



MACON WATER AUTHORITY

CONTRACT FOR

Advanced Metering Infrastructure (AMI)

System Installation

PROPRIETARY NOTICE

This document is prepared by the Macon Water Authority for the sole purpose of communicating to our vendors. The proprietary information contained herein is based on the requirements of the project. None of the information in this document is to be shared with any third parties without the expressed written consent of the Macon Water Authority.

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SECTION 00020**INVITATION TO BID****THE MACON WATER AUTHORITY
MACON, GEORGIA**

Sealed Bids for furnishing all labor, tools, equipment and appurtenances necessary for the installation of Large Meter and Advanced Metering Infrastructure (AMI) Device Installation (the “Project”) will be received by the Macon Water Authority (the “Owner”), at the Macon Water Authority, 790 Second Street, Macon, Georgia 31201 until 2:00 P.M., local time, on Tuesday, June 24th, 2025, and then at said office publicly opened and read aloud. All bidders must attend a mandatory pre-bid meeting via Microsoft Teams at 10:00 A.M. on Wednesday, May 21st, 2025. All bid questions must be submitted to the Owner by 10:00 A.M. on Tuesday, June 3rd, 2025. The Bidder should attend the pre-bid conference in its entirety.

The purpose of the pre-bid conference is to provide assistance to interested contractors in the interpretation of the Request for Proposal (RFP), Sample Contract, and other technical and contractual matters. Email Notification: Proposers shall submit an email notification of their intention to attend this Pre-Bid Conference no later than Monday, May 19th, 2025. Send notification of intent to attend and who will be attending to Veronica Jarrin; veronica.jarrin@jacobs.com.

Nothing stated or discussed during the pre-bid conference shall be considered to modify, alter or change the requirements of the RFP, unless it shall be subsequently incorporated into an addendum to the RFP. All questions asked during the pre-bid conference deemed to be pertinent by the Owner will be addressed in an addendum following the pre-bid conference. In no event may a Bidder rely on any oral statement by Owner or its agents, advisors or consultants.

The Project consists of labor services to install approximately 2,200 water meters in the Owner’s service territory. The Owner is purchasing AMI System hardware through a separate agreement with Neptune Technology Group.

The following is a summary of the Authority’s current water meter system:

- Number of existing Owner customers: 55,795
- Total number of new AMI meters to be installed: 2,472
- Total number of existing meters to be retrofit with MIU (Optional): Approximately 12,000
- Date of last major water meter upgrade: Residential sized replacement program (AMR) completed in 2023
- The Owner uses Cayenta, version 9.2 for its Customer Information System (CIS). The Authority also has a customer payment portal through Invoice Cloud, with origination point through Cayenta’s self-service portal.

Please refer to the table below for current meter by size numbers (approximate).

Meter Size (in inches)	Number of Meters	Number of Retrofits (Optional)
5/8"	2,000*	12,000
1"	0	0
1 ½"	738	0
2"	910	0
3"	263	0
4"	89	0
6"	87	0
8"	61	0
10"	15	0
Notes: *See Optional Bid #2 of Attachment 3 Pricing Table		

System Requirements

The Owner is soliciting proposals from qualified vendors to provide a complete System with the following Minimum and Optional Requirements as described below.

Minimum System Requirements

The basic components of the System sought by the Owner include the following:

- Installation of new meters, retrofit registers (if applicable), and AMI meter interface units (MIUs)
- Handheld devices and software necessary to program and/or initialize the MIUs and collect installation data
- Labor to replace or modify existing lids to facilitate AMI-compatibility for outside set meter boxes
- The design, installation and testing of information interfaces between the work order management system (WOMS) and the Owner's customer information system (CIS)
- All related documentation, including technical manuals and operating procedures
- Coordination, scheduling, communications and documentation of all installation services
- Project management to ensure all products and services are coordinated

Optional System Requirements

The Owner wishes to consider including the following optional items:

- Installation or replacement of infrastructure in or around the meter box (such as meter boxes, curb stops, shut off valves, meter box re-setting/leveling, etc.), as needed
- MIU-only replacements for additional services in the Authority's main residential service area that need to be upgraded to cellular in order to be read over the AMI Network.
- Disposal of old meter reading equipment including old remote reading devices and AMR MIUs, as appropriate
- Salvage of old meters and meter box lids, as appropriate

The Project will be awarded in one Contract. Fifty-one percent (51%) of the Work under the Contract Documents must be self-performed by the General Contractor. The Project will be

awarded by base bid on a lump sum basis for the performance and completion of all Work required by the Contract Documents.

The Contract Documents include, but may not be limited to, the Instructions to Bidders, the Contract Agreement, the General Conditions, the Drawings, the Specifications (Divisions 01 through 46, inclusive, where applicable), and the forms of Bid Bond, Performance Bond, and Payment Bond. These and any other Contract Documents may be examined at the following location:

Engineering Department
The Macon Water Authority
537 Hemlock Street
Macon, GA 31201

Each Bid must be accompanied by a Bid Bond in the amount of 10% of the Bid, prepared on the form of Bid Bond that is part of the Contract Documents, duly executed by the Bidder as principal and having as surety thereon a surety company licensed to do business in the State of Georgia and listed in the latest issue of U.S. Treasury Circular 570.

Bidders must comply with the Disadvantaged Business Enterprise Participation Requirements specified in the Instructions to Bidders.

The Bidder shall affix to the outside of its Bid envelope the Bidder's Georgia Utility Contractor License Number. A license number of a Utility Manager or a subcontractor is insufficient, and any Bid that fails to affix to the outside of its Bid envelope the Bidder's Georgia Utility Contractor License Number may be rejected.

The successful Bidder for this Project shall be required to furnish a Performance Bond and Payment Bond, satisfactory to the Owner, each in the amount of 100% of the Contract Price.

Employment of Local Businesses and Contractors: It is the desire of the Owner that local businesses--including disadvantaged, minority, and women enterprise subcontractors-- be given the opportunity to participate on the various parts of the Work.

The Owner's encouragement of participation of disadvantaged, minority, and women enterprises and of locally owned businesses and contractors is not intended to restrict or limit competitive bidding or to increase the cost of the Work. The Owner supports a healthy, free market system that seeks to include responsible local businesses and provide ample opportunities for local business growth and development.

In an effort to assist minority-owned businesses, Georgia law permits an income tax adjustment on the state tax return of any company that subcontracts with a certified minority-owned firm to furnish goods, property or services to the State of Georgia pursuant to O.C.G.A. §48-7-38. Suppliers should consult with their tax advisors to find out how to take advantage of these tax credits.

The Owner reserves the right to reject any or all Bids. The Owner reserves the right to waive informalities and technicalities.

The Macon Water Authority
Ron Shipman
Executive Director & President

END OF SECTION

SECTION 00100**INSTRUCTIONS TO BIDDERS****1.01 CONTRACT DOCUMENTS**

- A. The Bidder's attention is directed to the General Conditions and other Contract Documents, all of which should be reviewed and studied by the Bidders before submitting a Bid.
- B. The Contract Documents shall define and describe the complete Work to which they relate.

1.02 DEFINITIONS

The Bidder's attention is called to the definitions set forth in Article 41 of the General Conditions.

1.03 PREPARATION AND EXECUTION OF BID

- A. Each Bid must be prepared to represent that it is based solely upon the materials and equipment specified in the Contract Documents.
 - 1. *Trade Names.*— When reference is made in the Contract Documents to trade names, brand names, or to the names of manufacturers, such references are made solely to indicate that products of that description may be furnished and are not intended to restrict competitive bidding. Unless requests for approvals of other products have been received and approvals have been published by addendum in accordance with the procedure described below in this Section, the successful Bidder may furnish no products of any trade names, brand names, or manufacturers' names except those designated in the Contract Documents.
 - 2. *Use of other products.*—If a Bidder desires to use products of trade or brand names or of manufacturers' names which are different from those specified in the Contract Documents, application for the approval of the use of such products must be received by the Engineer at least ten (10) days prior to the date set for the opening of Bids. The application to the Engineer for approval of a proposed product must be accompanied by:
 - a. a schedule setting forth in which respects the materials or equipment submitted for consideration differ from the materials or equipment designated in the Contract Documents; and
 - b. a copy of the published recommendations of the manufacturer for the installation of the product together with a complete schedule of changes in the drawings and specifications, if any, which must be made in other work in order to permit the use and installation of the proposed product in accordance with the recommendations of the manufacturer of the product.

In addition, the Engineer will give consideration to reports from reputable independent testing laboratories, verified experience records showing the reputation of the proposed product with previous users, evidence of reputation of the manufacturer for prompt delivery, evidence of reputation of the manufacturer for efficiency in servicing its products, or any other written information that is helpful in the circumstances. To be approved, a proposed product must also meet or exceed all express requirements of the Contract Documents.

3. *Burden of proof.*— The degree of proof required for approval of a proposed product as acceptable for use in place of a named product or products is that amount of proof necessary to convince a reasonable person beyond all doubt.
 4. *Request for conference.*—Any Bidder who alleges that rejection of a submittal is the result of bias, prejudice, caprice, or error on the part of the Engineer may request a conference with a representative of the Owner: PROVIDED, that the request for said conference, submitted in writing, shall be received by the Owner at least five (5) days prior to the date set for the opening of Bids, time being of the essence.
 5. *Issuance of addenda.*— If the submittal is approved by the Engineer, an addendum will be issued to all prospective Bidders. Issuance of an addendum is a representation to all Bidders that the Engineer, in the exercise of its professional judgment and discretion, established that the product submitted for approval is acceptable and meets or exceeds all express requirements.
- B. Each Bid must be submitted on the Bid forms which are a part of the Contract Documents. **All blank spaces for Bid prices, both words and figures, must be filled in and completed in ink.** In case of discrepancy, the amount shown in words will govern. All required enclosed certifications or other documents must be fully completed and executed when submitted.
- C. In case of discrepancies between the figures shown in the unit prices and the totals, the unit prices shall apply and the totals shall be corrected to correspond with the unit prices. In case of discrepancies between written amounts and figures, written amounts shall take precedence over figures and the sum of all Bid extensions (of unit prices) plus lump sum items shall take precedence over the Bidders input of the Bid Total.
- D. Each Bid must be submitted in a sealed envelope, addressed to the Macon Water Authority (the “Owner”). Each sealed envelope containing a Bid must be plainly marked on the outside as, “**Advanced Metering Infrastructure (AMI) System Installation**”. The pricing tables included in the Project Pricing Proposal **must be submitted in Excel format**. Failure to conform to this requirement may be grounds for disqualification. Bidders shall also submit one electronic version of its Technical Proposal and one electronic version of its Project Pricing Proposal, on a USB drive.

- E. The Bidder shall provide on the outside of the sealed envelope the following information:
 - 1. Bidder's Name;
 - 2. Bidder's Georgia Utility Contractor License Number (if applicable); and,
 - 3. The words, "SEALED BID"
- F. Any Bid submitted which does not contain the above information on the outside of the sealed envelope will not be opened and will be returned to the Bidder.
- G. If forwarded by mail, the sealed envelope containing the Bid must be enclosed in another envelope addressed as follows:

THE MACON WATER AUTHORITY

Attn: Gene Inman
790 Second Street
Post Office Box 108
Macon, Georgia 31202-0108

- H. Any and all Bids not meeting the aforementioned criteria for Bid submittal may be declared non-responsive, and subsequently returned to the Bidder unopened.
- I. The Bidder, in signing a Bid on the whole or any portion of the Project, shall conform to the following requirements:
 - 1. Bids which are not signed by individuals making the Bid shall have attached thereto a power of attorney evidencing authority to sign the Bid in the name of the person for whom it is signed.
 - 2. Bids which are signed for a partnership shall be signed by all of the partners or by an attorney-in-fact. If a Bid is signed by an attorney-in-fact, there should be attached to the Bid a power of attorney executed by the partners evidencing authority to sign the Bid.
 - 3. Bids which are signed for a corporation shall have the correct, legal corporate name thereof, as reflected in the records of the Georgia Secretary of State, and the signature of the president or other authorized officer of the corporation manually written below the corporate name following the wording "By ." The corporate seal shall be affixed to the Bid.
 - 4. The Bidder shall complete, execute and submit the following documents, (if applicable to the Bidder) which are a part of the Contract Documents:
 - a. The Bid;
 - b. The Bid Bond;
 - c. Statement of Bidder's Qualifications;
 - d. Statement of Equipment;

- e. Corporate Certificate, if the Bidder is a corporation;
- f. Statement of Disadvantaged Business Enterprise (“DBE”) compliance;
- g. Contractor's License Certification;
- h. Photocopy of State of Georgia Utility Contractor’s License;
- i. Photocopy of Certificate of Authority from Georgia Secretary of State’s Office to do work in Georgia (if out of state contractor);
- j. Non-Collusion Affidavit of Prime Bidder;
- k. The Technical Proposal
 - a. RFP TITLE PAGE
 - i. RFP title
 - ii. Name of the proposer
 - iii. Managing office address
 - iv. Telephone number
 - v. Name and email address of contact person
 - vi. Date of submission
 - b. TABLE OF CONTENTS
 - i. Include a clear identification of the material included in the proposal by page number
 - c. TERMS & ABBREVIATIONS
 - d. PROPOSER’S RESPONSE TO SECTIONS 1 through 6 (and their applicable subsections)
 - e. APPENDIX A: Resumes
 - f. APPENDIX B: Attestation Regarding Disputes
 - g. APPENDIX C: Exceptions to Technical & Performance Requirements
 - h. APPENDIX D: Financial Data
 - i. APPENDIX E: Supplemental Specifications
- l. The Pricing Proposal
 - a. TITLE PAGE listing the
 - i. RFP title
 - ii. Name of the proposer
 - iii. Managing office address
 - iv. Telephone number
 - v. Name and email address of contact person
 - vi. Date of submission
 - b. PROPOSER’S RESPONSE TO PRICING PROPOSAL:
Required Bid Tab
 - i. SECTION 1: Cost to install meter & MIU components,
 - ii. SECTION 2: Cost to supply Professional Services.
 - c. Optional Bid Items: Cost of additional services including additional field labor line items, MIU-Only upgrades for additional services, and disposal of existing equipment.
- m. Any and all forms, certifications or other documentation required by the Georgia Department of Natural Resources Environmental Protection Division.

1.04 METHOD OF BIDDING

The unit or lump sum price for each of the several items in the Bid of each Bidder shall include its pro rata share of overhead and profit so that the sum of the products, obtained by multiplying the quantity shown for each item by the unit price, represents the total Bid. Any Bid not conforming to this requirement may be rejected. Additionally, unbalanced Bids (including unbalanced unit prices) may be rejected. Conditional Bids shall not be accepted. **The special attention of all Bidders is called to this provision, for should conditions make it necessary to revise the quantities, no limit will be fixed for such increased or decreased quantities, nor extra compensation allowed.**

1.05 ADDENDA AND INTERPRETATIONS

- A. No interpretation of the meaning of the Drawings, Specifications or other pre-bid documents or Contract Documents shall be made to any Bidder orally.
- B. Any and all such interpretations and any supplemental instructions will be in the form of written Addenda to the Contract Documents which, if issued, will be posted on the GA Procurement Registry and the MWA Website at least seventy-two (72) hours (exclusive of weekends and holidays) prior to the date fixed for the opening of Bids. Parties that registered to attend the Pre-Bid conference shall be notified of addenda by email; however, it shall be the Proposer's responsibility to ascertain if addenda have been issued.
- C. Failure of Bidders to receive or acknowledge any Addendum shall not relieve them of any obligation under the Bid or the Contract Documents. All Addenda shall become part of the Contract Documents and obligations there under binding.
- D. All questions by Bidders as to the interpretations of the RFP must be received no later than 10:00 A.M. on Tuesday, June 3rd, 2025, in writing via email to: Veronica Jarrin; veronica.jarrin@jacobs.com

1.06 BID MODIFICATIONS

Bidders may modify their Bid by facsimile communication at any time prior to the scheduled closing time for receipt of Bids, provided such facsimile communication is received by the Owner prior to the time Bids are required, and provided further that the Owner is satisfied that a written confirmation of the facsimile modification over the signature of the Bidder was mailed by the Bidder to the Owner prior to the time Bids are required. The facsimile communication should not reveal the Bid price but should provide the addition or subtraction or other modification so that the final prices or terms will not be known by the Owner until the sealed Bid is opened. If written confirmation from the Bidder is not received by the Owner within two business days from the time Bids are required, no consideration will be given to the facsimile modification and the facsimile modification shall be rejected.

1.07 BID SECURITY

- A. Each Bid must be accompanied by a Bid Bond, prepared on the form of Bid Bond included herein, duly executed by the Bidder as principal and having as surety thereon a surety company authorized to do business in the State of Georgia and listed in the latest issue of U.S. Treasury Circular 570, in the amount of **ten (10%)** percent of the Bid. Attorneys-in-fact who sign Bonds must file with each Bond a currently dated and valid original of their power of attorney. Where validity and currentness of a power of attorney are established by certification executed by a corporate officer, the certification shall be made and executed by a corporate officer of record, as reflected in the records of the Georgia Secretary of State, or by valid corporate resolution or authorization identifying such corporate officer.
- B. Except as provided in O.C.G.A. §§ 36-91-52 and 36-91-53, if for any reason whatsoever the successful Bidder withdraws from the competition after opening of the Bids, or if Bidder refuses to execute and deliver the Contract and Bonds required in Article 2 of the General Conditions, the provisions of the Bid Bond may be enforced.
- C. Except as provided in O.C.G.A. §§ 36-91-52 and 36-91-53, a Bid may not be revoked or withdrawn until sixty (60) days after the time set for opening the Bids. Upon expiration of this time period, the Bid will cease to be valid, unless the Bidder provides written notice to the Owner prior to the scheduled expiration date that the Bid will be extended for a time period specified by the Owner.

1.08 RECEIPT AND OPENING OF BIDS

The Owner may consider a technicality and informality any Bid not prepared and submitted in strict accordance with the provisions hereof and may waive any technicality and informality or reject any and all Bids. Any Bid may be withdrawn prior to the above scheduled time for the opening of Bids or authorized postponement thereof. Any Bid received after the time and date specified shall not be opened.

1.09 CONDITIONS OF THE PROJECT

- A. Each Bidder must be informed fully of the conditions relating to the construction of the Project and the employment of labor thereon. Failure to do so will not relieve a successful Bidder of the obligation to furnish all material and labor necessary to carry out the provisions of the Contract Documents. Insofar as possible, the Bidder, in carrying out the Work, must employ such methods or means as will not cause any interruption of or interference with the work of any other contractor.
- B. The Bidder is advised to examine the location of the Project and to be informed fully as to its conditions; access requirements, the conformation of the ground; the character, quality and quantity of the products needed preliminary to and during the prosecution of the work; the general and local conditions and all other matters which can in any way affect the work to be done under the Contract Documents. Failure to examine the site will not relieve the successful Bidder of an obligation to furnish all products and labor necessary to carry out the provisions of the Contract Documents.

- C. The Bidder shall notify the Owner of the date and time Bidder proposes to examine the location of the Project. The Bidder shall confine examination to the specific areas designated for the proposed construction, including easements and public right-of-ways. If, due to some unforeseen reason, the proceedings for obtaining the proposed construction site (including easements), have not been completed, the Bidder may enter the site only with the express consent of the property owner. The Bidder is solely responsible for any damages caused by examination of the site.

1.10 EQUAL EMPLOYMENT OPPORTUNITY

- A. During the performance of the Contract, the Bidder agrees as follows:
 - 1. The Bidder shall not discriminate against any employee or applicant for employment, or in any employment action during employment, based upon any applicable, legally-recognized and protected basis, including, but not limited to, veteran status, uniformed service member status, race, color, religion, sex, sexual orientation, gender identity, age (40 and over), pregnancy (including childbirth, lactation and related medical conditions), national origin or ancestry, citizenship status, physical or mental disability, genetic information (including testing and characteristics), or any other consideration protected by federal, state, or local law.
 - 2. The Bidder shall, in all solicitation or advertisement for employees placed by or on behalf of Bidder, state that all qualified applicants will receive consideration for employment without regard to any applicable, legally-recognized and protected consideration, including, but not limited to veteran status, uniformed service member status, race, color, religion, sex, sexual orientation, gender identity, age (40 and over), pregnancy (including childbirth, lactation and related medical conditions), national origin or ancestry, citizenship status, physical or mental disability, genetic information (including testing and characteristics), or any other characteristic or basis protected by federal, state, or local law.
 - 3. The Bidder shall send to each labor union or representative of the workers, with which the Bidder has a collective bargaining agreement or other contract or understanding, a notice advising the labor union or worker's representative of the Bidder's commitments under the Equal Employment Opportunity Program of the Owner and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
 - 4. The Bidder and its subcontractors, if any, shall file compliance reports at reasonable times and intervals with the Owner in the form and to the extent prescribed by the Owner or the Georgia Department of Natural Resources. Compliance reports filed at such times as directed shall contain information as to the employment practices, policies, programs and statistics of the Bidder and its subcontractors.

5. The Bidder shall demonstrate by the documentation required in Paragraph C, below, that a “Good Faith Effort” has been made to achieve compliance with the Owner’s goal that a minimum of ten percent (10%) of the Contract Price shall be subcontracted to a Disadvantaged Business Enterprise (DBE), which includes *business enterprises owned by women and by minorities*. More specifically, as used herein, the term “DBE” means a firm or business which is at least fifty-one percent (51%) owned, operated, capitalized, and controlled by one or more United States citizens or lawfully admitted residents who are socially and economically disadvantaged, as defined below.

As used herein, social disadvantage means an individual who is a member of a *presumed group* or who is a *woman*. Economic disadvantage, as used herein, means, generally, a socially disadvantaged individual who does not have a personal net worth in excess of \$1.32 million dollars, excluding the primary residence and ownership in the subject firm.

Member(s) of a *presumed group* include Black Americans (any Black racial group originating in Africa); Hispanic Americans (origins in Mexico, Puerto Rico, Cuba, Central and South America, or other Spanish or Portuguese cultures); Native Americans (Native of Alaska or Hawaii or certified member of a federal or state recognized Tribe); Asian Pacific Americans (origins in the Pacific Islands, China, Taiwan, Korea, Japan, Thailand, Burma, Cambodia, Vietnam, Malaysia, Indonesia, Singapore, or Philippines); and Subcontinent Asian Americans (origins in India, Pakistan, Bangladesh, Bhutan, Maldives Islands, Nepal, or Sri Lanka).

As used herein, the term “subcontracted” means providing subcontracting services or furnishing products or materials to be utilized in the performance of the Work.

