SECTION FOUR

COBB COUNTY WATER SYSTEM SPECIFICATIONS

WATER 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.
* 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.

BORE AND CASING (WATER)

Unit price per linear foot includes the installation of casing pipe by boring and jacking, including wooden skids, casing spacers, brick bulkheads, and grouting the annular space (if required). Bore and casing will be measured for payment in linear feet along the horizontal centerline of the casing pipe. Water pipe 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.

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 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.

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.

LANDSCAPE ALLOWANCE

Landscape 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.

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.

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 01600 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

Section Includes:

1. General product requirements, including:
    a. General specification requirements for all products.
    b. Product options.
    c. Procedures for substitution requests.
2. General procedures for products including:
    a. Procedures for transportation and handling.
    b. Procedures for delivery and receiving.
    c. Procedures for storage.

1.02 DEFINITIONS

Damage: Any sort of deterioration whether due to weather, normal wear and tear, accident, or abuse, resulting in soiling, marring, breakage, corrosion, rotting, or impairment of function.

1.03 SUBMITTALS

A. Schedule of Products: Submit for approval.

B. Final Schedule of Products: Submit for project record.

PART 2 - PRODUCTS

2.01 GENERAL

A. Components required to be supplied in quantity within a specification section shall be identical, interchangeable, and made by the same manufacturer.

B. Do not use products removed from existing construction, unless specifically permitted by the contract documents or approved by the **Owner**.

C. When material or equipment is specified by reference to two (2) or more brand names or catalog numbers, it shall be understood that these references are for the purpose of defining the performance, or other salient requirements, and that other materials or equipment, of equal capacities, quality and function, shall be considered by the **Owner** upon the **Contractor's** request for substitution.

D. If material or equipment is specified by only one patent or proprietary name or by the name of only one manufacturer, it is for the purpose of standardization, or because the **Owner** knows of no equal.

E. Any material, article or equipment of other manufacturers and vendors, which will perform adequately the duties imposed by the general design, will be considered equally acceptable provided the material, article or equipment so proposed, is in

the opinion of the **Owner**, of equal substance and function. It shall not be purchased or installed by the **Contractor** without the **Owner's** written approval.

PART 3 - EXECUTION

3.01 PRODUCT OPTIONS

A. It is the **Contractor's** responsibility to select products which comply with the contract documents and which are compatible with one another, with existing work, and with products selected by other contractors.

B. Do not use any substitute products which have not been approved in accordance with the requirements of the contract documents.

C. Definition of Substitute Product: Any product which does not meet the requirements of the contract documents, whether in product characteristics, performance, quality, or manufacturer or brand names, is considered a substitute.

D. Product Options: Where products are specified using more than one method, such as description with a manufacturer list, use a product meeting the requirements of both specification methods.

E. Products Specified by Reference Standard: Use any product meeting the specification.

F. Products Specified by Description: Use any product meeting the specification.

G. Products Specified by Performance Requirements: Use any product meeting the specification.

H. Products Specified by Listing a Brand Name Product as the "Basis of Design": Provide a product equivalent to the product specified within the limits of variation specified. Use of a product other than that specified constitutes a representation by the **Contractor** that he will comply with all the conditions specified for acceptance of substitutions.

I. Language indicating that substitutions are not allowed includes:
1. "Provide one of the following products."
2. "Provide products made by one of the manufacturers listed."
3. "Provide products complying with the contract documents and made by one of the following."
4. "No substitutions."
5. Other similar language.

J. Language indicating that substitutions are allowed includes:
1. Substitutions will be considered.
2. "... will be among those considered acceptable."
3. Other similar language.

3.02 PRODUCT SUBSTITUTION

A. Reference the General Conditions – Section 00700 4.05 (Requests for Substitution).

B. Submission of request for substitution shall constitute a representation that the **Contractor**:

1. Has investigated the proposed product and determined that it is equal to or better than the specified product.
2. Will provide the same warranty for the proposed product as for the specified product.
3. Will coordinate the installation and make other changes which may be required for the work to be complete in all respects, including:
   a. Redesign.
   b. Additional components and capacity required by other work affected by the change.

