to be performed entirely by the Contractor, compensations for such extra work shall be based on the direct costs as listed in a detailed proposal, plus 15 percent of direct costs for overhead and profit, plus 1 percent of such direct costs for bond. When the extra work involves subcontractors, compensation for such work shall be based on direct costs as listed by the subcontractor plus 15 percent of such direct costs for the subcontractor's overhead and profit. The Contractor may add 5 percent to the subcontractor proposal for overhead and profit, and 1 percent for bond. The 5 percent subcontractor markup shall be applied only once regardless of the number of tiers of subcontractors. The above allowances for overhead and profit shall include full compensation for overhead, including superintendence, and additional overhead attributable to a time extension granted because of the change order. For extra work that is funded from contract allowances, the 1 percent additional cost for bonds shall not be applied.

END OF SPECIAL CONDITIONS

**DISADVANTAGED BUSINESS ENTERPRISE (DBE)
IDENTIFICATION FORM**

A Disadvantaged Business Enterprise (DBE) is generally defined as a Female, Black American, Hispanic American and any other minority owned business. See *Instructions to Bidders* (Section 00100) and *Disadvantaged Business Enterprise (DBE) Participation* (Section 00570) for additional information related to periodic reporting guidelines.

If your firm is classified as a Disadvantaged Business Enterprise (DBE), please complete this form and submit with bid response:

Cobb County Purchasing Department
Attn: Purchasing Director
122 Waddell Street NE
Marietta, GA 30060
FAX: (770) 528-8428
Email: purchasing@cobbcounty.org

Name of Firm: _____

Address: _____

Telephone: _____ Fax: _____

Email: _____

DBE Certification Number: _____

Name of Certifying Organization: _____

**This information is acquired for documentation of participation only and
will have no bearing on the award unless otherwise stated in the
Advertisement for Bids.**

Bidder hereby agrees to commence work under this Contract promptly after receipt of Notice to Proceed and to complete the work within [] () calendar days. Should said work not be completed by that date, the sum of [] Dollars (\$) per day will be paid by the Contractor to the Owner as liquidated damages for each consecutive calendar day of delay.

Receipt is acknowledged of the following addenda:

No. _____, Dated _____

No. _____, Dated _____

Bidder agrees that the Owner has the right to accept or reject any or all bids and to waive all formalities.

Respectfully submitted,

Company

Date: _____

By: _____
Signature

Name

Title

Address

CORPORATE SEAL

City/State/Zip Code

() _____
Telephone

() _____
Fax Number

Georgia Utility Contractor License No.

SECTION 01010 - PROJECT PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

Section Includes:

1. Lands and Rights-of-Way
2. Access to and Contractor's use of the site.
3. Coordination requirements.
4. Construction procedures.

1.02 LANDS AND RIGHTS-OF-WAY

- A. Access to the work shall be limited to the right-of-way or easement area provided for execution of the work. The **Contractor** shall not enter any adjacent private property without prior written approval from the property owner. Proof of such approval shall be furnished to the **Owner** upon request.
- B. If the Contractor performs any work or service for any property owner outside the specified scope of the Contractor's agreement with the Owner or has any agreements with a private property owners for access to or for temporary use of property outside of the right-of-way or easement area, a written agreement shall be entered into, with the private property owner(s) prior to any work or service being performed or prior to any use by Contractor of the private property and such agreement shall be provided to Owner. The agreement shall contain the following language, in addition to the terms agreed to between the Contractor and the property owner.

"The Property Owner understands that Cobb County is not a party to this Agreement, exercises no control over the means, methods, and execution of this agreement, and that Cobb County assumes no responsibility for the Contractor's compliance with the terms of this agreement. The Contractor shall be solely liable for any and all claims, demands, and judgments related to loss or damage to property or person (including death) arising from or in any way related to the Contractor's acts or omissions related to the agreement".

1.03 ACCESS TO AND CONTRACTOR'S USE OF THE SITE

- A. The space available to the **Contractor** for the performance of the work, either exclusively or in conjunction with others performing other construction as part of the project, is shown on the drawings.
- B. The **Owner** will continue to occupy existing facilities during the construction period.
 1. The **Owner** will endeavor to cooperate with the **Contractor's** operations when the **Contractor** has notified the **Owner** in advance of need for changes in operations in order to accommodate construction operations.
 2. The **Contractor** shall conduct the Work so as to cause the least interference with the **Owner's** operations.

- C. Adequate signage will be provided by the **Contractor** as necessary.

1.04 COORDINATION REQUIREMENTS

- A. Coordination with Owner:
1. Limit access through occupied areas to those days and times which the **Owner** approves. Occupied areas include all areas in which the **Owner's** regular operations will be going on or to which the **Owner** requires access during the construction period.
 2. When the following must be modified, provide alternate facilities acceptable to the **Owner**:
 - a. Emergency means of egress.
 - b. Utilities which must remain in operation.
 - c. Informational signage.
 3. The **Contractor** shall notify the **Owner** of any circumstances which may jeopardize or have interrupted utility service.
- B. Security Procedures:
1. Limit access to the site to persons involved in the work.
 2. Provide secure storage for materials.
 3. Secure completed work as required to prevent loss.
- C. Coordination of Construction:
1. Inform each party involved, in writing, of procedures required for coordination of the work; include requirements for giving notice, submitting reports, and attending meetings.
 2. Inform the **Owner** when coordination of his work is required.
 3. Furnish coordination drawings, as required, where limited space available may cause conflicts in the locations of installed products, and where required to coordinate installation of products.
- D. Coordination with the Cobb County-Marietta Water Authority (CCMWA)
1. All work involving the isolation of and/or connection to a water main owned by the CCMWA must have the prior approval of the CCMWA.
 2. The **Contractor** shall notify CCMWA of any circumstances that may jeopardize or interrupt water service.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 CONSTRUCTION PROCEDURES

- A. General Examination Requirements:
1. Prior to performing work, examine the applicable substrates and the conditions under which the work is to be performed.
 2. If unsafe or otherwise unsatisfactory conditions are encountered, take corrective action before proceeding.
 3. Notify the **Owner** promptly of any modifications required due to existing conditions or previous work.

4. Before starting work which might affect existing construction, verify the existence and location of:
 - a. Underground utilities.
 - b. Other underground construction.
 - c. Location and invert elevation of points of connection to piped utilities.
5. Verify that utility requirements of operating equipment are compatible with building utilities.
6. Verify space requirements of items which are shown diagrammatically on the drawings or any other items that might impact construction.
7. Prepare preconstruction photographic documentation in conformance with the requirements of Section 01380 of these specifications.

B. General Preparation Requirements:

1. The **Contractor** shall obtain and pay for all required permits.
2. Prior to starting work, the **Contractor** shall have the limits of construction field staked by, or under the supervision of, a Georgia Registered Land Surveyor. The staking shall include, but not be limited to, easement (permanent and construction) limits, construction entrances, and any other staking that is necessary to clearly define the limits of construction.
3. Take field measurements as required to fit the work properly.
4. Recheck measurements prior to installing each product.

C. General Installation Procedures:

1. Accurately install the work and components of the work.
2. See sections describing specific parts of the work for additional requirements.
3. Where space is limited, install components to maximize space available for maintenance and to maximize ease of removal for replacement.
4. Install work in such manner to minimize cutting and patching.

D. Cleaning and Protection

1. Remove debris from concealed spaces prior to enclosing the space.
2. Keep the site and the work free of waste materials and debris.
3. Clean areas in which work is to be done to level of cleanliness necessary for proper execution of that work.
4. Keep installed work clean, and clean again when soiled by other operations.
5. Protect installed work from soiling and damage.

E. Do not cut existing mechanical and electrical services which are to remain in use until provisions have been made to relocate or reconnect them promptly; obtain approval of the **Owner of the time and duration of disconnection.**

F. Installation of Components:

1. Install products only at the time and in the sequence which will ensure the best possible results in conformance with project requirements.
2. Install products only during environmental conditions which will ensure the best possible results.
3. Install all products in accordance with manufacturer's instructions and recommendations, whether conveyed in writing or not.
4. Separate incompatible materials with suitable materials or spacing.

5. Provide all anchors and fasteners required and use methods necessary to securely fasten work.
 6. After installation, adjust operating components to proper operation.
- G.** Instruction of the **Owner's** Personnel:
1. Instruct personnel designated by the **Owner** in the operation and maintenance of equipment and systems, prior to substantial completion.
 2. Arrange times and places of instruction with the **Owner**.
 3. Provide instruction by qualified manufacturer representatives.
 4. Allow videotaping of instruction sessions by **Owner**.
- H.** Final Cleaning:
1. Remove materials and equipment which are not part of the work and all debris from the site prior to substantial completion.
 2. Dispose of debris in a lawful manner.
 3. Perform final cleaning after substantial completion has been certified, but before final payment.
 4. Clean entire project site and grounds.
 5. In spaces to be occupied, remove dirt, stains, and other foreign substances from all accessible surfaces and remove nonpermanent labels.
 6. In spaces not normally occupied, remove debris and surface dust and wipe equipment clean, removing excess lubrication, paint, and other foreign substances.
 7. Remove paint and other coatings from permanent labels and from mechanical and electrical equipment nameplates.
 8. Leave the project clean and ready for occupancy.
- I.** Substantial Completion Procedures:
Reference Section 00700 6.05 of the General Conditions
- J.** Final Completion Procedures
Reference Section 00700 6.07 of the General Conditions

3.02 HEALTH AND SAFETY CONSIDERATIONS

- A.** Take precautions to prevent fires and to facilitate fire-fighting operations.
- B.** Take precautions to prevent accidents due to physical hazards.
- C.** Maintain working conditions in order to keep the site and adjacent public ways free of hazardous and unsanitary conditions and public nuisances.
- D.** Maintain working conditions in order to control rodents and other pests; prevent infestation of adjacent sites and buildings due to pests on this site.
- E.** Keep public streets free of debris due to this work.
- F.** Provide adequate traffic control by means of signs, signals, and flaggers, as necessary.

3.03 ENVIRONMENTAL CONSIDERATIONS

- A. Take care to prevent pollution of air, water, and soil.
- B. Prevent the entry of rainwater runoff into sanitary sewer system.
- C. Control windblown dust; prevent erosion to site and nuisance to neighbors.
- D. Conduct construction operations so that waste of power, water, and fuel is avoided.
- E. Noise from the **Contractor's** operations shall not exceed limits established by applicable laws or regulations and in no event shall exceed 86 dBA at a distance of 50 feet from the noise source between 7:30 p.m. and 7:00 a.m. and on the weekends.
- F. Any created or observed situation involving discharge / spill of raw sewage shall be immediately reported to the Cobb County Water System Emergency Dispatch at (770) 419-6201.

3.04 PROTECTION OF THE WORK

- A. Conduct construction operations so that no part of the work is subjected to damaging operations or influences which are in excess of those to be expected during normal occupancy conditions.
- B. Execute work and stockpile spoils and materials to prevent flooding of excavations, below-grade construction, and adjacent properties due to rainwater runoff.
- C. Protect existing property not indicated to be removed.
- D. Provide temporary supports as required to prevent movement and structural failure.
- E. All equipment and vehicles used on Water system projects shall be clearly marked with the **Contractor's** name and telephone number. The identifying markings may be in the form of magnetic signs, decals, or painted lettering and shall be located on both sides of the equipment/vehicle. The lettering shall be legible, of a contrasting color to the background surface, and at least two inches in height. All markings shall be in place upon initiation of the work on the project site.
- F. A copy of the project's Notice to Proceed letter issued by the Water System shall be available at all times on the job site as proof of the contractual relationship of the Contractor with the Water System. The letter shall be presented for review upon request by regulatory agencies or other County departments that visit the job site.
- G. If removal and replacement of a paved private driveway is required, the replacement shall be performed within two (2) weeks of removal. The permanent pavement replacement for public roadways shall be performed within thirty (30) days or within 7 days if the roadway is a state highway or major county arterial roadway. Temporary surface maintenance is the **Contractor's** responsibility and shall be adequate for the volume and type of traffic loads imposed. Temporary asphalt cold mix application, steel traffic plates, etc. shall be utilized as necessary.