6. The Bidder shall include the provisions of paragraphs 1 through 6 of this Section 1.10.A in every subcontract or purchase order so that such provisions will be binding upon each subcontractor or vendor.
 - B. In determining whether a Bidder has made “Good Faith Efforts”, the Owner will look not only at the different kinds of effort that a Bidder has made, but also the quantity and intensity of these efforts.
 - C. The following list of kinds of efforts is provided for consideration, but this is not an exhaustive list of efforts that may be considered by the Owner:
 1. Whether the Bidder attended any pre-solicitation or pre-bid meetings that were scheduled by the Agent to inform DBEs of contracting and subcontracting opportunities;
 2. Whether the Bidder advertised in general circulation, trade association, and minority-focus media concerning the sub-contracting opportunities;

3. Whether the Bidder provided written notice to a reasonable number of specific DBEs that their interest in the Contract was being solicited, in sufficient time to allow the DBEs to participate effectively;
 4. Whether the Bidder followed up initial solicitations of interest by contacting DBEs to determine with certainty whether the DBEs were interested;
 5. Whether the Bidder selected portions of the Work to be performed by DBEs in order to increase the likelihood of meeting the DBE goals (including, where appropriate, breaking down contracts into economically feasible units to facilitate DBE participation);
 6. Whether the Bidder provided interested DBEs with adequate information about the Drawings, Specifications and requirements of the Contract Documents;
 7. Whether the Bidder negotiated in good faith with interested DBEs, not rejecting DBEs as unqualified without sound reasons based on a thorough investigation of their capabilities;
 8. Whether the Bidder made efforts to assist interested DBEs in obtaining bonding, lines of credit, or insurance required by the Contract Documents or Contractor; and
 9. Whether the Bidder effectively used the services of available minority or women community organizations; minority or women contractor's groups; local, state and federal minority or women business assistance offices and other organizations that provide assistance in the recruitment and placement of DBEs.
- D. Each Bidder shall include with his or her Bid a Statement of Disadvantaged Firm Utilization. Such statement shall include, as a minimum, the names and addresses of all disadvantaged/minority/women enterprise firms providing subcontracting services, furnishing products or materials, etc., the nature of the work to be contracted; and the anticipated cost of the services by each named firm as a percentage of the total Contract Price set forth in the Bid. The percentage participation should be calculated on the basis of the proportion of total dollar value of the Bid, including bulk purchase materials supplied by DBEs.
- E. It is the desire of the Owner that DBEs be given the opportunity to bid on the various parts of the Work, and that to the extent feasible, DBE firms in the Middle Georgia area will be solicited and used in order to meet the DBE goal set forth above. However, this desire is not intended to restrict or limit competitive bidding or to increase the cost of the Work. The Owner supports a healthy, free market system that seeks to include responsible businesses and provide ample opportunities for business growth and development.

In an effort to assist minority-owned businesses, Georgia law permits an income tax adjustment on the state tax return of any company that subcontracts with a certified minority-owned firm to furnish goods, property or services to the State of Georgia pursuant to O.C.G.A. §48-7-38. Suppliers should consult with their tax advisors to find out how to take advantage of these tax credits.

1.11 NOTICE OF SPECIAL CONDITIONS

If any special federal, state, county or city laws, municipal ordinances, and the rules and regulations of any authorities having jurisdiction over construction of the Project, enclosed, herein referred to, or applicable by law to the Project, conflict with requirements of the Contract Documents, then the federal, state, county or city laws, municipal ordinances, and the rules and regulations of any authorities having jurisdiction over construction of the Project shall prevail and supersede the conflicting requirements of the Contract Documents.

1.12 OBLIGATION OF BIDDER

- A. By submission of a Bid, each Bidder warrants that Bidder has inspected the site and has read and is thoroughly familiar with the Contract Documents (including all addenda). The failure or omission of any Bidder to examine any form, instrument or document shall in no way relieve any Bidder from any obligation in respect to the Bid.
- B. Special attention is directed to Article 4, "Insurance" contained at pages 00700-3 through 00700-6 in the General Conditions. The Owner requires (1) "Worker's Compensation and Employer's Liability Insurance," (2) "Commercial General and Umbrella Liability Insurance," (3) "Business Auto and Umbrella Liability Insurance," and (4) "Materials and Floater" Insurance. For each of the required policies, the Owner requires a certificate of insurance at least quarterly, a copy of the endorsement of the insurance company showing the Owner as an additional insured, and a copy of the insurance policy declaration and any necessary endorsements.
- C. Attention is further directed to Paragraph 6 of 00500, Contract Agreement and Article 9 of 00700, General Conditions regarding assignments. Prior written consent of the Owner is required for any assignment of any portion of this Contract, including any assignment due to "buyout" of Bidder or other acquisition of Bidder where the Bidder is a corporation or where Bidder is 50 percent or more owned by a corporation, firm, or person.

1.13 METHOD OF AWARD

- A. The Contract, if awarded, will be awarded based on evaluation criteria used to determine the responsible and responsive Bidder whose Bid is the most advantageous to the Owner and meets the requirements and criteria set forth in the Contract Documents. The Contract, if awarded, will be awarded by base bid plus selected alternates on a lump sum basis, comprised of unit prices, for the performance and

completion of all Work required by the Contract Documents. The Authority will negotiate a contract with the highest evaluated respondent, as determined by its evaluation committee.

- B. As part of the evaluation process, the Owner's Evaluation Committee will interview Bidder references and other parties to confirm Bidder's performance on previous projects.
- C. The evaluation criteria below will be used to determine which proposal is the most advantageous to the Owner. Respondents with an unacceptably low qualification/score will be eliminated from further consideration.

Weights	Evaluation Criteria
5	Strength of Contractor: Proposer's financial strength, stability and track record. Experience in the industry as well as R&D for new and improved capabilities. Ability to support production schedules for proposed equipment.
10	Experience of Proposed Staff: Relevant, related experience of the Project Managers and staff proposed for this Project, including sub-contractors.
10	Customer Management: Ability to manage customer interaction before, during, and after installations. Professional appearance when completing the Project. Responding to customer concerns in an efficient and satisfactory manner.
25	Installation Software and Interfaces: The capabilities of the Proposer's Installation Work Order Management System (WOMS) and its integration to CIS. Ease of use for Authority staff to review individual completed work order data and photos and to generate reports for overall installation progress. Timeliness of data transfer from installation to updating in CIS.
15	Installation Management: Proposed procedures and policies for project management, risk management, QA/QC, security, safety, training of installers, customer contact, scheduling appointments, troubleshooting and problem solving.
20	Risk Mitigation: Overall assessment of risk to delivery and operations. Overall system performance guarantees. Protection in the event of excessive failures. How the Proposer will deliver maintenance and operational support, as well as training.

Weights	Evaluation Criteria
15	SLBE/MBE/WBE Participation: To ensure the full participation of SLBE/MBE/WBE firms in all phases of the Authority's procurement activities, all Proposers at time of proposal submission shall complete and submit a [SLBE/MBE/WBE Participation Form]. (8 Points) Proposal complies with SLBE/MBE/WBE participation goal of 10% or will conduct good faith efforts to do so. (7 Points) Proposal submitted a quality proposal for SLBE/MBE/WBE participation that includes innovative strategies and approaches to achieve and maintain compliance over the contract term, including firm's past performance on meeting SLBE/MBE/WBE goals, technical assistance and supportive services designed to increase participation and builds capacity in the SLBE/MBE/WBE community.

- D. The Owner will incorporate cost into the evaluation via a Value for Money (VFM) ratio. The offer with the highest VFM ratio represents the best value.

$$\text{VFM Ratio} = \frac{\text{Total Weighted Score}}{\$ \text{ Total Project Cost}}$$

Where:

Total Weighted Score = Sum of [individual technical scores * individual criteria weights]

Total Project Cost = Sum of initial capital cost

- E. A short list of the top respondents may be created. The short-listed Bidders will be invited to present their qualifications to and answer questions from the evaluation committee. The evaluation committee will then rescore each short-listed proposal. The Owner may choose to waive the short list step in the evaluation process.
- F. The Bidder to whom the award is made will be notified. The Owner reserves the right to reject any and all Bids and to waive any technicalities and informalities in Bids received whenever such rejection or waiver is in the Owner's interest.
- G. A responsive Bidder shall be one who submits a Bid in the proper form without qualification or intent other than as called for in the Contract Documents, and who binds itself on behalf of the Bid to the Owner with the proper Bid Bond completed and attached, and who properly completes all forms required to be completed and submitted at the time of the Bidding. The Bidder shall furnish all data, documents, forms, and certifications required by the Contract Documents. Failure to do so may result in the Bid being declared non-responsive.

H. A responsible Bidder shall be one who can fulfill the following requirements:

1. The Bidder shall maintain a permanent place of business. This requirement applies to the Bidder where the Bidder is a division of a corporation, or where the Bidder is 50 percent or more owned by a person, corporation or firm.
2. The Bidder shall demonstrate adequate construction experience and sufficient equipment resources to properly perform the work under and in conformance with the Contract Documents. This evaluation will be based upon a list of completed or active projects and a list of construction equipment available to the Bidder to perform the work. The Owner may make such investigations as deemed necessary to determine the ability of the Bidder to perform the Work, and the Bidder shall furnish to the Owner all such information and data for this purpose as the Owner may reasonably request. The Owner reserves the right to reject any Bid if the evidence submitted by, or investigation of, such Bidder fails to satisfy the Owner that such Bidder is properly qualified to carry out the obligations of the Contract Documents and to complete the Project contemplated therein.
3. The Bidder shall demonstrate financial resources of sufficient strength to meet the obligations incident to the performance of the Work covered by the Contract Documents. The ability to obtain the required Performance and Payment Bonds will not alone demonstrate adequate financial capability.
4. The Owner's evaluation committee will evaluate Bidders' responses to Technical Requirements section 1: Proposer & Subcontractors Information to ensure the following minimum evaluation requirements are met. If the Bidder does not comply with the following minimum evaluation requirements, the Owner reserves the right to deem that Proposal non-responsive and may result in rejection of the proposal.

Comply? Y/N	Requirement
	Proposer shall have a minimum of five (5) years' experience with water AMI.
	Proposer's Key Personnel shall have a minimum of three (3) years' experience with water AMI and have at least one (1) completed water AMI project.
	Proposer shall have at least one (1) water AMI project in the last 3 years which has at least 10,000 completed water AMI MIU installations.
	Proposer shall have at least two (2) water meter installation projects in the last 3 years which have at least 2,000 completed 1.5" or larger water meter installations.
	Proposer shall provide at least three (3) verifiable project references. References shall be provided in response to Section 1.5 References.

1.14 EMPLOYMENT OF LOCAL LABOR

Preference in employment on the Project shall, insofar as practical, be given to qualified local labor.

END OF SECTION

SECTION 00210**FEDERAL WORK AUTHORIZATION PROGRAM AFFIDAVITS**

**EACH BIDDER MUST PROVIDE THE OWNER WITH THE
PROPERLY COMPLETED AND PROPERLY SIGNED
FEDERAL WORK AUTHORIZATION PROGRAM AFFIDAVITS
AS REQUIRED BY O.C.G.A. § 13-10-91**

**THIS FORM MUST BE COMPLETED BY ALL CONTRACTORS,
ALL SUBCONTRACTORS AND ALL SUB-SUBCONTRACTORS**

THE FORMS ARE ATTACHED HERETO.

Contractor Affidavit under O.C.G.A. § 13-10-91(b)(1)

By executing this affidavit, the undersigned contractor verifies its compliance with O.C.G.A. § 13-10-91, stating affirmatively that the individual, firm or corporation which is engaged in the physical performance of services on behalf of the Macon Water Authority has registered with, is authorized to use and uses the federal work authorization program commonly known as E-Verify, or any subsequent replacement program, in accordance with the applicable provisions and deadlines established in O.C.G.A. § 13-10-91. Furthermore, the undersigned contractor will continue to use the federal work authorization program throughout the contract period and the undersigned contractor will contract for the physical performance of services in satisfaction of such contract only with subcontractors who present an affidavit to the contractor with the information required by O.C.G.A. § 13-10-91(b). Contractor hereby attests that its federal work authorization user identification number and date of authorization are as follows:

Federal Work Authorization User Identification Number

Date of Authorization

Name of Contractor

Name of Project

Name of Public Employer: the Macon Water Authority

I hereby declare under penalty of perjury that the foregoing is true and correct.

Executed on _____, ___, 20___ in _____ (city), _____ (state).

Signature of Authorized Officer or Agent

Printed Name and Title of Authorized Officer or Agent

SUBSCRIBED AND SWORN BEFORE ME
ON THIS THE _____ DAY OF _____, 20____.

NOTARY PUBLIC

My Commission Expires: _____, 20____.

Subcontractor Affidavit under O.C.G.A. § 13-10-91(b)(3)

By executing this affidavit, the undersigned subcontractor verifies its compliance with O.C.G.A. § 13-10-91, stating affirmatively that the individual, firm or corporation which is engaged in the physical performance of services under a contract with _____ [insert name of contractor] on behalf of the Macon Water Authority has registered with, is authorized to use and uses the federal work authorization program commonly known as E-Verify, or any subsequent replacement program, in accordance with the applicable provisions and deadlines established in O.C.G.A. § 13-10-91. Furthermore, the undersigned subcontractor will continue to use the federal work authorization program throughout the contract period and the undersigned subcontractor will contract for the physical performance of services in satisfaction of such contract only with sub-subcontractors who present an affidavit to the subcontractor with the information required by O.C.G.A. § 13-10-91(b). Additionally, the undersigned subcontractor will forward notice of the receipt of an affidavit from a sub-subcontractor to the contractor within five business days of receipt. If the undersigned subcontractor receives notice that a sub-subcontractor has received an affidavit from any other contracted sub-subcontractor, the undersigned subcontractor must forward, within five business days of receipt, a copy of the notice to the contractor. Subcontractor hereby attests that its federal work authorization user identification number and date of authorization are as follows:

Federal Work Authorization User Identification Number

Date of Authorization

Name of Subcontractor

Name of Project

Name of Public Employer: Macon Water Authority

I hereby declare under penalty of perjury that the foregoing is true and correct.

Executed on _____, ___, 20__ in _____ (city), _____ (state).

Signature of Authorized Officer or Agent

Printed Name and Title of Authorized Officer or Agent

SUBSCRIBED AND SWORN BEFORE ME
ON THIS THE _____ DAY OF _____, 20____.

NOTARY PUBLIC

My Commission Expires: _____, 20____.

Sub-subcontractor Affidavit under O.C.G.A. § 13-10-91(b)(4)

By executing this affidavit, the undersigned sub-subcontractor verifies its compliance with O.C.G.A. § 13-10-91, stating affirmatively that the individual, firm or corporation which is engaged in the physical performance of services under a contract for _____ [insert name of subcontractor or sub-subcontractor with whom such sub-subcontractor has privity of contract] and _____ [insert name of contractor] on behalf of the Macon Water Authority has registered with, is authorized to use and uses the federal work authorization program commonly known as E-Verify, or any subsequent replacement program, in accordance with the applicable provisions and deadlines established in O.C.G.A. § 13-10-91. Furthermore, the undersigned sub-subcontractor will continue to use the federal work authorization program throughout the contract period and the undersigned sub-subcontractor will contract for the physical performance of services in satisfaction of such contract only with sub-subcontractors who present an affidavit to the sub-subcontractor with the information required by O.C.G.A. § 13-10-91(b). The undersigned sub-subcontractor shall submit, at the time of such contract, this affidavit to _____ [insert name of subcontractor or sub-subcontractor with whom such sub-subcontractor has privity of contract]. Additionally, the undersigned sub-subcontractor will forward notice of the receipt of any affidavit from a sub-subcontractor to _____ [insert name of subcontractor or sub-subcontractor with whom such sub-subcontractor has privity of contract]. Sub-subcontractor hereby attests that its federal work authorization user identification number and date of authorization are as follows:

Federal Work Authorization User Identification Number

Date of Authorization

Name of Sub-subcontractor

Name of Project

Name of Public Employer

I hereby declare under penalty of perjury that the foregoing is true and correct.

Executed on _____, ___, 20__ in _____ (city), _____ (state).

Signature of Authorized Officer or Agent

Printed Name and Title of Authorized Officer or Agent

SUBSCRIBED AND SWORN BEFORE ME
ON THIS THE _____ DAY OF _____, 20____.

NOTARY PUBLIC

My Commission Expires: _____, 20____.

SECTION 00300**BID**

TO: MACON WATER AUTHORITY

FROM: _____
(Bidder's Name)

FOR: _____

Submitted: _____, 20__

The undersigned Bidder, in compliance with your Invitation to Bid for the construction of this Project, having examined the Contract Documents and the site of the proposed Work, and being familiar with all of the conditions surrounding the construction of the proposed Project, including the availability of materials and labor, hereby proposes to construct the Project in accordance with the Contract Documents.

The Bidder proposes and agrees, if this Bid is accepted, to contract with the Macon Water Authority, in the form of Contract Agreement specified, and to furnish all necessary products, machinery, tools, apparatus, means of transportation and labor necessary to complete the construction of the Work in full and complete accordance with the reasonably intended requirements of the Contract Documents to the full and entire satisfaction of the Macon Water Authority with a definite understanding that no money will be allowed for extra work except as set forth in the Contract Documents, for the prices set forth in the attached Pricing Proposal.

The Bidder agrees hereby to commence Work under this Contract, with adequate personnel and equipment, on a date to be specified in a written order of the Engineer, and to fully complete all Work under this Contract within six hundred (600) consecutive calendar days from and including said date specified in the written order of the Engineer. Bidder further agrees to pay as liquidated damages, the sum of \$2,000.00 for each calendar day thereafter required to achieve substantial completion of all Work.

The Bidder declares an understanding that the quantities shown for unit price items are subject to either increase or decrease, and that should the quantities of any of the items of Work be increased, the Bidder proposes to do the additional Work at the unit prices stated herein; and should the quantities be decreased, the Bidder also understands that payment will be made on the basis of actual quantities at the unit price bid and will make no claim for additional costs or anticipated profits for any decrease in quantities; and that actual quantities will be determined upon completion of Work, at which time adjustment will be made to the Contract Price by direct increase or decrease.

In case of discrepancies between the figures shown in the unit prices and the totals, the unit prices shall apply, and the totals shall be corrected to agree with the unit prices.

The Bidder furthermore agrees that, in the case of a failure to execute the Contract Agreement and Bonds within ten days after receipt of conformed Contract Documents for execution, the attached Bid Bond accompanying this Bid and the monies payable thereon shall be paid into the funds of the Macon Water Authority as liquidated damages for such failure.

Attached hereto is a Bid Bond for the sum of _____

_____ Dollars (\$_____) according to the conditions of "Instructions to Bidders" and provisions thereof.

Bidder acknowledges receipt of the Following Addenda:

Addendum No. 1, dated: _____

Addendum No. 2, dated: _____

Addendum No. 3, dated: _____

Addendum No. 4, dated: _____

Remainder of Page Left Blank
[Signatures, attestations, and seal on following page]

BIDDER: _____

By: _____

Name: _____
(Print or Type)

Title: _____

Address: _____

Phone: _____

Attest: _____

Name: _____
(Print or Type)

Title: _____

(SEAL)

Note: Attest for a corporation must be by the secretary of record for the corporation, as reflected in the records of the Georgia Secretary of State; for a partnership by another partner; for an individual by a notary.

Note: If the Bidder is a corporation, the Bid shall be signed by an officer of the corporation; if a partnership, it shall be signed by a partner. If signed by others, authority for signature shall be attached.

The full names and addresses of persons or parties interested in the foregoing Bid, as principals, are as follows:

<u>Name</u>	<u>Address</u>

END OF SECTION

SECTION 00410

BID BOND

STATE OF GEORGIA

COUNTY OF MACON-BIBB

KNOW ALL MEN BY THESE PRESENTS, that we, _____, as Principal, and _____, as Surety, are held and firmly bound unto the Owner, the Macon Water Authority, in the sum of _____ Dollars (\$_____) lawful money of the United States of America, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, personal representatives, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted to the Owner a Bid for the _____.

NOW THEREFORE, the conditions of this obligation are such that if the Bid be accepted, the Principal shall, within ten days after receipt of conformed Contract Documents, execute a Contract in accordance with the Bid upon the terms, conditions and prices set forth therein, and in the form and manner required by the Contract Documents and execute sufficient and satisfactory separate Performance and Payment Bonds payable to the Owner, each in an amount of 100 percent of the total Contract Price, in form satisfactory to the Owner, then this obligation shall be void; otherwise, it shall be and remain in full force and effect in law; and the Surety shall, upon failure of the Principal to comply with any or all of the foregoing requirements within the time specified above, immediately pay to the aforesaid Owner, upon demand, the amount hereof in good and lawful money of the United States of America, not as a penalty, but as liquidated damages.

This bond is given pursuant to and in accordance with the provisions of the Georgia Procurement Manual and Georgia Local Government Public Works Construction Law, O.C.G.A. § 36-91-1 et. seq.. All the provisions of the law referring to this character of bond as set forth in said Manual or Code Sections or as may be hereinafter enacted and these are hereby made a part hereof to the same extent as if set out herein in full.

Remainder of Page Left Blank
[Signatures, attestations, and seals on following page]

IN WITNESS WHEREOF, the said Principal has hereunder affixed its signature and seal, and said Surety has hereunto caused to be affixed its corporate signature and seal, by its duly authorized officers, on this _____ day of _____, 20____.

CONTRACTOR - PRINCIPAL:_____

By:_____

Name:_____

(Print or Type)

Address:_____

Phone:_____

Attest:_____

Name:_____

(Print or Type)

Title:_____

(SEAL)

Note: Attest for a corporation must be by the secretary of record for the corporation, as reflected in the records of the Georgia Secretary of State; for a partnership by another partner; for an individual by a notary.

SURETY:_____

By:_____

Name:_____
(Print or Type)

Title:_____

Phone:_____

Attest:_____

Name:_____
(Print or Type)

Title:_____

(SEAL)

Note: Surety companies executing bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the Project is located.

END OF SECTION

SECTION 00420**STATEMENT OF BIDDER'S QUALIFICATIONS**

All questions must be answered and the data given must be clear and comprehensive. This statement must be notarized. If necessary, questions may be answered on separate attached sheets. In addition to the questions below, the Bidder shall provide responses to Technical Requirements Section 1 Minimum Evaluation Requirements for Proposer & Subcontractors. The Bidder may submit any additional information desired. Attach all additional sheets to this statement.

1. Name of Bidder:_____
2. Permanent main office address:_____
3. When organized:_____
4. If a Corporation, where incorporated:_____
5. How many years have you been engaged in the contracting business under your present firm or trade name?_____
6. Contracts on hand: (Schedule these, showing amount of each contract and the appropriate anticipated dates of completion):_____
7. General description of type of work performed by your company:_____

8. Have you ever failed to complete any work awarded to you? If so, where and why?

9. Have you ever defaulted on a contract? If so, where and why?

10. Attach a list of the most important projects recently completed by your company which are similar in scope to this Project. For each project, list its: official name and owner, a contact person's name, company and position, address and phone number; completion date; and contract amount.
11. Names, background and experience of the principal members of your organization, including officers:_____

12. The undersigned hereby authorizes and requests any person, firm, or corporation to furnish any information requested by the Owner in verification of the recitals comprising this Statement of Bidder's Qualifications.

Dated this _____ day of _____, 20____.

BIDDER: _____

By: _____

Title: _____

State of _____

County of _____

_____ being duly sworn deposes and says that he or she is of
and that the answers to the foregoing questions and all statements therein contained are true and
correct. Subscribed and sworn to before me this day of _____, 20____.

Notary Public: _____

(SEAL)

My Commission Expires: _____

(Date)

END OF SECTION

SECTION 00421**STATEMENT OF EQUIPMENT**

Show machinery and other equipment available to the Bidder for prosecuting the Work required by the Contract Documents. (To be filled in by Bidder and submitted with Bid.)

Available Machinery and Other Equipment			Date Proposed To Be Placed On Work
Kind - Size - Capacity	Location	Ownership	

The above is a true statement of the equipment available to the undersigned Bidder for prosecuting the Work required by the Contract Documents. Where it is shown that the equipment is not owned by the Bidder, arrangements have been made with the owners to furnish the equipment.

Signed:_____

Name:_____

Title:_____

END OF SECTION

SECTION 00422**CORPORATE CERTIFICATE**

I, _____, certify that I am the Secretary of the Corporation named as Bidder in the foregoing Bid; that _____, who signed said Bid on behalf of the Bidder was then _____ of said Corporation; that said Bid was duly signed for and on behalf of said Corporation by authority of its Board of Directors, and is within the scope of its corporate powers; that said Corporation is organized under the laws of the State of _____.