C. Substitutions will not be considered when:

1. Acceptance would require substantial revision of the contract documents.
2. They are indicated or implied on shop drawing or product data submittals without separate written request.

D. Substitution Request Submission:

1. Submit 3 copies of each request and accompanying data.
2. Submit all requests on a standard form.
3. Only one request for substitution will be considered for each product.

E. Data Required with Substitution Request: Submit written request with complete data substantiating compliance of the proposed product with the requirements of the Contract Documents. Provide at least the following data:

1. Identify product by specification section and paragraph number.
2. Manufacturer's name and address, trade name and model number of product (if applicable), and name of fabricator or supplier (if applicable).
3. Complete product data.
4. A list of other projects on which the proposed product has been used, with project name, the design professional's name, and owner contact.
5. An itemized comparison of the proposed product to the specified product.
6. Net amount of change to the contract sum.
7. List of maintenance services and replacement materials available.
8. Statement of the effect of the substitution on the construction schedule.
9. Description of changes that will be required in other work or products if the substitute product is approved.

3.03 SCHEDULE OF PRODUCTS

A. Prepare a complete schedule of products used, including the following for each product:

1. Manufacturer's name.
2. Brand or trade name.
3. Model number, if applicable.
4. Reference standard, if more than one is applicable.
5. Arrange products in the schedule by specification sections; indicate paragraph where specified.

B. Schedule of products shall not be used to obtain approval of substitute products; make separate request for substitution.

3.04 TRANSPORTATION AND HANDLING

A. Require supplier to package finished products in a manner which will protect from damage during shipping, handling, and storage.

B. Transport products by methods which avoid damage.

C. Deliver in dry, undamaged condition in manufacturer's unopened packaging.

D. Provide equipment and personnel adequate to handle products by methods which prevent damage.

E. Provide additional protection during handling where necessary to prevent damage to products and packaging.

F. Lift large and heavy components at designated lift points only.

3.05 DELIVERY AND RECEIVING

A. If storage area is not available on site, arrange deliveries so that storage is not required.

B. Arrange deliveries of products to allow time for inspection prior to installation.

C. Coordinate delivery to avoid conflict with the work and to take into account both the conditions at the site and the availability of personnel, handling equipment, and storage space.

D. Clearly mark partial deliveries to identify contents, to permit easy accumulation of entire delivery, and to facilitate assembly.

E. Promptly inspect shipments and remedy damage, incorrect quantity, incompleteness, improper or illegible labeling, and noncompliance with requirements of contract documents and approved submittals.

3.06 STORAGE

A. If authorized by the **Owner**, partial payment may be made for off-site storage of products. The **Contractor** shall provide evidence of full coverage insurance for any products stored at a facility outside of the project site.

B. General Storage Procedures:

1. Store products immediately on delivery.
2. Store products in accordance with manufacturer's instructions, with seals and labels intact and legible.
3. Store in a manner to prevent damage to the stored products and to the work.
4. Store moisture-sensitive products in weathertight enclosures.
5. Store indoors if necessary to keep temperature and humidity within ranges required by manufacturer.
6. Store unpacked and loose products on shelves, in bins, or in neat groups of like items.
7. Arrange storage to provide access for inspection and inventory.

8. Periodically inspect and remedy damage and noncompliance with required conditions.

END OF SECTION 01600

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 01740 - WARRANTIES AND BONDS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. Compile specified warranties and bonds.

B. Co-execute submittals when so specified.

C. Review submittals to verify compliance with Contract Documents.

D. Submit to the **Owner** for review.

1.02 SUBMITTAL REQUIREMENTS

A. Assemble warranties, bonds and service and maintenance contracts, executed by each of the respective manufacturers, suppliers, and subcontractors.