H. The Contractor shall maintain copies of all permits on the project site at all times.

3.05 NOTIFICATION OF SERVICE INTERRUPTION

During progress of work under this Contract, it may be necessary to temporarily interrupt water, sewer or other utility service to a limited number of customers in the vicinity of the work. It shall be the **Contractor's** responsibility to coordinate the service outage with the utility owner and to provide proper advance notification (a minimum of 48 hours) to the affected customers.

The **Contractor** is alerted to the fact that due to the nature of businesses and traffic in certain projects' areas, water outages for connections, service changeovers, and other work may not be allowable during normal work hours. Considerations of this are to be factored into bid price submitted. Coordination, special lighting, traffic control, employee overtime, special customer notification, etc. shall be included in these considerations by the **Contractor**.

3.06 WATER DISTRIBUTION SYSTEM VALVE OPERATION

All water distribution system service interruptions or outages, such as through water distribution system valve operation, either through pre-approved scheduling or in response to emergency situations, shall require the **Contractor** to notify the appropriate inspector/project engineer of the Cobb County Water System and the Cobb County Water System Dispatch/Emergency office at (770) 419-6201. Specifics of the outage shall be provided, including but not limited to the following information: **Contractor**, **Contractor** authorized representative providing the notice, contact number(s) of the Contractor or representative, anticipated duration of the outage, geographical limits of the outage, and definitive identification of the valves to be operated. The Cobb County Water System shall log this information for reference in the event inquiries develop and to ensure valves are repositioned correctly.

Upon conclusion of the work or repair and after service has been restored, the **Contractor** shall again notify the appropriate project representative of the Cobb County Water System and the Cobb County Water System Dispatch/Emergency office to confirm and crosscheck, as appropriate, that all affected valves have been fully and correctly repositioned. Additional **Contractor** contact information shall be provided to maintain and ensure Contractor responsibility for 24 hours or the next work day, whichever is longer. Such action does not relieve the **Contractor** from overall contract warranty responsibility.

Unauthorized operation of the Cobb County Water System water distribution system valves, hydrants, or other appurtenances, or operation in which the proper notification is not provided, is expressly forbidden and subject to penalties.

3.07 TRAFFIC CONTROL

The **Contractor** shall be responsible for traffic control during the course of each phase of the work. A Cobb County Department of Transportation (CDOT) Utility Permit shall be required for all partial and full lane closures. Road closures and / or detours shall require a CDOT Road Closure Permit. **Contractor** shall submit a traffic control plan to the **Owner** a minimum of two weeks prior to partial or full lane closures and a minimum of four weeks prior to a road closure along with other pertinent information needed for the associated

permit application. The **Owner** will submit the permit application to CDOT. The traffic control plan shall conform to CDOT requirements and be in conformance with the Manual on Uniform Traffic Control Devices for Streets and Highways. In the event the road or lane closure is necessary within the limits of a municipality or on a State of Georgia highway, the **Contractor** shall make direct application to the municipality or the Georgia Department of Transportation for the necessary road or lane closure permits. The **Contractor** shall install and maintain traffic control compliant with the approved permit, including but not limited to, trained and properly equipped flagmen, to safely control all traffic through the work zone(s). It is the **Owner's** intent that this work be accomplished with as little disturbance to traffic, private property, and the public as is reasonably possible, consistent with timely completion thereof.

3.08 WEEKLY SITE REVIEW

On a regular weekly basis, or prior to an inclement weather event forecast, the Contractor's field superintendent shall perform a full review of the construction site with the Construction Manager or his designee. This review shall examine the condition of the erosion/sedimentation control facilities, adequacy of traffic control and work zone safety facilities and procedures, restoration of disturbed areas, housekeeping of project site, proposed works plans for the coming week, and other pertinent items. Deficiencies shall be recorded and a schedule for resolution shall be established.

3.09 WATER CONSERVATION

The **Contractor** is required to exercise water conservation efforts to the fullest extent possible. These efforts shall include compliance with the current Cobb County "Drought Response Plan Regulations". The **Contractor** shall otherwise stage and sequence operations to be as effective as possible in conserving water and to collect any flushing water for reuse as dust control, backfill or roadway base consolidation, watering of landscape restoration, etc. All direct use of water from fire hydrants shall be metered via fire hydrant meters obtained from the Cobb County Water System. Any observed use of non-metered water by the **Contractor** shall be immediately reported to the **Owner**. Any observed leaks from an existing water main or fire hydrant shall be immediately reported. Leaks on newly installed, but not in service water mains, shall promptly be isolated and repaired. Best practices for irrigation shall be followed.

END OF SECTION 01010

SECTION 01300 - SUBMITTALS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Preparing and processing of submittals for review and action.
 - 2. Preparing and processing of informational submittals.
- B. Submit the following for the **Owner's** review and action:
 - 1. Shop drawings.
 - 2. Product data.
 - 3. Samples.
 - 4. Submittals indicated as "for approval."
- C. Submit the following as informational submittals:
 - 1. Structural design information required by the contract documents.
 - 2. Certificates.
 - 3. Coordination drawings.
 - 4. Reports.
 - 5. Qualification statements for manufacturers/installers.
 - 6. Submittals indicated as "for information only."
- D. Specific submittals are described in individual sections.
- E. Do not commence work which requires review of any submittals until receipt of returned submittals with an acceptable action.
- F. Do not allow submittals without an acceptable action marking to be used for the project.
- G. Submit all submittals to the **Owner**.
- H. Do not include requests for substitution (either direct or indirect) on submittals; comply with procedures for substitutions specified in Section 01600.

1.02 DEFINITIONS

- A. "Shop drawings" are drawings and other data prepared by the entity who is to do the work, specifically to show a portion of the work.
- B. "Product data submittals" are standard printed data which show or otherwise describe a product or system, or some other portion of the work.
- C. "Samples" are actual examples of the products or work to be installed.
- D. Informational Submittals: Submittals identified in the Contract Documents as for information only.

1.03 FORM OF SUBMITTALS

- A. Sheets Larger Than 8-1/2 by 14 Inches:
 - 1. Maximum sheet size: 24 by 36 inches (except for full size pattern or template drawings).
 - 2. Number of copies:
 - a. Submittals for review: Three blue or blackline prints.
 - b. Informational submittals: Three blue or blackline prints.
- B. Small Sheets or Pages:
 - 1. Minimum sheet size: 8-1/2 by 11 inches.
 - 2. Maximum sheet size for opaque copies: 11 by 17 inches.
 - 3. Number of copies will be the same as for larger sheets.
- C. Samples:
 - 1. 2 sets of each shall be submitted with the original submittal.
 - 2. 1 set will be returned.
 - 3. If additional sets are needed by other entities involved in work represented by the samples, submit with original submittal.

1.04 COORDINATION OF SUBMITTALS

Coordinate submittals and activities that must be performed in sequence or of different types for the same product or system so that the **Owner** has enough information to properly review each submittal.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 TIMING OF SUBMITTALS

- A. Transmit each submittal at the time indicated on the approved construction schedule.
- B. Deliver each submittal requiring approval in time to allow for adequate review and processing time, including resubmittals if necessary; failure of the **Contractor** in this respect will not be considered as grounds for an extension of the contract time.
- C. Deliver each informational submittal prior to start of the work involved, unless the submittal is of a type which cannot be prepared until after completion of the work; submit promptly.
- D. If a submittal must be processed within a certain time in order to maintain the progress of the work, state so clearly on the submittal.
- E. If a submittal must be delayed for coordination with other submittals not yet submitted, the **Owner** may at his option either return the submittal with no action or notify the **Contractor** of the other submittals which must be received before the submittal can be reviewed.

3.02 SUBMITTAL PROCEDURES - GENERAL

- A. Contractor Review: Sign each copy of each submittal certifying compliance with the requirements of the contract documents.
- B. Notify the **Owner**, in writing and at time of submittal, of all points upon which the submittal does not conform to the requirements of the contract documents, if any.
- C. Preparation of Submittals:
 - 1. Label each copy of each submittal, with the following information:
 - a. Project name.
 - b. Date of submittal.
 - c. Contractor's name and address.
 - d. Supplier's name and address.
 - e. Manufacturer's name.
 - f. Specification section where the submittal is specified.
 - g. Numbers of applicable drawings and details.
 - h. Other necessary identifying information.
 - 2. Submittals to receive **Owner's** action marking: Provide blank space on the label or on the submittal itself for action marking; minimum 4 inches wide by 5 inches high.
- D. Transmittal of Submittals:
 - 1. Submittals will be accepted from the **Contractor** only.
 - 2. Submittals received without a transmittal form will be returned without review or action.
 - 3. Transmittal form: Use a form acceptable to the **Owner**; provide space on form for:
 - a. Project name.
 - b. Submittal date.
 - c. Transmittal number.
 - d. Specification section number.
 - e. To:
 - f. From:
 - g. Contractor's name.
 - h. Subcontractor's and supplier's names.
 - i. Manufacturer's name.
 - j. Submittal type (shop drawing, product data, sample, informational submittal).
 - k. Description of submittal.
 - l. Action marking.
 - m. Comments.
 - 4. Fill out a separate transmittal form for each submittal; also include the following:
 - a. Other relevant information.
 - b. Requests for additional information.

3.03 SHOP DRAWINGS

- A. Content: Include the following information:
 - 1. Dimensions, at accurate scale.
 - 2. All field measurements that have been taken, at accurate scale.

3. Names of specific products and materials used.
4. Details, identified by contract document sheet and detail numbers.
5. Show compliance with the specific standards referenced.
6. Coordination requirements; show relationship to adjacent or critical work.
7. Name of preparing firm.

B. Preparation:

1. Reproductions of contract documents are not acceptable as shop drawings.
2. Copies of standard printed documents are not acceptable as shop drawings.
3. Identify as indicated for all submittals.
4. Space for **Owner's** action marking shall be adjacent to the title block.

3.04 PRODUCT DATA

A. Submit all product data submittals for each system or unit of work as one submittal.

B. When product data submittals are prepared specifically for this project (in the absence of standard printed information) submit such information as shop drawings and not as product data submittals.

C. Content:

1. Submit manufacturer's standard printed data sheets.
2. Identify the particular product being submitted; submit only pertinent pages.
3. Show compliance with properties specified.
4. Identify which options and accessories are applicable.
5. Include recommendations for application and use.
6. Show compliance with the specific standards referenced.
7. Show compliance with specified testing agency listings; show the limitations of their labels or seals, if any.
8. Identify dimensions which have been verified by field measurement.
9. Show special coordination requirements for the product.

3.05 SAMPLES

A. Samples:

1. Provide samples that are the same as proposed product.
2. Where selection is required, provide full set of all options.

B. Preparation:

1. Attach a description to each sample.
2. Attach name of manufacturer or source to each sample.
3. Where compliance with specified properties is required, attach documentation showing compliance.
4. Where there are limitations in availability, delivery, or other similar characteristics, attach description of such limitations.
5. Where selection is required, the first submittal may be a single set of all options; after return of submittal with selection indicated, submit standard number of sets of selected item.

C. Keep final sample set(s) at the project site, available for use during progress of the work.

3.06 REVIEW OF SUBMITTALS

- A. Submittals for approval will be reviewed, marked with appropriate action, and returned. Submittals are reviewed for conformance with project design concept and for compliance with standard of quality established in the Contract Documents. This review shall not relieve the **Contractor** from responsibilities for correctness of detail and dimension, nor from deviation from Contract Document requirements, except as noted and accepted in writing by the **Owner** at the time of submittal.
- B. Informational submittals: Submittals will be reviewed.
- C. Action markings for submittals for approval will be as follows:
 - 1. NO EXCEPTIONS TAKEN and EXCEPTIONS TAKEN AS NOTED: Indicate that the submitted item is released for manufacture with consideration given to any comments noted.
 - 2. REVISE AND RESUBMIT: Revise the submittal or prepare a new submittal complying with the comments made.
 - 3. REJECTED: Indicates that the submitted item does not comply with contract requirements and that another selection must be made and the submittal process repeated.

