

SECTION FOUR

COBB COUNTY WATER SYSTEM SPECIFICATIONS

**SECTION 01 12 00
PROJECT PROCEDURES**

PART 1 GENERAL

1.01 SUMMARY

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

1.02 LANDS AND RIGHTS-OF-WAY

- A. Access to the work shall be limited to the right-of-way or easement area provided for execution of the work. The **Contractor** shall not enter any adjacent private property without prior written approval from the property owner. Proof of such approval shall be furnished to the **Owner** upon request.
- B. If the **Contractor** performs any work or service for any property owner outside the specified scope of the **Contractor's** agreement with the **Owner** or has any agreements with a private property owners for access to or for temporary use of property outside of the right-of-way or easement area, a written agreement shall be entered into, with the private property owner(s) prior to any work or service being performed or prior to any use by **Contractor** of the private property and such agreement shall be provided to **Owner**. The agreement shall contain the following language, in addition to the terms agreed to between the **Contractor** and the property owner.
1. "The Property Owner understands that Cobb County is not a party to this Agreement, exercises no control over the means, methods, and execution of this agreement, and that Cobb County assumes no responsibility for the Contractor's compliance with the terms of this agreement. The Contractor shall be solely liable for any and all claims, demands, and judgments related to loss or damage to property or person (including death) arising from or in any way related to the Contractor's acts or omissions related to the agreement".

1.03 ACCESS TO AND CONTRACTOR'S USE OF THE SITE

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

need for changes in operations in order to accommodate construction operations.

2. The **Contractor** shall conduct the Work so as to cause the least interference with the **Owner's** operations.

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

1.04 COORDINATION REQUIREMENTS

A. Coordination with Owner:

1. Limit access through occupied areas to those days and times which the **Owner** approves. Occupied areas include all areas in which the **Owner's** regular operations will be going on or to which the **Owner** requires access during the construction period.
2. When the following must be modified, provide alternate facilities acceptable to the **Owner**:
 - a. Emergency means of egress.
 - b. Utilities which must remain in operation.
 - c. Informational signage.
3. The **Contractor** shall notify the **Owner** of any circumstances which may jeopardize or have interrupted utility service.

B. Security Procedures:

1. Limit access to the site to persons involved in the work.
2. Provide secure storage for materials.
3. Secure completed work as required to prevent loss.

C. Coordination of Construction:

1. Inform each party involved, in writing, of procedures required for coordination of the work; include requirements for giving notice, submitting reports, and attending meetings.
2. Inform the **Owner** when coordination of his work is required.
3. Furnish coordination drawings, as required, where limited space available may cause conflicts in the locations of installed products, and where required to coordinate installation of products.

D. Coordination with the Cobb County-Marietta Water Authority (CCMWA)

1. All work involving the isolation of and/or connection to a water main owned by the CCMWA must have the prior approval of the CCMWA.
2. The **Contractor** shall notify CCMWA of any circumstances that may jeopardize or interrupt water service.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 CONSTRUCTION PROCEDURES

A. General Examination Requirements:

1. Prior to performing work, examine the applicable substrates and the conditions under which the work is to be performed.
2. If unsafe or otherwise unsatisfactory conditions are encountered, take corrective action before proceeding.
3. Notify the **Owner** promptly of any modifications required due to existing conditions or previous work.
4. Before starting work which might affect existing construction, verify the existence and location of:
 - a. Underground utilities.
 - b. Other underground construction.
 - c. Location and invert elevation of points of connection to piped utilities.
5. Verify that utility requirements of operating equipment are compatible with building utilities.
6. Verify space requirements of items which are shown diagrammatically on the drawings or any other items that might impact construction.
7. Prepare preconstruction photographic documentation in conformance with the requirements of Section 01 32 33 of these specifications.

B. General Preparation Requirements:

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

C. General Installation Procedures:

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

D. Cleaning and Protection:

1. Remove debris from concealed spaces prior to enclosing the space.
2. Keep the site and the work free of waste materials and debris.

3. Clean areas in which work is to be done to level of cleanliness necessary for proper execution of that work.
 4. Keep installed work clean, and clean again when soiled by other operations.
 5. Protect installed work from soiling and damage.
- E. Do not cut existing mechanical and electrical services which are to remain in use until provisions have been made to relocate or reconnect them promptly; obtain approval of the **Owner** of the time and duration of disconnection.
- F. Installation of Components:
1. Install products only at the time and in the sequence which will ensure the best possible results in conformance with project requirements.
 2. Install products only during environmental conditions which will ensure the best possible results.
 3. Install all products in accordance with manufacturer's instructions and recommendations, whether conveyed in writing or not.
 4. Separate incompatible materials with suitable materials or spacing.
 5. Provide all anchors and fasteners required and use methods necessary to securely fasten work.
 6. After installation, adjust operating components to proper operation.
- G. Instruction of the **Owner's** Personnel:
1. Instruct personnel designated by the **Owner** in the operation and maintenance of equipment and systems, prior to substantial completion.
 2. Arrange times and places of instruction with the **Owner**.
 3. Provide instruction by qualified manufacturer representatives.
 4. Allow videotaping of instruction sessions by **Owner**.
- H. Final Cleaning:
1. Remove materials and equipment which are not part of the work and all debris from the site prior to substantial completion.
 2. Dispose of debris in a lawful manner.
 3. Perform final cleaning after substantial completion has been certified, but before final payment.
 4. Clean entire project site and grounds.
 5. In spaces to be occupied, remove dirt, stains, and other foreign substances from all accessible surfaces and remove nonpermanent labels.
 6. In spaces not normally occupied, remove debris and surface dust and wipe equipment clean, removing excess lubrication, paint, and other foreign substances.
 7. Remove paint and other coatings from permanent labels and from mechanical and electrical equipment nameplates.
 8. Leave the project clean and ready for occupancy.

- I. Substantial Completion Procedures:
 - 1. Reference Section 00 72 13, paragraph 6.05 of the General Conditions.
- J. Final Completion Procedures:
 - 1. Reference Section 00 72 13, paragraph 6.07 of the General Conditions.

3.02 HEALTH AND SAFETY CONSIDERATIONS

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

3.03 ENVIRONMENTAL CONSIDERATIONS

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

3.04 PROTECTION OF THE WORK

- A. Conduct construction operations so that no part of the work is subjected to damaging operations or influences which are in excess of those to be expected during normal occupancy conditions.

- B. Execute work and stockpile spoils and materials to prevent flooding of excavations, below-grade construction, and adjacent properties due to rainwater runoff.
- C. Protect existing property not indicated to be removed.
- D. Provide temporary supports as required to prevent movement and structural failure.
- E. All equipment and vehicles used on Water system projects shall be clearly marked with the **Contractor's** name and telephone number. The identifying markings may be in the form of magnetic signs, decals, or painted lettering and shall be located on both sides of the equipment/vehicle. The lettering shall be legible, of a contrasting color to the background surface, and at least two inches in height. All markings shall be in place upon initiation of the work on the project site.
- F. A copy of the project's Notice to Proceed letter issued by the Water System shall be available at all times on the job site as proof of the contractual relationship of the Contractor with the Water System. The letter shall be presented for review upon request by regulatory agencies or other County departments that visit the job site.
- G. If removal and replacement of a paved private driveway is required, the replacement shall be performed within two (2) weeks of removal. The permanent pavement replacement for public roadways shall be performed within thirty (30) days or within 7 days if the roadway is a state highway or major county arterial roadway. Temporary surface maintenance is the **Contractor's** responsibility and shall be adequate for the volume and type of traffic loads imposed. Temporary asphalt cold mix application, steel traffic plates, etc. shall be utilized as necessary.
- H. The Contractor shall maintain copies of all permits on the project site at all times.

3.05 NOTIFICATION OF SERVICE INTERRUPTION

- A. During progress of work under this Contract, it may be necessary to temporarily interrupt water, sewer or other utility service to a limited number of customers in the vicinity of the work. It shall be the **Contractor's** responsibility to coordinate the service outage with the utility owner and to provide proper advance notification (a minimum of 48 hours) to the affected customers.
- B. The **Contractor** is alerted to the fact that due to the nature of businesses and traffic in certain projects' areas, water outages for connections, service changeovers, and other work may not be allowable during normal work hours. Considerations of this are to be factored into bid price submitted. Coordination, special lighting, traffic control, employee overtime, special customer notification, etc. shall be included in these considerations by the **Contractor**.