This _____ day of _____, 20____.

(Corporate Secretary) _____

(SEAL)

END OF SECTION

SECTION 00423**STATEMENT OF DISADVANTAGED FIRM UTILIZATION**

The Bidder shall list all disadvantaged firms, as are defined in the Instructions to Bidders, providing subcontracting services, furnishing products or materials, etc., to be utilized in the performance of the work. This list shall be submitted in the following format:

Subcontractor (Name & Address)	Nature of Work to be Contracted	Group (Local, DBE)	Anticipated Cost of Services (\$ Value, %)
			\$
			%
			\$
			%
			\$
			%
			\$
			%
			\$
			%
			\$
			%
			\$
			%
			\$
			%
			\$
			%

NOTE: Any proposed changes from the above list shall be submitted in writing to the Macon Water Authority prior to initiation of the action, with the reason for the proposed deviation.

END OF SECTION

SECTION 00425**CONTRACTOR'S LICENSE CERTIFICATION**

Contractor's Name: _____

Georgia Contractor's License Number: _____

Expiration Date of License: _____

I certify that the above information is true and correct and that the classification noted is applicable to the Bid for this Project.

Signed: _____

Printed: _____

Date: _____

END OF SECTION

SECTION 00430**CONTRACTOR'S CERTIFICATION OF AUTHORITY**
(IF OUT OF STATE CONTRACTOR)

Contractor's Name: _____

Georgia Certificate of Authority Number: _____

Expiration Date of Certificate: _____

I certify that the above information is true and correct and that the classification noted is applicable to the Bid for this Project.

Signed: _____

Printed: _____

Date: _____

END OF SECTION

SECTION 00480**NON-COLLUSION AFFIDAVIT OF PRIME BIDDER**

STATE OF GEORGIA, COUNTY OF _____, being first duly sworn, deposes and says that:

He or she is _____
(Owner, Partner, Officer, Representative or Agent)
 of _____, the Bidder that has submitted the attached Bid;

He or she is fully informed respecting the preparation and contents of the attached Bid and of all pertinent circumstances respecting such Bid;

He or she understands that collusive bidding is a violation of State and Federal law and can result in fines, prison sentences, and civil damages awards;

Such Bid is genuine and is not a collusive or sham Bid;

Neither the said Bidder nor any of its officers, partners, owners, agents, representatives, employees or parties in interest, including this Affiant, has in any way colluded, conspired, connived or agreed, directly or indirectly with any other Bidder, firm or person to submit a collusive or sham Bid in connection with the Contract for which the attached Bid has been submitted or to refrain from bidding in connection with such Contract, or has in any manner, directly or indirectly, sought by agreement or collusion or communication or conference with any other Bidder, firm or person to fix the price or prices in the attached Bid or of any other Bidder, or to fix any overhead, profit or cost element of the Bid price or the Bid price of any other Bidder, or to secure through any collusion, conspiracy, connivance or unlawful agreement any advantage against the Owner, the Macon Water Authority, or any person interested in the proposed Contract; and

The price or prices quoted in the attached Bid are fair and proper and are not tainted by any collusion, conspiracy, connivance or unlawful agreement on the part of the Bidder or any of its agents, representatives, owners, employees, or parties in interest, including this Affiant. Affiant agrees to abide by all conditions of this Bid, and certifies that he or she is authorized to sign this Bid for the Bidder.

(Signed) _____

(Title) _____

Subscribed and Sworn to before me this _____ day of _____, 20____.

 (Notary Public)
 (SEAL)

My Commission Expires: _____

Note: If the Bidder is a partnership, all of the partners and any officer, agent or other person who may have represented or acted for the partnership shall also make the foregoing oath. If the Bidder is a corporation, all officers, agents, or other persons who may have acted for or represented the corporation shall also make the oath.

END OF SECTION

SECTION 00500**CONTRACT AGREEMENT****AGREEMENT BETWEEN CONTRACTOR AND OWNER**

THIS AGREEMENT is made and entered into on the ___ day of _____ in the year Two Thousand and _____ (20____) by and between _____, hereinafter

referred to as the "Contractor", and THE MACON WATER AUTHORITY, hereinafter (the "Owner") (collectively, "the Parties").

WITNESSETH, that the Contractor and the Owner, for the consideration hereinafter named, agree as follows:

1. **SCOPE OF WORK.** - That the Contractor will furnish all products, tools, construction equipment, materials, skill and labor of every description necessary to carry out and to complete in a good, firm, substantial workmanlike manner perform the _____ project and will complete the Work in strict conformity with the Drawings and the Specifications (Divisions 01 through 46, inclusive, together with the foregoing Bid made by the Contractor, the Invitation to Bid, Instructions to Bidders, General and Supplementary Conditions, Special Conditions, Performance and Payment Bonds and all Addenda hereto incorporated (if applicable) which form essential parts of this Contract Agreement, as if fully contained herein, the same collectively referred to as the "Contract Documents."

2. **TIME OF COMPLETION.**-The Contractor shall commence the Work to be performed under this Contract Agreement on a date to be specified in a written Notice to Proceed and shall achieve substantial completion of all Work required by the Contract Documents within _____ (____) consecutive calendar days (the "Contract Time"). Time is of the essence and is an essential element of this Contract, and the Contractor shall pay to the Owner, not as a penalty, but as liquidated damages, the sum of _____ Dollars (\$____.00) for each calendar day for which there is an unexcused delay in achieving substantial completion of the Work within the time limit set forth herein. These liquidated damages are not established as a penalty but are calculated and agreed upon in advance by the Owner and the Contractor due to the uncertainty and impossibility of making a determination as to the actual and consequential damages incurred by the Owner and the general public of Macon-Bibb County, Georgia as a result of the failure on the part of the Contractor to complete the Work on time. Such liquidated damages referred to herein are intended to be and are cumulative and shall be in addition to every other remedy now or hereafter enforceable at law, in equity, by statute, or under the Contract Documents.

3. **THE CONTRACT PRICE.**-The Owner shall pay to the Contractor for the faithful performance of the Contract Agreement, subject to additions and deductions as provided for in the Contract Documents, in current funds a sum of _____ Dollars (\$____.00) (the "Contract Price") which sum shall also pay for loss or damage arising out of the nature of the Work aforesaid, or from the action of the elements, or from

unforeseen obstructions or difficulties encountered in the prosecution of the Work, and for all expenses incurred by, or in consequence of the Work, its suspension or discontinuance and for well and faithfully completing the Work and the whole thereof, as herein provided, and for replacing defective Work or products for a period of one year after completion.

4. **PROGRESS PAYMENTS** The Owner shall make progress payments on account of the Contract Price as follows: On or about the 20th day of each month, ninety-five percent (95%) of the value, based on the contract prices, of labor and materials incorporated in the Work and of materials suitably stored at the site thereof up to the twenty-fifth day of the month preceding, as estimated by the Engineer, less the aggregate of previous payments. Application for Payment must be made on the standard Owner's form to be provided by the Owner to the Contractor. No form of collateral in lieu of cash will be acceptable as retainage. At the discretion of the Owner, the retainage of each Subcontractor may be released separately as each Subcontractor completes its work. An application for release of a Subcontractor's retainage shall bear the certificates of the Subcontractor, the Contractor, and the Engineer that the Subcontractor's work has been fully performed and that the sum for which payment is requested is due by the Contractor to the Subcontractor. Checks releasing a Subcontractor's retainage shall be made payable to the Contractor, the Contractor's surety, and the Subcontractor, and shall be mailed to the Contractor's surety. This Article does not create any contractual relationship between the Owner and the Subcontractor or any duty of the Owner to any Subcontractor. Payments pursuant to this Article shall in no way diminish, change, alter or affect the rights of the Owner under the Contract Documents.

5. **FINAL PAYMENT.**-(a)-Final payment including retainage, shall be due 30 days after the date of notice from the Owner of the final acceptance of the Work, provided that all other requirements of the Contract Documents shall have been met in full. Final payment shall be made by a check payable jointly to the Contractor and surety and shall be mailed to the surety.

(b)-Upon receipt of written notice from the Contractor pursuant to Article 30 of the General Conditions that the Work is ready for final inspection, the Engineer shall promptly make such inspection, and when he/she finds the Work complies with the Contract Documents, and when the Contract shall have been fully performed the Engineer shall promptly issue a final certificate of recommendation to the Owner, over the Engineer's signature, stating that the Work required by the Contract Documents has been completed under the terms and conditions thereof, and that the entire balance of the Contract Price found to be due to the Contractor and noted in said final certificate, is due and payable.

(c)-Before issuance of a final certificate of recommendation, the Contractor shall submit evidence satisfactory to the Engineer that all payrolls, material bills, and all other indebtedness in connection with the Work has been paid in full.

(d)-If full completion of the Work is materially delayed through no fault of the Contractor, and the Engineer so certifies same, the Owner shall, upon certificate of the Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed. Such payment shall be made under the terms and conditions of the General Conditions governing final payment, except that it shall not constitute a waiver of claims.

6. NO ASSIGNMENT.- This Contract and the proceeds of this Contract may not be assigned nor may the performance thereunder be assigned, except with the prior written consent of the Owner.

7. BONDS. – The Contractor shall furnish both a performance bond and a payment bond and shall pay the premium thereon. The performance bond shall guarantee the full performance of the Contract.

Remainder of Page Left Blank

[Signatures, attestations, and seals on following page]

IN WITNESS WHEREOF, the parties hereto have executed this Contract Agreement under their respective seals on the day and date first above written in six counterparts, each of which shall, without proof or accounting for the other counterparts, be deemed an original Contract.

Signed, sealed, and delivered
in the presence of:

THE MACON WATER AUTHORITY

1. _____

By: _____
Gary Bechtel, Chairman

2. _____

Attest: _____
Ron Shipman, Executive Director & President

(Official Seal)

Signed, sealed, and delivered
in the presence of:

CONTRACTOR: _____

1. _____

By: (Signed) _____

2. _____

(Printed) _____

Attest: (Signed) _____

(Printed) _____

(Secretary)

(Corporate Seal)

APPROVED AS TO FORM

(Printed Name)
Attorney for the Macon Water Authority

END OF SECTION

SECTION 00550**PRE-AWARD OATH**

STATE OF GEORGIA

COUNTY OF _____

In accordance with O.C.G.A. 36-91-21(e), we, the undersigned of _____

being first duly sworn, depose and say that:

We have not directly or indirectly violated O.C.G.A. 36-91-21(d), and more specifically, we have not

- prevented or attempted to prevent competition in such bidding or proposals by any means whatever,
- prevented or endeavored to prevent anyone from making a bid or proposal thereof by any means whatever, nor
- caused or induced another to withdraw a bid or proposal for the work.

We, the undersigned, to the best of our knowledge, affirm that no other officers, agents or other persons acted for or represented the Contractor in the bidding for and procurement of this Contract.

Signature	Printed Name	Title	Date
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

 (Notary Public)

My Commission
 Expires:

(SEAL)

END OF SECTION

SECTION 00600**PERFORMANCE BOND**

Bond No. _____

KNOW ALL MEN BY THESE PRESENTS:

That _____

(Legal title and address of the Contractor)

as Principal (hereinafter referred to as "Contractor"), and _____

(Legal title and address of Surety)

as Surety (hereinafter referred to as "Surety"), do hereby acknowledge ourselves indebted and firmly bound and held unto the Macon Water Authority (the "Owner") in the amount of _____ Dollars (\$_____.00) to which payment Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the above bound Principal has entered into a Contract with Owner bearing date of _____ for construction of _____ Project in accordance with Contract Documents prepared by Owner all of which said Contract Documents are incorporated herein by reference and made a part hereof, and are hereinafter collectively referred to as the "Contract."

NOW THEREFORE, THE CONDITION OF THIS OBLIGATION is such that, if the Contractor shall promptly and faithfully perform and comply with the terms and conditions of said Contract; and shall indemnify and save harmless the Owner against and from all costs, expenses, damages, injury or loss to which said Owner may be subjected by reason of any wrongdoing, including patent infringement, misconduct, want of care or skill, default or failure of performance on the part of said Principal, his agents, subcontractors or employees, in the execution or performance of said Contract, and shall fully reimburse and repay the said Owner any and all outlay, costs, and expense which it may incur in making good any such default and shall guarantee all products and workmanship against defects, as provided in the Contract Documents which comprise and constitute the Contract, for a period of one year and shall replace all defective work and products for such period of one year then this obligation shall be null and void; otherwise it shall remain in full force and effect.

1. The said Surety to this bond, for value received, hereby stipulates and agrees that no change or changes, extension of time or extensions of time, alteration or alterations or addition or additions to the terms of the Contract or to the Work to be performed thereunder, or the specifications or drawings accompanying same shall in any wise affect its obligations on this bond, and it does hereby waive notice of any such change or changes, extension of time or extensions of time, alteration or alterations or addition or additions to the terms of the Contract or to the Work or to the specifications or drawings.

2. It is expressly agreed that this bond shall be amended automatically and immediately, without formal and separate amendments hereto, upon amendment to the Contract not increasing the Contract Price more than 20 percent in excess of the original Contract Price, so as to bind the Principal and Surety to the full and faithful performance of the Contract as so amended. The term "amendment" shall include any alteration, addition, extension, or modification of any character whatsoever.
3. If pursuant to the Contract Documents the Contractor shall be declared in default by the Owner under the aforesaid Contract, the Owner shall take possession of the Project and finish the Work by whatever method the Owner may deem expedient, in accordance with Article 7 of the General Conditions.
4. Supplementary to and in addition to the foregoing, whenever the Owner shall notify the Surety that the Owner has notice that the Contractor has failed to pay any subcontractor, materialman, or laborer for labor or materials certified by the Contractor as having been paid for by the Contractor, the Surety shall, within thirty (30) days of receipt of such notice, cause to be paid any unpaid amount for such labor or materials.
5. It is expressly agreed by the Principal and the Surety that the Owner, if it desires to do so, is at liberty to make inquiries at any time of subcontractors, laborers, materialmen, or other parties concerning the status of payments for labor, materials, or services furnished in the prosecution of the work.
6. The Surety agrees that other than as is provided in this bond it may not demand of the Owner that the Owner shall (a) perform anything or act, (b) give any notice, (c) furnish any clerical assistance, (d) render any service, (e) furnish any papers or documents, or (f) take any action of any nature or description which is not required of the Owner to be done under the Contract Documents.
7. No right of action shall accrue on this bond to or for the use of any person or corporation other than the Owner named herein or the legal successors of the Owner.

This bond is given pursuant to and in accordance with the provisions of the Georgia Procurement Manual and of Title 36, Chapter 91 of the Official Code of Georgia Annotated, as may be amended or modified from time to time, and all the provisions of the law referring to this character of bond as set forth in said sections or as may be hereafter enacted or amended and these are hereby made a part hereof to the same extent as if set out in full herein.

Remainder of Page Left Blank

[Signatures, attestations, and seals on following Page]

Signed and sealed this _____ day of _____, 20____.

Signed, sealed and delivered
in the presence of:

(Insert Name of Contractor)

1. _____

By: (Signed)_____

(Printed)_____

2. _____

Attest: (Signed)_____

(Printed)_____

(CORPORATE SEAL)

Signed, sealed and delivered
in the presence of:

(Insert Name of Surety)

1. _____

By: (Signed)_____

(Printed)_____

2. _____

Attest: (Signed)_____

(Printed)_____

(CORPORATE SEAL)

APPROVED AS TO FORM:

(Printed Name)

Attorney for the Macon Water Authority

END OF SECTION

PLACE SURETY FOR PERFORMANCE BOND HERE

SECTION 00610**PAYMENT BOND**

Bond No. _____

KNOW ALL MEN BY THESE PRESENTS:

That _____
(Legal title and address of the Contractor)

as Principal (hereinafter referred to as "Contractor"), and _____

(Legal title and address of Surety)

as Surety (hereinafter referred to as "Surety"), do hereby acknowledge ourselves indebted and firmly bound and held unto the Macon Water Authority (the "Owner"), in the amount of _____ Dollars (\$ _____ .00) to which payment Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the above bounden Principal has entered into a Contract with Owner bearing date of _____ for construction of _____ Project in accordance with the Contract Documents prepared by Owner, all of which said Contract Documents are incorporated herein by reference and made a part hereof, and are hereinafter collectively referred to as the "Contract."

NOW THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if the Contractor shall promptly make payment to all claimants as hereinafter defined for all labor and material supplied in the prosecution of the work provided for in said Contract Documents, then this obligation shall be void; otherwise it shall remain in full force and effect, subject, however, to the following conditions:

1. The said Surety to this bond, for value received, hereby stipulates and agrees that no change or changes, extension of time or extensions of time, alteration or alterations or addition or additions to the terms of the Contract or to the Work to be performed thereunder, or the specifications or drawings accompanying same shall in any wise affect its obligations on this bond, and it does hereby waive notice of any such change or changes, extension of time or extensions of time, alteration or alterations or addition or additions to the terms of the Contract or to the work or to the specifications or drawings.
2. It is expressly agreed that this bond shall be amended automatically and immediately, without formal and separate amendments hereto, upon amendment to the Contract Documents not increasing the Contract Price more than 20 percent in excess of the original Contract Price, so as to bind the Contractor and Surety to the full and faithful performance of the Contract as so amended. The term "amendment" shall include any alteration, addition, extension, or modification of any character whatsoever.

3. A Claimant is defined as any subcontractor and any person supplying labor, materials, machinery, or equipment in the prosecution of the Work provided for in said Contract.
4. Every person or entity entitled to the protection hereunder and that has not been paid in full for labor or materials furnished in the prosecution of the Work referred to in said bond before the expiration of a period of ninety days after the day on which the last of the labor was done or performed by them, or materials or equipment or machinery was furnished or supplied by them for which such claim is made, or when they have completed its subcontract for which claim is made, shall have the right to sue on such payment bond for the amount, or the balance thereof, unpaid at the time of the commencement of such action and to prosecute such action to final execution and judgment for the sum or sums due them; provided, however, that any person or entity having direct contractual relationship with a subcontractor, but no contractual relationship, express or implied, with the Contractor, shall have the right of action upon this bond upon giving written notice to said Contractor within ninety days from the day on which such person or entity did or performed the last of the labor, or furnished the last of the materials or machinery or equipment for which such claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were furnished or supplied or for whom the labor was performed or done; provided further that nothing contained herein shall limit the right of action to said 90-day period. Notice may be served by depositing a notice, registered mail, postage prepaid, duly addressed to the Contractor at any place the Contractor maintains an office or conducts business, including any post office or branch post office or any letter box under the control of the United States Postal Service, or notice may be served in any manner in which the sheriffs of Georgia are authorized by law to serve summons or process.
5. Every suit instituted under this section shall be brought in the name of the claimant without the Owner being made a party thereto. The official who has the custody of said bond is authorized and directed to furnish, to any person or entity making application therefor who submits an affidavit that it has supplied labor or material for such work and payment therefor has not been made, or that it is being sued on any such bond, a copy of such bond and the Contract for which it was given, certified by the official who has custody of said bond; this copy shall be primary evidence of this bond and Contract and shall be admitted as evidence without further proof. Applicants shall pay for such certified copies and such certified statements such as fees as the official fixes to cover the cost of preparation thereof, but in no case shall the fee exceed the fees which the clerks of the superior courts are permitted to charge for similar copies.
6. No action can be instituted on this bond after one year from the date of the final acceptance of the Owner.

This bond is given pursuant to and in accordance with the provisions of the Georgia Procurement Manual and of Title 36, Chapter 91 of the Official Code of Georgia Annotated, as may be amended or modified from time to time, and all the provisions of the law referring to this character of bond as set forth in said sections or as may be hereafter enacted or amended and these are hereby made a part hereof to the same extent as if set out in full herein.

[Signatures, attestations, and seals on following Page]

Signed and sealed this _____ day of _____, 20____

Signed, sealed and delivered
in the presence of:

(Insert Name of Contractor)

1. _____

By: (Signed)_____

(Printed)_____

2. _____

Attest: (Signed) _____

(Printed)_____

(CORPORATE SEAL)

Signed, sealed and delivered
in the presence of:

(Insert Name of Surety)

1. _____

By: (Signed)_____

(Printed)_____

2. _____

Attest: (Signed) _____

(Printed)_____

(CORPORATE SEAL)

APPROVED AS TO FORM:

(Printed Name)

Attorney for the Macon Water Authority

END OF SECTION

SECTION 00611

PLACE SURETY FOR PAYMENT BOND HERE

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Article 1. - Notice of Award of Contract. Within sixty (180) days after receipt of Bids, the Owner will notify the successful Bidder of the award of the Contract. Should the Owner require additional time to award a Contract, the time may be extended by the mutual agreement between the Owner and the successful Bidder. If an award of Contract has not been made within 60 days from the Bid date or within the extension mutually agreed upon, the Bidder may withdraw the Bid without further liability on the part of either party.

Article 2. - Execution of Contract Documents. (a) *Time Limits.*—Within fifteen (15) days of notification of Award of Contract, the Owner will furnish the Contractor with conformed copies of Contract Documents for execution by the Contractor and the surety. The Contractor and its surety must execute the bond forms contained in the conformed Contract Documents without any changes. Within ten (10) days after receipt, the Contractor shall return all the Contract Documents properly executed by the Contractor and the surety. Attached to each set of Contract Documents shall be original powers-of-attorney for the person executing the Bonds for the surety and certificates, endorsements, and declarations of insurance for the required insurance coverages, all as required by Article 3 and Article 4. Within thirty (30) days after receipt of the conformed Contract Documents properly completed and executed by the Contractor and the surety together with the power-of-attorney, and the proper certificates, endorsements and declarations of insurance, the Owner will complete the execution of the Contract Documents. Distribution of the completed Documents will be made upon execution by the Owner.

(b) *Failure of Contractor or Surety to Execute Documents.*—Should the Contractor or the surety fail to properly execute the Documents within the specified time the Owner will have the right to proceed on the Bid Bond accompanying the Bid.

(c) *Failure of Owner to Execute Documents.*—If the Owner fails to execute the Documents within the time limit specified, the Contractor will have the right to withdraw the Bid without penalty. In such event the Owner will have no liability to the Contractor under these Documents or otherwise.

(d) *Extensions of Time.*—Should either party require an extension of any of the time limits stated above, this shall be done only by mutual agreement between both parties.

(e) *Changes to Documents.*-- Insertion, addition, alteration, modification, revision, or deletion of any text, verbiage, provision, statement, term, condition, or other component of the Contract Documents, whether textual, numerical, or pictorial, is prohibited and no such unilateral change to the Contract Documents shall be binding. In the event the Owner discovers any attempt by the Contractor to modify the Contract Documents by insertion, addition, alteration, revision, or deletion of any text, verbiage, provision, statement, term, condition, or other portion of the Contract Documents without the written assent and approval of the Owner, the Owner shall have grounds to withdraw the contract award, terminate all proceedings related to contractual relationship with the Contractor for the subject Project, and to award the contract to the next bidder which met the requirements of the invitation to bid.

(f) *Incorporation of Prior Agreements.* — All agreements between the parties are incorporated into this Agreement. In the event of any conflict or inconsistency between this Agreement and any provisions, terms or conditions of any other prior agreement, the provisions, terms and conditions of this Agreement shall supersede, control and prevail over the conflicting or inconsistent provisions of the prior agreement.

Article 3. - Contract Security.—The Contractor shall furnish separate Performance and Payment Bonds each in a sum equal to the amount of the Contract Price on the Owner's forms. Such Bonds shall be executed by the Contractor and a bonding company licensed to transact such business in Georgia and named on the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds" as published in the Treasury Department Circular Number 570. The expense of these Bonds shall be borne by the Contractor.