3.07 RETURN, RESUBMITTAL, AND DISTRIBUTION

- A. Submittals will be returned to the **Contractor** by mail.
- B. Perform resubmittals in the same manner as original submittals; indicate all changes other than those requested by the **Owner**.
 - 1. Exception: Transmittal number for resubmittal shall be the number of the original submittal plus a letter suffix.
 - 2. Resubmittals shall be submitted within 14 days of **Contractor's** receipt of rejected submittal.
- C. Distribution:
 - 1. Make one copy for project record documents.

END OF SECTION 01300

SECTION 01720 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.01 SUMMARY

Record documents refer to those documents maintained and annotated by the **Contractor** during construction to provide a record of the Work as installed. The Record Drawings are defined as a neatly and legibly marked set of Contract Drawings showing the final location of piping, valves, fittings, and equipment. The Record Drawings shall show field changes, changes by change order, and details not shown on the original Contract Drawings.

1.02 SUBMITTALS

Submit one set of Record Drawings and one copy of the Record Survey (if required) in accordance with Substantial Completion Procedures (00700, 6.05). The **Owner** may withhold declaring the project substantially complete and shall withhold Final Payment until acceptable Record Drawings are submitted.

1.03 QUALITY ASSURANCE

- A. The Record Drawings shall be maintained continuously. Prior to each request for partial progress payment, the **Owner** may review the Record Drawings with the **Contractor**. Progress payments may be withheld or reduced if Record Drawings are not current.
- B. In addition to the annotated Contract Drawings, the **Contractor** shall provide a Record Survey of sanitary sewer lines installed as a part of the Work. This Record Survey shall be prepared under the supervision of, and be sealed by, a Land Surveyor registered in the State of Georgia.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 GENERAL

- A. Unless otherwise required, the Record Drawings shall be a full-size set of the Contract Drawings maintained in a clean, dry and legible condition. Each drawing shall be marked "RECORD DRAWING" in large, clear print. Annotations on the drawings should be made with red pencil or red ink. Record Drawings shall not be used for construction purposes.
- B. Marking of the drawings shall be kept current and shall be done at the time the material and equipment are installed. Do not conceal any work until required information is recorded.
- C. If the project consists of both water line work and sanitary sewer work, the Record Drawings for each shall be maintained separately. Additional sets of the Contract Documents will be furnished by the **Owner** for Record Drawing purposes.

- D.** The **Contractor's** name, address and telephone number shall be shown on each sheet. The date(s) of installation of the Work shall also be shown on each sheet of the plan set.

3.02 WATER LINE RECORD DRAWINGS

- A.** In addition to the information shown on the Contract Drawings, the Water Line Record Drawings must contain the following information:
1. Pipe size, material, and pressure class.
 2. Manufacturer's name and model number of fire hydrants and valves; date of manufacture.
 3. Horizontal location of water lines, valves, fire hydrants, service connections, meters, air release valves and all other appurtenances. Location to be referenced to horizontal control system shown on the Contract Drawings (e.g., station and offset). If the location is identical to that shown on the Contract Drawings, indicate with the annotation "As Installed".
 4. Vertical location of water lines at crossings of creeks, storm drains, sanitary sewers, and other utilities. Also indicate any other locations where the depth of the water lines are other than standard depth.
 5. Detailed sketches, with dimensions, of connections of water mains, including valves and fittings.
- B.** Field-measured tie-down dimensions shall be provided for all valves installed (except for those on fire hydrant leads). Each valve shall be referenced to no less than three permanent and well-defined physical objects located within 100 feet of the valve. Tie-down measurements shall be shown to the nearest one-hundredth of a foot. The tie-down dimensions and reference object descriptions shall be clearly presented on the Record Drawings in the form of tables or enlarged scale sketches.

3.03 SANITARY SEWER RECORD DRAWINGS

- A.** In addition to the information shown on the Contract Drawings, the Sanitary Sewer Record Drawings must contain, as a minimum, the following information:
1. Pipe material.
 2. Manhole type, if other than standard (i.e., drop, doghouse, etc.).
 3. Pipe size and slope and length between manholes. Slope shown as percent to the nearest hundredth; length to the nearest tenth of a foot.
 4. All pipe end inverts (ins and outs) to the nearest hundredth of a foot.
 5. Manhole rim elevation to the nearest hundredth of a foot.
 6. Ground elevation at each manhole to the nearest tenth of a foot.
 7. Stationing between manhole centers to the nearest tenth of a foot.
 8. Relative horizontal angle between all pipes entering and exiting manholes; to the nearest second.
 9. Horizontal location of service laterals, stationed along sewer centerline from manholes.
 10. Invert elevation of lateral at right-of-way or easement limit; required only if lateral depth is other than standard shallow service connection.

- B.** If the project includes a sewage pump station and force main, provide the following information:
1. Elevations to accuracy noted, using site bench mark as reference, including:
 - a. Wet well top slab, bottom slab, invert of incoming gravity sewers, and centerline of pump discharge lines exiting; hundredths of a foot.
 - b. Equipment building slab; hundredths of a foot.
 - c. Generator slab; hundredths of a foot.
 - d. Ground at wet well and at fence corners; tenths of a foot.
 - e. Centerline of access road, on 50 foot centers; tenths of a foot.
 2. Site, mechanical and electrical drawings, marked to show any changes.
 3. Equipment manufacturer names and model numbers; including pumps, valves, generator, etc.
 4. Force main pipe size and material.
 5. Horizontal location of force main, air release valves and all other appurtenances. Location to be referenced to horizontal control system shown on the Contract Drawings (e.g., station and offset). If the location is identical to that shown on the Contract Drawings, indicate with the annotation "As Installed".
 6. Vertical location of force main at crossings of creeks, storm drains, water lines, and other utilities. Also indicate any other locations where the depth of the force main is other than standard depth.

3.03 SANITARY SEWER RECORD SURVEY

- A.** As noted in Paragraph 1.03.B above, the **Contractor** shall provide a Record Survey of sanitary sewer lines installed as a part of the Work, in addition to the annotated Contract Drawings submitted as Record Drawings. The Record Survey must include, as a minimum, the following information:
1. Pipe size and slope and length between manholes. Slope shown as percent to the nearest hundredth; length to the nearest tenth of a foot.
 2. All pipe end inverts (ins and outs) to the nearest hundredth of a foot.
 3. Manhole rim elevation to the nearest hundredth of a foot.
 4. Ground elevation at each manhole to the nearest tenth of a foot.
 5. Ground profile along centerline of sewer between manholes; to the nearest tenth of a foot.
 6. Manhole stationing to the nearest tenth of a foot.
 7. Relative horizontal angle between all pipes entering and exiting manholes; to the nearest second.
- B.** The Record Survey must be referenced to the horizontal and vertical controls shown on the Contract Drawings. The coordinates of the manholes shall be presented in tabular form on each sheet of the set.
- C.** Each drawing shall indicate the Cobb County Water System project name and project number, the **Contractor's** name, address and telephone number, the surveyor's name, address and telephone number, and the surveyor's seal.

END OF SECTION 01720

SECTION 02221 - TRENCHING FOR UTILITIES

PART 1 - GENERAL

1.01 SUMMARY

Section Includes:

1. Preparation.
2. Utilities trenching.
3. Backfilling.
4. Compacting.

1.02 SUBMITTALS

- A. Test Reports: Testing laboratory will submit the reports directly to the **Owner** and shall copy the **Contractor**.
- B. The results of sheeting and shoring analysis and design shall be submitted to the **Owner** on request.

1.03 QUALITY ASSURANCE

- A. An independent geotechnical consultant will take samples and perform moisture content, gradation, compaction, and density tests during placement of backfill materials to check compliance with these specifications. The **Contractor** shall provide such assistance as necessary for sampling and testing. The cost of the services of the geotechnical consultant will be paid for by the **Owner** under a separate contract or from the Geotechnical Allowance in the Bid Schedule.
- B. All excavation and trenching activities must be performed in accordance with all applicable Federal, state and local safety requirements and all permits and certifications must be obtained by the **Contractor** prior to the execution of the work. Copies of obtained Trenching and Excavation Permits along with copies of specific jobsite key personnel "Competent Person" and "Excavation and Trenching" certifications shall be submitted to the Owner on request.

1.04 SITE CONDITIONS

- A. Traffic: Do not interfere with or close public or private roadways or driveways without permission of governing authorities. Work within the rights-of-way of public roadways shall be done in accordance with requirements and provisions of the permits issued by the agencies for the construction within their respective rights-of-way.
- B. Site Utilities:

1. Advise utility companies of excavation activities before starting excavations. Locate and identify underground utilities passing through work area before starting work. Contact The Utilities Protection Center at 800-282-7411 and comply with "Call before you dig" requirements.
 2. If underground utilities are encountered in locations other than indicated, immediately advise utility owners before proceeding. Amend project record documents to show actual locations of all existing utilities encountered, regardless of whether or not shown on contract drawings.
 3. Protect existing utilities.
 4. Do not interrupt existing utilities without advance notice to and written approval from the utility owner.
- C. If materials are encountered that are suspected of being hazardous or toxic, the **Contractor** shall follow the procedures specified in Section 01010.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Obtain approval of each soil material from the Owner's geotechnical consultant prior to use.
- B. Satisfactory Topsoil: Fertile agricultural soil, typical for locality, capable of sustaining vigorous plant growth; free of subsoil, rocks, clay, toxic matter, plants, weeds, and roots.
- C. Satisfactory Backfill Material: Fine, sound, loose, low plasticity soil (Plasticity Index less than 30) free from all wood, vegetable matter, debris, and other objectionable material, and having scattered clods, stones, or broken concrete less than 6 inches in maximum dimension except that maximum particle size shall be less than 2 inches in backfill under roadways or other paved areas and less than $\frac{3}{4}$ inch when used with PVC or other flexible thermoplastic pipe.
- D. Bedding Material and Stabilization Stone: Gravel, air-cooled blast furnace slag, crushed stone or synthetic aggregate meeting the requirements of Section 800 of the State of Georgia Department of Transportation Standard Specifications for the Construction of Roads and Bridges, latest edition. Gradation shall be Size No. 57.
- E. Where existing excavated materials are deemed unsuitable for backfill, obtain satisfactory borrow materials from other acceptable sources. Contractor shall be compensated for this replacement material in accordance with the Contract's Unsuitable Trench Backfill Allowance.
- F. If compromise of otherwise suitable excavated material is caused by the Contractor's failure to provide proper dewatering measures, to prevent

surface water run-off into the excavated area, or to protect stockpiles of stored material, the removal of the compromised material and replacement with satisfactory borrow material will be accomplished by the Contractor at no cost to the Owner.

PART 3 - EXECUTION

3.01 PREPARATION

- A.** Protection: Provide markers indicating limits of work and clear identification of items and areas requiring protection.
- B.** Provide barricades, warning signs, and warning lights around open excavations as necessary to prevent injury to persons.
- C.** The **Contractor** is solely responsible for determining the potential for injury to persons and damage to property and for executing the work to prevent injury and damage.
- D.** Do not allow excavation subgrades and soil to be subjected to freezing temperatures, frost or excessive water.

3.02 EROSION CONTROL

Provide erosion control during the entire project in accordance with the drawings and with the requirements of Section 02270 and 02275 (as applicable) of these Specifications.

3.03 PROTECTION OF TREES

- A.** Provide temporary guards to protect the tops, trunks and roots of trees and vegetation to remain. Protective guards or fencing shall be installed before work is started and shall be removed when directed by the **Owner**. Heavy equipment or the stockpiling of material will not be permitted within the branch spread drip line of protected trees.
- B.** Promptly repair any damaged trees to prevent death or loss of vigor. Repairs shall be performed in conformance with accepted horticultural practices suited to the nature and extent of damage done.
- C.** The Cobb County arborist will determine if additional measures are required to protect specific trees. The **Contractor** shall comply with all of the arborist's directions, at no additional cost to the **Owner**.