3.06 WATER DISTRIBUTION SYSTEM VALVE OPERATION

- A. All water distribution system service interruptions or outages, such as through water distribution system valve operation, either through pre-approved scheduling or in response to emergency situations, shall require the **Contractor** to notify the appropriate inspector/project engineer of the Cobb County Water System and the Cobb County Water System Dispatch/Emergency office at (770) 419-6201. Specifics of the outage shall be provided, including but not limited to the following information: **Contractor**, **Contractor** authorized representative providing the notice, contact number(s) of the Contractor or representative, anticipated duration of the outage, geographical limits of the outage, and definitive identification of the valves to be operated. The Cobb County Water System shall log this information for reference in the event inquiries develop and to ensure valves are repositioned correctly.
- B. Upon conclusion of the work or repair and after service has been restored, the **Contractor** shall again notify the appropriate project representative of the Cobb County Water System and the Cobb County Water System Dispatch/Emergency office to confirm and crosscheck, as appropriate, that all affected valves have been fully and correctly repositioned. Additional **Contractor** contact information shall be provided to maintain and ensure Contractor responsibility for 24 hours or the next work day, whichever is longer. Such action does not relieve the **Contractor** from overall contract warranty responsibility.
- C. Unauthorized operation of the Cobb County Water System water distribution system valves, hydrants, or other appurtenances, or operation in which the proper notification is not provided, is expressly forbidden and subject to penalties.

3.07 TRAFFIC CONTROL

- A. The **Contractor** shall be responsible for traffic control during the course of each phase of the work. A Cobb County Department of Transportation (CDOT) Utility Permit shall be required for all partial and full lane closures. Road closures and / or detours shall require a CDOT Road Closure Permit. **Contractor** shall submit a traffic control plan to the **Owner** a minimum of two weeks prior to partial or full lane closures and a minimum of four weeks prior to a road closure along with other pertinent information needed for the associated permit application. The **Owner** will submit the permit application to CDOT. The traffic control plan shall conform to CDOT requirements and be in conformance with the Manual on Uniform Traffic Control Devices for Streets and Highways. In the event the road or lane closure is necessary within the limits of a municipality or on a State of Georgia highway, the **Contractor** shall make direct application to the municipality or the Georgia Department of Transportation for the necessary road or lane closure permits. The **Contractor** shall install and maintain traffic control compliant with the approved permit, including but not limited to, trained and properly equipped flagmen, to safely control all traffic through the work zone(s). It is the **Owner's** intent that this work be accomplished with as little disturbance to

traffic, private property, and the public as is reasonably possible, consistent with timely completion thereof.

3.08 WEEKLY SITE REVIEW

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

3.09 WATER CONSERVATION

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

END OF SECTION

**SECTION 01 33 00
SUBMITTAL PROCEDURES**

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 01 60 00 - Product Requirements.

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. Submittals shall, unless specifically accepted, be made in electronic format. Detailed procedures for handling electronic submittals will be discussed at the preconstruction conference.
1. Each submittal shall be an electronic file in Adobe Acrobat Portable Document Format (PDF). Use the latest version available at time of execution of the Agreement.
 2. Electronic files that contain more than 10 pages in PDF format shall contain internal bookmarking from an index page to major sections of the document.
 3. PDF files shall be set to open "Bookmarks and Page" view.
 4. Add general information to each PDF file, including title, subject, author, and keywords.
 5. PDF files shall be set up to print legibly at 8.5-inch by 11-inch, 11-inch by 17-inch, or 22-inch by 34-inch. No other paper sizes will be accepted.
 6. Submit new electronic files for each resubmittal.
 7. Include a copy of the Transmittal of Contractor's Submittal form with each electronic file as described in paragraph 3.02D.3 below.
 8. **Owner** will reject submittal that is not electronically submitted, unless specifically accepted.
 9. Provide **Owner** with authorization to reproduce and distribute each file as many times as necessary for Project documentation.
- B. Samples:
1. Two sets of each shall be submitted with the original submittal.
 2. One 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

- A. 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 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.
- 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.

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. Except for samples, submittals will be returned to the **Contractor** electronically. Samples 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: Make one copy for project record documents.

END OF SECTION

**SECTION 01 60 00
PRODUCT REQUIREMENTS**

PART 1 GENERAL

1.01 SUMMARY

- A. 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

- A. 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 00 72 13 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 electronically in Adobe Acrobat Portable Document Format (PDF) with 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

SECTION 01 78 39
PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.01 SUMMARY

- A. 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

- A. Submit one set of Record Drawings and one copy of the Record Survey (if required) in accordance with Substantial Completion Procedures (00 72 13, 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.

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 (such as, drop, doghouse).
 - 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 benchmark 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).
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 (such as, 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.

3.04 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

**SECTION 31 23 33
TRENCHING AND BACKFILLING**

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Preparation.
 - 2. Utilities Trenching.
 - 3. Backfilling.
 - 4. Compacting.

1.02 RELATED WORK

- A. Section 01 11 00 - Summary of Work.
- B. Section 31 70 05 - Blasting.
- C. Section 31 25 00 - Erosion and Sedimentation Controls.
- D. Section 01 57 23 - NPDES Storm Water Discharges.

1.03 SUBMITTALS

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

1.04 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. Cost of 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. Excavation and trenching activities must be performed in accordance with all applicable Federal, state, and local safety requirements, and all permits and certifications required by Cobb County Code must be obtained by the Contractor from the Cobb County Community Development Department prior to the execution of the work. Contractor must obtain Cobb County Trenching and Excavation Permit from the Cobb County Community Development Department. Copies of obtained permits along with copies of specific jobsite key personnel "Competent Person" and "Excavation and Trenching" certifications shall be submitted to the Owner.

1.05 SITE CONDITIONS

- A. Traffic: Do not interfere with or close public or private roadways or driveways without permission of governing authorities. Work within the right-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 all 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 and the Owner 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 01 11 00.

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 local conditions, capable of sustaining vigorous plant growth; free of subsoil, rocks, clay, toxic matter, plants, weeds, roots, or other undesirable material harmful or unnecessary for grading, planting, and maintenance.
- C. Satisfactory Backfill Material: Fine, sound, loose, low plasticity soil (Plasticity Index less than 30). Material shall be free from all wood, vegetable matter, debris, and other objectionable material. If the backfill material has scattered clods, stones, or broken concrete, the maximum particle size shall be less than 3 inches in maximum dimension. When the backfill is used under roadways or other paved areas, the maximum particle size shall be less than 2 inches. When the backfill is used with PVC or other flexible thermoplastic pipe, the maximum particle size shall be less than 3/4 inch.
- 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 otherwise suitable excavated material is compromised 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. As well as the 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

- A. Provide erosion control during the entire project in accordance with the drawings and with the requirements of Section 31 25 00 - Erosion and Sedimentation Controls, and Section 01 57 23 - NPDES Storm Water Discharges, (as applicable) of these Specifications.

3.03 PROTECTION OF TREES

- A. Provide temporary guards to protect the tops, trunks, and roots of trees as well as vegetation to remain in place. 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 tree health. Repairs shall be performed in conformance with accepted horticultural practices suited to the nature and extent of damage done. The Contractor shall coordinate with the County's arborist to determine best practices for damage mitigation.

- C. The Cobb County arborist will determine if additional measures are required to protect specific trees. The Contractor shall comply with the arborist's directions, at no additional cost to the Owner.