If at any time a surety on any such Bond is declared bankrupt, becomes insolvent, loses its right to do business in Georgia or is removed from the list of Surety Companies accepted on Federal Bonds, the Contractor shall, within ten (10) days after notice from the Owner to do so, substitute acceptable Bonds in such form and sum and signed by such other surety as may be satisfactory to the Owner. The premium on such substitute Bonds shall be paid by the Contractor. No further progress payments shall be deemed due, nor shall any be made, until the new surety furnishes acceptable Bonds to the Owner. The person executing the substitute Bonds on behalf of the surety shall submit with the Bonds valid powers-of-attorney certified to by an official of said surety company.

Article 4. - Insurance—Proof of insurance coverage and furnishing of insurance policies acceptable to the Owner shall be as set forth in this Article.

(a) *Policies, Certificates, Limits and Disposition of Documents.*—The Contractor shall obtain at his expense insurance with limits as shown hereinbelow, unless the Contractor desires to broaden the limits and obtain more protection. The Contractor shall provide the Owner with all insurance documentation and evidence of insurance as required herein, and updated certificates of all insurance required herein must be provided to the Owner at least quarterly until Final Payment.

(1) **WORKER'S COMPENSATION AND EMPLOYER'S LIABILITY INSURANCE.**—The Contractor shall procure and maintain Worker's Compensation and Employers Liability Insurance for all of his employees to be engaged in Work on the project under this contract, and in case any such Work is sublet, the Contractor shall require the Subcontractor similarly to provide Worker's Compensation and Employer's Liability Insurance for all of the latter's employees to be engaged in such work unless such employees are covered by the protection afforded by the Contractor's insurance. Worker's Compensation insurance policies shall include GEORGIA under Section 3A and shall include Other States coverage and Voluntary Compensation.

Worker's Compensation Limits: Statutory

Employers Liability Limits:

Each Accident	\$1,000,000
Disease - Policy Limit	\$1,000,000
Disease - Each Employee	\$1,000,000

Contractor waives all rights against Owner and its agents, officers, directors, and employees for recovery of damages to the extent these damages are covered by the worker's compensation and employer's liability or commercial umbrella liability insurance obtained by Contractor pursuant to Article 4 of this agreement. The Waiver of Our right To Recover From Others Endorsement, ISO Form SC 00 03 13 shall be attached to the policy showing the Owner listed in the Schedule.

Disposition: Certificate(s) of insurance showing the required coverage and copy of declaration page must be returned to the Owner with properly executed Contract Documents. If requested by the Owner, Contractor shall also provide a certified copy of the policy(ies) required by Article 4(a)(1).

(2) COMMERCIAL GENERAL AND UMBRELLA LIABILITY INSURANCE.—The Contractor shall procure and shall maintain commercial general liability (CGL) and if necessary, commercial umbrella insurance with a limit of not less than \$2,000,000 each occurrence, as shall protect him and any Subcontractor performing Work covered by this Contract from claims for damages for bodily injury, including accidental death, as well as from claims for property damages, which may arise from operations under the Contract Agreement, whether such operations are by himself or by any Subcontractor or by anyone directly or indirectly employed by either of them.

CGL insurance shall be written on ISO occurrence form CG 00 01 10 93 (or substitute form providing equivalent coverage) and shall cover liability arising from premises, operations, independent contractors, products-completed operations, personal injury and advertising injury, and liability assumed under an insured contract (including the tort liability of another assumed in a business contract). If such CGL insurance contains a general aggregate limit, it shall apply separately to this project, (Per Project Aggregate Endorsement). Each policy shall be indorsed with ISO Form CG 25 03 11 85 or equivalent form with wording satisfactory to Owner.

The Owner shall be included as an additional insured under the CGL, using ISO additional insured endorsement CG 20 33 or a substitute providing equivalent coverage, and under the commercial umbrella, if any. This insurance shall apply as primary insurance with respect to any other insurance or self-insurance programs afforded to the Owner.

There shall be no endorsement or modification of the CGL limiting the scope of coverage for liability arising from explosion, collapse, or underground property damage.

Contractor waives all rights against the Owner and its agents, officers, directors, and employees for recovery of damages to the extent these damages are covered by commercial general liability or commercial umbrella liability insurance maintained pursuant to Article 4 of this agreement.

Disposition: Certificate(s) of insurance showing the required coverage and copy of declaration page must be returned to the Owner with properly executed Contract Documents. If requested by the Owner, Contractor shall also provide a certified copy of the policy(ies) required by Article 4(a)(2).

(3) BUSINESS AUTO AND UMBRELLA LIABILITY INSURANCE.—The Contractor shall procure and shall maintain business automobile liability, and if necessary, commercial umbrella liability insurance with a limit of not less than \$2,000,000 each occurrence.

Such insurance shall cover liability arising out of any auto (including owned, hired, and non-owned autos).

Business auto coverage shall be written on ISO form CA 00 01, CA 00 05, CA 00 12, CA 00 20 or a substitute form providing equivalent liability coverage. If necessary, the policy shall be endorsed to provide contractual liability coverage equivalent to that provided in the 1990 and later editions of ISO form CA 00 01. This insurance shall apply as primary insurance with respect to any other insurance or self-insurance programs afforded to the Owner. Owner is named as additional insured.

Contractor waives all rights against the Owner and its agents, officers, directors, and employees for recovery of damages to the extent these damages are covered by the business auto liability or commercial umbrella liability insurance obtained by Contractor pursuant to Article 4 of this agreement or under any applicable auto coverage.

Disposition: Certificate(s) of insurance showing the required coverage and copy of declaration page must be returned to the Owner with properly executed Contract Documents. If requested by the Owner, Contractor shall also provide a certified copy of the policy(ies) required by Article 4(a)(2).

Cross-Liability Coverage.—If Contractor's liability policies do not provide the standard ISO separation of insureds provision, or a substantially similar clause, they shall be endorsed to provide cross-liability coverage.

(3) By proper endorsement, the policy must name

MACON WATER AUTHORITY
790 Second Street
P. O. Box 108
Macon, GA 31202

as an additional insured and shall provide for not less than thirty (30) days prior written notice before cancellation or any material change in the policy, except for non-payment of premium which shall require ten (10) days prior written notice of cancellation, to the Owner.

(4) COMMERCIAL UMBRELLA/EXCESS POLICY - Contractor shall procure a commercial umbrella or excess policy with a limit of no less than \$5,000,000. Coverage must follow form over underlying policies including GL, Auto and Employer's Liability insurance.

(5) MATERIALS AND EQUIPMENT FLOATER. - The Contractor shall procure, and shall maintain during the performance of the Contract Agreement, Materials and Equipment Floater (May be labeled as *Equipment Floater* or *Installation Floater* or *Builders Risk*) Insurance to protect

the interests of the Owner, the Contractor and Subcontractors against loss by vandalism, malicious mischief, and all hazards included in a standard All Risk Endorsement. The amount of insurance shall at all times equal or exceed the amount of the materials in the Contract + \$30k for Owner furnished materials. The policies shall be in the names of the Owner and the Contractor.

Disposition: Original policy must be returned to the Owner with properly executed Contract Documents. Owner may accept with returned, executed Contract Documents in lieu of an original policy, an insurance binder evidencing the policy coverage, but Contractor shall not be relieved of the obligation to furnish the actual policy.

Endorsement on Materials and Equipment Floater Policy.—There shall be attached to and made a part of the insurance policy for MATERIALS AND EQUIPMENT FLOATER an endorsement of the insurance company in accordance with the specimen shown in preceding Paragraph (a)(3).

(6) CYBER LIABILITY INSURANCE - The Contractor shall procure insurance with limits not less than \$1,000,000 per occurrence or claim, \$2,000,000 aggregate. Coverage shall be sufficiently broad to respond to the duties and obligations as is undertaken by the Contractor in the Contract Documents and shall include, but not be limited to, claims involving infringement of intellectual property, with the exception of patent infringement or trade secret misappropriation, but including infringement of copyright, trademark, trade dress, invasion of privacy violations, information theft, damage to or destruction of electronic information, release of private information, alteration of electronic information, extortion and network security. The policy shall provide coverage for breach response costs as well as regulatory fines and penalties as well as credit monitoring expenses. If coverage is on a claims made basis, the Retroactive Date must be shown on the certificate and must be before the date of the contract or the beginning of contract work, insurance must be maintained and evidence of insurance must be provided for at least two (2) years after completion of the contract of work. If coverage is canceled or non-renewed, and not replaced with another claims-made policy form with a Retroactive Date prior to the contract effective date, the Contractor must purchase “extended reporting” coverage for a minimum of two (2) years after completion of contract work.

Article 5. - Hazards and Indemnification. (a) *Hazards.* —The Contractor shall be responsible from the time of his execution of the Contract Documents or from the time of the beginning of the first work, whichever shall be earlier, for all injury or damage of any kind resulting from the Work to persons or property regardless of who may be the owner of the property. It is the intention of this paragraph to shift the full and complete risk of all such loss to the Contractor for the period of construction and until notice from the Owner of the final acceptance of the Work is made in accordance with Article 30, regardless of whether or not any particular hazard shall be insured against.

(b) *Indemnification.*—In addition to the liability imposed upon the Contractor on account of bodily injury (including death) or property damage, which liability is not impaired or otherwise affected hereby, the Contractor assumes the obligation to save the Owner harmless and to indemnify and defend the Owner, the Engineer and their agents and employees from and against all claims, damages, losses and expenses including claims consultant's and attorney's fees arising

out of or through bodily injury, sickness, disease or death of any person or persons or damage to property (regardless of who may be the owner of the property) including the loss of use resulting therefrom arising out of or suffered through any act or omission of the Contractor or any Subcontractor, or anyone either:

- (1) directly or indirectly employed by the Contractor, or
- (2) under the supervision of the Contractor or any subcontractor in the prosecution of the Work required by the Contract Documents.

In any and all claims against the Owner or the Engineer, or any of their agents or employees, by any employee of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, this indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any Subcontractor under workers' compensation acts, disability benefit acts or other employee benefits acts.

(c) *Sole Negligence Exception.* —The Contractor shall not be liable or responsible for loss or damage, and the indemnity obligation set forth above will not apply if the incident from which the loss or damage arose was the result of the sole negligence or sole cause of the Owner, the Engineer, or their agents, servants and employees.

Article 6. - Notice to Proceed. The Notice to Proceed will be issued, following the pre-construction conference, within thirty (30) days of the execution of the Contract Agreement by the Owner. The time may be extended by mutual agreement between the Owner and the Contractor. If the Notice to Proceed has not been issued within the thirty (30) day period or within the period mutually agreed upon, the Contractor may terminate the Contract Agreement without further liability on the part of either party.

Within ten (10) days of receiving the Notice to Proceed, the Contractor must initiate on-site construction activity. If on-site construction activity is not initiated within this time period, the Owner may begin proceedings for Termination of Work for Default.

Article 7. - Termination of Work for Default. (a) *Definition.*—The Work may be terminated for default if any one of the following events or circumstances occurs:

- (1) The Contractor is adjudged bankrupt or becomes insolvent;
- (2) The Contractor makes a general assignment for the benefit of creditors;
- (3) A trustee or receiver is appointed for the Contractor or for any of Contractor's property;
- (4) The Contractor files a petition to take advantage of any debtor's act, or to reorganize under the bankruptcy or applicable laws;

- (5) The Contractor fails to supply sufficient skilled workmen, materials or equipment;
- (6) The Contractor fails to make satisfactory progress toward timely completion of the Work;
- (7) The Contractor fails to make prompt payments to Subcontractors or material suppliers for labor, materials or equipment;
- (8) The Contractor disregards laws, ordinances, rules, regulations, or orders of any public body having jurisdiction of the Work;
- (9) The Contractor fails to comply with directives of the Engineer; or,
- (10) The Contractor otherwise violates any provision of the Contract Documents.

(b) *Grounds for Issuance of Notice of Declaration of Default.* —It shall be a sufficient ground for the issuance of a notice of declaration of default that the Contractor has been unfaithful or delinquent in the performance of the Contract or any part of it in any respect. The Engineer does not have authority to declare the Contractor in default.

(c) *Termination of Services and Possession of the Project.* —The Owner may, without prejudice to any other right or remedy and after giving the Contractor and surety written notice ten (10) days in advance, terminate the services of the Contractor and take possession of the Project, the Work and of all products thereon owned by the Contractor, and finish the Work by whatever method the Owner may deem expedient. In such case the Contractor shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds the direct and indirect costs of completing the Project and all Work, including compensation for additional professional services, such excess shall be paid to the Contractor. If such costs exceed such unpaid balance, the Contractor or surety shall pay the difference to the Owner. Such costs incurred by the Owner will be determined by the Engineer and incorporated in a Change Order.

(d) *Effect of Termination.* —Where the Contractor's services have been so terminated by the Owner, said termination will not affect any right of the Owner against the Contractor then existing or which may thereafter accrue. Any retention or payment of monies by the Owner due the Contractor will not release the Contractor from compliance with the Contract Documents.

Article 8. - Termination for Convenience of Owner. (a) *General.* —If, for any reason other than those provided for under Article 7, the Owner elects to discontinue, in whole or in part, the Work under this Contract, the Owner may, ten (10) days after delivery of a written notice to the Contractor and the Engineer, terminate, in whole or in part, the Contractor's performance of the Work under this Contract. The notice of termination shall specify the extent to which performance of the Work under the Contract is terminated.

(b) *Entitlement to Payment.* —In the event of such termination by the Owner, the Contractor shall be entitled to payment for the Work properly performed up to the time of the termination and reimbursement for such actual costs as are reasonably incurred by the Contractor due to the termination and not otherwise compensated. The Contractor shall also be entitled to profit on the amounts payable to the Contractor, but such profit shall be limited to six (6%) percent of such amounts. The Contractor shall not be entitled to any payment, including any anticipated profit, on Work not performed, and the Contractor shall not be entitled to any compensation or recovery of damages for any other costs, losses, or damages of any nature.

Article 9. - Assignments. The Contractor shall not assign the whole or any part of this Contract or any monies due or to become due hereunder without prior written consent of the Owner.

Should the Owner consent, in writing, to Contractor's assigning of all or any part of any monies due, or to become due, under this Contract, the instrument of assignment shall contain a clause substantially to the effect that it is agreed that the right of any assignee in and to any monies due or to become due to the Contractor shall be subject to any set-offs then due to the Owner and to prior liens of all persons, firms, and corporations for services rendered or materials supplied for the performance of the Work called for under this Contract.

Article 10. - Subcontractors, Materialmen, Suppliers and Employees. —(a) *Submission of List.* -As soon as possible after notice of award of the Contract and in any event not later than the time fixed in the Contract for delivery of the executed Contract Documents to the Owner, the Contractor shall submit in writing to the Engineer a list of the names of Subcontractors that the Contractor will engage for the Work. The list of Subcontractors is not submitted for approval, but is for the purpose of establishing:

- (1) What trades and portions of the Work are to be performed under subcontract; and,
- (2) The names of the entities selected by the Contractor to perform work by subcontract, the aforesaid selection being a matter lying solely within the discretion of the Contractor.

The Contractor shall utilize the services of specialty Subcontractors on those parts of the Work which, under normal construction practices, are best performed by specialty Subcontractors and as may be required by the Engineer in the Engineer's sole discretion, at no additional cost to the Owner. If the Contractor desires to self-perform specialty Work, the Contractor shall submit a notice to the Owner accompanied by evidence that the Contractor's own organization has successfully performed the type of work, and the performance of the Work by specialty Subcontractors will result in materially increased costs or inordinate delays.

(b) *No Approval of Subcontractors.*—Neither the Owner nor the Engineer undertakes to pass upon or approve any Subcontractor.

(c) *Warranty of Contractor.*—The Contractor warrants that the Subcontractors selected by the Contractor are reputable, skilled, reliable, competent, qualified in the trade or field in which such Subcontractors are to perform Work on the Project, and that all Subcontractors are thoroughly familiar with applicable codes.

(d) *Certification on account of.*—The Engineer shall, upon written request, furnish to any Subcontractor, wherever practicable, evidence of the amounts certified as payable or paid on the Subcontractor's account. Furnishing any such evidence shall not establish any relationship between the Engineer and any Subcontractor.

(e) *Contractor Responsible for Acts and Omissions of Subcontractors, Materialmen, Suppliers and Employees.*—The Contractor agrees that it is as fully responsible for the acts and omissions of its Subcontractors, materialmen, suppliers, and employees (and of entities either directly or indirectly employed by any of them) as the Contractor is for the acts and omissions of entities directly employed or engaged by the Contractor. The failure of a Subcontractor, materialman, supplier, or employee to timely and properly perform any Work shall not be asserted by the Contractor as an excuse for any omission from, or noncompliance with, the requirements of the Contract Documents; nor shall the Contractor be entitled to an extension of the Contract Time because of any failure of a Subcontractor, materialman, supplier, or employee to timely perform the Work unless such failure was a direct result of some critical delay to the Subcontractor, materialman, supplier or employee of the kind and character described under Article 28 of the General Conditions for which the Contractor shall have requested and received an extension of time under the terms of Article 28 of the General Conditions. The subcontracting of work does not relieve the Contractor of the full responsibility for the execution of the Work and for compliance with all requirements of the Contract Documents. The Contractor may not assert negligence, inefficiency, insolvency, bankruptcy, or incompetence of any Subcontractor, materialman, supplier, or employee as excuse for any noncompliance with methods and material designated in the Contract Documents. As to Subcontractors, materialmen, suppliers and employees of the Contractor, the doctrine that a principal is liable for acts and omissions of his agent shall be binding on the Contractor, and the Contractor may not reverse the aforesaid doctrine by serving as a conduit or agent for its Subcontractors, materialmen, suppliers and employees. Any provision in any Contract between the Contractor and any Subcontractor pursuant to which the Contractor is obliged to present to the Owner any claim of any Subcontractor shall be invalid, null and void.

(f) *No Contract Between Owner and Any Subcontractor, Materialman, Supplier, or Employee.*—Nothing contained in the Contract Documents shall create any contractual relationship between the Owner and any Subcontractor or between the Owner and any materialman, supplier or employee of the Contractor or its Subcontractors.

(g) *Relationship of Contractor and Subcontractors.*—The Contractor agrees to bind every Subcontractor to, and every Subcontractor agrees to be bound by, the terms of the Contract Documents, including the following provisions of this Article:

The Subcontractor agrees

- (1) To be bound to the Contractor by the terms of the Contract Documents and to assume toward the Contractor all the obligations and responsibilities that the Contractor by the Contract Documents assumes toward the Owner.

- (2) To submit to the Contractor applications for payment in such reasonable time as to enable the Contractor to apply for payment under Article 30 of the General Conditions.
- (3) To make claims for extras, for extensions of time or for damages to the Contractor in the manner provided in the General Conditions for like claims by the Contractor upon the Owner.

The Contractor agrees

- (1) To be bound to the Subcontractor by all the obligations that the Owner assumes to the Contractor under the Contract Documents.
- (2) To pay the Subcontractor upon the payment of certificates issued under the schedule of values described in Article 24 of the General Conditions the amount allowed to the Contractor on account of the Subcontractor's work to the extent of the Subcontractor's interest therein; amounts retained by the Contractor from payments due to Subcontractors (expressed as a percentage) shall not exceed that being retained by the Owner.
- (3) To pay the Subcontractor as required by the Contract Documents.
- (4) To pay the Subcontractor on demand for its work or materials as far as executed and fixed in place, less the retained percentage, even though the Engineer fails to approve payment to the Contractor for any cause not the fault of the Subcontractor.
- (5) To pay the Subcontractor a just share of any fire insurance money received by the Contractor.
- (6) To make no demand for liquidated damages or penalty for delay in any sum in excess of such amount as may be specifically identified in the subcontract.
- (7) That no claim for services rendered or materials furnished by the Contractor to the Subcontractor shall be valid unless written notice thereof is given by the Contractor to the Subcontractor during the first ten days of the calendar month following that in which the claim originated.
- (8) To give the Subcontractor an opportunity to be present and to submit evidence in any dispute involving rights of the Subcontractor.

(b) *Owner Not Obligated to any Subcontractor.*—There is no obligation on the part of the Owner to pay, or to see to the payment of, any sums to any (1) Subcontractor, (2) materialman, (3) supplier, (4) laborer, (5) employee, or (6) claimant as defined in the Payment Bond.

(c) *Incorporation of Terms in Subcontracts.*—The Contractor agrees that failure on its part to incorporate in all subcontracts an express provision in accordance with this Article shall be deemed to be and is a breach of an essential covenant, and that, in the event of such breach, that

Contractor shall, within five (5) days after demand of the Owner, furnish proof in writing that the deficiency has been remedied and that (1) the Contractor may not maintain that it is beyond the Contractor's right or ability to require performance of terms of the Contract Documents by a Subcontractor and (2) no Subcontractor may maintain that it has not assumed toward the Contractor all the obligations and responsibilities that the Contractor has assumed toward the Owner.

Article 11 - Engineer. (a) *Supervision.*—The Engineer shall have general supervision and direction of the Work except in respect to safety and except as qualified by Articles 27 and 36 of the General Conditions. He/she shall make visits to the Project site and make determination as to whether the Work is proceeding in accordance with the Contract Documents. Except for projects on which the Macon Water Authority itself serves in the capacity of engineer by use of its employees, which shall be indicated in the Contract Documents, the Engineer is an independent contractor and acts as the agent of the Owner only when in special instances he/she is authorized in writing by the Owner so to act, and in such instances he/she shall, upon request, show the Contractor written authority. The Engineer has authority to stop the Work whenever such stoppage may be necessary to ensure the proper execution of the Contract.

(b) *Interpreter and Impartial Judge.*—As the Engineer is the interpreter of the conditions of the Contract and the judge of its performance, the Engineer shall side neither with the Owner nor with the Contractor but shall use the Engineer's powers to enforce the faithful performance of the Contract by both the Owner and the Contractor.

(c) *Succession.*—In case of the termination of the employment of the Engineer, the Owner shall appoint a capable and reputable Engineer against whom the Contractor shall make no objection and whose status under the Contract shall be that of the former Engineer.

(d) *Promptness.*—The Engineer shall make decisions with reasonable promptness after presentation of evidence on (i) any claim of the Owner or Contractor, (ii) a demand of the Owner or Contractor for a decision on any matter relating to the execution, or progress, of the Work, or (iii) a demand of the Contractor or Owner for interpretation of or additional instructions ("Request for Information" or "RFI") with respect to the Contract Documents.

(e) *Engineer's Authority.*—The Engineer shall be vested with the authority to judge, determine and direct the following:

- (1) Whether products furnished are of the quality, type and kind called for by the Contract Documents and are otherwise acceptable for the Work as provided in the Contract Documents, and if not, to reject those not so qualifying or otherwise unacceptable;
- (2) Whether products incorporated in the Work comply with the standards and requirements of the Contract Documents as to installation and operation and, if not, to require their removal and replacement, at the expense of the Contractor, with products which do meet the qualifications and operating ability, requirements, performance and standards as provided in said Contract Documents;

- (3) The accuracy of quantities, amount of Work performed and all other submittals by the Contractor submitted in partial or periodic payment estimates, and whether all or any part of such quantities and other submittals are acceptable and comply with the Contract Documents, and to disallow any submittals not approved by the Engineer until the deficiencies causing such disallowance have been eliminated and rectified;
- (4) The validity and merit of any and all claims for additional compensation or extension of the Contract Time;
- (5) All matters relating to artistic effect;
- (6) The validity and reasonableness of any notice of facility interruption given under Article 20 of the General Conditions; and,
- (7) All other matters relating to the proper execution of the Work in conformity with the Contract Documents, including workmanship.