3.04 DEWATERING

- A. Do not allow surface or ground water to flow into or accumulate in excavations. All excavation shall be done "in-the-dry", defined as no more than $\pm 3\%$ of soils' optimum moisture content.
- B. Do not allow water to flow in an uncontrolled fashion across the project site or to erode slopes or to undermine excavations.
- C. Provide and maintain temporary diversion ditches, dikes, and grading as necessary. When required by surface or subsurface water conditions, provide sumps, wellpoints, french drains, pumps, and other control measures necessary to keep excavations free of water.
- D. If foundation soils are disturbed or loosened by the upward seepage of water or an uncontrolled flow of water, the affected areas shall be excavated and replaced with stabilization stone at no cost to the Owner.
- E. Water shall be disposed of in such a manner as not to be a menace to the public health and in accordance with applicable local regulations and State Environmental Protection Division standards and permits.

3.05 EXCAVATION

- A. Explosives: The **Contractor** shall assume sole responsibility for the effects of explosives. Comply with the requirements of Section 02201 of these Specifications.
- B. General: Excavation includes the removal of any materials necessary to achieve the required subgrade elevations and includes the reuse or disposal of such materials.
- C. Unnecessary Excavation: The expense of excavation of materials outside of limits indicated shall be borne by the **Contractor**.
- D. Approval of Subgrade: The adequacy of the subgrade shall be subject to the inspection and approval of the **Owner** before the installation of the pipeline.
- E. Excavation Stabilization: Design, provide, maintain, and remove shoring and bracing in compliance with requirements of governing authorities. The **Owner** has the right (but not the duty) to require additional stabilization measures if the **Contractor** fails to comply with applicable requirements. The **Contractor** shall immediately comply with the **Owner's** directives, at no additional cost to the **Owner**.
- F. Excavation for Utilities Structures: Excavate to allow proper construction and inspection of concrete formwork and other materials.
- G. Excavation for Footings and Foundations: Delay excavation to final grade and final compaction until just before concrete will be placed. Remove any

loose or sloughed material and adjust excavations to form a suitable bearing surface.

H. Excavation for Trenches:

1. Dig trenches to uniform widths and depths as indicated.
2. Trench walls for piping shall be vertical from trench bottom to one foot above top of pipe or to top elevation of initial backfill, whichever is higher.
3. Should hard, unyielding material be encountered when excavating for utilities bearing directly on trench bottom remove such material to at least 6 inches below required grade and replace with approved bedding material.

I. Unsuitable Excavated Soils and Subgrade: Where unsuitable materials are encountered within or below the excavation limits, they shall be removed and disposed of to the level or limits of suitable material. Areas so excavated shall be backfilled with satisfactory soil material and/or stabilization stone. Payment for this additional material will be from the corresponding allowance items listed in the bid form and with proper authorization and approval of the Owner representative(s).

J. Progress of Work: The length of trench to be opened or the areas of the surface to be disturbed or un-restored at any one time shall be limited by the **Owner** with regard both to expeditious construction and to the convenience and comfort of the persons residing in the neighborhood or frequenting the project area. New trenching will not be permitted when earlier trenches need backfilling or labor is needed to restore the surfaces to a safe and proper condition. Pipe trenches shall not be excavated more than 100 feet in advance of pipe laying and all work shall be performed to cause the least possible inconvenience to the public. Adequate temporary bridges or crossings shall be constructed and maintained where required to permit uninterrupted vehicular and pedestrian traffic. All trenches must be closed at the end of each work day.

3.06 STORAGE

- A.** Stockpile materials to be used for filling and backfilling in a manner to protect from contamination. Erosion and sedimentation control measures shall be provided as required by the field conditions encountered at no additional cost to the **Owner**.
- B.** In the storing of excavated material which is to be used for 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 or relocate this excavated material, the **Contractor** will be required to do so at no cost to the **Owner**.

3.07 BACKFILLING

- A.** Preparation: Backfill excavations as soon as practicable. Complete the following operations before backfilling:
 - 1. Remove temporary shoring and bracing as the work progresses and when its use is no longer necessary.
 - 2. Request the performance of any inspections or testing required in the open ditch.
- B.** Installation:
 - 1. Place bedding material and install pipe in conformance with the applicable sections of these specifications and with the details on the drawings.
 - 2. Place approved soil materials in layers to required elevations.

3.08 COMPACTION

- A.** Place backfill in layers not exceeding loose depths as follows:
 - 1. Heavy equipment compaction: 8 inches.
 - 2. Hand operated tampers: 4 inches.
- B.** In-Place Density Requirements: Compact soil to not less than the standard proctor values given below.
 - 1. Unpaved areas outside of roadway right-of-ways: 90 percent for all lifts.
 - 2. Unpaved areas of roadway right-of-way: 98 percent for all lifts.
 - 3. Paved areas: 98 percent for all lifts up to the top 12-inches, 100 percent for the top 12-inches.
- C.** Moisture Control: During compaction, control moisture of subgrades and subsequent lifts to within $\pm 3\%$ of optimum moisture content.

3.09 GRADING

- A.** Slope grades to prevent ponding. Finish subgrades to following tolerance:
 - 1. Unpaved areas: Plus or minus 0.10 foot.
 - 2. Sidewalk areas: Plus or minus 0.05 foot.
 - 3. All other paved areas: Plus or minus 0.05 foot.
- B.** Restore disturbed wetlands areas to original pre-construction configuration. Dispose of excess soil in upland areas.

3.10 FIELD QUALITY CONTROL

- A.** Testing Laboratory Services: Provide timely notice to testing laboratory. Do not proceed with construction until testing, inspection and approval have been obtained.
- B.** Maximum Density at Optimum Moisture Content: Determined in accordance with ASTM D 1557, Method D.

- C.** In-Place Density Tests: ASTM D 1556 (sand cone method), ASTM D 2167 (rubber balloon method), or ASTM D 2922 (nuclear method), as applicable.
- D.** If testing indicates that subgrade or fills are below specified density, scarify or remove and replace to the required depth, re-compact, and retest at no additional cost to the **Owner**.
- E.** The cost of the initial tests will be borne by **Owner**. The cost of any retests or additional tests will be borne by **Contractor**.

3.11 MAINTENANCE

- A.** Completed Areas: Protect from damage by pedestrian or vehicular traffic, freezing, erosion, and contamination with foreign materials.
- B.** Damaged Areas: Where completed or partially completed surfaces become eroded, rutted, settled, or lose compaction and whether due to subsequent construction operations or weather conditions, restore materials to required condition. Scarify or remove and replace to the required depth, return to optimum moisture content, and compact materials to the required density before continuing construction. The restoration of damaged areas will be accomplished at no additional cost to the **Owner**.

3.12 DISPOSAL OF EXCESS AND WASTE MATERIALS

- A.** Evenly spread any excess satisfactory topsoil in locations on site as directed by the **Owner**. Properly dispose of unsatisfactory topsoil off site.
- B.** Remove any trash, debris, and other materials not required for use on the project and legally dispose of it off site.
- C.** On-site burning or burying of any material is prohibited.

END OF SECTION 02221

SECTION 02650 - MANHOLE FRAME AND COVER ADJUSTMENTS

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A.** This Section addresses the adjustment to grade and/or replacement of manhole frames and covers for both in-pavement and out-of-pavement structures
- B.** The Contractor shall be responsible for the following:
 - 1. Furnishing all labor, equipment, and materials necessary to complete the work.
 - 2. Compliance with Cobb County Department of Transportation and/or Georgia Department of Transportation guidelines for work zone establishment, traffic control, authorization to perform work within roadways and right-of-ways, material specifications, etc.
 - 3. Compliance with Cobb County Community Development regulations in regards to erosion and sedimentation control.
 - 4. Negotiations and obtaining (in writing) any necessary permission to enter private property to access work areas.
 - 5. Protect or re-establish existing drainage ways or easements which may be impacted during work activities.
 - 6. Repair of any manholes damaged as a result of work activities
- C.** The Owner will provide maps of the sewer collection systems' (via electronic PDF format) and other location details based on the best information currently and readily available for the Contractor's use in establishing the general location of a manhole. The Contractor is responsible for further location efforts (electromagnetic devices, survey measurement/alignment, etc.) to properly identify the work order location.
- D.** Water supply for concrete mix preparation shall be from an authorized, metered source. Fire hydrant meter(s) are available for rental from the Cobb County Water System

1.02 WARRANTY

- A.** A written two year warranty covering all workmanship and materials shall be provided by the Contractor for each adjustment from the date of the completion of the work order.

1.03 SUBMITTALS

- A.** Submit shop drawings for materials furnished under this section to the Owner in conformance with the requirements of Section 01300 (Submittals) of these Specifications.
- B.** Submit to owner the detailed mix design information (compressive strength, curing time, availability to introduce traffic loads, etc.) for the concrete
- C.** Submit a letter from the rapid-set cement manufacturer certifying that all products proposed for use in conjunction with the cement have been reviewed (including the dye/ staining agent, curing and sealing compound, and crack sealant) and have been determined to be compatible with the cement material when used as intended in this project.

PART 2 - PRODUCTS

2.01 GENERAL

- A.** All materials and products utilized in the execution of the work shall be in accordance with these Specifications and the subject to the inspection, testing, and approval of the Owner.

2.02 MATERIALS

- A. Manhole Frames and Covers**
 - 1. Standard manhole frames and covers shall be furnished and installed on manholes in roadways and in maintained right-of-ways (unless located in direct drainage ways). Standard manhole frames and covers shall be East Jordan Iron Works Model V-1480, U.S. Foundry Model USF 360-E, or approved equal.
 - 2. Bolt-down, watertight frames and covers shall be furnished and installed on manholes along easements for outfall collector and interceptor sewers, in drainage ways, and elsewhere as directed. Bolt-down, watertight frames and covers shall be East Jordan Iron Works Model V2480, U.S. Foundry USF 360-E / ORS, or approved equal with rubber gasket. Two (2), 5/8-inch diameter, stainless steel, machine bolts shall be furnished and installed along with two (2) Owner-furnished, 5/8-inch stainless steel, "tamper-proof" bolts.
- B. Concrete and Grout**
 - 1. Concrete for manhole frame and cover adjustments in roadways shall be a rapid-setting, early strength mix meeting the requirements of Section 934-Rapid Setting Patching Materials for Portland Cement Concrete of the Georgia Department of Transportation's Standard Specifications and utilizing a product from the Georgia Department of Transportation's Qualified Products List 27, "Rapid Setting Patching Materials" (latest edition) such as CTS Manufacturing Company's Rapid Set D.O.T. Cement or approved equal. Sand, coarse

aggregate, water, and other special additives shall be furnished and accurately proportioned in accordance with the patching material manufacturer's specifications.

2. Sand-cement grout for setting precast concrete adjustment rings shall consist of 1 part Type III Portland cement, 2 parts sand, with a maximum of 4.5 gallons of water per sack (cubic foot) of cement.
 3. Hydraulic cement for use in sealing manhole joints, lift holes, around pipe connections, inverts, complete interior grouting of brick manholes, etc. shall be Thoro Waterplug (Masterseal 590), Quikrete Hydraulic Water-Stop Cement (No. 1126) or approved equal.
- C. An acrylic curing and sealing compound shall be applied to the concrete surface in accordance with the manufacturer's instruction. The compound shall be Rez-Seal by Euclid Chemical Company or approved equal.
- D. The perimeter joint shall have a cold-pour, liquid, crack sealant applied to inhibit the effects of water penetration between the newly placed concrete and the surrounding pavement. This application shall be in accordance with the manufacturer's instruction. The sealant shall be Brewer Cote of the Brewer Company, or approved equal.
- E. Reinforcing steel shall be deformed, billet-steel bars conforming to ASTM A615, Grade 60. Bars shall be shop fabricated and bent cold.
- F. Precast Concrete manhole sections shall conform to Specification for Precast Concrete Manhole Sections, ASTM designation C478, except as otherwise specified below. The method of construction shall conform to the drawings and details and the following additional requirements:
1. Barrel sections shall have tongue and groove joints. Joints shall have a round rubber gasket set in specially provided indentations. The round rubber "O"-ring gasket shall conform to ASTM C443 standard specifications SS-S-210A "Sealing Compound, Preformed Plastic for Pipe Joints", Type I, Rope Form and AASHTO Designation M-198 75 1, Type B, Flexible Plastic Gasket (Bitumen) are also acceptable.
 2. Type I cement shall be used except as otherwise approved.
 3. The date of manufacture and the name or trademark of the manufacturer shall be clearly marked on the inside of each precast section. Each section of the manhole must be inspected and stamped by an accredited testing laboratory.
 4. Sections shall be cured by an approved method for at least 28 days.