3.04 DEWATERING

- A. Do not allow surface or groundwater to flow into or accumulate in excavations. All excavation shall be done "in-the-dry", defined as no more than ± 3 percent of the soil's optimum moisture content.
- B. Do not allow water to flow in an uncontrolled fashion across the Project Site, 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. Do not use ditches and sumps as primary means of dewatering.
- 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. General: Excavation includes the removal of any materials necessary to achieve the required subgrade elevations and includes the reuse or disposal of such materials.
- B. Unnecessary Excavation: Expense of excavation of materials outside of limits indicated shall be borne by the Contractor.
- C. 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.
- D. 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 (such as, Contractor has not fully removed unsuitable materials, completed dewatering). The Contractor shall immediately comply with the Owner's directives, at no additional cost to the Owner.
- E. Excavation for Utilities Structures: Excavate to allow proper construction and inspection of concrete formwork and other materials.
- F. Excavation for Footings and Foundations: Remove any loose or sloughed material and adjust excavations to form a suitable bearing surface. Prior to

concrete placement, the excavations shall be inspected for proper grades, slopes, and compaction. Care should be taken to keep surface and groundwater out of the excavation prior to placement of concrete.

G. 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 1 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.

H. 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.

1. If the limit of unsuitable materials extends beyond reasonable distance within the proposed trench excavation, the Contractor shall consider alternative stabilization measures (such as, 57 stone wrapped in geotextile fabric). Any alternative measures must be approved by the Engineer and Owner/Owner's representative.

I. Explosives: The Contractor shall assume sole responsibility for the effects of explosives. Comply with the requirements of Section 31 70 05 - Blasting, of these Specifications.

J. Progress of Work: 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 workday.

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 any inspections or testing required in the open ditch.
- B. Installation:
 - 1. Place bedding material and install pipe in conformance with 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 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 percent of optimum moisture content.

3.09 GRADING

- A. 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. Slope grades to prevent ponding.
- C. Restore disturbed wetlands areas to original pre-construction configuration. The Contractor shall oblige to all relevant permits for the reestablishment of the wetland.

- D. 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 D1557, Method D.
- C. In-Place Density Tests: ASTM D1556 (sand cone method), ASTM D2167 (rubber balloon method), or ASTM D2922 (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, 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. 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 offsite.
- B. Remove any trash, debris, and other materials not required for use on the project and legally dispose of it offsite.
- C. Onsite burning or burying of any material is prohibited.

END OF SECTION

SECTION 31 25 00
EROSION AND SEDIMENTATION CONTROLS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This section includes requirements for the provision, maintenance, and subsequent removal of temporary and/or permanent erosion and sediment controls as shown on the plans.
- B. The temporary erosion and sediment controls contained herein shall be coordinated with the permanent erosion controls, to assure economical, effective, and continuous erosion and sediment control during construction within acceptable limits. Acceptable limits are as established by the Georgia Erosion and Sedimentation Control Act of 1975, as amended, Section 402 of the Federal Clean Water Act, and applicable codes, ordinances, rules, regulations, and laws of local and municipal authorities having jurisdiction.
- C. Land disturbance activities shall not commence until the Land Disturbance Permit, Stream Buffer variance, and Notice of Intent, if applicable, have been properly issued by the appropriate governing authority.
- D. This section includes the design of project specific devices and practices to meet requirements of the related work and references listed below in conjunction with the Contractor's own means, methods, and techniques, schedules and sequences of work, and actual conditions encountered. Design shall be performed by professionals experienced and familiar with storm water and drainage characteristics as well as the requirements of references listed below.

1.02 RELATED WORK

- A. Erosion and Sediment Control Plan.
- B. Section 32 92 19 - Seeding.
- C. Section 32 92 23 - Sodding.
- D. Section 32 93 00 - Plants.
- E. Section 01 57 23 - NPDES Storm Water Discharges.

1.03 REFERENCES

- A. Cobb County Soil Erosion and Sedimentation Control Ordinance.
- B. Cobb County Comprehensive Stormwater Management and Stormwater Quality Ordinance.

- C. Manual for Erosion and Sediment Control in Georgia, as published by the Georgia Soil and Water Conservation Commission (current edition).
- D. Federal Clean Water Act.
- E. Georgia Erosion and Sedimentation Act of 1975, as amended.
- F. Georgia Department of Natural Resources, Environmental Protection Division General NPDES Permit GAR100002.
- G. AASHTO M288: Geosynthetic Specification for Highway Applications (current edition)

1.04 QUALITY ASSURANCE

- A. The Contractor shall provide at least one representative involved in the project's land disturbing activities that has successfully completed the erosion and sediment control education and certification program as administered by the Georgia Soil and Water Conservation Commission; this "certified person" must have completed as a minimum, the Level 1A (Fundamentals) course. A "certified person" must be present onsite at all times when work is being performed. Failure to maintain a certified person onsite at all times may result in a stop work order or other appropriate enforcement action.

1.05 SUBMITTALS

- A. Certification credentials of all persons that have completed the Georgia Soil and Water Conservation Commission's erosion and sediment control education and certification program and that will be involved in the project shall be provided to the Owner prior to the start of any land disturbing activities.

PART 2 PRODUCTS

2.01 GENERAL

- A. The following paragraphs describe the erosion and sediment control practices and products typically employed on a utility construction project. The detailed requirements for these, as well as for other measures which may be needed to achieve effective erosion control, shall be as specified in the Standards and Specifications for General Land Disturbing Activities in the latest edition of the Manual for Erosion and Sediment Control in Georgia.
- B. The paragraph titles and alpha-numeric codes refer to specific structural and vegetative type practices included in the aforementioned Standards. All practices are considered as temporary erosion and sediment control features, except the channel stabilization, gabions, grassing/sodding, trees, shrubs, and groundcovers, which are considered as permanent measures.

2.02 STRUCTURAL PRACTICES

A. Geotextiles:

1. Geotextiles shall be used as a separator between the graded stone, the soil base, and the abutments.
2. Geotextile selection shall be based on the current AASHTO M288 specification.

B. Construction Exit - Co:

1. A construction exit consists of a stone-stabilized pad with a geotextile underliner located at any point where traffic will be leaving a construction site to a public right-of-way, street, alley, sidewalk, or parking area.
2. Construction exits are used to reduce or eliminate transport of mud from the construction area.
3. Construction exits shall consist of graded 1.5-to-3.5-inch stone meeting National Stone Association grade R-2. The geotextile underliner shall be a non-woven fabric equal to No. C-45NW as manufactured by Contech Construction Products, Inc. or equal. Geotextile selection shall be based on the current AASHTO M288 specification.

C. Channel Stabilization (RIPRAP) - Ch:

1. Channel stabilization consists of structures to stabilize an open channel for water conveyance. Such stabilization is typically applied in these locations where the channel banks and bed have been disturbed by excavation for a pipeline crossing.
2. Channels will be stabilized using a rock riprap lining. The lining shall consist of filter bedding stone and graded riprap stone. Sizes of riprap shall be in accordance with National Stone Association (N.S.A.) classification (Table C-1 of Appendix C of the Manual for Erosion and Sediment Control in Georgia, latest edition) or the Department of Transportation (DOT) classification system (Table C-3 of Appendix C of the Manual for Erosion and Sediment Control in Georgia, latest edition). Riprap stone shall be equal to Georgia Department of Transportation Type 1 or Type 3, as specified on the erosion control plans. Filter bedding stone shall be graded stone not exceeding 6 inches in diameter. An appropriate geotextile fabric may be substituted for filter stone.

D. Gabions – Ga:

1. Gabions are large, multi-celled mesh boxes used in channel revetments, retaining walls, abutments, and check dams. Boxes shall be constructed of PVC coated wire mesh and filled with 4-inch to 8-inch pieces of durable stone. Stone placement shall be placed principally by hand or gentle mechanical dumping in no more than 12-inch layers with PVC coated wire cross and diagonal supports in each cell to retain and support basket sides at those intervals. Minimum size for box gabions

shall be 6'-0" by 3'-0" by 3'-0". Minimum size for reno mattresses shall be 9'-9" by 6'-6" by 0'-9". Gabions shall be manufactured by Macaferri or equal.

2. Gabions shall be placed over a 6-inch layer of soil, crushed stone or sand overlaying a filter fabric.

E. Temporary Stream Crossing - Sr:

1. A temporary stream crossing is a structure installed across a flowing stream for use by construction equipment.
2. Structures may include bridges, round pipes, and pipe arches. Structure shall be large enough to convey the full bank flow of the stream and be designed by the Contractor to withstand flows from a 2-year, 24-hour frequency storm.
3. Temporary crossings shall not be used on streams with drainage areas greater than 1 square mile. Permanent structures are required for such crossings.
4. Plastic filter fabric shall not be used on temporary stream crossings.