B. Number of original signed copies required: Two each.

1.03 FORM OF SUBMITTALS

A. Prepare in duplicate packets.

B. Format:
1. Size 8-1/2 inches x 11 inches, punch sheets for standard 3-post binder.
   a. Fold larger sheets to fit into binders.
2. Cover: Identify each packet with typed or printed title "WARRANTIES AND BONDS." List:
   a. Title of Project.
   b. Name of Contractor.

C. Binders: Commercial quality, three-post binder, with durable and cleanable plastic covers and maximum width of 2 inches.

1.04 WARRANTY REQUIREMENTS

A. For all major pieces of equipment, submit a warranty from the equipment manufacturer. The manufacturer's warranty period shall be concurrent with the **Contractor's** for one (1) year commencing at the time of acceptance by the **Owner**.

B. The **Contractor** shall be responsible for obtaining certificates for equipment warranty for all major equipment specified herein which lists for more than $1,000. The **Owner** reserves the right to request warranties for equipment not classified as major. The **Contractor** shall still warrant equipment not considered to be "major" in the **Contractor's** one-year warranty period even though certificates of warranty may not be required.

C. Equipment shall be warranted to be free from defects in workmanship, design, and materials. If any part of the equipment should fail during the warranty period, it

shall be replaced and the equipment restored to service at no expense to the **Owner**.

D. The manufacturer's warranty period shall run concurrently with the **Contractor's** warranty or guarantee period. No exception to this provision shall be allowed.

E. Upon determination that work covered by a warranty has failed, replace or rebuild the work to an acceptable condition complying with requirements of Contract Documents. The **Contractor** is responsible for the cost of replacing or rebuilding defective work regardless of whether the **Owner** has benefited from use of the work through a portion of its anticipated useful service life.

F. When correcting warranted work that has failed, remove and replace other work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted work.

G. When work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

H. Written warranties made to the **Owner** are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.

I. The **Owner** reserves the right to reject warranties and to limit selections to Products with warranties not in conflict with requirements of the Contract Documents.

J. The **Owner** reserves the right to refuse to accept work for the project where a special warranty, certification, or similar commitment is required on such work or part of the work, until evidence is presented that entities required to countersign such commitments are willing to do so.

K. Manufacturer's disclaimers and limitations on product warranties do not relieve the **Contractor** of the warranty on the work that incorporates the products, nor does it relieve suppliers, manufacturers and subcontractors required to countersign special warranties with the **Contractor**.

L. Standard Product Warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the **Owner**.

M. Special Warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the **Owner**.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01740

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 ¾ 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 ± 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 ± 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 02235 - BORING AND JACKING

PART 1 - GENERAL

1.01 WORK INCLUDED

The work included in this Section consists of furnishing and installing bored and jacked pipeline casings, and installation of pipelines within the casings, through whatever material is encountered where cased pipelines are required.

1.02 METHOD OF CONSTRUCTION

A. All roadway crossings must conform to the requirements of the state or local Department of Transportation having jurisdiction in the project area.

B. All railroad crossings shall conform to the requirements of the American Railway Engineering Association Manual for Railway Engineering, Part 5. The **Contractor** shall secure permission from the railroads to schedule the work so as not to interfere with the operation of the railroads. The **Contractor** shall be held responsible for any delays or damages occurring to the railroads. The **Contractor** will furnish the railroad with such additional insurance as may be required, cost of same to be included in the Contract Price, together with the costs for flagmen, watchmen, temporary work of any nature, safety devices and any other items that may be imposed by the railroad.

C. Any change in the construction method during the work or increase in length of bore beyond that specified due to a selected construction method shall not result in additional payments to the **Contractor**.

D. No payment will be made for incomplete or unacceptable casings and no extra payment will be made for realignment of casings.

1.03 SUBMITTALS

If requested, submit casing pipe manufacturer's certification stating the casing complies with the requirements of this Specification and submit product data for casing carrier spacers.

1.04 JOB CONDITIONS

A. Protect and preserve benchmarks, monuments, and reference points provided.

B. Conduct all work on Georgia DOT right-of-way in strict conformance to Georgia DOT rules and regulations. Coordinate and schedule the work with the Cobb County DOT and/or Georgia DOT, as appropriate. Provide traffic protection as required by the governing authority.