5. Top sections shall be eccentric except that precast concrete slabs shall be used where cover over the top of the pipe is less than 4 feet for all manholes.
 6. Precast concrete slabs over top sections, where required, shall be capable of supporting the overburden plus live load equivalent to AASHTO H-20 loading.
 7. Manhole steps shall be cast into precast sections and shall conform to ASTM Specification C478. Steps shall be Plastic Step by M.A. Industries, Inc. or equal.
 8. Lift holes for handling the precast sections shall not penetrate completely through the wall.
- G.** Precast concrete adjustment rings shall conform to ASTM C478, except as otherwise specified below. The method of construction shall conform to the drawings and detail and the following additional requirements:
1. The precast concrete adjustment ring shall only be used for minor vertical adjustments (12-inches or less) to a manhole frame and cover out of pavement and where directed by the Owner.
 2. The precast concrete adjustment ring shall be free from cracks, voids, and other defects.
 3. The inside diameter of the precast concrete adjustment ring shall have a diameter to match the manhole frame and cover.

PART 3 - EXECUTION

3.01 GENERAL

- A.** Care shall be taken in all aspects of the work, including, but not limited to the following:
1. Protection of existing sanitary sewer mains and manholes.
 2. Protection of existing adjacent utilities.
 3. Protection of existing adjacent trees, shrubs, landscape, etc.
 4. Protection of existing adjacent roadway surfaces.
 5. Protection of existing adjacent drainage ways, creeks, streams, ponds, and lakes.
 6. Handling of materials.

7. Providing traffic control.

- B. The Contractor shall be effectively equipped with machinery, tools, materials, traffic control devices, etc. to perform the necessary tasks for completing work in accordance with these specifications and detail drawings.
- C. The Contractor shall be effectively staffed with knowledgeable, capable personnel. Experienced, trained supervisory personnel shall be present at all times to ensure the best quality work in accordance with these specifications and detail drawings.
- D. The Contractor shall legally dispose of all waste, surplus, or unsuitable materials or debris on a daily basis. Debris allowed to drop into sewer manholes shall immediately be removed to avoid the potential of sewer blockages. Contractor will be held responsible for any fine levied by Federal, State, or Local authorities having jurisdiction, which may be the direct or indirect result of work performed under this Contract.
- E. In the event the Contractor encounters a manhole which has not previously been adjusted in accordance with the Specifications of this Contract, the Contractor shall inform the Owner. At the Owner's direction, the Contractor will correct the existing condition to bring the manhole to the current standards set forth by this Contract.

3.02 ADJUSTMENT AND/ OR REPLACEMENT IN ROADWAYS AND PAVEMENT

- A. The adjustment to grade and/ or replacement of manhole frames and covers in roadways shall be performed with the following guidelines:
 - 1. Accurately locate the Manhole (if not currently visible) and its center.
 - 2. Mechanically core or saw-cut the full depth of existing roadway pavement around the manhole. A circular core/cut with a diameter sufficient for adjustment needs is required.
 - a. Exceptions to this include situations in which existing, square concrete pad/patch, exposed at roadway surface is being replaced. In these instances the replacement pad/patch is to match the existing square dimensions.
 - 3. All existing adjustment rings, bricks, shims, etc. shall be removed and the surrounding sub-base and base shall be excavated to the clean lines and dimension of the pavement core/cut.
 - a. For Manhole adjustments less than 24-inches- Excavation shall be to a depth of 3-inches (minimum) below the resulting top of the intact manhole structure. The existing structure shall be exposed and be cleaned of residual dirt, mud, cement, gravel, etc. Care shall be employed to prevent the entry of dirt, debris, and foreign materials into the manhole, and if such occurs, shall immediately be removed by the Contractor at no additional cost to the Owner.

- b. For manhole adjustments greater than 24-inches- Excavation shall be to a depth of 3-inches (minimum) below existing cone section, the existing cone section removed, 1-foot concrete riser section(s) installed, the existing cone section reinstalled (if suitable for reuse), and all joints sealed & grouted. Care shall be employed to prevent the entry of dirt, debris, and foreign materials into the manhole, and if such occurs, shall immediately be removed by the Contractor at no additional cost to the Owner.
 - 4. The cast iron manhole frame shall be supported in place, centered accurately over the manhole throat/chimney, and set to the elevation and slope of the adjacent roadway surface. This support and the formwork for subsequent concrete placement around the installation shall be by a proven method deemed acceptable by the owner. The manhole throat/chimney diameter shall not be permanently compromised or constricted in any way. The use of manhole adjusting rings (of any type of material) or brick is not acceptable. Any supporting interior form/liner to remain in place shall be of a corrosion-resistant material, such as Vylon, PVC, HDPE, etc. and shall be secured and sealed in place with a proven, compatible adhesive/ sealant.
 - 5. Accurately proportion the rapid-setting, high-early strength concrete mix in accordance to manufacturer's specifications. Place the concrete along with the required reinforcing steel to the detailed clearances. Mechanically vibrate the concrete to achieve proper consolidation and the elimination of voids. The concrete collar shall be a monolithic placement, completely filling the core/cut opening and encapsulating the top of the manhole structure and manhole cast iron frame. Screed concrete surface flush with the adjacent roadway surface. Float and/or trowel to a consistent finish. Tool a perimeter joint to a depth of 1-1/2-inch and apply a light broom finish. Following the finishing, apply a curing and sealing compound to the concrete and a crack sealant to the perimeter joint in accordance with manufacturer's instructions.
 - 6. Maintain full traffic control around the freshly placed concrete until the concrete has achieved a minimum compressive strength of 1200 psi based upon manufacturer's mix design guidelines. Curing duration will be validated by the Owner by random sampling and testing during the course of the contract.
 - 7. Place concrete only if ambient and adjoining surface temperatures are 45 degrees and rising or if sufficient thermal protection is provided to maintain proper curing conditions. Appropriate curing precautions shall be taken to protect the concrete during hot weather conditions.
- B.** As specifically directed for coordination with select Department of Transportation roadway resurfacing projects, the Contractor shall lower existing manholes prior to major road surface milling operations. The following general guidelines shall apply:
- 1. Accurately locate the manhole (if not currently visible) and its center. Reference and record location for subsequent adjustment.

2. Mechanically core or saw cut the full depth of existing roadway around the manhole, or completely remove the concrete pad/patch if such exists.
3. Dependent upon the anticipated depth of proposed road surface milling
 - a. Remove the manhole frame and cover.
 - b. Remove any existing manhole adjustments, i.e. adjustment rings, bricks, shims, etc.
 - c. For manhole adjustments greater than 24-inches- The existing cone section is to be removed, 1-foot precast concrete riser section(s) shall be installed, the existing cone section (if suitable) shall be reinstalled, and all joints sealed and grouted. Care shall be employed to prevent the entry of dirt, debris, and foreign materials into the manhole, and if such occurs, it shall be immediately removed by the Contractor at no additional cost to the Owner.
 - d. If the proposed milling depth allows, the manhole frame and cover may be reset. If not, the manhole frame and cover shall be removed and an adequate sized steel traffic plate placed over the manhole structure. Either method is temporary until roadway milling and resurfacing has been completed, and shall be sufficient to support traffic loads as well as to protect the sanitary sewer facility.
 - e. All debris, including the manhole frame and cover (if removed) shall be removed from the site.
4. Backfill with select granular material and compact to a level of 3-inches below the anticipated road surface milling depth.
5. Accurately proportion the rapid-setting, high-early strength concrete mix in accordance to manufacturer's specifications. Place concrete and screed to a level flush with the existing roadway surface. Neither concrete curing compound nor joint sealant will be required for this temporary pad/patch.
6. Maintain full traffic control around the freshly placed concrete until the concrete has achieved a minimum compressive strength of 1200 psi based upon manufacturer's mix design guidelines, curing duration will be validated by the Owner by random sampling and testing during the course of the contract.
7. Place concrete only if ambient and adjoining surface temperatures are 45 degrees and rising or if sufficient thermal protection is provided to maintain proper curing conditions. Appropriate curing precautions shall be taken to protect the concrete during hot weather conditions.
8. Following completion of the Department of Transportation's resurfacing of the roadway, permanent adjustment to grade of the manhole frame and cover shall be performed in accordance with these specifications.

3.03 ADJUSTMENT AND/OR REPLACEMENT OUT OF PAVEMENT

- A. The adjustment to grade and/or replacement of manhole frames and covers out of pavement within right-of ways and/or easements shall be performed in accordance with the following guidelines:
1. Accurately locate the Manhole (if not currently visible) and its center.
 2. Excavate to fully expose the top of the manhole structure at a depth to effectively and safely perform the manhole adjustment work.
 3. All existing adjustment rings, bricks, shims, etc. shall be removed. Care shall be employed to prevent the entry of dirt, debris, and foreign materials into the manhole, and if such occurs, shall immediately be removed by the Contractor at no additional cost to the Owner.
 4. Perform manhole adjustments using all new materials and components in accordance with manufacturer instructions, industry guidelines, and these specifications and detail drawings.
 - a. Manhole adjustments involving only frame and cover replacement will be accomplished by attaching the new frame to the manhole structure with 4 each, ½-inch diameter, stainless steel anchor bolts (or threaded rods), installed in drilled holes with epoxy adhesive. Install a butyl rubber flexible sealant (Ram-Nek, Kent Seal, or equal) to provide a mastic seal between frame and structure.
 - b. Manhole height adjustments involving the removal of the existing precast cone or flat-top section, installation of a new precast concrete riser section of the proper diameter and height, and resetting the existing cone or flat-top section (if acceptable for reuse). Anchor Straps shall be installed per the standard details
 - c. If the existing manhole is of brick and mortar construction, the brick cone and walls shall be demolished/ removed to an adequate and structurally sound level (as determined by the Owner). A new precast concrete riser and cone or flat-top sections of the proper diameter and height shall be installed on the brick structure. An external concrete collar shall be placed to secure the precast concrete to the brick structure as indicated by contract standard details.
 - d. For locations specifically authorized by the Owner for minor vertical adjustments (12-inches or less), precast concrete adjustment rings may be used to elevate the frame and cover. Adjustment rings, along with the frame, shall be secured to the manhole structure with 4 each, ½-inch stainless steel anchor bolts (or threaded rods) installed in drilled holes with epoxy adhesive. Grout shall be used to bond adjustment rings as well as to provide an exterior seal.

5. Place concrete only if ambient and adjoining surface temperatures are 45 degrees and rising or if sufficient thermal protection is provided to maintain proper curing conditions. Appropriate curing precautions shall be taken to protect the concrete during hot weather conditions.

3.04 FIELD QUALITY ASSURANCES

- A. Owner shall field inspect all work performed before final acceptance and payment.
- B. A written two-year warranty shall be provided for the replacement work.
- C. Failures considered to be warranty repairs include concrete surface spalling, cracking of the concrete, separation of the manhole frame from the concrete, or other obvious defects. The Owner may require the concrete mix manufacturer's involvement in examination of failures and determination of modifications necessary to avoid future defective work.
- D. Warranty repair consists of complete removal and replacement of the manhole frame in accordance with these adjustment specifications at no cost to the Owner. Critical failures that create a potential traffic hazard shall be rectified within 24 hours of notice, while less serious failures shall be addressed within 30 days of notice. The failure type shall be determined by the Owner.