F. Check Dams - Cd:

1. Check dams are barriers composed of stone or haybales placed across a natural or constructed drainageway to prevent erosion in areas of concentrated flows.
2. Check dams shall not be installed in live streams.
3. Stone check dams shall not be utilized where the drainage area exceeds two acres.
4. Stone check dams should be constructed of graded size 2-inch to 10-inch stone.
5. Haybale check dams shall not be used where drainage areas exceed one acre.
6. Hay bales shall be clean, seed-free cereal hay, rectangular in shape and contain 5 cubic feet or more of material. Stakes shall be steel reinforcement bars, steel pickets or 2-inch by 2-inch wooden stakes.

G. Sediment Barrier:

1. Staked Haybales - Sd1:
 - a. Haybale barriers are placed in a single row on natural ground where the most likely erodible areas are located to restrain sediment particles carried by sheet flow.
 - b. Hay bales shall be clean, seed-free cereal hay, rectangular in shape and contain 5 cubic feet or more of material.
 - c. Stakes shall be steel reinforcement bars, steel pickets or 2-inch by 2-inch wooden stakes.
2. Silt Fence - Sd1:
 - a. Silt fences are temporary measures to retain suspended silt particles carried by sheet flow.

- b. Silt fence consists of silt fabric, as specified in the Georgia Department of Transportation Qualified Products List (QPL #36), wood or steel posts, and wire or nail fasteners.
- c. Non-Sensitive Areas Sd1-NS (Type A) silt fence is a non-woven 36-inch wide filter fabric and shall be used on developments where the life of the project is greater than or equal to six (6) months. The flow rate (gallon/minute/square foot) is 25. Additionally, Type A fabric has a color mark.
- d. Sensitive Areas Sd1-S (Type C) silt fence is a woven 36-inch-wide filter fabric with wire reinforcement. The wire reinforcement is necessary because this fabric allows almost three times the flow rate as Type A silt fence. The flow rate (gallon/minute/square foot) is 70. Additionally, Type C fabric does not have a color mark.

H. Inlet Sediment Trap - Sd2:

- 1. Inlet sediment traps are temporarily protective devices formed around a storm drain inlet to trap sediment.
- 2. Inlet sediment traps are used to prevent sediment from leaving a site or from entering storm drain systems prior to permanent stabilization of the disturbed area.

I. Rock Filter Dam - Rd:

- 1. Rock filter dams are installed across small non-actively flowing drainageways and are applicable for projects that involve grading activity directly in those drainageways.
- 2. Rock filter dams consist of riprap faced with smaller rock on the upstream side for additional filtering affect. Stone size shall be determined by the design criteria established in riprap; Appendix C of the Manual for Erosion and Sediment Control in Georgia, latest edition.

J. Stream Diversion - Piped Diversion (DV1), Pumped Diversion (DV2), Engineered Diversion Structures (DV3):

- 1. Installation of water and sewer pipelines designed to cross natural streams shall be accomplished only in "dry channel" conditions (such as, in the absence of stream flow in the work area). Provisions shall be implemented to divert a constant quantity and quality of stream waters around the construction area by means of adequately sized pipes, pumps, or engineered diversion structures, or other methods proposed by the Contractor and approved by the Owner. These diversion devices will be maintained throughout the duration of construction within the stream channel. The structures shall be designed by professionals familiar with storm water / drainage characteristics and applicable requirements to withstand flows from a 2-year, 24-hour frequency storm event unless otherwise noted on the drawings. Stream diversion devices shall not be removed until all disturbed areas of the stream channel bottom and banks are returned to original contours and

stabilized to prevent erosion. The planning, scheduling, and sequencing of work by the Contractor shall be described in a detailed submittal to the Owner for approval. The final implementation schedule will only be determined in conjunction with forecasted weather conditions for the period anticipated for diversion.

a. Piped Diversion - Dv1:

- 1) Piped diversions shall be installed and implemented in conjunction with and as an extension of Temporary Stream Crossings - (Sr). Pipes shall be sized as shown on the drawings with sufficient coordination and planning as to their locations, elevations to allow subsequent water/sewer pipeline construction to occur in "dry channel" conditions.
- 2) Necessary sandbags or other sealing devices, dewatering shall be provided to accomplish this piped diversion as well as other "Best Management Practices" to ensure that erosion and sedimentation is controlled.

b. Pumped Diversion - Dv2:

- 1) Pumped diversions shall be installed and implemented in conjunction with and as an extension of Temporary Stream Crossings - (Sr). Pumps and piping shall be sized as shown on the drawings with sufficient coordination and planning as to their locations, elevations to allow subsequent water/sewer pipeline construction to occur in "dry channel" conditions.
- 2) Necessary sandbags or other sealing devices, dewatering, discharge sediment basins, sediment filter socks, "floc logs", "dirt bags" shall be provided to accomplish this pumped diversion as well as other "Best Management Practices" to ensure that erosion and sedimentation is controlled.

c. Engineered Diversion Structure - Dv3:

- 1) Engineered diversion structures such as "Aqua Barrier", "Portadam", interlocked sheet piling, riprap cofferdams, shall be installed and implemented to allow subsequent water/sewer pipeline construction to occur in "dry channel" conditions. Sequential work elements may be involved to allow the construction area to progress across a stream, and to ensure that the previously completed segment is reasonably restored and stabilized.
- 2) Necessary sandbags, geotextiles, linings, or other sealing devices, dewatering shall be provided to accomplish this manner of diversion as well as other "Best Management Practices" to ensure that erosion and sedimentation is controlled.

K. Filter Sock - Cd-Fs:

1. Compost filter media used for compost filter sock filler material shall be weed free and derived from a well-decomposed source of organic matter. Compost shall be produced using an aerobic composting

process meeting CFR 503 regulations including time and temperature data. Compost shall be free of any refuse, contaminants or other materials toxic to plant growth. Non-composted products will not be accepted.

2. Compost shall be tested in accordance with latest edition of the Manual for Erosion and Sediment Control in Georgia. Test methods should follow US Composting Council Test Methods for the Examination of Composting and Compost guidelines for laboratory procedures.
3. Filter sock should be staked in the center. The filter sock shall sit flush with the ground and follow contours. If the compost filter sock is to be left as a permanent filter or part of the natural landscape, it may be seeded at time of installation for establishment of permanent vegetation.

2.03 VEGETATIVE PRACTICES

- A. General: Disturbed areas shall be stabilized as construction progresses. All projects shall not exceed 300 linear feet without stabilization.
- B. Disturbed Area Stabilization (with Mulching Only) - Ds1:
 1. This practice is applicable where disturbed areas, temporarily idle, have not been established to final grade and/or where permanent vegetative cover is delayed for a period not to exceed 6 months.
 2. Mulch materials shall consist of dry straw or hay, wood chips, erosion control matting or netting, or polyethylene film. The mulch should be uniform, spread over the designated area from 2 inches to 4 inches thick.
 3. Disturbed areas that have not yet reached final grade shall be stabilized with mulch or temporary grassing within fourteen (14) calendar days of disturbance.
- C. Disturbed Area Stabilization (with Temporary Seeding) - Ds2:
 1. Temporary seeding is a measure consisting of seeding and mulching to reduce erosion. All disturbed areas shall be seeded when and where necessary to reduce erosion.
 2. This practice is applicable where disturbed areas, temporarily idle, have not been established to final grade and/or where permanent vegetative cover is delayed for up to 6 months.
 3. Temporary seeding consists of a grass or grass-legume mixture suitable to the area and season of the year.
- D. Disturbed Area Stabilization (with Permanent Vegetation) - Ds3
 1. See Section 32 92 19 - Seeding.
 2. See Section 32 93 00 - Plants.
 3. Permanent (perennial) vegetation shall consist of planted grasses, trees, shrubs, and/or perennial vines; a crop of perennial vegetation appropriate for the time of year and region (or to match, in kind, pre-existing maintained vegetation); or a crop of annual vegetation and

seeding of target crop perennials appropriate for the region (or to match, in kind, pre-existing maintained vegetation), such that within the growing season a 70 percent coverage by perennial vegetation shall be achieved.