C. Protect existing underground and overhead utility pipes, poles, lines, services, structures, etc., from damage or interruption of service by the conduct of construction operations. Location and protection of all underground utilities and structures in the path of construction is the responsibility of the Contractor.

PART 2 - PRODUCTS

2.01 CASING PIPE

A. Casing pipe shall be welded steel, smooth wall pipe conforming to ASTM A139, except that the hydrostatic test is not required. The casing shall be fully coated on the exterior with a coal tar epoxy. Field connections between sections of pipe shall be continuous circumferential welded joints.

B. The diameter of the casing pipe shall be as indicated on the Drawings. The wall thickness of the casing pipe shall be as follows:

Nominal Diameter (Inches)	Wall Thickness (Inches)
Under 14	0.188
14	0.219
16	0.219
18	0.250
20	0.281
22	0.312
24	0.344
26	0.375
28	0.406
30	0.406
32	0.438
34	0.469
36	0.469
42	0.500
48	0.625
54	0.700

2.02 CARRIER PIPE

A. The product transporting pipeline that is inserted through the casing pipe is referred to hereinafter as "carrier pipe". The pipe size, material and application (water supply, gravity sewer, sewage force main) shall be as indicated on the drawings.

B. For installations involving water lines or sewage force mains, blocking or skids shall be placed under the carrier pipe prior to inserting pipe into the casing. Skids shall be formed with pressure treated lumber and be attached to the pipe with metal bands. Skid spacing shall not exceed ten feet on center.

C. For installations involving gravity sewer lines, manufactured casing spacers shall be used to maintain proper line and grade of the carrier pipe. Spacer spacing shall not exceed ten feet on center. Spacers shall be equal to Model 4810 stainless steel Casing Chocks as manufactured by Power Seal.

PART 3 - EXECUTION

3.01 CLEARING

Clearing shall be done as required for completion of the Work within the limits indicated in the Contract Documents.

3.02 PROTECTION OF UTILITIES

Locate and protect all existing overhead and underground utilities.

3.03 EXCAVATION

Excavate suitable pits or trenches. Provide suitable sheeting and bracing where necessary. Keep the work dewatered at all times.

3.04 ALIGNMENT AND GRADE

Install casing pipe at the location and grade shown on the Drawings. Variation in the final position of the pipe from the line and grade shown on the Drawings will be permitted only if approved by the **Owner**. The **Contractor** shall be responsible for all costs of realignment which result from unacceptable casings.

3.05 INSTALLATION OF CASING PIPE

The diameter of the bored excavation shall conform to the outside diameter and circumference of the casing pipe as closely as practicable. Any voids which develop during the installation operation and which are determined by the **Owner** to be detrimental to the work, shall be pressure grouted with an approved mix.

3.06 INSTALLATION OF CARRIER PIPE

A. Install carrier pipe in casing utilizing adequate blocking, bracing and skids or casing spacers per the manufacturer's recommendations.

B. When indicated in the Contract Documents, the annular space between the casing pipe and the carrier pipe shall be completely filled with an approved grout mix. Proper precautions shall be taken to prevent floating and misalignment of the carrier pipe during grouting operations.

C. Seal casing ends against entrance of foreign material by means of casing seals, grout, brick and mortar or steel plate.

D. Backfilling: Backfill pits and trenches immediately after installation of the casing pipe and carrier pipe and approval by the **Owner**. Compaction of backfill shall follow appropriate provisions of Section 02221.

END OF SECTION 02235

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 a have 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/A21.51-09, Standard for Ductile-Iron Pipe, Centrifugally Cast
- ANSI / AWWA C153/A21.53-06, 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/A21.11-06, 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/1 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/1 concentration in 100 feet of pipe is as follows:

Pipe Dia. (in.)	100% Chlorine (lb)	1% Chlorine Solution (gal.)
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/1. Measure the rate 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. 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/1.

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/1.

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.

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