The determination and decision, and any resulting approval, non-approval, condemnation, rejection, requirements of removal or replacement in all the foregoing matters of or by the Engineer shall be final and conclusive and binding upon the Contractor, all Subcontractors and all suppliers of products materials and equipment.

(f) *Claims for alleged procrastination.*—No claim for delay to the Contractor or for additional expense to the Contractor shall commence to accrue on account of failure of the Engineer to render decisions, make interpretations, or furnish additional instructions until ten (10) days after receipt of written claim for additional compensation, damages, or extension of time served upon the Engineer and the Owner and not then unless such claim be reasonable and otherwise permitted under the Contract Documents.

Article 12. - Separate Contracts.—(a) *Cooperation of Contractor.*—The Owner reserves the right to let other contracts in connection with, or related to, this Project. The Contractor shall afford other contractors reasonable opportunity for the introduction and storage of their products and the execution of their work, and the Contractor and other contractors shall properly connect and coordinate their respective work with each other. If the proper execution or results of any part of the Contractor's Work depends upon the work of any other contractor, the Contractor shall inspect and promptly report to the Engineer any defects in such other contractor's work that render it unsuitable for such proper execution and results.

(b) *Performance of Work by Owner.*—The Owner may perform additional work related to the Project with Owner's own forces. The Contractor shall afford the Owner reasonable opportunity for the introduction and storage of products and the execution of such work and shall properly connect and coordinate Contractor's work with work performed by Owner's own forces.

(c) *Claims for Extra Expense.*—If the performance of additional work by other contractors or the Owner is not noted in the Contract Documents prior to the execution of the Contract, written notice thereof will be given to the Contractor prior to starting any such additional work. If the

Contractor believes that the performance of such additional work by the Owner or others causes the Contractor any additional expense or entitles the Contractor to an extension of the Contract Time, the Contractor may make a claim therefor as provided in Article 29 of the General Conditions.

Article 13. - Laws and Regulations. (a) *General.*—The Contractor acknowledges and agrees that all applicable federal, state, county and city laws, municipal ordinances, and the codes, rules, and regulations of all authorities having jurisdiction over construction of the Project shall apply to the Contract as though written out in full herein. The Contractor shall keep fully informed of all laws, ordinances and regulations of the federal, state, county, city and municipal governments or authorities in any manner affecting those engaged or employed in the Work or the material used in the Work or in any way affecting the conduct of the Work and of all orders and decrees of bodies or tribunals having any jurisdiction or authority over same. If any discrepancy or inconsistency should be discovered in these Contract Documents herein referred to, in relation to any such law, ordinance, regulation, order or decree, the Contractor shall herewith report the same, in writing, to the Owner and the Engineer.

(b) *Expense for Violation of Laws, Ordinances, etc.*—If the Contractor performs any work knowing or reasonably knowing it to be contrary to such laws, ordinances, rules or regulations without such notice to the Owner, the Contractor shall bear all costs arising therefrom.

(c) *Indemnification.*—The Contractor shall at all times observe and comply with all such existing and future laws, ordinances, and regulations, and shall protect and indemnify the Owner, the Engineer and their agents against the violation of any such law, ordinance regulation, order or decree, whether by the Contractor or by the Contractor's employees or Subcontractors.

(d) *Drug Free Workplace Act.*—The Contractor certifies that the provisions of O.C.G.A. §§ 50-24-1 through 50-24-6 (as may be amended or re-numbered) relating to the "Drug Free Workplace Act" will be complied with in full. The Contractor further certifies that: (i) A Drug Free Workplace will be provided for employees during the performance of the Contract, and (ii) that if a Subcontractor is engaged by the Contractor to work in a Drug Free Workplace, the Contractor shall secure from the Subcontractor the following written certification:

"As part of the subcontracting agreement with _____ (Contractor's name), _____ (Subcontractor's name) certifies to the Contractor that a drug-free workplace will be provided for the Subcontractor's employees during the performance of this Contract pursuant to the 'Drug Free Workplace Act'". Contractor also certifies to the Owner and the Engineer that the Contractor and its employees will not engage in the unlawful manufacture, sale, distribution, dispensation, possession, or use of any controlled substance or marijuana during the performance of the Contract.

(e) *Alcoholic Beverages on the Jobsite.*—The Contractor will strictly enforce a policy prohibiting the possession and consumption of alcoholic beverages on the jobsite before, during or after working hours for duration of the Work.

Article 14. - Taxes. (a) *General.*—The Contractor shall pay all sales, consumer, use and other similar taxes required by the law of the place where the Work is performed. The Owner will be responsible for any sales or use tax due on products furnished by the Owner to the Contractor to be incorporated into the Work.

(b) *Tabulation.*—The Contractor shall provide a written tabulation, plus other documentation as may be required, of all taxes, including sales tax, paid by the Contractor to assist the Owner in obtaining sales or use tax refunds for eligible machinery and equipment used for the primary purpose of reducing or eliminating air or water pollution as provided for in Chapter 48-8-3 (36) and (37) of the Official Code of Georgia (as may be amended). Such written tabulation shall be included with each partial payment request. Additionally, the tabulation shall be documented with copies of invoices indicating the amount of tax paid, with all blanks completed on the invoice, and with a description of the function of the item included in the tabulation. All taxes will be paid by the Contractor. All refunds will accrue to the Owner.

Article 15. - Notice and Service Thereof. (a) *General.*—All notices, demands, requests, instructions, approvals, and claims shall be in writing.

(b) *Notice to Contractor.*—Any notice to or demand upon the Contractor will be sufficiently given if delivered at the office of the Contractor specified in the Bid (or at such other office as the Contractor may from time to time designate to the Owner in writing), or if delivered by the United States Mail in a sealed, postage-prepaid envelope, or delivered by facsimile transmission, followed by written confirmation, in each case addressed to such office.

(c) *Notice to Owner.*—All papers required to be delivered to the Owner shall, unless otherwise specified in writing to the Contractor, be delivered to:

Macon Water Authority
790 Second Street
Macon, GA 31201
FAX (478) 750-2007

Any notice to or demand upon the Owner shall be sufficiently given if delivered to the Office of the Executive Director or if delivered by the United States Mail in a sealed, postage-prepaid envelope, or delivered by facsimile addressed to said Executive Director or to such other representative of the Owner or to such other address as the Owner may subsequently specify in writing to the Contractor for such purposes. Any such notice or demand shall be deemed to have been given to the Owner or made only as of the time of actual delivery to Owner.

(d) *Delivery to Engineer or Resident Inspector.*—Notice in writing or orally to the Engineer or to the resident inspector is not notice to the Owner unless a copy of the aforesaid notice in writing shall have been properly served upon the Owner as provided in this Article.

Article 16. - Patents and Royalties. (a) *General.*—If the Contractor uses any patented, trademarked or copyrighted design, process, device, material or other item, , the Contractor shall provide for such use by suitable agreement between the Owner and the holder of such patented, trademarked or copyrighted design, device or material. The Contract Prices shall include royalties or costs arising from the use of such design, device, or materials, in any way involved in the Work.

(b) *Indemnification.*—The Contractor and the Contractor’s surety shall indemnify and save harmless the Owner, the Engineer and their agents from claims for infringement by reason of the use of such patented, trademarked or copyrighted design, process, device or materials in connection with Work agreed to be performed under this Contract, and shall indemnify the Owner, the Engineer and their agents for any cost, expense, damage and reasonable attorneys’ fees which the Owner, the Engineer or their agents may be obliged to pay by reason of such infringement, at any time during the prosecution of the Work or after completion of the Work.

Article 17. - Land and Rights-of-Way. (a) *Project Site.*—The Owner will provide, as indicated in the Contract Documents and prior to the Notice to Proceed, the lands upon which the Work is to be performed, rights-of-way for access thereto, and such other lands which are designated for the use of the Contractor. The Contractor shall confine all Work and all associated activities to the easements and other areas designated for the Contractor’s use. The Contractor shall comply with any limits on construction methods and practices which may be required by easement agreements.

(b) *Delays in Providing Access.*—If, due to some unforeseen reason, the necessary easements are not obtained, the Contractor shall receive an equitable extension of Contract Time or an equitable increase in the Contract Price, or both, to cover the Contractor’s additional costs as a result thereof, provided the Owner is notified in writing of the claim. The Contractor’s claim therefor shall be made as provided for in Article 29 of the General Conditions.

(c) *Additional Easements.*—Should additional temporary easements for ingress or egress be required by the Contractor for access to the Work, these easements shall be obtained by the Contractor, at no additional cost to the Owner.

Article 18. - Products. (a) *Storage.*—Products shall be stored in accordance with the manufacturer’s recommendations to insure the preservation of their quality and fitness for the Work. Stored products to be incorporated in the Work shall be located so as to facilitate prompt inspection by the Owner or the Engineer.

(b) *Installation.*—Manufactured products shall be applied, installed, connected, erected, used, cleaned, and conditioned as directed by the manufacturer.

(c) *Conformance with Shop Drawings.*—Products shall be furnished in accordance with shop drawings or samples submitted by the Contractor and approved by the Engineer.

(d) *Quality and Ownership.*—Unless otherwise specified, all products incorporated into the Work shall be new, and both workmanship and materials shall be of good quality. The Contractor shall, if required, furnish satisfactory evidence as to the kind and quality of products. The burden of proof is on the Contractor. Products to be incorporated into the Work shall not be purchased by the Contractor or Subcontractor subject to a chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller.

Article 19. - Supervision of Work. (a) *Supervision by Contractor.*—The Contractor shall give efficient supervision to the Work, using its best skill and attention. The Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.

(b) *Superintendent of Contractor.*—The Contractor shall employ and maintain on the Work a qualified superintendent and any necessary assistants, all satisfactory to the Owner and Engineer, who shall have been designated in writing by the Contractor as the Contractor's representative at the site. The superintendent shall not be changed except with the consent of the Owner and Engineer unless the superintendent proves to be unsatisfactory to the Contractor and ceases to be in the Contractor's employ. The superintendent shall represent the Contractor and shall be present on the site at all times as required to perform adequate supervision and coordination of the Work. The superintendent's sole responsibility shall be to superintend the construction of the Project; he shall not be a "working foreman." The superintendent shall have full authority to act on behalf of the Contractor and to execute orders or directions of the Engineer without delay. The superintendent shall have full authority to promptly supply products, tools, plant equipment and labor as may be required. The superintendent's authority shall be such that all communication given to the supervisor shall be as binding as if given to the Contractor.

(c) *Contractor's Personnel.*—The Contractor shall employ only competent and skilled personnel. The Contractor shall at all times enforce strict discipline and good order among its employees and shall not employ on the Work any unfit person or anyone not skilled in the work assigned to him. The Contractor shall, upon demand from the Engineer, immediately remove any superintendent, foreman, or worker whom the Engineer or Owner may consider incompetent or undesirable.

Article 20. - Interruption of Facility Operations. (a) *General.*—The Contractor shall provide the Owner with written notice at least five (5) days prior to any interruption in facility operations required by any construction activity. The notice shall include the date and time of the scheduled interruption; the length of time the interruption will be in effect; the procedures to be followed in effecting the interruption; a complete identification of all those processes, equipment and operations to be affected; and all other information the Owner may require. The Contractor shall provide any and all equipment, piping, auxiliary power or other means necessary to sustain facility operations or function for interruptions which have not been identified by the Contract Documents, or when interruptions must exceed the time allowed by the Contract Documents.

(b) *Damages and Fines.*—Any damages resulting from surcharging, overflow or back-up caused by the Contractor's operations shall be the Contractor's responsibility. Any fines levied against the Owner resulting from a surcharge, overflow or backup caused by the Contractor shall be paid by the Contractor.

Article 21. - Protection of Work, Property and Persons. (a) *Duty to Protect Persons and Property.*—The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. The Contractor shall take all necessary precautions for the safety of, and shall provide necessary protection to prevent damage, injury or loss to all employees on the Work and other persons who may be affected thereby, all the Work and all products to be incorporated therein, whether in storage on or off the site, and other

property at the site and adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction. The Contractor shall pay for any such damage, injury, or loss except such as may be directly the result of errors in the Contract Documents or such as shall be caused directly by agents or employees of the Owner.

(b) *Safety Precautions.*—The Contractor shall comply with the Occupational Safety and Health Act, the Contract Work Hours and Safety Standards Act, and all rules and regulations relating thereto. Contractor warrants and represents that it is thoroughly familiar with the safety requirements with regard to scaffolding set forth in O.C.G.A. § 25-15-110, the requirements concerning blasting or excavating near underground gas pipes and utility facilities contained in O.C.G.A. § 25-9-1, *et seq.*, and the High Voltage Safety Act, O.C.G.A. § 46-3-30, *et seq.*, and that the Work shall be prosecuted in complete accord with all limitations and requirements set forth in these, and other applicable, laws. The contractor's operation of the jobsite shall be consistent with the provisions of the "Manual of Accident Prevention in Construction" issued by the Associated General Contractors of America, Inc., and shall maintain an accurate record of all cases of death, occupational disease, and injury requiring medical attention or causing loss of time from work arising out of and in the course of employment on the Work. The Contractor alone shall be responsible for the safety, efficiency, and adequacy of its plant, appliances, and methods and for any damage which may result from their improper construction, maintenance, or operation. The Contractor shall erect and properly maintain at all times as required by the conditions and progress of the work proper safeguards for the protection of workers and the public and shall post danger warnings against any hazards created by the construction operations. The Contractor shall designate a responsible member of its organization on the Work whose duty shall be the prevention of accidents. In the absence of notice to the contrary filed with the Engineer in writing with a copy to the Owner, this person shall be the superintendent of the Contractor.

(c) *Emergencies.*—In an emergency affecting the safety of life or the Work or adjoining property, the Contractor, without special instruction or authorization from the Engineer or Owner, is hereby permitted to act, at its discretion, to prevent such threatened loss or injury. Any remuneration claimed by the Contractor on account of emergency work shall be determined in accordance with allowances permitted on force account under section (c), Case(c) of Article 29 of the General Conditions.

(d) *Injury or Loss to Persons or Property.*—The Contractor shall remedy all damage, injury or loss to any property, improvements or facilities caused, directly or indirectly, in whole or in part, by the Contractor or any of the Contractor's Subcontractors or anyone directly or indirectly employed by and of them or anyone for whose acts any of them may be liable. The property, improvements or facilities shall be replaced or restored to a condition as good as when the Contractor entered upon the Work. In case of failure on the part of the Contractor to restore such property, or pay for such damages or injury, the Owner may, after 48 hours written notice, proceed to repair, rebuild, or otherwise restore such property, improvements or facilities as may be deemed necessary. The cost thereof will be deducted from any monies due or which may become due to the Contractor under this Contract.

(e) *Blasting*.—In the absence of an express provision in the Contract Documents permitting blasting, there shall be no blasting. If blasting is permitted under the Contract Documents and under the law which is applicable to the Project site, such blasting shall be done in such manner as to prevent all damage and injury.

(f) *Rain Water, Surface Water, and Backup*.—The Contractor shall protect all Work, including but not limited to excavations and trenches, from rain water, surface water, and back-up of drains and sewers. The Contractor shall furnish all labor, pumps, shoring, enclosures, and equipment necessary to protect and keep the Work free of water. Completed Work and stored products shall be suitably protected during inclement weather to allow Work to proceed in a timely fashion. Work planned, or in progress, should be performed to minimize impact of adverse weather conditions.

Article 22. - Protection of the Environment. (a) *General*.—The Contractor shall be responsible for taking all measures required to minimize all types of pollution associated with the undertaking of the proposed Work, and shall abide by the requirements of all governmental agencies having jurisdiction over the Work or Contractor's Project operations.

(b) *Restoration*.—Any area used or involved in the Project that is disturbed by the Contractor, shall be restored to original or better condition, even though such area is outside the limits of that specified for grading, grassing or landscaping.

Article 23. - Protection, Location and Relocation of Utilities. (a) *Notification and Protection*.—The Contractor shall notify owners of adjacent utilities when prosecution of the Work may affect them. The Contractor shall protect from damage all existing improvements or utilities at, or in proximity to, the site of the Work, and shall repair or restore any damage to such facilities resulting from the performance of the Work. If the Contractor fails or refuses to repair any such damage promptly, the Owner may have the Work performed and charge the cost thereof to the Contractor.

(b) *Relocation*.—Prior to the construction or installation of any proposed facility or pipeline, the Contractor shall expose all existing utilities true to their vertical and horizontal location, within the vicinity of the Work. In order to avoid conflicts between existing and proposed facilities or utilities, the Contractor shall either relocate the existing or proposed utility on a temporary or permanent basis, or shall take whatever means necessary to protect the existing facilities or utilities during the installation of proposed utilities, as approved by the Engineer. No separate or additional payment will be made for the relocation of existing utilities or for any work associated with the protection of existing facilities or utilities.

Article 24. - Schedules, Reports and Records.—(a) *Progress Reports*.—Within such reasonable time as the Owner shall designate in writing, the Contractor shall submit to the Owner such schedule of quantities and costs, construction progress schedules, payrolls, bills, vouchers, correct copies of all subcontracts, statements, reports, correct copies of all agreements, correspondence, and written transactions with the surety that have any relevance to the Work, estimates, records, and other data as the Owner may request concerning Work performed or to be performed under this Contract. When requested by the Owner, the Contractor shall give the Owner access to accounts relating to the foregoing. The above reports shall include but are not limited to (i) written

notice of dates by which specified Work will have been completed, (ii) written notice of dates by which condemned Work shall have been remedied, (iii) written notice that condemned Work has been remedied, (iv) written notice as to the date or dates by which Work that has not been performed with equal steps and at the same rate required by the construction progress schedule shall have been brought into conformity with the schedule, (v) written notice of the date by which any undisputed claim of a Subcontractor, materialman, or laborer shall have been paid, (vi) written advice regarding the nature and amount of any disputed claim of a Subcontractor, materialman, or laborer, and (vii) information regarding work performed under Sections (c), Case (b) and Case (c) of Article 29 of the General Conditions.

(b) *Construction Progress Schedule.*—Within ten (10) days of the Notice to Proceed, the Contractor shall submit to the Engineer a Preliminary Progress Schedule (“PPS”) and a Near Term Schedule (“NTS”) in the form and with the content required by the Specifications. Within forty-five (45) days of the Notice to Proceed, the Contractor shall submit to the Engineer the Overall Project Schedule (“OPS”) as required in the Specifications.

(c) *Schedule of Values.*—The Contractor shall, within ten (10) days of the Notice to Proceed, submit to the Engineer a Schedule of Values of the various parts of the Work, including quantities, aggregating the total Contract Price, divided in such manner as to facilitate payments to Subcontractors in accordance with Article 10, with a complete breakdown of the Contract Price so arranged and so itemized in accordance with the Specifications as to meet the approval of the Engineer, and, if requested, supported by such evidence as to its correctness as the Engineer may direct. This schedule, designated herein as the Schedule of Values, when approved by the Engineer shall be used as a basis for certificates of payment.

(d) *Shop Drawings.*—The Contractor shall prepare, execute, and submit shop drawings as required by the Specifications. No shop drawings shall be submitted which do not comply with the Contract Documents.

(e) *Schedule of Submittals.*—Within ten (10) days of the Notice to Proceed, the Contractor shall prepare and submit for the approval of the Engineer a Schedule of Submittals showing the estimated date of submittal of all shop drawings and the desired approval date for each shop drawing anticipated. The Contractor shall submit in accordance with the schedule and the Engineer shall furnish approval in accordance with the schedule. The schedule must be consistent with the construction progress schedules.

(f) *Submitting Updated Schedules.*—An updated OPS and NTS together with an updated Schedule of Submittals shall be presented with each periodical payment request. Failure to timely submit such schedules will delay processing of the pay request until receipt of the updated schedules.

(g) *Float in the Schedule.*—If the OPS reflects a completion date prior to the completion date established in the Contract Agreement, or as extended by Change Order, this shall afford no basis for a claim of delay should the Contractor not complete the Work prior to the projected date set forth in the OPS. All “float” between the completion date in the OPS and the completion date established in the Contract Agreement shall belong to and be exclusively available to the Owner.

Should a Change Order be executed with a revised completion date, the progress schedule shall be revised to reflect the new completion date.

(h) *Record Drawings.*—The Contractor shall maintain on the Project site throughout the Contract Time an up-to-date set of records and drawings as required by the Specifications.

(i) *Project Coordination Meetings.*—The Contractor shall participate in Project Coordination Meetings to be held on the site monthly, or more often if conditions warrant, to establish the current state of completion and revise the schedule as necessary. The Project Coordination Meeting will be conducted by the Owner and the Engineer.

(j) *Maintenance of Project Scheduling System.*—The Contractor shall take the following steps to ensure that the Project stays on schedule:

- (1) The Contractor shall implement the detailed NTS of activities to the fullest extent possible between Project Coordination Meetings.
- (2) The Contractor shall provide a copy of the Contractor's Daily Report to the Resident Inspector by 10:00 a.m. of the day following the Report date. This Daily Report will contain, as a minimum, the weather conditions; number of workers by craft, including supervision and management personnel on site; active and inactive equipment on site; Work accomplished by Critical Path Method activity item; problems; and visitors to the jobsite.
- (3) If a current activity or series of activities on the OPS is behind schedule and if the late status is not due to an excusable delay for which an extension of the Contract Time would be forthcoming, the Contractor shall attempt to reschedule the activity to be consistent with the OPS so as not to delay completion of the Contract. The Contractor agrees that:
 - a. The Contractor shall attempt to expedite the activity to completion so as to have it agree with the OPS. Such measures as the Contractor may choose shall be made explicit during the Project Coordination Meeting;
 - b. If, within two weeks of identification of such behind-schedule activity, the Contractor is not successful in restoring the activity to an on-schedule status, the Contractor shall:
 1. Carry out the activity with the scheduled crew on an overtime basis until the activity is complete or back on schedule;
 2. Increase the crew size or add shifts so the activity can be completed as scheduled; or,
 3. Commit to overtime or increased crew sizes for subsequent activities, or some combination of the above as deemed suitable by the Engineer.

These actions shall be taken at no increase in the Contract Price.

- (4) Maintain a current copy of all construction schedules on prominent display in the Contractor's field office at the Project site; and,
- (5) Cooperate with the Owner or Owner's representative in all aspects of the Project Scheduling System. Failure to implement the Project Scheduling System or to provide specified schedules, diagrams, and reports, or to implement actions to re-establish progress consistent with the OPS may be causes for withholding of payment.

Article 25. - Drawings and Specifications.

(a) *Identification.*— The Contract Documents shall be as defined in Article 41(e) of the General Conditions. They are intended to define, describe, and provide for all Work necessary to complete the Project in an acceptable manner, ready for use, occupancy, or operation by the Owner. Insertion, addition, alteration, modification, revision, or deletion of any text, verbiage, provision, statement, term, condition, or other component of the Contract Documents, whether textual, numerical, or pictorial, is prohibited and no such unilateral change to the Contract Documents shall be binding.

(b) *Number of Copies.*—The Engineer will furnish the Contractor two copies of the Contract Documents, one copy of which the Contractor shall have available at all times on the Project site. Any additional copies will be furnished at additional cost.