4. This practice is applicable on disturbed areas at final grade.
5. Permanent perennial vegetation shall be applied on rough graded areas that will be undisturbed for more than (6) months.

E. Disturbed Area Stabilization (with Sodding) - Ds4:

1. See Section 32 92 23 - Sodding.
2. This practice shall consist of ground preparation, furnishing lime and fertilizer, and placement of sod.
3. Sod shall be from the local area and delivered to the job site in either industry standard blocks or rolls. Sod shall not be delivered to the job site more than 24 hours prior to installation. Sod shall be hand placed with edges butted and cut as required to fit the placement area. The finished installation shall be rolled with a lawn roller and thoroughly watered. Sod will be watered in accordance with Section 32 92 23 - Sodding.
4. Sod shall be anchored on slopes steeper than 3:1.

F. Erosion Control Matting and Blankets - Mb:

1. This practice is a protective covering (blanket) or soil stabilization mat used to stabilize disturbed areas until permanent vegetation on steep slopes, channels, or shorelines can be established.
2. Concentrated flow areas, all slopes steeper than 3:1 and with a height of 10 feet or greater, and cuts and fills within stream buffers, shall be stabilized with the appropriate erosion control matting or blankets.
3. All blanket and matting materials shall be on the Georgia Department of Transportation Qualified Products List (QPL #62 for Blankets, QPL #49 for Matting).

G. Joint Planting Stabilization (Riprap and Willow Stakes):

1. Joint planting is a system that installs live willow stakes between riprap (type 3) placed previously along the stream bank. It is installed to increase the effectiveness of the rock system by forming a living root matt in the base upon which rock has been placed and improve the environmental function and aesthetics of the rock bank. The rock shall be principally placed by hand or gentle mechanical dumping. Willow stake density of installation shall be 3 to 5 cuttings per square yard. Cuttings shall be 2-inch diameter and 3.5 feet in length. Cutting shall be freshly cut and alive. Two thirds (2/3) of live stake shall be in the ground below the previously placed rock. Use only native species willow stakes.

PART 3 EXECUTION

3.01 GENERAL

- A. At the Preconstruction Conference, the Contractor shall submit a schedule for accomplishment of the temporary erosion control work for specific conditions to be encountered on the Project.
- B. The Contractor shall install all erosion and sediment control devices as required by actual field conditions, as shown on the plans, or as directed by the Owner or by any agency having jurisdiction in the locale of the Project.
- C. The Contractor shall oblige to the standards and installation methods presented in the latest edition of the Manual for Erosion and Sediment Control in Georgia.
- D. Erosion and sediment control devices shall be installed by the Contractor before land disturbing activities begin.
- E. The Owner has the authority to direct the Contractor to provide immediate, additional temporary erosion control measures to prevent contamination of adjacent waterways and drainage ways. Additional erosion control measures may be used to correct conditions that develop during construction that were not foreseen during the design stage or that are needed prior to installation of the permanent erosion control features.
- F. The Owner may limit the area of excavation in progress based on the Contractor's capability and progress in keeping the finish grading, mulching, and seeding current, in accordance with the accepted schedule. Should seasonal limitations make such coordination unrealistic, temporary erosion control measures, such as mulching or temporary seeding, shall be taken immediately to the extent feasible and justified.
- G. The Contractor shall incorporate all permanent erosion control features (grassing and sodding) into the Project at the earliest practicable time.

3.02 INSTALLATION

- A. Erosion control measures shall be designed by professionals familiar with storm water / drainage characteristics, installed, and maintained in accordance with the latest edition of the "Manual for Erosion and Sediment Control in Georgia", published by the Georgia Soil and Water Conservation Commission.

3.03 INSPECTION

- A. Upon completion of installation, the Owner or local government authority shall inspect the erosion and sediment control devices for proper installation, flaws, defects, or other damage. The Contractor shall repair or replace the unacceptable portions as directed by the Owner or local government authority.

- B. All erosion and sediment control devices shall be inspected by the Contractor at least weekly and after each rainfall occurrence.
- C. All projects which require compliance with General NPDES Permit No. GAR100002 guidelines must have inspections and monitoring in accordance with the specific monitoring plan and Section 01 57 23 - NPDES Storm Water Discharges, of these specifications.

3.04 MAINTENANCE

- A. The Contractor shall maintain the erosion and sediment control devices until the project is completed and all disturbed areas are stabilized. Maintenance of the devices shall include the following: removal and disposal of silt accumulation; replacement of damaged or deteriorated devices; other repairs; and the installation of additional devices, should those devices installed prove to be inadequate, at no additional cost to the Owner.
- B. Silt shall be cleaned out once it has accumulated to half the height of the device or when half of the available sediment storage capacity has been attained.

3.05 REMOVAL

- A. Temporary erosion and sediment devices shall remain in place until such time as a satisfactory stand of grass has been established in accordance with the latest edition of the "Manual for Erosion and Sediment Control in Georgia", unless the Owner or local government authority directs earlier removal. Damaged or otherwise unusable devices shall be removed from the site and disposed of properly.
- B. After erosion and sediment device removal, the Contractor shall dress out any disturbed areas in the vicinity of the removed device and grass according to these specifications.

END OF SECTION

SECTION 32 92 19 SEEDING

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The work covered by this section consists of furnishing all labor, equipment, and material required to place topsoil, seed, commercial fertilizer, agricultural limestone, and mulch material, including seedbed preparation, harrowing, compacting, and other placement operations on graded earthen areas as described herein and/or shown on the Drawings. In general, seeding operations shall be conducted on all newly graded earthen areas not covered by structures, pavement, or sidewalks; all cleared or grubbed areas which are to remain as finish grade surfaces; and on all existing turf areas which are disturbed by construction operations and which are to remain as finish grade surfaces. Areas disturbed by borrow activities shall also be seeded according to these specifications. Seeding shall also be completed for the purpose of stormwater management in accordance with Project Drawings.
- B. The work shall include temporary seeding operations to stabilize earthen surfaces during construction or inclement weather and to minimize stream siltation and erosion. Temporary seeding shall be performed on any disturbed area left exposed for a period greater than 7 days.
- C. Areas disturbed by construction activities, shall be restored to their original conditions with regard to surface grading, drainage, grass type (predominate), or other landscape features.

1.02 RELATED WORK

- A. 01 57 23 - NPDES Storm Water Discharges.
- B. 31 11 00.01 - Clearing and Grubbing (Easement Clearing).
- C. 31 11 00.02 - Clearing and Grubbing (Site Preparation).
- D. 31 25 00 - Erosion and Sediment Control.
- E. 32 01 90.19 - Mowing.
- F. 32 92 23 - Sodding.
- G. Erosion and Sediment Control Plan.

1.03 QUALITY ASSURANCE

- A. Prior to seeding operations, the Contractor shall furnish to the Owner labels, or certified laboratory reports from an accredited commercial seed laboratory or a state seed laboratory showing the analysis and germination of the seed to be furnished. Acceptance of the seed test reports shall not relieve the

Contractor of any responsibility or liability for furnishing seed meeting the requirements of this section.

- B. Prior to topsoil operations, the Contractor shall obtain representative samples and furnish soil test certificates including textural, pH, and organic ignition analysis from the State University Agricultural Extension Services or other certified testing laboratory.

1.04 ALTERNATE METHODS

- A. The Contractor may propose alternate means and methods to establish a satisfactory coverage of healthy grass of the type required. The Contractor shall submit sufficient information to enable the Owner to assess the acceptability of the alternate approach.