END OF SECTION 02650

SECTION 02660 - VALVE BOX ADJUSTMENTS

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A.** This Section addresses the adjustment to grade and/or replacement of valve box for both in-pavement and out-of-pavement situations
- B.** The Contractor shall be responsible for the following:
 - 1. Furnishing all labor, equipment, and materials necessary to complete the work.
 - 2. Compliance with Cobb County Department of Transportation and/or Georgia Department of Transportation guidelines for work zone establishment, traffic control, authorization to perform work within roadways and right-of-ways, material specifications, etc.
 - 3. Compliance with Cobb County Community Development regulations in regards to erosion and sedimentation control.
 - 4. Negotiations and obtaining (in writing) any necessary permission to enter private property to access work areas.
 - 5. Protect or re-establish existing drainage ways or easements which may be impacted during work activities.
 - 6. Repair of any valve boxes damaged as a result of work activities.
- C.** The Owner will provide maps of the water distribution systems (via electronic PDF format) and other location details based on the best information currently and readily available for the Contractor's use in establishing the general location of a valve box. The Contractor is responsible for further location efforts (electromagnetic devices, survey measurement/alignment, etc.) to properly identify the work order location.
- D.** Water supply for concrete mix preparation shall be from an authorized, metered source. Fire hydrant meter(s) are available for rental from the Cobb County Water System

1.02 WARRANTY

- A.** A written two-year warranty covering all workmanship and materials shall be provided by the Contractor for each adjustment from the date of the completion of the work order.

1.03 SUBMITTALS

- A.** Submit shop drawings for materials furnished under this section to the Owner in conformance with the requirements of Section 01300 (Submittals) of these Specifications.
- B.** Submit to owner the detailed mix design information (compressive strength, curing time, availability to introduce traffic loads, etc.) for the concrete
- C.** Submit a letter from the rapid-set cement manufacturer certifying that all products proposed for use in conjunction with the cement have been reviewed (including the dye/ staining agent, curing and sealing compound, and crack sealant) and have been determined to be compatible with the cement material when used as intended in this project.

PART 2 - PRODUCTS

2.01 GENERAL

- A.** All materials and products utilized in the execution of the work shall be in accordance with these Specifications and the subject to the inspection, testing, and approval of the Owner.

2.02 MATERIALS

- A.** Valve Box
 - 1. Valve Box shall be approved standard cast iron adjustable with a minimum diameter of 5-1/4-inches. The casting shall be coated with coal-tar pitch varnish. The lid shall bear the word "WATER", the letter "W", or other applicable designation for sewer, reuse water, etc. The valve box shall be East Jordan Iron Works model 8550 or approved equal.
- B.** Concrete and Grout
 - 1. Concrete for valve box adjustments in roadways shall be a rapid-setting, early strength mix meeting the requirements of section 934 - Rapid Setting Patching Materials for Portland Cement Concrete of the Georgia Department of Transportation Standard Specification and utilizing a product from the Georgia Department of Transportation's Qualified Products List 27, "Rapid Setting Patching Materials" (latest edition) such as CTS Manufacturing Company's Rapid Set D.O.T. Cement or approved equal. Sand, coarse aggregate, water, and other special additives shall be furnished and accurately proportioned in accordance with the patching material manufacturer's specifications.
 - 2. Sand-cement grout for filling of annular space between valve box and precast collar shall consist of 1 part Type III Portland cement, 2 parts sand, with a maximum of 4.5 gallons of water per sack (cubic foot) of cement.

- C. An acrylic curing and sealing compound shall be applied to the concrete surface in accordance with the manufacturer's instruction. The compound shall be Rez-Seal by Euclid Chemical Company or approved equal.
- D. The perimeter joint shall have a cold-pour liquid, crack sealant applied to inhibit the effects of water penetration between the newly placed concrete and the surrounding pavement. This application shall be in accordance with the manufacturer's instruction. The sealant shall be Brewer Cote of the Brewer Company, or approved equal.
- E. Mesh reinforcement shall be electrically welded, cold-drawn, mild-steel, plain wire fabric conforming to ASTM A185. Wires shall be cold-drawn steel conforming to ASTM A82. Mesh reinforcement shall be supplied as flat sheets or mats.
- F. Precast concrete valve collars may be used in unpaved areas instead of casting valve collar in place upon approval of the precast valve collar shop drawings. The precast collar can be square or circular in shape. The concrete shall be a minimum of 3000 psi design and have a minimum thickness of 4". The precast collar shall be a minimum 18-inch square or have a minimum diameter of 18".

PART 3 - EXECUTION

3.01 GENERAL

- A. Care shall be taken in all aspects of the work, including, but not limited to the following:
 - 1. Protection of existing water main and valves.
 - 2. Protection of existing adjacent utilities.
 - 3. Protection of existing adjacent trees, shrubs, landscape, etc.
 - 4. Protection of existing adjacent roadway surfaces.
 - 5. Protection of existing adjacent drainage ways, creeks, streams, ponds, and lakes.
 - 6. Handling of materials.
 - 7. Providing traffic control.
- B. The Contractor shall be effectively equipped with machinery, tools, materials, traffic control devices, etc. to perform the necessary tasks for completing work in accordance with these specifications and detail drawings.

- C. The Contractor shall be effectively staffed with knowledgeable, capable personnel. Experienced, trained supervisory personnel shall be present at all times to ensure the best quality work in accordance with these specifications and detail drawings.
- D. In the event the Contractor encounters a valve box which has not previously been adjusted in accordance with the Specifications of this Contract, the Contractor shall inform the Owner. At the Owner's direction, the Contractor will correct the existing condition to bring the valve box to the current standards set forth by this Contract.
- E. All water distribution system valves shall be exercised through their full range upon completion of valve box adjustment work. An accurate "count" of full turns to fully open and close the valve shall be recorded along with the original position (open, closed, partial) and provided to the Owner. The valve shall be returned to its original position.
- F. The Contractor shall avoid allowing any debris from the work activities to enter the valve box. If such occurs, the Contractor shall immediately take action to remove debris.

3.02 ADJUSTMENT AND/ OR REPLACEMENT IN ROADWAYS AND PAVEMENT

- A. The adjustment to grade and/ or replacement of valve boxes in roadways shall be performed with the following guidelines:
 - 1. Accurately locate the valve box (if not currently visible) and its center.
 - 2. Mechanically core or saw-cut the full depth of existing roadway pavement around the valve box. A circular core/cut with a diameter sufficient for adjustment (but not to exceed 20-inches) is required.
 - a. Exceptions to this include situations in which existing, square concrete pad/patch, exposed at roadway surface is being replaced. In these instances the replacement pad/patch is to match the existing square dimensions.
 - 3. Excavate as necessary around the existing valve box including removing it to clean debris from the box and valve nut and to center the box on the valve nut. No existing valve box shall be reused if cracked, otherwise damaged, or if found inappropriate for the location. The area of excavation shall be to the clean lines and dimensions of the pavement core/cut. Excavation below the nominal depth of the concrete collar shall be backfilled in lifts and compacted to 98% standard proctor using select materials.
 - 4. The valve box shall be supported in place, centered accurately over the valve, and set to the elevation and slope of the adjacent roadway surface. This support and the formwork for subsequent concrete placement around the installation shall be by a proven method and deemed acceptable by the owner. The valve box shall be installed to ensure positive accessibility of the operating nut or extension stem (if required) of the valve.

5. Accurately proportion the rapid-setting, high-early strength concrete mix in accordance to manufacturer's specifications. Place the concrete along with the required reinforcing steel to the detailed clearances. Mechanically vibrate the concrete to achieve proper consolidation and the elimination of voids. The concrete collar shall be a monolithic placement, completely filling the core/cut opening and encapsulating the top 10-inches of the valve box. Screed concrete surface flush with the adjacent roadway surface. Float and/or trowel to a consistent finish. Tool a perimeter joint to a depth of 1-1/2-inch and apply a light broom finish. Following the finishing, apply a curing and sealing compound to the concrete and a crack sealant to the perimeter joint in accordance with manufacturer's.
 6. Maintain full traffic control around the freshly placed concrete until the concrete has achieved a minimum compressive strength of 1200 psi based upon manufacturer's mix design guidelines. Curing duration will be validated by the Owner by random sampling and testing during the course of the contract.
 7. Place concrete only if ambient and adjoining surface temperatures are 45 degrees and rising or if sufficient thermal protection is provided to maintain proper curing conditions. Appropriate curing precautions shall be taken to protect the concrete during hot weather conditions.
- B.** As specifically directed for coordination with select Department of Transportation roadway resurfacing projects, the Contractor shall prepare existing valve boxes prior to major road surface milling operations. The following general guideline shall apply:
1. Accurately locate the valve box (if not currently visible) and its center. Reference and record location for subsequent adjustment.
 2. Expose the valve box as necessary and/or otherwise remove the valve box cover.
 3. Pack the valve box with heavy paper or other suitable filler material to prevent milling residue from filling the valve box.
 4. Following completion of the Department of Transportation resurfacing of the roadway, permanent adjustment to grade of the valve box shall be performed in accordance with these specifications. This work will typically include valve box clean-out and valve box replacement.

3.03 ADJUSTMENT AND/ OR REPLACEMENT OUT OF PAVEMENT

- A.** The adjustment to grade and/or replacement of valve boxes out of pavement shall be performed in accordance with the following guidelines:
1. Accurately locate the valve box (if not currently visible) and its center.
 2. Excavate as necessary around the existing valve box including removing it to clean debris from the box and valve nut and to center the box on the valve nut. No existing valve box shall be reused if cracked, otherwise damaged, or if

found inappropriate for the location. The area of excavation shall be limited as much as practical. Excavation below the required depth of the concrete collar shall be backfilled in lifts and compacted to 98% standard proctor using select materials.

3. The valve box intended for installation shall be supported in place, centered accurately over the valve, and set to the elevation and slope of the adjacent ground. The valve box shall be installed to ensure positive accessibility of the operating nut or extension stem (if required) of the valve.
4. The final 4" shall be reserved for the valve collar:
 - a. Installing the cast in place concrete valve collar. Accurately proportion the rapid-setting, high-early strength concrete mix in accordance to manufacturer's specifications. Place the concrete along with the required reinforcing mesh to the detailed clearances. The concrete shall be a monolithic placement encompassing the top 4-inches of the valve box. Screed concrete surface to be flush with the adjacent ground level. Float and/or trowel to a consistent finish and apply a light broom finish.
 - i. Maintain full traffic control around the freshly placed concrete until the concrete has achieved a minimum compressive strength of 1200 psi based upon manufacturer's mix design guidelines. Curing duration will be validated by the Owner by random sampling and testing during the course of the contract.
 - ii. Place concrete only if ambient and adjoining surface temperatures are 45 degrees and rising or if sufficient thermal protection is provided to maintain proper curing conditions. Appropriate curing precautions shall be taken to protect the concrete during hot weather conditions.
 - b. Install approved precast concrete valve collar.

3.04 FIELD QUALITY ASSURANCE

- A. Owner shall field inspect all work performed before final acceptance and payment.
- B. A written two-year warranty shall be provided for the replacement work.
- C. Failures considered to be warranty repairs include concrete surface spalling, cracking of the concrete, separation of the valve box from the concrete, or other obvious defects. The Owner may require the concrete mix manufacturer's involvement in examination of failures and determination of modifications necessary to avoid future defective work

- D. Warranty repair consists of complete removal and replacement of the valve box in accordance with these adjustment specifications at no cost to the Owner. Critical failures that create a potential traffic hazard shall be rectified within 24 hours of notice, while less serious failures shall be addressed within 30 days of notice. The failure type shall be determined by the Owner.

END OF SECTION 02660

SECTION 02713 - WATER LINES

PART 1 – GENERAL

1.01 SCOPE OF WORK

Provide all labor, equipment, materials and incidentals necessary to install and test all water supply piping and appurtenances as specified.

1.02 RELATED WORK

Section 02221 - Trenching for Utilities

1.03 SUBMITTALS

- A.** Submit shop drawings for materials furnished under this section to the Owner in conformance with the requirements of Section 01300 (Submittals) of these specifications.
- B.** Submit operating and maintenance information for valves and hydrants furnished under this section to the Owner in conformance with the requirements of Section 01730 (Operating and Maintenance Data) of these specifications.