(c) *Correlation and Intent.*—The Contract Documents are complementary, and what is called for by one shall be as binding as if called for by all. The intention of the documents is to include all labor and materials, equipment, and transportation necessary for the proper execution of the Work. It is not intended, however, that materials or work not covered by or properly inferable from any heading, branch, class, or trade of the Specifications shall be supplied unless distinctly noted on the drawings. Materials or Work described in words which so applied have a well-known technical or trade meaning shall be held to refer to such recognized standards. In the event the Engineer shall have used such phrases anywhere in the Specifications as: “work indicated on the drawings and herein specified”, “work shown and specified”, “in accordance with the drawings and Specifications”, “indicated on the drawings and Specifications”, “in accordance with Specifications and applicable drawings”, “these Specifications and the accompanying drawings”, “as indicated on the drawings and as specified herein”, or similar expressions, they shall not be deemed to be and are not a defeasance of the provisions under this Article of the General Conditions, and they are not to be construed as requiring Work to be called for both in the Specifications and in the drawings in order to be a requirement under the Contract. Any of the aforesaid conjunctive expressions and phrases or any cross-references between drawings and Specifications, between Specifications and Specifications, or between drawings and drawings to the contrary notwithstanding, the Contract Documents are complementary, and what is called for by one shall be as binding as if called for by all.

(d) *Refinement of Documents.*—The Contractor shall do no Work without complete, definite, and clear Drawings and Specifications. In the event the Contract Documents are not complete, definite, and clear, the Contractor shall make demand upon the Engineer, in writing, for a Request for Instructions (RFI) in accordance with Section (d) (iii) of Article 11 of the General Conditions. A copy of such demand shall be served upon the Owner. With reasonable promptness

the Engineer shall furnish complete, definite, and clear instructions in writing, or by means of drawings, or in writing and by means of drawings. Such additional instructions if given orally shall be confirmed in writing or by drawings or both within a reasonable time. All such additional instructions shall be consistent with the Contract Documents, true developments thereof, and reasonably inferable therefrom. The Work shall be executed in conformity with the aforesaid instructions. The Engineer shall furnish the Owner a copy of all additional instructions issued to the Contractor. No clarification of the Drawings and Specifications hereunder by the Engineer will entitle the Contractor to any additional monies unless a Change Order has been processed as provided by Article 29 of the General Conditions.

(e) *Conflicts.*—The following principles shall govern the settlement of disputes which may arise over conflicts in the Contract Documents:

- (i) as between figures given on drawings and the scaled measurements, the figures shall govern;
- (ii) as between large-scale drawings and small-scale drawings, the larger scale shall govern;
- (iii) As between Drawings and Specifications, the requirements of the Specifications shall govern;
- (iv) as between the form of the Contract Agreement, General Conditions or agency funding documents, the requirements of the agency funding documents shall govern; and,
- (v) in cases where products or quantities are omitted from the Specifications, the description and quantities on the Drawings shall govern.

Conflicts noted shall be reported to the Engineer. The principles set forth herein shall not alter the provisions of subsection (c) herein. Schedules, lists, indexes, tables, inventories, written instructions, written descriptions, summaries, statements, classifications, specifications, written selections, or written designations although appearing on the drawings are deemed to be and are “Specifications” within the meaning of this Article.

(f) *Materially Differing Site Conditions.*—Any materially differing site condition as between what is shown on the Drawings and Specifications and actually found on site shall be immediately reported to the Engineer and Owner, in writing, prior to the continuance of Work at the site. Failure of the Contractor to notify the Engineer, in writing, of the differing site condition prior to performance of Work at the site shall constitute a waiver of any claim for additional monies. Any Change Order necessitated by the differing site condition shall be processed as provided under Article 29 of the General Conditions. Any Work done by the Contractor following a discovery of such differing site condition or ambiguity or need for clarification in the Contract Drawings and Specifications, prior to a written report to the Engineer, shall not entitle the Contractor to additional monies and shall be done at the Contractor's risk.

Article 26. - Surveys and Permits.—(a) *Surveys.*—The Owner will furnish a land survey to establish a base line for locating the principal component parts of the Work, as shown in the Contract Documents. A bench mark will be otherwise specified in the Contract Documents; the Contractor shall develop and make all detailed surveys needed for construction, such as alignment, slope stakes, batter boards, stakes for pile location and other working points, lines, elevations and cut sheets.

(b) *Permits.*—Permits and licenses of a temporary nature necessary for the prosecution of the Work shall be obtained and paid for by the Contractor. Permits, licenses and easements for permanent structures or permanent changes in existing facilities shall be obtained and paid for by the Owner unless otherwise specified.

Article 27. - Testing, Inspection and Rejection of Work.—(a) *Testing of Materials.*—Unless otherwise specifically provided for in the Specifications, the inspection and testing of materials and products to be incorporated in the Work at the site shall be made by bureaus, laboratories, or agencies approved by the Owner; the cost of such inspection and testing shall be paid by the Contractor. The Contractor shall furnish evidence, satisfactory to the Owner and Engineer, that the materials and products have passed the required tests prior to their incorporation into the Work. The Contractor shall promptly segregate and remove rejected materials and products from the site of the Work.

(b) *Access to Work.*—The Owner and Engineer and their representatives shall at all times have access to the Work wherever it is in preparation or progress, and the Contractor shall provide proper facilities for such access and for inspection.

(c) *Notice to Engineer from Contractor Prior to Covering Work.*—If the Specifications, the Engineer's instructions (either in the Specifications or issued later in writing), laws, ordinances or any public authority require any Work to be specially tested or approved, the Contractor shall give the Engineer timely notice in writing of its readiness for inspection, and if the inspection is by any authority other than the Engineer, of the date fixed for such inspection. Inspections by the Engineer shall be made promptly and where practicable at the source of supply. If any Work should be covered without approval or consent of the Engineer, it must, if required by the Engineer, be uncovered for examination at the Contractor's expense.

(d) *Re-examination or Re-testing of Work Covered pursuant to Consent of Engineer.*—Re-examination or re-testing of questioned work covered pursuant to consent of the Engineer may be ordered by the Engineer, and if so ordered the Work must be uncovered by the Contractor. If such Work is found in accordance with the Contract Documents the Owner shall pay the cost of re-examination and replacement or of re-testing. If such Work is found not in accordance with the Contract Documents the Contractor shall pay such cost unless he shall show that the defect in the Work was caused by another contractor of the Owner, and in that event the Owner shall pay such cost. Re-examination or re-testing under the terms of this section applies only to Work which has been covered with consent of the Engineer. Work covered without consent of the Engineer must be uncovered for examination as provided under Article 27(c) of the General Conditions.

(e) *Inspection Does Not Relieve Contractor.*—Under the Contract Documents, the Contractor has assumed the responsibility of furnishing all services, labor, and materials for the entire Work in accordance with such documents. No provisions of this Article or any inspection of the Work by the Owner, representatives of the Owner, resident inspector, clerk-of-the-works, architects employed by the Engineer, representatives of the Engineer, or the Engineer shall in any way diminish, relieve, or alter said responsibility and undertaking of the Contractor; nor shall the omission of any of the foregoing to discover or to bring to the attention of the Contractor the existence of any Work or materials injured or done not in accordance with said Contract Documents in any way diminish, relieve, or alter such obligation of the Contractor nor shall the aforesaid omission diminish or alter the rights or remedies of the Owner as set forth in the Contract Documents. Subject to the provisions of Section (g) herein, the resident inspector has no power to make decisions, to accept or reject Work, or to consent to the covering of Work. The resident inspector owes no duty to the Contractor.

(f) *False Start.*—In the event notice of readiness pursuant to Article 30(g) of the General Conditions shall have been issued prematurely by the Contractor, the Contractor's action shall be deemed to be a "false start", and the Contractor shall be liable for the damage resulting from the aforesaid false start, including but not limited to the salary, professional fees, and travel and living expenses of the person or parties inconvenienced by the aforesaid false start.

(g) *Authority and Duties of the Resident Inspector.*—The Resident Inspector will be authorized to inspect all Work done and all products furnished, including preparation, fabrication and manufacture of the products to be used, but the Resident Inspector is not authorized to alter or waive any requirements of the Contract Documents. The Resident Inspector may temporarily reject products or suspend the Work until any question at issue can be referred to and decided by the Engineer. The responsibility of the Contractor is not lessened by the presence of the Resident Inspector.

(h) *Rejection of Work; Orders of Condemnation.*—The Contractor shall remove from the premises within the time designated in orders of condemnation all Work condemned by the Engineer as failing to conform to the Contract Documents, whether incorporated in the Work or not, and the Contractor shall promptly replace and re-execute the Work in accordance with the Contract Documents and without expense to the Owner and shall bear the expense of making good all work of other contractors destroyed by such removal or replacement. The Contractor shall supply any omitted Work and perform all unexecuted Work within the time fixed by the Engineer in orders of condemnation.

(i) *Remedy of the Owner for Breach of Order of Condemnation.*—If the Contractor does not make good a deficiency within the time fixed in an Order of Condemnation, the Owner may:

- (1) Remove the condemned Work and store it at the expense of the Contractor. If the Contractor does not pay the expenses of such removal and storing within ten (10) days after receipt of written demand of the Owner, the Owner may upon three (3) days' notice in writing to the Contractor sell such materials at private sale or at auction and shall account for the net proceeds thereof after deducting all proper costs incurred by the Owner; or

- (2) Supply omitted Work, perform unexecuted Work, or replace and re-execute Work not done in accordance with the methods and materials designated in the Contract Documents and deduct the cost thereof from any payment then or thereafter due the Contractor; or,
- (3) Accept the condemned Work and deduct the reasonable value of such Work from the Contract Price.

The remedies stated in this Article are in addition to the remedies otherwise available to the Owner, do not exclude such other remedies, and are without prejudice to any other remedies. Time limits stated in orders of condemnation are of the essence of the Contract. Unless otherwise agreed to by the Owner in writing, the making good of condemned Work shall physically commence at the site in not more than seven (7) days after receipt of the Order of Condemnation except that in case of emergency correction shall physically commence immediately and except that the Contractor shall in any event physically commence the correction at the site early enough to complete within the time allowed in the Order of Condemnation. The Owner shall give prompt consideration to reasonable requests for delay in commencement of the making good of orders of condemnation. The making good of condemned Work shall be completed within the time allowed in the Order of Condemnation unless the Contractor shall have requested from the Engineer an increase in the amount of time allowed and the Engineer shall have given notice to the Contractor in writing, with copy to the Owner, stating the additional time, if any, allowed. An extension of the time allowed to correct condemned Work shall not extend the Contract Time.

(j) *Notice of Correction from Contractor.*—The Contractor shall give prompt notice in writing to the Engineer, with copy to the Owner, upon completion of the correction of any Work, the supplying of any omission of any Work or materials or the performance of any unexecuted Work condemned by the Engineer. In the absence of such notice, it shall be and is presumed under this Contract that there has been no correction, supplying remedy, or performance of unexecuted Work.

Article 28. - Contract Time and Liquidated Damages. (a) *Rate of Progress.*—The Contractor shall proceed with the Work at a rate of progress which will insure substantial completion of the Project within the Contract Time. It is expressly understood and agreed by and between the Contractor and the Owner that the Contract Time for the Work is a reasonable time, taking into consideration the average climatic and economic conditions, and other factors prevailing in the locality of the Work. It is understood that the Contractor's proposed construction schedule is based on a normal 40-hour work week, less recognized holidays. If the Contractor desires to work in excess of a normal 40-hour work week, the Contractor shall submit a written request to the Owner and Engineer a minimum of two (2) days prior to the desired work date. The Contractor shall be responsible for any additional expenses incurred by the Owner as a result of any extended work hours, including resident inspection overtime. The cost associated with resident inspector overtime will be deducted from the Contractor's monthly progress payment request.

(b) *Grounds for Delays and Extensions of Time.*—If the Contractor be delayed at any time in the progress of the Work by any act or neglect of the Owner or the Engineer, or of any employee of either, or by any separate contractor of the Owner, or by changes ordered in the Work, or by

strikes, lockouts, pickets, abnormal and unforeseeable weather, unforeseeable subsurface conditions, fire, unusual delay in transportation, unavoidable casualties, or any causes beyond the Contractor's control, or by any cause which the Engineer shall decide to justify the delay, then the Contract Time may be extended for such reasonable time as the Engineer may decide.

(c) *Filing of Claims.*—No extension of the Contract Time shall be made for delay occurring more than ten (10) days before claim therefor is made in writing to the Engineer with a copy to the Owner. In the case of a continuing cause of delay, only one claim is necessary, but no claim for a continuing delay shall be valid unless the Contractor, within ten (10) days of the commencement of the delay, shall have given notice in writing to the Engineer, with copy to the Owner.

(d) *Weather Delays.*—The Contractor is held to be familiar with weather conditions in the Macon-Bibb County area. When a claim for extension of the Contract Time is based on abnormal and unforeseeable weather conditions the request must be accompanied by U.S. Weather Bureau data for the past ten (10) years for the Macon/Macon-Bibb County, Georgia area that substantiates the claim of abnormal and unforeseeable weather conditions. Each day of inclement weather is not, by itself, reason for an extension of the Contract Time. Extensions of the Contract Time will be based solely on the number of rain days in a monthly period that are in excess of the ten (10) year average as established for the Macon/Macon-Bibb County area. A rain day, for purposes of calculating the ten (10) year average, is defined as a day in which 0.10 inch of rain or more was measured by the Weather Bureau.

(e) *Delay in Furnishing Drawings.*—If no Schedule of Submittals or agreement stating the dates upon which drawings or approval of shop drawings shall be furnished is made, then no claim for delay shall be allowed on account of failure of the Engineer to furnish drawings or approval of shop drawings until fourteen (14) days after demand therefor and not then unless such claim be reasonable.

(f) *No Damages for Delay.*—In the event of any delay as set forth in Section (b) herein, the Contractor may be entitled to an extension of the Contract Time only, and shall not be entitled to any additional payment on account of such delay. Without limiting the foregoing, except as otherwise specifically provided under Article 29, the Contractor shall not be entitled to payment or compensation of any kind from the Owner for direct, indirect or impact damages, including but not limited to costs of acceleration or extended home office overhead arising because of hindrance or delay from any cause whatsoever, whether such hindrances or delays be reasonable or unreasonable, foreseeable or unforeseeable, or avoidable or unavoidable.

(g) *Liquidated Damages.*—If the Contractor shall fail to perform the Work required within the Contract Time, or extended Contract Time if authorized by Change Order, then the Contractor shall pay Owner the full amount of liquidated damages specified in the Contract Documents for each calendar day that the Contractor shall be in default after the time stipulated in the Contract Documents shall have expired, and the Owner shall deduct such liquidated damages from the Contractor's monthly progress payment request.

Article 29. - Changes in the Work.—(a) *Owner's Right to Make Changes.*—The Owner without invalidating the Contract may authorize or order extra work or may authorize or order changes by altering, adding to, or deducting from the Work, the Contract Price or the Contract Time, or both, being adjusted accordingly. The Contractor hereby expressly agrees that the Contractor shall have no right to a claim for damages or extended overhead of any nature because of changes made by the Owner. Such Work is hereinafter designated “change” or “changes”.

(b) *Field Orders.*—The Engineer may at any time, by issuing a field order, make changes in the details of the Work. These changes by field order will not affect Contract Time or Contract Price. The Contractor shall proceed with the performance of any such changes in the Work so ordered by the Engineer, unless the Contractor believes that such field order entitles Contractor to a change in Contract Price or Contract Time, or both, in which event Contractor shall give the Engineer immediate, written notice thereof and if required by the Owner, an immediate estimate of the direct cost of Work as outlined in Case (b) below, after the receipt of the ordered change, and the Contractor shall not execute such changes pending the receipt of an executed Change Order or further written instruction from the Owner.

(c) *Cost to Owner for Changes.*—The cost to the Owner of any change shall be determined in one or more of the following ways:

CASE (a) By estimate and acceptance in a lump sum.

CASE (b) By unit prices identified in the Contract or subsequently agreed upon. Unit prices are net including overhead and profit. Neither establishment of unit prices in the Contract or later agreement to unit prices shall entitle the Contractor to execute any change under Case (b) prior to issuance of an authorization or order of the Owner in writing.

CASE (c) By force account, which is defined as expenditures allowed under Article 29(i) plus a percentage or percentages as stated under Article 29(i).

(d) *Changes Forbidden without Consent of Owner.*—Neither the Engineer or the Contractor shall make any change whatsoever in the Work without authorization or order of the Owner in writing except in emergency as described hereinbelow. The making of any change without authorization or order of the Owner in writing is a breach of contract except in emergency as referred to under Article 21 of the General Conditions. In the absence of authorization or order of the Owner given in advance in writing (except in emergency as referred to under Article 21 of the General Conditions) the Contractor shall have no claim for payment, repayment, reimbursement, remittance, remuneration, compensation, profit, cost, overhead, expense, loss, expenditure, allowance, charge, demand, hire, wages, salary, tax, cash, assessment, price, money, bill, statement, dues, recovery, restitution, benefit, recoupment, exaction, injury, damages or time based upon or resulting from any change.

(e) *Notice of demand of Contractor for extraordinary remuneration or for damages.*—For a change in the Work, the Contractor shall be entitled to no claim other than or in excess of allowances permitted under Article 29(i) unless prior to commencement of execution of the change

(a) the Contractor shall have notified the Owner in writing of the nature of the claim and (b) the Owner shall have agreed in writing to the claim. Commencement of execution of a change authorized by the Owner in the absence of the aforesaid written notice from the Contractor and written agreement to the claim by the Owner shall be deemed to be and is conclusive proof that the Contractor acknowledges that it makes no claim other than or in excess of allowances permitted under Article 29(i).

(f) *Subsurface Conditions.*—Material below the surface of the ground is assumed to be earth and other material that can be removed by a backhoe or similar equipment. Should conditions encountered below the surface of the ground be at variance to conditions indicated by Drawings, Specifications, or geotechnical reports, and subject to Article 23 of the General Conditions, the Contract Price may be adjusted as provided in this Article for changes in the Work upon claim by either party made in writing within a reasonable time after the first observance of the conditions; PROVIDED, however, that the Contractor shall in any event give written notice to the Owner before proceeding to execute any change resulting from subsurface conditions; and PROVIDED FURTHER; that the Owner shall not be liable to the Contractor for any claim occasioned by the aforesaid subsurface conditions except in accordance with and pursuant to authorization of the Owner issued in writing prior to commencement of execution of the aforesaid change to which authorization the Contractor shall have taken no exception. If exception to the authorization be taken by the Contractor, the Owner may issue an order pursuant to Article 29(i). Commencement of execution of work pursuant to Article 29(i) shall not exclude the recovery of damages by the Contractor under other Articles of the General Conditions, but the cost to the Owner for the changes executed pursuant to the aforesaid order shall not exceed the “net allowable expenditures” permitted to the Contractor under Article 29(i) plus the “allowance for overhead and profit” permitted under Article 29(i).

(g) *Rock.*—If rock, as hereinafter defined, is encountered, no claim for additional compensation for changes shall lie against the Owner in the absence of previous authorization by the Owner in writing, and the cost to the Owner for any changes shall be determined as provided in this Article. **CAUTION: No rock for which extra compensation is expected to be received shall be removed except pursuant to and in conformity with a written authorization or order of the Owner.** Shale, rotten stone, or stratified rock that can be loosened with a pick or removed by a backhoe or similar equipment shall not be classified as rock. Rock is defined as follows: any material which cannot be excavated with conventional equipment, and must be removed by drilling, chemical cracking, or blasting, and occupies an original volume of at least one-half cubic yard.

(h) *Existing Conditions.*—The Contractor in undertaking the Work under this Contract is assumed to have visited the premises and to have taken into consideration all conditions which might affect the Work. No consideration will be given any claim based on lack of knowledge of existing conditions except where existing conditions are such as cannot be readily ascertained. Any claims relating to conditions which were not readily ascertainable shall be adjusted as provided in this Article for changes in the Work.

(i) *Cost to Owner, Allowances for Contractor, and Allowable Expenditures.*—In Cases (a) and (c), above, the “allowance for overhead and profit” combined, included in the total cost to the Owner, shall be based upon the following schedule:

- (1) For the Contractor an allowance for Work which it performs with its own forces, not to exceed 16% of its “net additional allowable expenditures”, if any, for changes.
- (2) For a Subcontractor an allowance for Work which it performs with its own forces, not to exceed 16% of its “net additional allowable expenditures”, if any, for changes. A Subcontractor shall receive no allowance for overhead and profit on Work not performed by its own forces. Under these Contract Documents, the forces of a Sub-subcontractor of a Subcontractor are deemed to be and are the forces of the Subcontractor.
- (3) For the Contractor an allowance for Work performed by its Subcontractor, not to exceed 10% of the amount, if any, due the Subcontractor for changes.

The above percentages shall be applied to the “net additional allowable expenditures”, if any, as limited and defined herein. If the net difference between “allowable expenditures” and savings results in a decrease in expenditures, the amount of credit allowed the Owner shall be the net decrease without any credit for profit and overhead. “Net additional allowable expenditures” as used herein shall mean the difference between all “allowable expenditures” and savings. The term “allowable expenditures” is limited to and defined as items of:

- (1) Labor which is defined as the specific labor wages including a thirty percent (30%) markup on the cost of direct payroll wages. The Contractor shall furnish, if required by the Owner, certified payrolls to verify wages.
- (2) Material delivered and used on the designated Work, including sales tax, if paid for by the Contractor and as verified by original invoices or otherwise verifiable to the Engineer's acceptance.
- (3) Rental, or Ownership cost of equipment, including necessary transportation of equipment, having a purchase value in excess of \$300.00. Rental or Ownership cost will be allowed for only those hours during which the equipment is required on the Project site. Cost allowances will not exceed the rates defined as follows: the hourly rate, for equipment not used exclusively in the change to the scope of Work, will be the monthly rate, as printed in the current Rental Blue Book for Construction Equipment published by Dataquest, divided by 176; the rate, for equipment used exclusively for those tasks identified in the change to the scope of Work, will be the daily, weekly or monthly rate, used singularly or in combination, which will provide the lowest total cost. The rates will be modified by the Rate Adjustment Table factors to reflect a depreciation allowance indexed to the year a machine was originally manufactured and sold. The rates will be adjusted to account for regional differences in annual use hours, cost of labor, freight, taxes, etc. The amount by which basic rates

will be increased or decreased is shown on the adjustment maps included in the “Blue Book”. The equipment use period will begin only at the time equipment is unloaded at the site of the changed Work; will include each day that the equipment is required at the site of the changed Work; and will terminate at the end of the day on which the use of such equipment becomes unnecessary, plus reasonable transportation time. The maximum time to be paid per day will not exceed eight hours unless the equipment is in operation for a longer time. The time which will be paid for per day for equipment not used exclusively in the change to the scope of Work, will be the hours which the equipment was actually in operation on the changed Work.

- (4) In cases where there is an extension of the Contract Time, *pro rata* expenditures for time of foremen employed in the direct superintendence of productive labor in execution of changes.

All expenditures not included in the term “allowable expenditures” as limited and defined in this Article shall be considered as overhead, including, but not limited to, bond premiums, supervision, travel (meals, transportation, and lodging), superintendence [except *pro rata* time of foremen as referred to herein], timekeepers, clerks, watchmen, hand tools, small tools, incidental job burdens, engineering, drafting, and office expense. Any other provisions in the Contract Documents to the contrary notwithstanding, only demonstrable, direct, out-of-pocket expenditures for the changes plus percentages as set forth hereinabove shall be allowable for changes. No wages of a foreman shall be allowable for a change carried on concurrently with contract Work unless the claim includes a demand for extension of time caused by the authorizing or ordering of the change.

(j) *Execution of Changes Pursuant to Order.*—In the event neither Case (a) nor Case (b) can be mutually agreed upon as the method of determining the cost to the Owner for a change, the Contractor, provided it receives a written order from the Owner, shall proceed on force account under Case (c), and he shall keep and present in such form as the Engineer may direct a correct account of the expenditures together with vouchers. Allowable expenditures shall in no event exceed current costs for like services and materials, the burden of proof being on the Contractor.