PART 2 PRODUCTS

2.01 TOPSOIL

- A. The Contractor shall place a minimum of 4 inches of topsoil over all graded earthen areas and over any other areas to be seeded. The quality of topsoil shall be acceptable to the Owner.
- B. Topsoil shall be a friable loam containing a large amount of humus and shall be original surface soil of good, rich, uniform quality, free from any material such as hard clods, stiff clay, hardpan, partially disintegrated stone, pebbles larger than 1/2 inch in diameter, lime, cement, bricks, ashes, cinders, slag, concrete, bitumen or its residue, boards, sticks, chips, or other undesirable material harmful or unnecessary for grading, planting, and maintenance. Topsoil shall be reasonably free from perennial weeds and perennial weed seeds, and shall not contain objectionable plant material, toxic amounts of either acidic or alkaline elements or vegetable debris undesirable or harmful to plant life.
- C. Topsoil shall be natural topsoil without admixture of subsoil material, and shall be classifiable as loam, silt loam, clay loam, sandy loam, or a combination thereof. The pH shall range from 5.5 to 7.0. Topsoil shall contain not less than 5 percent nor more than 20 percent, by weight, of organic matter as determined by loss on ignition of oven-dried samples to 65 degrees C.

2.02 SEED

- A. Seed shall be delivered in new bags or bags that are sound and labeled in accordance with the U.S. Department of Agriculture Federal Seed Act.
- B. All seed shall be from the last crop available at time of purchase and shall not be moldy, wet, or otherwise damaged in transit or storage.
- C. Seed bags shall bear labels, or certified laboratory reports from an accredited commercial seed laboratory or a state seed laboratory, which display 98 percent for purity and 90 percent for germination. At the discretion of the

Owner, samples of seed may be taken for check against the labels and/or certified laboratory reports.

- D. Species, rate of seeding, fertilization, and other requirements shall be as necessary to successfully establish the required stand of grass.

2.03 FERTILIZER AND LIMING MATERIALS

- A. Fertilizer and liming materials shall comply with applicable state, local, and federal laws concerned with their production and use.
- B. Commercial fertilizer shall be a ready mixed material of grade 10-5-5. Container bags shall have the name and address of the manufacturer, the brand name, net weight, and chemical composition.
- C. Agricultural limestone shall be a pulverized limestone having a calcium carbonate content of not less than 85 percent by weight. Agricultural limestone shall be crushed so that at least 85 percent of the material will pass a No. 10 mesh screen and 50 percent will pass a No. 40 mesh screen.

2.04 MULCH MATERIAL

- A. All mulch materials shall be air dried and reasonably free of noxious weeds and weed seeds or other materials detrimental to plant growth.
- B. Mulch shall be composed of wood cellulose fiber, straw, or stalks, as specified herein. Mulch shall be suitable for spreading with standard mulch blowing equipment.
- C. Straw mulch shall be partially decomposed stalks of wheat, rye, oats, or other approved grain crops.
- D. Stalks shall be the partially decomposed, shredded residue of corn, cane, sorghum, or other approved standing field crops.

2.05 MULCH BINDER

- A. Mulch on slopes exceeding 3 to 1 ratio shall be held in place by the use of an approved mulch binder. The mulch binder shall be non-toxic to plant life.
- B. Emulsified asphalt binder shall be Grade SS-1, ASTM D977. Cutback asphalt binder shall be Grade RC 70 or RC 250.

2.06 INOCULANTS FOR LEGUMES

- A. All leguminous seed shall be inoculated prior to seeding with a standard culture of nitrogen-fixing bacteria that is adapted to the particular seed involved. Inoculation shall be completed in accordance with the inoculant manufacturer's instructions.

2.07 WATER

- A. Water shall be clean, clear water free from any objectionable or harmful chemical qualities or organisms and shall be furnished by the Contractor.

PART 3 EXECUTION

3.01 PLACING TOPSOIL

- A. Before placing or depositing topsoil upon any areas, all site improvements within the area shall be completed.
- B. The areas in which topsoil is to be placed or incorporated shall be prepared before securing topsoil for use.
- C. Do not place topsoil when subsoil or topsoil is frozen, excessively wet, or otherwise detrimental to the Work.
- D. Mix soil amendments, lime, and other soil additives, identified in analysis reports with topsoil before placement or spread on topsoil surface and mix thoroughly into entire depth of topsoil before planting or seeding. Delay mixing of fertilizer if planting or seeding will not occur within 3 days.
- E. Place one-half of the total depth of topsoil and work into top 4 inches of subgrade soil to create a transition layer. Place remainder of topsoil to depth as shown where seeding and planting are scheduled.
- F. Uniformly distribute to within 1/2 inch of final grades. Fine grade topsoil eliminating rough or low areas and maintaining levels, profiles, and contours of subgrade.
- G. Remove surplus subsoil and topsoil from Site. Grade stockpile area as necessary and place in condition acceptable for planting or seeding.

3.02 SEEDBED PREPARATION

- A. Before fertilizing and seeding, the topsoil surfaces shall be trimmed and worked to true line. Seedbed shall be free from unsightly variation, bumps, ridges and depressions, and all detrimental material, roots, and stones larger than 1-1/2 inches in any dimension shall be removed from the soil.
- B. Not earlier than 24 hours before the seed is to be sown, the soil surface to be seeded shall be thoroughly cultivated to a depth of not less than 2 inches with a weighted disc, tiller, pulvimixer, or other equipment, until the surface is smooth.
- C. If the prepared surface becomes eroded because of rain or for any other reason, or becomes crusted before the seed is sown, the surface shall again be placed in a condition suitable for seeding.
- D. Ground preparation operations shall be performed only when the ground is in a tillable and workable condition.

3.03 FERTILIZATION AND LIMING

- A. Following seedbed preparation, fertilizer shall be applied to all areas to be seeded to achieve an application rate in accordance with the soil analysis results for the work area.
- B. Fertilizer shall be spread evenly over the seedbed and shall be lightly harrowed, raked, or otherwise incorporated into the soil for a depth of 2 inches or per the manufacturer's instructions.
- C. Fertilizer need not be incorporated in the soil as specified above when mixed with seed in water and applied with power sprayer equipment. The seed shall not remain in water containing fertilizer for more than 30 minutes when a hydraulic seeder is used to prevent fertilizer from burning seed.
- D. Agricultural limestone shall be thoroughly mixed into the soil at a rate of 1 ton to 2 tons per acre. The specified rate of application of limestone may be reduced by the Engineer if pH tests indicate this to be desirable. It is the responsibility of the Contractor to obtain such tests and submit the results to the Owner for adjustment in rates.
- E. It is the responsibility of the Contractor to make one application of maintenance fertilizer at one-half the original rates applied in early spring following initial establishment of cover.

3.04 SEEDING

- A. Seed of the specified group shall be sown as soon as preparation of the seedbed has been completed. No seed shall be sown during high winds, nor until the surface is suitable for working and is in a proper condition. Seeding shall be performed during the periods shown below. Seed mixtures may be sown together provided they are kept in a thoroughly mixed condition during the seeding operation.
- B. Seeds shall be uniformly sown by any approved mechanical method to suit the slope and size of the areas to be seeded, preferably with a broadcast type seeder, windmill hand seeder, or approved mechanical power drawn seed drills. Hydroseeding and hydromulching may be used on steep embankments (such as, 3:1 slope ratio), provided full coverage is obtained. Care shall be taken to adjust the seeder for seedings at the proper rate before seeding operations are started and to maintain their adjustment during seeding. Seed in hoppers shall be agitated to prevent segregation of the various seeds in a seeding mixture.
- C. Immediately after sowing, the seeds shall be covered and compacted to a depth of 1/8 to 1/4 inch for small seeds and 1/2 to 1 inch for large seeds by a cultipacker or suitable roller.
- D. Leguminous seeds shall be inoculated prior to seeding with an approved and compatible nitrogen-fixing inoculant in accordance with the manufacturer's mixing instructions.