1.04 INSPECTION

All materials to be installed under this contract may be inspected by the Owner at the site of manufacture for compliance with these Specifications.

1.05 DESIGN CRITERIA

Reference Standards of the American National Standards Institute (ANSI), the American Society of Testing of Materials (ASTM), and the American Waterworks Association (AWWA).

- ANSI / AWWA C151/A21.51, Standard for Ductile-Iron Pipe, Centrifugally Cast
- ANSI / AWWA C153/A21.53, Standard for Ductile-Iron Compact Fittings for Water Service
- ANSI / AWWA C115/A21.15, Standard for Flanged Ductile-Iron Pipe with Ductile Iron or Gray Iron Threaded Flanges
- ANSI / AWWA C111/A21.11, Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
- ANSI / AWWA C110/A21.10, Standard for Gray-Iron and Ductile-Iron Fittings, 3" through 48" Inches for Water and Other Liquids
- ANSI / AWWA C600 Standard for Installation of Ductile-Iron Mains and Their Appurtenances
- ANSI / AWWA C509 Standard for Resilient-Seated Gate Valves for Water-Supply Service
- ANSI / AWWA C502 Standard for Dry-Barrel Fire Hydrants
- ANSI / AWWA C651 Standard for Disinfecting Water Mains
- ANSI / AWWA C800 Standard for Underground Service Line Valves and Fittings
- ASTM B88 Standard Specification for Seamless Copper Water Tube

All materials, testing, and incidentals referenced by the Standards and Specifications mentioned herein are to conform to the latest revisions.

PART 2 - PRODUCTS

2.01 GENERAL

- A.** All materials shall be of standard design for which the manufacturer recommends the service is intended in accordance with AWWA or ASTM Standard Specifications.
- B.** All pipe and appurtenances shall be of the type and size shown in the Contract Documents and all materials of the same type shall be from one manufacturer.
- C.** Pipe materials shall be as follows:
 - 1. Mains (public) 4 inch diameter and larger, ductile iron.
 - 2. Mains (private) 6 inch diameter and larger, ductile iron.
 - 3. Service lines, 3/4 inch diameter and larger, copper.

2.02 DUCTILE IRON PIPE AND FITTINGS

- A.** Ductile iron pipe shall meet the following requirements, and be as specified hereinafter.
 - 1. Ductile iron pipe shall be of the centrifugally cast type, either in metal or cast molds, and shall conform to ANSI A21.51 or AWWA C151. Ductile iron shall have a minimum tensile strength of 60,000 psi with a minimum yield strength of 42,000 psi, pressure rated at a minimum of 350 PSI and have a minimal wall thickness of 0.25" unless field conditions determine that a heavier wall thickness is required. The pressure rating and manufacture date shall be shown on each piece. All pipe shall be furnished in industry standard lengths, complete with all necessary glands, joint material, including rubber gaskets, lubricant, bolts and nuts, etc. Pipe furnished shall be as manufactured by U.S. Pipe and Foundry; American Cast Iron Pipe; or equal.
 - 2. All ductile iron pipe used for below-grade service in the project shall have push-on joints and shall meet the requirements of ANSI A21.11 or AWWA C111, latest revisions. Ductile iron pipe used in the project for above-ground service or in below-ground vaults shall have flanged joints conforming to the requirements of ANSI A21.15, latest revision.
- B.** Fittings:
 - 1. All pipe fittings shall be ductile iron and shall be of a standard design for use with the pipe purchased under these specifications. Fittings shall conform to the following applicable specification.
 - a. Mechanical Joint fittings: Fittings shall be ductile iron compact fittings conforming to ANSI A21.53. The rubber gasket joints shall conform to ANSI A 21.11. Bolts shall be low alloy, high strength equal to "Acipolly", "Usalloy", or "Corten" bolts.

- b. Flanged Fittings: Shall conform to ANSI A21.10 or A21.11 and shall have flanges faced and drilled in conformance with ANSI Standard A21.15. Joints shall be installed with full ring rubber gasket. Bolts shall be low alloy, high strength equal to "Acipolly", "Usalloy", or "Corten" bolts.
- C. Pipe and fittings shall have a cement mortar lining and a bituminous seal coat on the inside in accordance with ANSI A21.4 and be coated on the exterior with a 1.0 mils thick bituminous coat in accordance with ANSI A21.51. A ceramic coating shall be substituted for the cement mortar lining where shown in the Contract drawings.
- D. Polyethylene Encasement:
 - 1. Where indicated in the Contract Documents, the Contractor shall provide a double layer of polyethylene encasement over pipe, fittings and valves when installed in close proximity to steel natural gas pipelines. The material, installation and workmanship shall conform to applicable sections of ANSI Standard A21.5. Installation shall be employed using flat tube polyethylene.
- E. Restrained joints:
 - 1. Sections of ductile iron piping (including fittings) designated in the Contract Documents as having restrained joints shall be constructed using pipe and fittings equal to those listed below:
 - a. U.S. Pipe and Foundry Company TR-FLEX
 - b. American Ductile Iron Pipe Company LOK FAST or LOK RING
 - 2. Restrained joint pipe sections where specifically noted shall utilize basic push-on joints with special gaskets equal to:
 - a. U.S. Pipe and Foundry Company FIELD LOK GASKET
 - b. American Ductile Iron Pipe Company FAST-GRIP GASKET
 - 3. Wedge action retainer glands where specifically noted or directed shall be used in conjunction with other conventional thrust restraint devices (rodding, thrust blocking, thrust collars, etc.) and shall be equal to:
 - a. EBAA Iron Megalug
 - b. Ford Uni-Flange Series 1400
 - c. U.S. Pipe and Foundry M.J. Field Lok Gasket

2.03 COPPER PIPE

All copper pipe shall conform to Federal Specifications WW-T-799, Type "K" as a minimum with plain ends. Fittings and connections for pipe sizes of 1-inch and less shall be of the flared type. Pipe sizes greater than 1-inch shall have compression fittings and connections.

2.04 COPPER TUBING

All copper tubing shall conform to ASTM Designation B88 for the Type "K" Soft Temper and AWWA 7S-CR Type "K" copper. Fittings and connections for pipe sizes of 1-inch and less shall be of the flared type. Pipe sizes greater than 1-inch shall have compression fittings and connections.

2.05 GATE VALVES

- A.** All valves three to 12 inches in diameter shall be iron-body resilient-seated gate valves with non-rising stems conforming to the requirements of AWWA C-509, rated for a design working pressure of 200 psig. Valves 16 and 20 inches shall have a design working pressure of 150 psig. Sizes smaller than three inches shall meet Federal Specification WW-V-54. Gate valves shall be as manufactured by Dresser, Mueller, Darling, Clow Corporation, Kennedy, Walworth, American AVK, or similar approved equal.
- B.** All gate valves shall have mechanical joint ends meeting ANSI A21.11, be equipped with a two-inch square operating nut and open counterclockwise.
- C.** Valve stem extensions shall be provided and installed for all valves 5 feet or greater in depth (operating nut depth). Reference 2.09, Valve Boxes, below for specifics.

2.06 BUTTERFLY VALVES

- A.** All valves 16 inches and larger shall be butterfly valves of the tight closing, rubber-seat type with mechanical joint ends meeting ANSI A21.11 and shall conform to the requirements of AWWA C-504 for Class 150 B rated for a working pressure of 150 psig and as further specified herein. The butterfly valves shall be of the rubber-seat type with valve seat securely fastened to the valve body. No metal-to-metal seating surfaces shall be permitted. Valves shall be bubble-tight at rated pressures with flow in either direction, and shall be satisfactory for applications involving throttling service and/or frequent operation and for applications involving valve operation after long periods of inactivity. Butterfly valves shall be as manufactured by BIF Industries, Henry Pratt Company, Dresser, or similar approved equal.
- B.** Where shown in the Contract Documents, butterfly valves shall be furnished with a rated working pressure of 250 psig. These valves, and their operators, shall be designed, manufactured, and tested in accordance with AWWA C504, latest revision, and shall include design features for the additional working pressure.
- C.** All butterfly valve operators shall include an AWWA operating nut and shall be gasketed and grease packed for submerged operation at water pressures to 10 psig. Valves shall open counterclockwise. Extension stems shall be provided where shown on the Drawings.
- D.** Valve stem extensions shall be provided and installed for all valves 5 feet or greater in depth (operating nut depth). Reference 2.09, Valve Boxes, below for specifics.

2.07 AIR/VACUUM RELEASE VALVES

The valves shall have a cast iron body, cover, and baffle, stainless steel float, bronze water diffuser and Buna-N seat with threaded fittings. The valves shall be manufactured by GA Industries, APCO Valve and Primer Corporation or equal.

2.08 CORPORATION STOPS

Corporation stops shall be all "No-lead" brass suitable for 200 psi operating pressure and similar to A.Y. McDonald 74701B, Ford FB600, or approved equal.

2.09 VALVE BOXES, VALVE ASSEMBLIES, VALVE PADS/MARKERS

A. Valve boxes shall be cast-iron two or three piece with cast iron covers. The barrel shall be one or two-piece, screw type, having 5-1/4-inch shaft. Covers shall have "WATER" cast into the top.

B. Valves which have operating nut at depths greater than 5 feet or valves specifically designated by the drawings or Special Conditions shall be composed of a valve box and extension stem. All moving parts of the extension stem shall be enclosed in the valve box housing to prevent contact with the soil. Valve box and extension assembly shall be adjustable to accommodate variable trench depths. A debris cap or seal shall be integral to the assembly to prevent debris, silt, etc. from entering the barrel of the valve box.

The stem material shall be of plated steel square tubing. The stem assembly shall have a built in device that keeps the stem assembly from disengaging at its full extension length or from the valve nut. Valve box / extension assembly shall incorporate American Flow Control's *Trench Adapter*, Ametek's *Roadway Valve Box with Integral Key*, or equal.

C. Concrete valve pads/collars are required for all valve boxes that are not located in a paved area. Concrete valve markers shall be furnished and installed on existing roads where shown in the Contract Drawings.

2.10 FLEXIBLE COUPLINGS

Flexible couplings shall be Catalog No. 411as manufactured by Smith-Blair, Style No. 38 and 40 as manufactured by Dresser Manufacturing Company, or approved equal.

2.11 FIRE HYDRANTS

A. Fire hydrants shall conform to AWWA C502-85 for dry-barrel fire hydrants. Hydrants shall be traffic type with safety flange which allows the valve to remain closed when the hydrant is broken or damaged above or near grade level. The design of hydrant shall be of the compression type with main valves and "O" ring seal between the operating nut and the bonnet. Hydrant color shall be silver.

B. Hydrant inlet shall be 6-inch, mechanical joint with harnessing lugs. Hydrant main valve opening shall be 5-1/4-inch. Valve seats shall be bronze to bronze.

C. Operating nut shall be solid pentagon, 1-1/2 inches measured flat at point (31/32 on side). Operating nut shall turn counterclockwise to open.

D. Hydrant shall have two 2-1/2-inch diameter and one 4-1/2-inch diameter nozzle. Nozzles threads shall be the standard adopted by NBFU. Nozzles shall all have gasketed caps fitted with chain.

- E.** The hydrants shall be as follows:
1. American - AVK models 2700 & 2780
 2. Mueller - Centurion & Improved
 3. U. S. - Metro 250 Sentinel
 4. Kennedy - K81-A
 5. M & H - Models 129 & 929
 6. Clow - Medallion
 7. American Darling - B62-B
 8. EJ USA Inc, Model 5CD 250

2.12 CURB STOPS

Curb stops shall be of "No-lead" brass construction with tee handle operator. Curb stops shall be A.Y. McDonald 76102W, Ford B21, or approved equal.

2.13 TAPPING SLEEVES

Tapping sleeves shall be full-bodied mechanical joint Class 250 pipe for 200 psi cold water working pressure. Sleeves shall be either American Flow Control Series 2800, Mueller #H-615, or approved equal.