(k) *Stipulated Maximum Sum.*—Under Case (b) and Case (c), the Owner shall prescribe the limits of any authorization or order for a change by means of an authorization or order in writing stipulating the maximum sum of money committed toward execution of the said change, and the Contractor shall have no authority to perform any change which will cost the Owner in excess of the stipulated maximum sum. It shall be solely the Contractor’s responsibility **to apply in writing to the Owner, NOT [repeat NOT] to the Engineer,** for an enlargement of the scope of the authorization or order by an increase in the said stipulated maximum sum if during the course of the performance of a change on force account under Case (c) the additional cost of the change to the Owner as established in accordance with allowable expenditures and allowances for profit and overhead permitted under Article 29(i) is approaching, or may exceed, the said stipulated maximum sum. It shall likewise be the responsibility of the Contractor to apply for an enlargement of the scope of the authorization or order if the total value of units at any agreed unit price under Case (b) is approaching the said stipulated maximum sum. For changes in the Work no claim for payment, repayment, reimbursement, remittance, remuneration, compensation, profit, cost, overhead, expense, loss, expenditure, allowance, charge, demand, hire, wages, salary, tax, cash,

assessment, price, money, bill, statement, dues, recovery, restitution, benefit, recoupment, exaction, injury or damages shall lie against the Owner for any amount in excess of such amount as shall have been mutually agreed to under Case (a) or in excess of such amount as shall have been established as the stipulated maximum sum under Case (b) or Case (c). The cost to the Owner for any change in the Work, except a change based upon agreed unit prices under Case (b), shall be established in accordance with the schedule of allowances and percentages stipulated under Article 29(i).

(l) *Breakdown of Expenditures.*—To accompany all Change Orders, the Contractor shall furnish a breakdown of expenditures for labor and materials by units and quantities in the form prescribed by the Owner, and the breakdown shall be accompanied by the following declaration: “I do solemnly swear, under criminal penalty, that the costs shown hereinabove do not exceed current costs for like services or materials and do not exceed the actual costs to the Contractor therefor, and that the quantities shown do not exceed actual requirements.” For all force account changes, the Contractor shall promptly, and in no event later than thirty (30) days after receipt of written demand therefor, pursuant to Article 29(i) submit to the Engineer a complete, accurate, and final breakdown and account together with vouchers, showing all expenditures and percentages allowable under Case (c). For all unit price changes, the Contractor shall promptly, and in no event later than thirty (30) days after receipt of written demand therefor, pursuant to Article 29(i) submit to the Engineer an accurate account of the quantity of Work performed under Case (b). In any case, the Engineer shall certify to the amount [including under Case (a) and Case (c) the allowance prescribed in the Contract for overhead and profit] due the Contractor. The Contractor shall obtain and furnish as back-up to the Contractor’s breakdown a separate breakdown for each Subcontractor’s charges prepared by each Subcontractor on the letterhead of the Subcontractor and properly signed by the Subcontractor.

(m) *Payment on Account.*—If the Contractor desires to obtain payment on account before any change in the Work has been completed, a Change Order certified by the Engineer and signed by the Contractor and the Owner must have been executed for so much of the change as has been completed at the time of the filing of the request for payment on account.

(n) *Form and Execution of Change Orders.*—Change Orders shall be recommended by the Engineer and signed by the Contractor and the Owner in accordance with the form of change order prescribed by the Owner. No request for payment of the Contractor for account of a change shall be due, nor shall any such request appear on a progress payment request or demand for final payment until (1) the Change Order shall have been certified by the Engineer and (2) a Change Order shall have been executed by the Contractor and the Owner.

(o) *Claims Distinguished from Changes.*— Claims for damages arising out of alleged negligence of the Engineer or Owner as provided for under Article 37 of the General Conditions are distinguished from claims for allowances for changes as provided for under Article 29. Claims for damages must be filed entirely separately pursuant to Article 37 of the General Conditions and claims for allowances for changes must be filed entirely separately pursuant to Article 29 unless the Contractor and Owner agree in writing otherwise.

(p) *Conditions Different from Those Indicated in Contract Documents.*—The parties contemplate delays necessary to complete tests, to redesign, and to perform change order Work in the event conditions encountered at the site are different from those indicated in the Contract Documents, or to perform change order Work to correct errors and omissions in the Drawings and Specifications. Execution of any change must be authorized. In such event there shall be an adjustment in the Contract Price as provided in the Contract for changes in the Work, but no claim for damages shall lie against the Owner for the aforesaid delays. Such delays are not a breach of contract because the parties contemplate such delays as a natural and probable consequence of construction operations. The parties agree that such delays constitute no wrong or injury, create no right to a claim for damages, and are not a ground for claiming extraordinary remuneration.

(q) *Unit Prices.*— The term “net” as used in reference to “unit prices” means in respect to Change Orders performed in accordance with Case (b) of Article 29 of the General Conditions that the unit prices offered by the Contractor and accepted by the Owner shall be inclusive of all sums for payment, repayment, reimbursement, remittance, remuneration, compensation, profit, cost, overhead, expense, loss, expenditure, allowance, charge, demand, hire, wages, salary, tax, cash, assessment, price, money, bill, statement, dues, recovery, restitution, benefit, recoupment, exaction, or injury. Upon request of the Owner in writing and within such reasonable space of time as the Owner shall designate in writing, the Contractor shall submit for consideration of the Owner proposals in writing for unit prices to be applied in the event Work is authorized by the Owner to be performed under Case (b) of Article 29. Under penalty of false swearing, a principal of the contracting firm shall certify that the unit prices submitted do not exceed current costs for like services or materials.

(r) *Combining Small Change Orders.*—The Owner may, with the Contractor’s concurrence, elect to postpone the issuance of a Change Order until such time that a single Change Order of substantial importance can be issued incorporating several changes. In such cases, the Owner will indicate this intent for each change in the Contract in a written notice to the Contractor, following agreement by the Owner and Contractor on the scope, price and time, if any, of the change.

(s) *Changes in the Contract Time.*—The Contract Time may be changed only by a Change Order. Changes in the Work described in section (a) of this Article and any other claim made by the Contractor for a change in the Contract Time will be evaluated by the Engineer and if the conditions warrant, an appropriate adjustment of the Contract Time will be made. The Engineer, when making these evaluations will take into consideration the amount and scope of Work which has been changed and will evaluate if the change in Work has affected the Critical Path as currently accepted on the Progress Schedule such that it would delay the completion of the Project. If after these evaluations have been made, and in the sole opinion of the Engineer the Contractor is due an extension of the Contract Time, then it will be granted by a Change Order. Extensions of the Contract Time granted as a result of weather will not result in a change in Contract Price.

(t) *Effect of Executed Change Order.*—The execution of a Change Order by the Contractor shall constitute conclusive evidence of the Contractor’s agreement to the ordered changes in the Work, the Contract as thus amended, the Contract Price and the Contract Time. The Contractor, by executing the Change Order, waives and forever releases any claim against the Owner for additional time or compensation for matters relating to or arising out of or resulting from the Work

included within or affected by the executed Change Order. The foregoing waiver and release expressly includes, without limitation, claims for additional compensation or time based on the theory that the Contractor has suffered so-called "impact" damage attributable to the effect of change order Work on other change orders Work or on unchanged Work.

Article 30. - Payments and Completion.—(a) *Contract Price.*— The Contract Price is either a lump sum or the sum of the unit prices stated in the Contract Agreement, for each item multiplied by the actual quantities installed of each item, and is the total amount payable by the Owner to the Contractor for the performance of the Work set forth in the Contract Documents. It is understood that the Contractor shall provide and pay for all products, labor, (including labor performed after regular working hours, on Sundays, or on legal holidays), equipment, tools, water, light, power, sewer, transportation, supervision, temporary construction of any nature, and all other services and facilities of any nature whatsoever necessary to execute, complete, place into operation, and deliver the Work.

(b) *Application for Payment and Receipts.*—The Contractor shall submit to the Engineer in accordance with a form to be supplied by the Owner an application for each monthly progress payment, and, if requested by the Owner or Engineer, receipts or other vouchers, showing his payments for materials and labor, including payments to Subcontractors as required by Article 10 of the General Conditions.

(c) *Progress Payments.*—If progress payments are made on valuation of Work done, such complete application shall be submitted to the Engineer at least twenty (20) days before payment falls due. In applying for payments, the Contractor shall submit a statement based upon the Schedule of Values on a progress payment form to be supplied by the Owner, and, if requested by the Engineer or Owner, itemized in such form and supported by such evidence as the Engineer or Owner may direct showing the Contractor's right to the payment claimed.

(d) *Materials stored.*—Application for payment may include, at the Contractor's option, the cost of products not yet incorporated into the Work which have been delivered to the site or to other storage locations authorized and approved by the Engineer. The Owner reserves the right to accept or reject pay requests for stored materials, and to limit payments to those stored materials which, in the Engineer's judgment, are necessary for continuing satisfactory Project progress.

Payment for stored products will be subject to the following conditions being met or satisfied:

- (1) The products shall be received in a condition satisfactory for incorporation in the Work, including manufacturer's storage and installation instructions;
- (2) The products shall be stored in accordance with the manufacturer's recommendations and in such manner that any and all manufacturer's warranties will be maintained and that they will not be damaged due to weather, construction operation, or any other cause;

- (3) An invoice from the manufacturer shall be furnished for each item on which payment is requested. The request may include reimbursement for cost of delivery, limited to common carrier rates, to the site, but will not include the Contractor handling, on or off site, or for storage expense;
- (4) The Contractor shall, on request of the Engineer, furnish written proof from the supplier of payment (less retention equal in percentage to that being retained by the Owner) for the products no later than 30 days after receipt of payment for same from the Owner. The Owner will have the right to deduct from the next payment estimate an amount equal to the payment for products if reasonable and adequate proof is not submitted; and,
- (5) Shop drawings, product data and samples, showing “No Exceptions Taken”, have been received from the Contractor for that specific equipment or material.

(e) *Operating Test Period.*—Upon receipt of written notice from the Contractor that the Work is ready to be placed into service for the operating test period, the Engineer will, within a reasonable time, inspect the Work. Prior to initiating the operating test, Work required by the Contract Documents must be in place and operable as determined by the Engineer, which includes, but is not limited to the following:

- (1) Pressure testing all lines as required in the Specifications;
- (2) Making adjustments of manhole rims;
- (3) Performing functional tests and providing manufacturers’ required certification as specified;
- (4) Removing temporary plugs, bulkheads, bypasses, etc., and diverting flow into the facility when directed by the Engineer; and,
- (5) All painting, grassing and restoration of the Work area, provided the Work area is not part of another segment not yet in the 30-day operating test period.

When the Engineer finds the Work of the Contractor ready for initiation of the operating test period, the Engineer will recommend to the Owner that the operating test period begin.

Certain segments of the Work, whether new or existing to be modified, may need to be placed in service prior to completion of the entire Project. Prior to placing these segments in operation, the requirements above, which pertain to the operating test period, must be complete for each segment.

The operating test period begins upon written notification from the Owner and runs for a period of 30 days. During this period, the Contractor shall complete all remaining items of Work, make adjustments found to be necessary, and ensure that all equipment and systems are functioning properly, and continue to function properly. The beginning of the operating test period initiates the Owner’s responsibility for providing chemicals, power, and operating personnel. The

Contractor retains responsibility for maintaining equipment until acceptance by the Owner. The segments to be placed into service prior to completion of the entire Project will be determined solely by the Engineer or the Owner.

(f) *Conditions Precedent to Application for Final Payment.*—ALL WORK REQUIRED BY THE CONTRACT DOCUMENTS MUST BE COMPLETED BEFORE THE FINAL INSPECTION IS PERFORMED. This includes, but is not limited to, the following:

- (1) Performing infiltration and pressure tests as described in the detailed Specifications;
- (2) Removing temporary plugs, bulkheads, bypasses, etc.;
- (3) Flushing all lines with potable water furnished by Contractor;
- (4) Pressure testing all lines as required in the Specifications;
- (5) Demonstrating the operation of all valves;
- (6) Providing specified instruction for the Owner's personnel;
- (7) Disinfecting all water mains as required in the Specifications; and,
- (8) Grassing and restoration of the Work area.

(g) *Notification of Readiness for Final Inspection.*—When all conditions precedent for the application have been completed, the Contractor shall submit completed Record Drawings to the Engineer and give notice to the Engineer in accordance with Article 5 of the Contract Agreement with a copy to the Owner in the following words:

The work on the Contract for the _____ having been fully completed except as stipulated hereinbelow, it is requested that a final inspection be made promptly by the Engineer in accordance with Article 5 of the Contract Agreement. The following Work is incomplete through no fault of the Contractor:

No final inspection shall be made until such time as the Engineer has received a letter in the exact form indicated above and a copy thereof has been received by the Owner. In the event the Contractor shall have issued the "Notice of Readiness for Final Inspection" prematurely [hereinafter referred to as "false start"] he shall be liable for the damage resulting from the aforesaid false start including but not limited to the salaries, professional fees, and travel and living expenses of the persons or parties inconvenienced by the aforesaid false start. The Contractor acknowledges and agrees that he has an indivisible, non-delegable, and non-transferable contractual obligation to the Owner to make its own inspections of the Work at all stages of construction; and the Contractor shall supervise and superintend performance of the Contract in such manner as to enable it to confirm and corroborate at all times that all Work has been executed strictly, literally, rigidly, and inflexibly in accordance with the methods and materials designated

in the Contract Documents so that (a) its certifications on periodical estimates shall be true and correct and (b) its notice of readiness for final inspection shall be true and correct. Accordingly, the Contractor agrees that it may not defend or excuse any deviation from the Contract Documents on the ground (a) that the deviation was not brought to its attention by another person or party or other persons or parties or (b) that a Subcontractor is, or Subcontractors are, at fault.

(h) *Final Acceptance.*—If the Engineer finds the Work of the Contractor complete and acceptable in accordance with the provisions of the Contract Documents and that the Record Drawings accurately depict the complete Work, the Engineer will recommend to the Owner that the Project be accepted and that final payment be made. In the event that the final inspection reveals deficiencies in meeting the Contract requirements, the Contractor shall complete all remaining items of Work, and make adjustments found to be necessary. Upon receipt of written notice from the Contractor that the Work is complete and ready for re-inspection, the Engineer will make another final inspection. The Contractor will be notified, in writing, by the Owner of the final acceptance of the Work. The date of final acceptance shall be the beginning of the warranty period.

(i) *Liens.*—Neither the final payment or any part of the retained percentage shall become due until the Contractor has furnished the Owner proper and satisfactory evidence (under oath if required) that all claims for labor employed and materials used in the construction of the Work under this Contract have been paid, satisfied or waived, and that no claims can be filed against the Owner for such labor or materials. If required, the Contractor shall deliver to the Owner a complete release of all liens or claims arising out of this Contract, and an affidavit that so far as it has knowledge or information the releases include all labor and materials for which a lien or claim could be filed; provided, however, that the Contractor may, if any Subcontractor or claimant refuses to furnish a release, furnish a bond satisfactory to the Owner to indemnify the Owner against any lien or claim. If any lien or claim remains unsatisfied after all payments are made, the Contractor shall refund to the Owner all moneys that the Owner may be compelled to pay in discharging such lien or claim, including all costs and a reasonable attorneys' fees.

(j) *Compliance with O.C.G.A. §§ 13-10-80 and 13-10-81.*—For purposes of O.C.G.A. § 13-10-80(b) the term “substantial completion of the Work” shall mean that “the Work has been satisfactorily completed and is accepted in accordance with the Contract Documents.” If upon completion of the second “final” inspection provided for in subsection (g) of this Article there are still remaining (i) any disputed indebtedness or (ii) if there are liens upon the property, or (iii) there are any items of Work uncompleted which in the opinion of the Engineer are “incomplete items” within the meaning of O.C.G.A. §§ 13-10-80(b)(2)(B) and/or 13-10-81(c), an amount equal to two hundred percent (200%) of each such item of indebtedness, lien or uncompleted Work as determined by the Engineer shall be withheld until such item or items are paid, settled or completed and the remaining retainage shall be paid to the Contractor.

Article 31. - Certificates of Payment.—(a) *Issuance.*—If the Contractor has made application for payment as provided under Article 30, the Engineer shall not later than the date when each payment falls due issue to the Owner a certificate for such amounts as he decides to be properly due or state in writing his reasons for withholding a certificate.

(b) *Warranty of Title.*—The Contractor warrants that title to all Work and products covered by a Certificate of Payment, whether incorporated into the Project or not, will pass to the Owner upon the receipt of such payment by the Contractor, free and clear of all liens, claims, security interests or encumbrances except retention equal in percentage to that being retained by the Owner.

(c) *Effect.*—No Certificate issued, or payment made to the Contractor, or partial or entire use of occupancy of the Project by the Owner shall be an acceptance of any Work or materials not in accordance with the Contract Documents. The making of the final payment shall constitute a waiver of all claims by the Owner other than those arising from unsettled liens, from faulty work appearing after final payment, or from the requirements of the Contract Documents, including but not limited to the provisions of Article 5, Hazards and Indemnification, of these General Conditions. Acceptance of the final payment shall operate as and shall be a release by the Contractor to the Owner from all claims of any kind or character arising out of or related to the Contract except for such specific amount or amounts as may have been withheld to cover the fair value of any incomplete Work which has been certified by the Engineer under the provision of Paragraph (d) of Article 5 of the Contract Agreement as incomplete through no fault on the part of the Contractor.

(d) *Date and Rate of Payment.*—Progress payments will be made by the Owner to the Contractor in accordance with Article 4 of the Contract Agreement. Final payment will be made in accordance with Article 5 of the Contract Agreement. The date and rate of payment are subject to Article 32 of the General Conditions. Sums retained pursuant to this Article are and remain the property of the Owner until such time as the Contractor shall have become entitled to receive payment of such retainage by complying with the full terms of the Contract Documents.

(e) *Delays in Making Payments.*—The date on which any progress payment is due shall be extended for such period of time as may be necessary in the determination of the Engineer for the Contractor to remedy any incorrect or incomplete application for payment.

(f) *Interest.*—Should the Owner fail to pay the sum named in any certificate of the Engineer when due, the Contractor shall receive, in addition to the sum approved in the certificate, simple interest thereon at the legal rate; PROVIDED, however, that the Contractor shall have given the Owner written notice of the date on which payment was properly due, and no interest shall be payable if the Owner makes payment when due or within three days after receipt of the aforesaid notice from the contractor. Such notice shall be in writing, and shall set forth:

- (1)— A short and concise statement that interest is due pursuant to this Article;
- (2)— The principal amount of the progress or final payment which is allegedly due to the Contractor; and,
- (3)— The first day and date upon which the Contractor alleges that interest will begin to accrue, pursuant to this Article.

(g) *Integration with the Prompt Pay Act.*—The provisions of the Contract Documents with respect to time limits for payments, grounds for withholding payment, conditions authorizing payments, and interest on late payments shall supersede all provisions of the Georgia Prompt Pay Act, as originally enacted or as amended, and any dispute arising between the parties hereto as to whether or not the provisions of this Contract or the Georgia Prompt Pay Act control will be resolved in favor of the terms of these Contract Documents.

Article 32. - Payments Withheld.—The Engineer may withhold or, on account of subsequently discovered evidence, nullify the whole or a part of any certificate to such extent as may be necessary to protect the Owner from loss on account of:

- (a)—Defective work not remedied;
- (b)—Claims filed or reasonable evidence indicating probable filing of claims;
- (c)—Failure of the Contractor to make payments properly to Subcontractors or for materials or labor;
- (d)—A reasonable doubt that the Project can be completed for the unpaid balance of the Contract Price.
- (e)—Damage to another Contractor or to some third party;
- (f)—Failure to maintain a rate of progress in accordance with the currently approved construction progress schedule;
- (g)—Failure to supply enough skilled workers or proper materials; or,
- (h)—Failure to complete all Work within the Contract Time.

When the above grounds are removed, the Engineer shall issue to the Owner a certificate for such withheld amounts as he determines to be properly due, and the Owner shall pay such amounts within ten (10) days. At the option of the Owner adherence to the construction progress schedule shall be a condition precedent to the right of the Contractor to demand payment of a progress payment. No omission on the part of the Owner to exercise the aforesaid option shall be construed to be a waiver of breach of the construction progress schedule or acquiescence therein, and the Owner may exercise its option from time to time as often as may, in its judgment, be expedient.

Article 33. - Notice of Commencement.—See Notice to Proceed, as used throughout these General Conditions.

Article 34. - Correction of Work after Final Payment.—Neither (1) the final certificate, (2) or any decision of the Engineer, (3) nor payment, (4) nor any provision in the Contract shall relieve the Contractor of responsibility for faulty materials, faulty workmanship, or omission of Work required by the Contract Documents, and the Contractor shall remedy any defects or supply any omissions resulting therefrom and pay for any damage to other Work resulting therefrom. The Owner shall give notice of observed defects or omissions with reasonable promptness. The Contractor shall within the time designated in orders of condemnation and without expense to the Owner, correct, remedy, replace, re-execute, supply omitted Work, or remove from the premises all Work condemned by the Engineer. The Contractor shall give prompt notice in writing to the Engineer, with copy to the Owner, upon completion of the supplying of any omitted Work or the correction of any Work condemned by the Engineer. In the absence of said notice, it shall be and is presumed under this Contract that there has been no correction of the condemned Work or

supplying of omitted Work. If the Contractor does not remove, make good the deficiency, correct, or remedy faulty Work, or supply any omitted Work within the time designated in orders of condemnation without expense to the Owner, the Owner, after ten (10) days' notice in writing to the Contractor, may remove the Work, correct the Work, remedy the Work or supply omitted Work at the expense of the Contractor. In case of emergency involving health, safety of property, or safety of life the Owner may proceed at once. Correction of defective Work executed under the Contract Documents or supplying of omitted Work, whether or not covered by warranty of a Subcontractor or materialmen, remains the primary, direct responsibility of the Contractor. The foregoing obligation of the Contractor shall remain in effect until the same shall have been extinguished by operation of the statute of limitations.

As additional security for the fulfillment of such obligation, but in no way limiting the same, the Contractor warrants and guarantees (1) that all work executed under the Contract Documents shall be free from defects of materials or workmanship for a period of one year from the notice of final acceptance of the Work by the Owner, and (2) that for not less than one year from such final acceptance, or for such greater time as may have been designated in the Contract Documents, products of manufacturers shall be free from defects of materials and workmanship. Whenever written guaranties or warranties are called for, the Contractor shall furnish the aforesaid for such period of time as may be required. The aforesaid instruments shall be in such form as to permit direct enforcement by the Owner against any Subcontractor, materialmen, or manufacturer whose guaranty or warranty is called for, and the Contractor agrees that:

- (a) The Contractor is jointly and severally liable with such Subcontractors, materialmen, or manufacturers;
- (b) The said Subcontractors, materialmen, or manufacturers are agents of the Contractor for purposes of performance under this Article, and the Contractor, as principal, ratifies the warranties or guaranties of his aforesaid agents by the filing of the aforesaid instruments with the Owner. The Contractor as principal is liable for the acts or omissions of his agents;
- (c) Service of notice on the Contractor that there has been breach of any warranty or guaranty will be sufficient to invoke the terms of the instrument; provided, however, that the Owner shall have furnished the Contractor with a copy of notice served on the Subcontractor, materialmen, or manufacturer; and,
- (d) The Contractor will bind his Subcontractor, materialmen, and manufacturers to the terms of this Article.

The calling for or the furnishing of written warranties shall in no way limit the contractual obligation of the Contractor as set forth hereinabove. The remedies stated in this Article are in addition to the remedies otherwise available to the Owner, do not exclude such other remedies, and are without prejudice to any other remedies.