E. Seeding Requirements Table

1. The seed shall be a mixture as shown in the table below, and shall be applied at the rates shown in the table:

Application		
Season	Kinds of Seed	Pounds Per Acre
Jan.1 – May 15	Unhulled Common Bermuda	45
	Kentucky 31 Fescue	300
	Rebel II Supreme	150
May 16 – Sep. 1	Hulled Common Bermuda	75
Sep. 2 – Dec. 31	Unhulled Common Bermuda	45
	Kentucky 31 Fescue	300
	Rebel II Supreme	150

3.05 MULCHING

- A. All areas to be seeded shall be uniformly mulched in a continuous blanket immediately after seeding when using Wheat straw at a minimum of 2-1/2 tons per acre or equivalent to 2-inch to 4-inch thickness. The rate of application will correspond to a depth of at least 1-inch and not more than 1-1/2-inch, according to the texture and moisture content of the mulch material. It is intended that mulch shall allow some sunlight to penetrate and air to circulate, at the same time shading the ground, reducing erosion, and conserving soil moisture. The Contractor shall take steps necessary to prevent loss of mulch or bunching of mulch as caused by the wind.
- B. Mulch on slopes greater than 3 to 1 ratio shall be held in place by the use of an approved mulch binder. Binder shall be thoroughly mixed and applied with the mulch. Emulsified asphalt or cutback asphalt shall be applied at the approximate rate of 5 gallons per 1,000 square feet as required to hold the mulch in place. Application rates shall conform to the manufacturer's guidelines.
- C. The Contractor shall cover structures, poles, fence, and appurtenances if the mulch binder is applied in such a way that it would come in contact with or discolor the structures.
- D. Mulch and binder shall be applied by suitable blowing equipment at closely controlled application rates.

3.06 WATERING

- A. Apply water with fine spray after mulching to saturate top 4 inches of soil.
- B. Contractor shall be responsible for maintaining the proper moisture content of the soil to ensure adequate plant growth until a satisfactory stand is obtained.

If necessary, watering shall be performed to maintain an adequate water content in the soil. Water shall not be applied when there is danger of freezing. In the event that official watering bans or water restrictions are in effect, the Contract shall comply with applicable guidelines on watering for new grassing.

- C. Watering shall be accomplished by hoses, tank truck, or sprinklers in such a way to prevent erosion, excessive runoff, and overwatered spots.
 - 1. All direct use of water from in-service water mains by the Contractor for construction activities shall be metered via the use of meters acquired from the Cobb County Water System. The costs of which shall be included in the bid unit price for this item.

3.07 MAINTENANCE

- A. Upon completion of seeding operations, the Contractor shall clear the area of all equipment, debris, and excess material and the premises shall be left in a neat and orderly condition.
- B. The Contractor shall maintain all seeded areas without additional payment until final acceptance of the work by the Owner, including any regrading, refertilizing, reliming, reseeding, or remulching required. Seeding work shall be repeated on defective areas until a satisfactory uniform stand is accomplished. Damage resulting from erosion, gulleys, washouts, or other causes shall be repaired at the Contractor's expense by filling with topsoil, compacting, and repeating the seeding work.

3.08 VEGETATIVE STABILIZATION SCHEDULE

- A. The Contractor shall stabilize disturbed areas as construction progresses. The time duration limitations for stabilization of disturbed areas by either temporary mulching (for 7 days or less), temporary grassing, permanent grassing, or permanent sodding shall be as specified in Section 31 25 00 - Erosion and Sediment Control; however, unstabilized areas of the construction corridor shall not exceed 1,000 linear feet on sanitary sewers or water mains installed with easements and 300 linear feet for all other projects. Stabilization with permanent vegetation is preferred unless seasonal limitations exist.

END OF SECTION

SECTION 33 05 06
WATER LINES

PART 1 GENERAL

1.01 SCOPE OF WORK

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

1.02 RELATED WORK

- A. Section 01 33 00 - Submittals.
- B. Section 01 78 23 - Operating and Maintenance Data.
- C. Section 31 23 33 - Trenching and Backfilling.

1.03 SUBMITTALS

- A. Submit Shop Drawings for materials furnished under this section to the Owner in conformance with the requirements of Section 01 33 00 - 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 01 78 23 - Operating and Maintenance Data, of these specifications.

1.04 INSPECTION

- A. 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

- A. Reference Standards of the American National Standards Institute (ANSI), the American Society of Testing of Materials (ASTM), and the American Waterworks Association (AWWA).
 - 1. ANSI / AWWA C151/A21.51, Standard for Ductile-Iron Pipe, Centrifugally Cast.
 - 2. ANSI / AWWA C153/A21.53, Standard for Ductile-Iron Compact Fittings for Water Service.
 - 3. ANSI / AWWA C115/A21.15, Standard for Flanged Ductile-Iron Pipe with Ductile Iron or Gray Iron Threaded Flanges.
 - 4. ANSI / AWWA C111/A21.11, Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - 5. ANSI / AWWA C110/A21.10, Standard for Gray-Iron and Ductile-Iron Fittings, 3" through 48" Inches for Water and Other Liquids.

6. ANSI / AWWA C104/A21.4, Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.
7. ANSI / AWWA C600 Standard for Installation of Ductile-Iron Mains and Their Appurtenances.
8. AWWA M41, Ductile Iron Pipe and Fittings.
9. ANSI / AWWA C509, Standard for Resilient-Seated Gate Valves for Water-Supply Service.
10. ANSI / AWWA C502, Standard for Dry-Barrel Fire Hydrants.
11. ANSI / AWWA C651, Standard for Disinfecting Water Mains.
12. ANSI / AWWA C800, Standard for Underground Service Line Valves and Fittings.
13. ASTM B88, Standard Specification for Seamless Copper Water Tube.
14. MSS SP-80, Standard Practice for Bronze Gate, Globe, Angle, and Check Valves.

- B. 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, ductile iron.
 2. Service lines, 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-inch unless field conditions determine that a heavier wall thickness is required. The pressure rating and manufacture date shall be shown on each piece. Pipe shall be furnished in industry standard lengths, complete with all necessary glands, joint material, including rubber gaskets, lubricant, bolts and nuts. 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 A21.11. Bolts shall be low alloy, high strength equal to "Acipolly", "Usalloy", or "Corten" bolts.
 - b. Flanged Fittings: Shall conform to ANSI A21.10 and shall have flanges faced and drilled in conformance with ANSI Standard A21.15. Joints shall be installed with full ring rubber gasket that shall conform to ANSI A21.11. 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 mil thick bituminous coat in accordance with ANSI A21.51, unless substituted for an alternative exterior coating as shown in the contract drawings. A ceramic lining shall be substituted for the cement mortar lining where shown in the Contract drawings. Linings shall meet NSF 61 requirements for potable water service.
- D. Polyethylene Encasement: Where indicated in the Contract Documents, the Contractor shall provide a double layer of polyethylene encasement over pipe, fittings and valves when installed near 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. McWane Ductile: TR FLEX.
 - c. 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. McWane Ductile: SURE STOP 350® GASKET.
 - c. 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) 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

- A. 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

- A. 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 3 inches to 12 inches in diameter shall be iron-body resilient-seated gate valves with non-rising stems conforming to the requirements of AWWA C509, 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 MSS SP-80. Gate valves shall be as manufactured by Dresser, Mueller, American-Darling, Clow, 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 2-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 AIR/VACUUM RELEASE VALVES

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

2.07 CORPORATION STOPS

- A. 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.

2.08 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-piece 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 and silt from entering the barrel of the valve box.
 - 1. 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.

2.09 FLEXIBLE COUPLINGS

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

2.10 FIRE HYDRANTS

- A. Fire hydrants shall conform to AWWA C502 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. Mueller Co.; Model Super Centurion 250.
2. U. S. Pipe Valve & Hydrant, LLC; Model Metropolitan M-94.
3. M & H Valve Company; Model:129.

2.11 CURB STOPS

- A. 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.

2.12 TAPPING SLEEVES

- A. 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 2800C, Mueller #H-615, or approved equal.

2.13 TAPPING SADDLES

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

2.14 ADAPTERS AND UNIONS

- A. 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.
- B. 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.
- C. 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. 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 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. 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 conform to the lines and grades required.