Authorized connections to water mains of the Cobb County – Marietta Water Authority require utilization of tapping sleeves / saddles approved by the Authority.

2.14 TAPPING SADDLES

Double Strap Saddles: Saddles shall be either Smith Blair 313 Double Strap, Romac 202U or approved equal.

2.15 ADAPTERS AND UNIONS

Adapters for copper flare to female iron pipe thread shall be of "No-lead" brass construction and shall be A.Y. McDonald 74754, Ford C21, or approved equal.

Adapters for copper flare to male iron pipe thread shall be of "No-lead" brass construction and shall be A.Y. McDonald 74753, Ford C28, or approved equal.

Union shall be of "No-lead" brass construction and shall be A.Y. McDonald 74758, Ford C22

PART 3 - EXECUTION

3.01 GENERAL

- A.** Care shall be taken in loading, transporting, and unloading to prevent damage to the pipe or coatings. All pipe shall be protected during handling against impact shocks and free fall, and shall be kept clean at all times. No forks, chains, straps, hooks, etc. shall be placed inside the pipe and/or fittings for lifting, positioning, or installing material. All pipe or fittings shall be examined before installation, and no piece shall be installed which is found to be defective. Any damage to the pipe coatings shall be repaired as directed by the Owner.

- B. The Owner shall be notified 24 hours prior to construction beginning on Water facilities. Pipe and fittings shall be subjected to a careful inspection just prior to being laid or installed. If any defective pipe is discovered after it has been installed it shall be removed and replaced with a sound pipe in a satisfactory manner at no additional expense to the Owner. All pipe and fittings shall be thoroughly cleaned before installation, and shall be kept clean until they are used in the work, and when installed, shall conform to the lines and grades required.
- C. Contractor must have a set of the original Contract plans at all times on the job site. These plans shall be kept current by the Contractor in regards to field changes.
- D. Unless specifically indicated otherwise, underground piping shall slope uniformly between joints.
- E. Extreme care shall be used when constructing piping to protect all existing underground utilities, and all existing structures. Any damage to existing utilities or structures shall be repaired or replaced, and restored equal to or better than pre-construction conditions.
- F. For existing lines installed under other contracts, to which piping of this Contract must connect, the Contractor shall expose buried lines to confirm or determine pipe material and diameter, furnish and install appropriate piping, and make proper connections.
- G. Contractor shall inscribe (saw-cut) a "V" on the concrete curb or sidewalk in line with and adjacent to a water distribution valve/valve box location (if no witness mark currently exists and no valve marker is present or required).

3.02 INSTALLATION

- A. Pipe and fittings shall be installed as shown on the Contract Drawings, and in accordance with requirements of AWWA Standard Specifications except as otherwise provided herein. A firm, even bearing throughout the length of the pipe shall be constructed by tamping selected material at the sides of the pipe up to the springline. **BLOCKING SUPPORTS WILL NOT BE PERMITTED.** Bell holes shall be hand excavated to insure uniform bearing along the pipe barrel. Pipe shall be installed with a minimum of 42 inches of cover or as otherwise stated in the Contract Documents.
- B. All pipe shall be sound and clean before installing. When installation is not in progress, including lunchtime, the open ends of the pipe shall be closed by watertight plug or other approved means. Good alignment shall be preserved in installation. The deflection at joints shall not exceed that recommended by manufacturer.
- C. When cutting pipe is required, the cutting shall be done by machine, leaving a smooth cut at right angles to the axis of the pipe. Cut ends of pipe to be used with a bell shall be beveled to conform to the manufactured spigot end. Lining shall be undamaged.

- D. Push-on joints shall be made in strict accordance with the manufacturer's instructions. Pipe shall be laid with bell ends looking ahead. A rubber gasket shall be inserted in the groove of the bell end of the pipe, and the joint surfaces cleaned and lubricated. The plain end of the pipe is to be aligned with the bell of the pipe to which it is to be joined, and pushed home with a jack or by other means. Hydraulic excavators, backhoes, or other machinery shall not be used to push slip-joint pipe together. After joining the pipe, a metal feeler shall be used to make certain that the rubber gasket is correctly located.
- E. Unless otherwise noted, underground ductile-iron piping shall be push-on with mechanical joint fittings, valves, fire hydrants, etc.
- F. The Contractor shall carefully regulate his equipment and construction operations such that the loading of the pipe does not exceed the loads for which the pipe is designed and manufactured. Any pipe damaged during construction operations shall be replaced at the Contractor's expense.
- G. Wet tap connections shall only be allowed on ductile iron water mains and with a smaller nominal size main connecting (tapped) to a larger main.
- H. Unless otherwise noted, service lines 2" inches and smaller that are to be installed under paved roadways (long side services) are to be encased in the appropriate sized conduits as shown on the Contract Drawings.

3.03 PIPE SUPPORTS AND THRUST RESTRAINT

- A. All piping shall be properly and adequately supported. Longitudinal thrust along pressurized pipe lines at bends, tees, reducers, and caps or plugs shall be counteracted by enough weight of concrete to counterbalance the vertical and horizontal thrust forces.
- B. Joints shall be protected by felt roofing paper prior to placing concrete thrust block. Bearing area of thrust blocks shall be adequate to prevent any movement of the fitting and shall be of the size and dimensions as shown on the Contract Drawings.
- C. The dimensions and values for thrust block sizing is based on a water main test pressure of 350 psi and a horizontal bearing strength of the soil of 2,000 psf. The bearing surface of the thrust block shall be placed against undisturbed soil, unless precluded by site conditions. In these cases, selected fill material shall be placed between the bearing surface and undisturbed soil and compacted to at least 95% Modified Proctor density to obtain the required bearing pressure.
- D. Concrete for thrust blocking shall be 3000 psi minimum. Concrete shall be placed against undisturbed material, and shall not cover joints, bolts or nuts, or interfere with the removal of any joint. Wooden side forms shall be provided for thrust blocks.
- E. Restrained joints shall be used as shown on the Contract Drawings. Thrust blocks shall be used at all other locations or as directed by the Owner.

- F. Tie rods, where shown on the Contract Drawings to be used in conjunction with thrust restraint devices, shall be cold-rolled alloy steel rods with a minimum tensile strength of 125,000 p.s.i. and shall be coated with bitumastic paint after installation.
- G. Wedge action retainer glands where shown on the Contract Drawings to be used in conjunction with thrust restraint devices, shall be installed in accordance with manufacturer's instructions.

3.04 CLEANING MAINS

At the conclusion of the Work and prior to pressure testing and disinfection, the Contractor shall thoroughly clean the new pipe line by flushing with water or other means to remove all dirt, stones, pieces of wood or other material which may have entered during the construction period. If, after this cleaning, obstructions remain, they shall be removed.

Flushing of pipelines shall be performed in a manner to protect the environment as well as physical features from the impacts of the discharge of water. Hoses, diffusers, or other devices shall direct or dissipate pressure impacts to structures, ground surfaces, roadways, etc. Dechlorination of discharge flow is mandatory prior to allowing it to enter any waterway or storm drainage network subsequently discharging into an active stream.

3.05 PRESSURE AND LEAKAGE TESTS OF UNDERGROUND PRESSURE PIPING

- A. Hydrostatic pressure and leakage tests shall conform to Section 5 of AWWA C600. The Contractor shall furnish all gauges, meters, pressure pumps and other equipment needed to test the line. The pressure gauge used for testing shall be laboratory calibrated suitable for the test pressure required. The Contractor must submit his plan for testing to the Owner for review at least three days before starting the test.
- B. The pressure required for the field hydrostatic pressure test shall be 150% of the maximum normal operating pressure of the test section (200 psi minimum), or the pressure class of the pipe, whichever is greater. The Contractor shall provide temporary plugs and blocking necessary to maintain the required test pressure. Duration of pressure test shall be at least 2 hours.
- C. The leakage test shall be a separate test at the maximum operating pressure as determined by the Owner following the pressure test and shall be of not less than 2 hours duration. All exposed pipes, fittings, valves and joints will be carefully examined during the tests and all leaks evident at the surface shall be repaired and leakage eliminated regardless of total leakage as shown by test. Lines which fail to meet tests shall be repaired and retested as necessary until test requirements are complied with. Defective materials, pipes, valves and accessories shall be removed and replaced. The pipe lines shall be tested in such sections as may be directed by the Owner by shutting valves or installing temporary plugs as required. The line shall be filled with water and all air removed and the test pressure shall be maintained in the pipe for the entire test period by means of a force pump to be furnished by the Contractor. Accurate means shall be provided for measuring the water required to maintain this pressure. The amount of water required is a measure of the leakage.

- D. The amount of leakage, which will be permitted, shall be in accordance with AWWA C600 Standards for all pressure lines. No pipe installation will be accepted if the leakage is greater than that determined by the following formula:

$$L = \frac{SD\sqrt{P}}{148,000}$$

in which "L" is the allowable leakage, in gallons per hour; "S" is the length of pipe tested, in feet; "D" is the nominal diameter of the pipe, in inches; and "P" is the average test pressure during the leakage test, in pounds per square inch gauge.

- E. The Owner's Representative shall observe all pressure and leakage testing associated with the Contract work.
- F. The Contractor shall remove and adequately dispose of all temporary blocking material and equipment after completion and acceptance of the field hydrostatic test, unless otherwise directed by the Owner. Any damage to the pipe coating shall be repaired by the Contractor.

3.06 DISINFECTION

- A. Upon completion of the pressure and leakage test, the pipe shall be disinfected.
- B. Disinfection shall be accomplished by the continuous feed chlorination method in accordance with AWWA C651. The following steps shall be employed:
1. Begin filling main at a constant, measured rate with potable water. As water first flows in, begin adding chlorine at a point no more than ten feet from the beginning of the new main.
 2. Add chlorine at a rate to attain a 25 mg/L chlorine concentration. The acceptable method is by preparing a 1% solution with sodium hypochlorite or calcium hypochlorite. The required amount of chlorine to produce a 25 mg/L concentration in 100 feet of pipe is as follows:

<u>Pipe Dia. (in.)</u>	<u>100% Chlorine (lb)</u>	<u>1% Chlorine Solution (gal.)</u>
4	0.013	0.16
6	0.030	0.36
8	0.054	0.65
10	0.085	1.02
12	0.120	1.44
16	0.217	2.60
18	0.275	3.30
20	0.339	4.06
24	0.488	5.85

3. Continue adding chlorine at a rate to attain a minimum concentration of 25 mg/L. Measure the free chlorine concentration at regular intervals as given in AWWA M12 or with a high range test kit. Chlorine application shall continue until the entire main is filled.
4. The chlorinated water shall be retained in the water main for a minimum of 24 hours during which time valves and hydrants in the treated section shall

be operated to ensure disinfection of the appurtenances. At the end of the 24 hour period the water in all portions of the main shall have a minimum chlorine residual of 10 mg/L.

- C. The heavily chlorinated water shall be dechlorinated and flushed in a manner which is not detrimental to the environment. The method proposed shall be submitted to and approved by the Owner prior to discharge. Final flushing shall continue until the chlorine residual is less than 2 mg/L.
- D. Contractor shall coordinate sampling with the Cobb County-Marietta Water Authority (CCMWA), following authorization by the Owner. No earlier than 16 hours after final flushing, the CCMWA will obtain bacteriological samples for testing using Option B as described in AWWA C651:

Before approving a main for release, let it sit for a minimum of 16 hours without any water use. Then collect, using the sampling site procedures outlined and without flushing the main, two sets of samples a minimum of 15 minutes apart while the sampling taps are left running. Both sets of samples must pass for the main to be approved for release.

- E. If bacteriological test results are unsatisfactory, the main shall either be flushed with potable water or re-disinfected by the Contractor, as directed by the Owner, prior to obtaining additional samples. Satisfactory bacteriological test results shall be obtained prior to placing the new main in service. The disinfection process will be repeated by the Contractor at no cost to the Owner until satisfactory results are obtained.

END OF SECTION 02713