- C. Contractor must have a set of the original Contract plans and specifications at all times on the job site. These 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 at the contractor's expense.
- 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 ensure uniform bearing along the pipe barrel. Pipe shall be installed with a minimum of 48 inches of cover or as otherwise stated in the Contract Documents.
- B. 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 75 percent of that recommended by the 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. Contractor shall take care not to damage lining, if the lining is damaged, the contractor shall perform field repairs to the lining in accordance with manufacturer's requirements.
- D. Push-on joints shall be installed in strict accordance with the manufacturer's instructions. Pipe shall be laid with bell ends facing upstream, unless directed otherwise by the Engineer due to significant slopes. 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, to the painted gauge line on the plain end to ensure it is properly

positioned in the bell socket. 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.
- F. The Contractor shall carefully regulate their 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. Authorized connections to water mains of the Cobb County – Marietta Water Authority require utilization of tapping sleeves / saddles approved by the Authority.
- I. 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 pipelines 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, or the test pressure as shown on the Contract Drawings if it is exceeded by this requirement 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 percent Modified Proctor density to obtain the required bearing pressure.
- D. Concrete for thrust blocking shall be 3,000 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 psi 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

- A. At the conclusion of the Work and prior to pressure testing and disinfection, the Contractor shall thoroughly clean the new pipeline 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.
- B. 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. 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 their 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 percent of the maximum normal operating pressure of the test section (200 psi minimum), or the pressure class of the pipe, or the surge pressure of the section, whichever is greater as shown on the Contract Drawings. 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 pipelines 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 10 feet from the beginning of the new main.
 2. Add chlorine at a rate to attain a 25 mg/L chlorine concentration. The acceptable method is by preparing a 1 percent solution with sodium hypochlorite or calcium hypochlorite. The required amount of chlorine to produce a 25 mg/L concentration in 100 feet of pipe is as follows:

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

Pipe Dia. (in.)	100% Chlorine (lb)	1% Chlorine Solution (gal.)
16	0.217	2.60
18	0.275	3.30
20	0.339	4.06
24	0.488	5.85

3. Continue adding chlorine at a rate to attain a minimum concentration of 25 mg/L. Measure the free chlorine concentration at regular intervals as given in AWWA M12 or with a high range test kit. Chlorine application shall continue until the entire main is filled.
 4. The chlorinated water shall be retained in the water main for a minimum of 24 hours during which time valves and hydrants in the treated section shall be operated to ensure disinfection of the appurtenances. At the end of the 24-hour period the water in all portions of the main shall have a minimum chlorine residual of 10 mg/L. If the residual chlorine is below 10 mg/L, the disinfection process will be repeated by the Contractor at no cost to the Owner until satisfactory results are obtained.
- C. Heavily chlorinated water shall be dechlorinated and flushed in a manner which is not detrimental to the environment. The method proposed shall be submitted to and approved by the Owner prior to discharge. Final flushing shall continue until the chlorine residual is less than 2 mg/L.
- D. Contractor shall coordinate sampling with the Cobb County-Marietta Water Authority (CCMWA), following authorization by the Owner. No earlier than 16 hours after final flushing, the CCMWA will obtain bacteriological samples for testing using Option B as described in AWWA C651:
1. Before approving a main for release, let it sit for a minimum of 16 hours without any water use. Then collect, using the sampling site procedures outlined and without flushing the main, two sets of samples a minimum of 15 minutes apart while the sampling taps are left running. Both sets of samples must pass for the main to be approved for release.
- E. If bacteriological test results are unsatisfactory, the main shall either be flushed with potable water or re-disinfected by the Contractor, as directed by the Owner, prior to obtaining additional samples. Satisfactory bacteriological test results shall be obtained prior to placing the new main in service. The disinfection process will be repeated by the Contractor at no cost to the Owner until satisfactory results are obtained.

END OF SECTION

MEASUREMENT AND PAYMENT

GENERAL

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

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

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

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

WATER MAIN

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

VALVE ASSEMBLY

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

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.

FIRE HYDRANTS

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

ANCHOR COUPLINGS

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

CONNECT TO EXISTING WATER MAIN - WET (NO 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, valves, customer notification, and temporary water shut down. Water main, 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.

REMOVE EXISTING WATER METER

Unit price each is for all required labor, tools, equipment, and materials to remove an existing water meter, vault or meter box, and backflow prevention device including abandonment in-place of the existing service line and restoration of the landscaping in the area of the meter. The water meter, meter box/vault, and backflow prevention device shall be delivered to the Cobb County Water System Warehouse. Water meter size shall be as indicated in the Bid Schedule.

ABANDON EXISTING WATER MAIN IN PLACE

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

ABANDON EXISTING VALVE BOX - IN PAVEMENT

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

ADJUST EXISTING VALVE BOX TO GRADE

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

ADJUST EXISTING MANHOLE TO GRADE

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

BRIDGE/CULVERT CROSSING, COMPLETE

Lump sum price is for installation including all pipe and/or fittings, pipe supports, insulation, and connections as may be required by existing field conditions. Bridge crossing, complete, as identified by the stationing on the plans and/or in the bid schedule, will be paid on a lump sum basis.

BASIC EROSION CONTROL

Lump sum price is for installation, maintenance, and the subsequent removal (as required) of any and all temporary and/or permanent erosion control measures as may be indicated on the erosion control plan and details shown on the drawings. Properly installed and successful erosion control measures will be progressively paid from the lump sum amount on the basis of the percentage of the total work in place.

Temporary grassing is considered an erosion control measure and will be paid for under BASIC EROSION CONTROL. Permanent grassing will be paid under GRASSING or SODDING; Channel Stabilization (Rip Rap) will be paid under RIP RAP or STREAM/DITCH CROSSING, as applicable.

GRASSING

Unit price per square foot includes ground surface preparation, application of fertilizer, lime, mulch, and seed appropriate for soil type and season, and plant establishment to successfully match in kind the preconstruction condition or as required by the plans. The actual area of grassed surfaces will be measured for payment; however, the width of the disturbed area considered for payment shall not exceed the construction easement limits, unless directed by the Project Engineer.

Temporary grassing is considered an erosion control measure and will be paid for under BASIC EROSION CONTROL.

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.

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SPECIAL CONDITIONS

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

1. Excavation will be unclassified. Rock will not be measured or paid for separately.
2. If additional work is required and the bid unit prices are not applicable to the necessary additional work, the Contractor shall be compensated as follows. If the additional work is to be performed entirely by the Contractor, compensations for such extra work shall be based on the direct costs as listed in a detailed proposal, plus 15 percent of direct costs for overhead and profit, plus 1 percent of such direct costs for bond. When the extra work involves subcontractors, compensation for such work shall be based on direct costs as listed by the subcontractor plus 15 percent of such direct costs for the subcontractor's overhead and profit. The Contractor may add 5 percent to the subcontractor proposal for overhead and profit, and 1 percent for bond. The 5 percent subcontractor markup shall be applied only once regardless of the number of tiers of subcontractors. The above allowances for overhead and profit shall include full compensation for overhead, including superintendence, and additional overhead attributable to a time extension granted because of the change order. For extra work that is funded from contract allowances, the 1 percent additional cost for bonds shall not be applied.
3. In the event any of the Cobb County Water System's utilities are damaged during the course of construction by the Contractor or its subcontractors, it shall be the Contractor's responsibility to have appropriate repair fittings and pipe maintained onsite and to respond within two hours to make the necessary repairs to restore service. In the event the Contractor cannot respond within the timeframe or is judged by the Water System to not have the necessary capabilities or qualifications to repair the damage, the Water System will make the necessary repairs to restore service, and the cost for such repairs will be billed to the Contractor. The repair cost billed to the Contractor will (1) be at the actual cost incurred by the Water System if it uses one of its pre-qualified contractors to make the repair, or (2) include all labor, material, and equipment costs plus a \$1,200.00 priority fee if the Water System makes the repairs with its own forces. Labor cost shall include all salary costs, payroll taxes and benefits.

END OF SPECIAL CONDITIONS

SECTION 02660 - VALVE BOX ADJUSTMENTS

PART 1 - GENERAL

1.01 SCOPE OF WORK

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

1.02 WARRANTY

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

1.03 SUBMITTALS

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

PART 2 - PRODUCTS

2.01 GENERAL

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

2.02 MATERIALS

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

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

PART 3 - EXECUTION

3.01 GENERAL

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

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

3.02 ADJUSTMENT AND/ OR REPLACEMENT IN ROADWAYS AND PAVEMENT

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

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

3.03 ADJUSTMENT AND/ OR REPLACEMENT OUT OF PAVEMENT

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

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

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

3.04 FIELD QUALITY ASSURANCE

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

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

END OF SECTION 02660