Article 35. - Cash Allowances.—The Contractor shall include in the Contract Price all cash allowances named in the Contract Documents and shall cause the Work thus covered to be done by such contractors or firms and for such sums as the Engineer may direct, the Contract Price being adjusted in conformity therewith. The Contractor declares that the Contract Price includes such sums for overhead and profit on account of cash allowances as he deems proper. No demand for overhead and profit other than those included in the Contract Price shall be allowed. The Contractor shall not be required to employ for any such Work persons against whom he has a reasonable objection.

Article 36. – Contractor’s Warranty as to Performance.—The Contractor warrants that it is familiar with the codes applicable to the Work and that it has the skill, knowledge, competence, organization, and plan to execute the Work promptly and efficiently in compliance with the requirements of the Contract Documents. The Contractor having the obligation to keep a competent superintendent engaged on the Work during its progress, to employ only skilled mechanics, and to enforce strict discipline and good order among its employees, the Contractor, itself, is responsible for seeing that the Work is installed in accordance with the Contract Documents. Failure or omission on the part of the Owner, representatives of the Owner, agents of the Owner, resident engineer inspector, clerk-of-the-works, engineers employed by the Engineer, representatives of the Engineer, or the Engineer either to discover or to bring to the attention of the Contractor any deviation from, omission from, or noncompliance with the Contract Documents shall not be asserted by the Contractor as a defense for failure on the Contractor’s part to install the Work in accordance with the Contract Documents or for any other neglect to fulfill requirements of the Contract; nor shall the presence of any one, or all, or any of the foregoing at the site or the fact that any one, or all, or any of the foregoing may have examined the Work or any part of it be asserted as a defense by the Contractor against a claim for failure on its part to install the Work in accordance with the Contract Documents or for any neglect to fulfill requirements of the Contract. No requirement of this Contract may be altered or waived except in pursuance of a written order of the Owner and in strict accordance with the provisions in the Contract for changes in the Work.

Article 37. - Claims.—(a) *Extra Cost.*—If the Contractor maintains that any instructions by drawings or otherwise involve extra cost to the Owner under this Contract, the Contractor shall give the Owner and the Engineer written notice thereof within a reasonable time after the receipt of such instructions, and in any event before proceeding to execute any change except in emergency endangering life or property. The allowances to the Contractor shall then be as provided under Article 29 of the General Conditions. No claim for extra cost shall be valid unless so made.

(b) *Protest.*—All references to arbitration are deleted from the Contract Documents. Decisions of the Engineer shall be rendered in all cases as provided for under the General Conditions of the Contract, but no decision of the Engineer shall deprive the Owner or the Contractor of any form of redress which may be available under the laws of the State of Georgia to contracting parties. Any decision of the Engineer shall be final and binding on the Contractor in the absence of written notice of protest from the Contractor received by the Owner by registered mail within twelve (12) days of the date of the decision of the Engineer. The Owner shall have twelve (12) days from the date of receipt of a protest within which to investigate and make a reply.

There is no provision under the Contract for execution of work “under protest”. A protest must contain (1) the date of the decision of the Engineer to which exception is taken, (2) a statement of the issue or issues, (3) a citation of the provision or provisions of the Contract Documents which govern the issue or issues, (4) a summary of the logical principle or principles on which the protest is based, and (5) a summary of the legal grounds for taking exception. Filing a written notice of protest shall not be grounds for an extension of the Contract Time.

(c) *Shall be Based on the Legal Assertions of the Contractor.*—The Contractor shall assert claims solely on the basis of (a) principles of logic and (b) principles of law to which the Contractor, itself, has prescribed. The Contractor shall not protest a decision or request a conference on the ground merely that a Subcontractor, materialmen, or supplier has protested to the Contractor. Accordingly, the Contractor shall neither file a claim or make a request for a conference with the Owner regarding a claim except as it shall be for the purpose of asserting in the exercise of the Contractor’s best judgment such views, requests, and legal propositions as he deems the Contractor is entitled to maintain independently of any right of any Subcontractor, materialmen, or supplier against the Contractor.

(d) *Conference with the Owner.*—

(1) *Effect of.*—The Owner has no legal obligation to confer orally with the Contractor about the terms of the Contract or its performance and may insist that all transactions and all intercourse shall be in writing. Agreement of the Owner to confer with a Contractor shall not be construed as an offer of the Owner to reconsider or alter the Owner’s policies, practices, procedures, or prior position, and no such agreement shall constitute a waiver of any right or defense of the Owner. Such a conference is without prejudice to any rights or defense of the Owner. After the conference there will be nothing to confirm since the Owner does not engage itself to do or not to do a thing by agreeing to confer with the Contractor. It is expressly agreed that no conference between the Contractor and the Owner shall cure any failure of the Contractor to give any notice nor shall it cure any breach of any time limit or revive any right in the Contract.

(2) *Conditions precedent to.*—A proposal from the Contractor for a conference in respect to (a) a dispute, (b) a controversy, or (c) an interpretation or construction of any provision of the Contract Documents shall contain (a) a statement of the issue or issues, (b) a citation of the provisions of the Contract Documents which govern the issue or issues, (c) a precise summary of the logical principle or principles on which the issue or issues are based, and (d) a summary of the legal grounds which the Contractor takes with respect to the issue or issues.

(3) *Basis for and Terms of.*—All conferences between the Owner and the Contractor shall be pursuant to, under the terms of, and in accordance with this Article of the General Conditions.

Article 38. - Use of Premises.—The Contractor shall confine its equipment, apparatus, the staging and storage of materials, the operations of its forces, and the Work to limits indicated by law, ordinances, permits, or the Contract Documents and shall not unreasonably encumber the premises with materials. The Contractor shall not load or permit any part of the Work to be loaded with weight that will endanger its safety. The Contractor shall enforce the Engineer's instructions regarding signs, advertisements, fires, and smoking.

Article 39. - Specification Arrangement.—The Specifications are separated into numbered and titled divisions for convenience of reference. Neither the Owner nor the Engineer assumes any responsibility for defining the limits of any subcontracts on account of the arrangement of the Specifications. Notwithstanding the appearance of such language in the various divisions of the Specifications as, "The Mechanical Contractor", "The Electrical Contractor", "The Roofing Contractor", etc., the Contractor is responsible to the Owner for the entire Contract and the execution of all of the Work referred to in the Contract Documents.

Article 40. - Valuable Material, Geological Specimens.—If during the execution of the Work the Contractor, any Subcontractor, or any servant, employee, or agent of either should uncover any valuable material or materials such as, but not limited to, treasure, geological specimen or specimens, archival material or materials, or ore, the Contractor acknowledges that title to the foregoing is vested in the Owner. The Contractor shall notify the Owner upon discovery of any of the foregoing, shall guard it, and shall deliver it promptly to the Owner. The Contractor agrees that the Geologic and Water Resources Division of the Georgia Department of Natural Resources may inspect the Work at reasonable times consistent with the convenience of the Contractor.

Article 41. - Definitions.—(a) *Applicable Law.*—This Contract shall be governed by the law of Georgia.

(b) *Article Not Plenary.*—This Article is not entire, plenary, or exhaustive of all terms used in the General Conditions which require definition. There are definitions of other terms under Articles to which the terms are related.

(c) *Balanced Bid.*—Balanced Bid shall mean a Bid in which each of the unit prices and total amount bid for each of the listed items reasonably reflects the value of that item with regard to the entire Project considering the prevailing cost of labor, material and equipment in the relevant market. A Bid is unbalanced when, in the opinion of the Owner, any unit prices or total amounts Bid on any of the listed items do not reasonably reflect such actual values.

(d) *Change Order Form.*—The Change Order Form is the instrument by which adjustments in the Contract Price and Contract Time are effected pursuant to changes made in accordance with Case (a), Case (b) or Case (c) of Article 29 of the General Conditions or in accordance with Subparagraph (i) of Article 29 of the General Conditions. The Change Order Form shall be accompanied by a breakdown in the form prescribed in a specimen, which the Owner will supply to the Contractor. The Engineer shall certify to the amount of the adjustment. The Change Order Form shall be signed by the Contractor and the Owner. The breakdown is only for the purpose of enabling the Engineer and the Owner to make a judgment on the dollar amount of the adjustment in the Contract Price. No condition, term, qualification, limitation, exception, exemption,

modification, or proviso shall appear in the breakdown. The breakdown shall be in the exact form and language of the above-mentioned specimen. In the event any condition, term, qualification, limitation, exception, exemption, modification, or proviso shall appear in a breakdown, it shall be invalid.

(e) *Contract; Contract Documents.*—The terms Contract and Contract Documents include the Invitation to Bid, Instructions to Bidders, Contractor's Bid (including all documentation accompanying the Bid and any post-Bid documentation required by the Owner prior to the Notice of Award), the Contract Agreement, Bonds, all Special Conditions, General Conditions, Supplementary Conditions, Specifications (Divisions 01 through 46, inclusive), Drawings, and Addenda, together with written amendments, Change Orders, field orders and the Engineer's written interpretations and clarifications issued in accordance with the General Conditions on or after the date of the Contract Agreement. Shop drawing submittals reviewed in accordance with the General Conditions, geotechnical investigations and soils reports, and drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the site are not Contract Documents.

(f) *Contract Time.*—Contract Time shall mean the number of consecutive calendar days as provided in the Contract Agreement for substantial completion of the Project, to be computed from and including the date of the Notice to Proceed. All time limits stated in the Contract Documents or shown on the construction progress schedule are of the essence of the Contract.

(g) *Contractor.*—The Contractor shall mean the party identified in the Contract Agreement and its authorized and legal representatives.

(h) *Cross-reference and Citations of Articles and Paragraphs of the General Conditions.*—Cross-references and citations of Articles and paragraphs of the General Conditions are for the convenience of the Contractor, Engineer and the Owner, and are not intended to be plenary or exhaustive nor are they to be considered in interpreting the Contract Documents or any part of the Contract Documents.

(i) *Engineer.*—The Engineer shall mean JACOBS ENGINEERING GROUP INC.

(j) *Furnished by Owner.*—Furnished by Owner shall mean that the Owner shall pre-purchase specific products and have them delivered to a place mutually agreed upon by the supplier, the Owner and the Contractor, at no cost to the Contractor. In connection with an item furnished by the Owner, "Install" shall mean to take delivery of the item, off-load and transport to the job site, store as necessary and install according to the Drawings and Specifications.

(k) *Install, Deliver, Furnish, Supply, Provide.*—Such words mean the work in question shall be put in place by the Contractor ready for occupancy and use, unless expressly provided to the contrary.

(l) *Liquidated Damages.*—Liquidated Damages shall mean the sum stated in the Contract Agreement which the Contractor agrees to pay for each consecutive calendar day beyond the Contract Time required to achieve substantial completion of the Project. Liquidated Damages will end upon written notification from the Owner that the Project is ready for initiation of the Operating Test Period for the total Project.

(m) *Meaning of words and phrases.*—Unless the context or the Contract Documents taken as a whole indicate to the contrary, words used in the Contract Documents that have usual and common meanings shall be given their usual and common meanings and words having technical or trade meanings shall be given their customary meaning in the subject business, trade or profession.

(n) *Notices.*—Unless otherwise provided in the Contract Documents, written notice shall be deemed to have been duly served if delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or if delivered or sent by certified mail to the last business address known to the party that gives notice.

(o) *Notice to Proceed.*—The Notice to Proceed is a written notice from the Owner pursuant to which the Contractor shall commence physical work on the Project site. A Notice to Proceed is a condition precedent to the execution of any Work on the site by the Contractor.

(p) *Order of Condemnation.*—An Order of Condemnation shall be in writing, shall be dated, shall be signed by the Engineer, shall be addressed to the Contractor with a copy to the Owner, and shall contain three elements as follows:

FIRST ELEMENT: Description of Work

- (1) which has been omitted or
- (2) which is unexecuted as of the date of the Order of Condemnation, the time for its incorporation into the Work under the construction progress schedule having expired, or
- (3) which has not been executed in accordance with the methods and materials designated in the Contract Documents.

SECOND ELEMENT: Citation of the provision or provisions of the Contract Documents which has or have been violated.

THIRD ELEMENT: Fixing of a reasonable time within which the Contractor shall have made good or remedied the deficiency which said time shall not be deemed to be an extension of Contract Time or deemed to be authorization for amendment to the construction progress schedule.

An Order of Condemnation may be issued for failure of the Contractor to supply enough workers or enough materials or proper materials, the Order of Condemnation in such event being based on Article 28 of the General Conditions and upon the definition of Work as set forth under Article 41(u).

(q) *Owner.*—The Owner shall mean THE MACON WATER AUTHORITY or its authorized and legal representatives.

(r) *Products.*—Products shall mean materials or equipment permanently incorporated into the Work.

(s) *Specifications*.—The term “Specifications” shall include all written matter in the bound volume (Divisions 01 through 46, inclusive) or on the drawings and any addenda or modifications thereto.

(t) *Subcontractor*.—The term Subcontractor as employed herein includes only those having a direct contract with the Contractor. It includes one who furnishes labor and materials which are incorporated into the Work but does not include one who merely furnished materials incorporated into the Work by the labor of others.

(u) *Work; Project*.—The terms Work and Project shall mean the entire completed construction required to be furnished under the Contract Documents.

END OF SECTION

SECTION 00800**SUPPLEMENTARY CONDITIONS****GENERAL** (Example, if any conditions exist)

The provisions in these Supplementary Conditions shall govern in the event of any conflict between the General Conditions and the provisions herein.

Policy “A”. ~~Compaction Tests and Shop Drawing Submittals~~

~~Please contact Mr. Joel Herndon, the Macon Water Authority’s (the “Owner’s”) Chief Inspector, at 478.464.5639 before commencing the construction activity. Compaction tests, where required, shall be performed in accordance with Macon Water Authority’s policy. The Contractor and the soil testing laboratory shall contact Mr. Herndon before the testing. The location at which the tests are performed will be decided by our inspection crew. The test report shall be submitted to the Engineering Division before the Owner can accept the Project for operation and maintenance. The Contractor shall submit five (5) copies of the shop drawings (ductile iron pipe, gate valve, valve box, ductile iron fittings, fire hydrant, manholes, manhole frames and covers, gravity sewer pipe, support structures, appurtenances, etc.) before installation. The Contractor will not be permitted to install materials and appurtenances until all the shop drawings are approved. The Contractor shall submit two copies of as-built drawings after the completion of construction but before the Project is accepted for operation and maintenance. The as-built drawings shall include the following for water/sewer portion of the Project: location of water main, valves, fire hydrants, fittings, water services to each lot, location of sewer mains, manholes (including rim and invert elevations), distance and angle between manholes, distance and length of each lateral from manholes, location of water main, gate valves, fire hydrants and fittings, width of easements and any other pertinent information.~~

Note: See Section 01720 for additional requirements.

Policy “B”. ~~Televising: NOT USED~~

Policy “C”. ~~As-Built: Produce and submit “AS-BUILT” survey of the generator, electrical lines to and from transfer switch, and any other underground utilities that were encountered during the installation. As-Built shall be prepared by a licensed Professional Engineer or Georgia Registered Land Surveyor, as appropriate for the project, and shall be submitted before the project is accepted by the Owner for operation and maintenance and before any project plat is signed.~~

~~The As-Built drawings shall be submitted in either the (.dxf) or the (.dwg) version DWG 2010 or later on a USB Flash Drive, along with two (2) sets of plans in the same format as shown on the drive. The As-Built drawings shall be submitted on a (24” x 36”) sheet. The vertical and horizontal accuracy of the as-builts shall be within 0.1 foot accuracy.~~

~~All relative information such as right-of-way, property corners, state plane monuments, etc. shall be located and tied to Georgia State Plane Coordinates.~~

Policy “D” – Payment Estimate Form – The Contractor shall generate an EXCEL spreadsheet listing all items in the Proposal and columns for quantities this period, total this period, total quantities to date, and total amount to date for a detail backup for the attached pay estimate summary sheet.

MWA PAY ESTIMATE FORM – FOLLOWS ON SEPARATE PAGE

Project Milestone & Scheduling- It is the desire of the Owner to complete this Project within the Contract Time allocated in the Contract Documents.

END OF SECTION

SECTION 00805**MATERIAL PICKUP ACKNOWLEDGMENT*****Macon Water Authority***

790 Second Street P.O. Box 108

Macon GA 31202

Phone: (478) 464-5600

Fax: (478) 738-3864

Project Name: _____

Project Engineer: _____

Project Manager: _____

Itemized List of the Materials:

Material Description	Size (if applicable)	Length (if applicable)	Quantity
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

I understand and acknowledge by receipt of the Materials listed, that:

These Materials furnished by the Macon Water Authority have been inspected thoroughly by me prior to transport to the project location; and that Materials in transport to the project location become the sole responsibility of my company.

By: _____

(Print Contractor's Company Name) **(Signature** of Authorized Representative - *person picking up the materials*)

Date: _____

Print Name: _____

By: _____

Date: _____

MWA-Warehouse Manager or MWA-Authorized Representative

SECTION 00810**PAY ESTIMATE**

Summary Sheet

Macon Water Authority

790 Second Street P.O. Box 108

Macon GA 31202

Phone: (478) 464-5600

Fax: (478) 738-3864

Project Name: _____

MWA's Project Number: _____

Pay Estimate Number: _____

Partial: _____

Pay Period: _____

Final: _____

Original Contract Amount: \$ _____

Total Change Orders to Date: _____

Current Contract Amount: \$ _____

Original contract Work Performed to Date: _____

Change Order Work Performed to Date: _____

Materials Stored on Job Site: _____

Subtotal: _____

Less (5 %) Previous Retainage: _____

Subtotal: _____

Less Previous Payments: _____

Current Invoice Amount: _____

Less (5 %) Current Retainage: _____

Balance Due This Payment: _____

According to the best of my knowledge and belief, all items and amounts shown on the face of this Pay Estimate are correct; that all Work has been performed or materials supplied, or both, in full accordance with the requirements of the Contract Documents, or duly authorized deviations or additions thereto; that the foregoing is a true and correct statement of the Contract Price account up to and including the last day of the period covered by this Pay Estimate; that none of the "Balance Due This Payment" has been received, and that the undersigned and its Subcontractors have complied with all the labor provisions of the Contract Documents.

The Contractor further certifies that on those items of Work not disputed that all payables, materials, bills, and other indebtedness connected with the Work have been paid (less retention equal to that being retained by the Owner) for Work covered by previous payments.

Quantities on request for partial payment are estimated only. Final quantities are by a final survey and "as built" drawings by Contractor.

(Contractor's Company Name-PRINT) By: _____
(Signature of Contractor's Authorized Representative)

Date: _____

Title: _____

By: _____

MWA-Inspector

Date: _____

By: _____

Project Engineer

Date: _____

By: _____

MWA-Project Manager

Date: _____

TECHNICAL & PERFORMANCE REQUIREMENT RESPONSE COVER PAGE**RFP title****Name of the proposer****Managing office address****Telephone number****Name and email address of contact person****Date of submission**

TERMS & ABBREVIATIONS

The following terms and definitions are used herein:

AASHTO – American Association of State Highway and Transportation Officials

ANSI – American National Standards Institute

ASCII – American Standard Code for Information Interchange, character encoding standard

ASQ – American Society for Quality

AWWA – American Water Works Association

CIS – Customer Information System

DCU – Data Collection Unit

FM – Factory Mutual (Global), a testing laboratory

FTP – File Transfer Protocol

GIS – Geographical Information System

GPS – Global Positioning System

HES – Head End System

HMRU – Handheld Meter Reading Unit

Installation Period – The period that begins on the Commencement Date stated in the Authority's issued Notice to Proceed and ends upon the certification of Substantial Completion.

IEC – International Electrotechnical Commission

IP Code – Ingress protection code (referring to enclosure protection and resistance to ingress of foreign solids or liquids)

MDCU – Mobile Data Collection Unit

MDMS - Meter Data Management System

MIU – Meter Interface Unit (Endpoint)

NSF – National Sanitation Foundation

ODBC – Open Database Connectivity, a standard application programming interface

OSHA – Occupational Safety and Health Administration

PSI – Pounds per Square Inch

Route Release – A group of accounts determined by the Authority released to the Proposer for installations. The accounts may be grouped by meter reading route, zip code, or other group based on geographic proximity and logistics.

SAML – Security Assertion Markup Language

SaaS – Software as a Service

SQL – Structured Query Language

WAN – Wide Area Network

XML – eXtensible Markup Language, used to store and transport data

INTRODUCTION & CAPABILITY STATEMENT

- *Provide a summary of up to 1 page describing your company and your partner subcontractors' background qualifications for completing the defined Scope of Work & Technical Requirements in this RFP.*
- *Please use an easily printed blue for all responses throughout this proposal.*

For Example:

<i>Name of Company</i>	

1 MINIMUM EVALUATION REQUIREMENTS FOR PROPOSER & SUBCONTRACTORS

➤ Please use an easily printed *blue* for all responses throughout this proposal.

For Example:

Name of Company	

1.1 Company Information

Fill in the following as they pertain to the Proposer's company:

Name of Company	
Number of Years in Business	
Number of Active and Completed AMI Projects	
Number of Employees	
Any local staff/offices	
Is Proposer ready, willing, and able to perform the Scope of Work and meet the Technical Requirements as described in this RFP?	
Authorized Representative's Name	
Authorized Representative's Title	
Authorized Representative's Phone Number	
Authorized Representative's Email	
Authorized Representative's Signature	

1.2 Proposer Team's Company Backgrounds

Using the following tables, provide company backgrounds for Proposer and any Primary Subcontractors* regarding each company's water AMI experience.

(*Primary Subcontractors are those who are considered an integral part of Proposer's team but are separate business entities from Proposer)

- a. **PROPOSER:** Use the following table to note **ALL** water AMI projects that have commenced or have been completed in the last 5 years.

Customer Name	Total # of Meters	AMI Technology (Network & MIU)	Meter (Vendor)	Project Start Date	Percentage Complete	Project Completion Date (if applicable)

- b. **PRIMARY SUBCONTRACTORS:** Use the following table to note **ALL** water AMI projects that have commenced or have been completed in the last 5 years.

Customer Name	Total # of Meters	AMI Technology (Network & MIU)	Meter (Vendor)	Project Start Date	Percentage Complete	Project Completion Date (if applicable)

1.3 Proposer's Team: Key Personnel and Primary Subcontractors

- a. Use the following table to identify Proposer's key personnel for this project.
Use the "BACKGROUND" area to summarize their experience
Attach resumes for team members in **APPENDIX A**.

Proposer's Key Personnel:

NAME	ROLE/TITLE	REPRESENTATIVE WATER AMI PROJECTS	# OF METERS
BACKGROUND			
BACKGROUND			
BACKGROUND			

- b. Use the following table to identify Proposer's Primary Subcontractor partners (including Installation Subcontractors) for this project.
Use the "BACKGROUND" area to summarize their experience.
Attach resumes in **APPENDIX A**.

Proposer's Primary Subcontractor's Key Personnel

COMPANY	NAME	ROLE/TITLE	PRODUCT	SERVICE
BACKGROUND				
BACKGROUND				

1.4 Project & Contract Management

- *Proposer will designate a Project Manager who*
 - *Shall be responsible for managing the overall project on behalf of the Proposer*
 - *Should be onsite throughout the duration of the project*
 - *Shall have managed at least five (5) water AMI projects*
 - *The Authority shall approve the Project Manager or a change in the Project Manager.*
- *Proposer will designate a Contract Manager, who*
 - *Shall have the authority to handle and resolve any disputes or contract issues with the Authority*
 - *Disputes that cannot be resolved at this level must be resolved in accordance with the dispute section of this Contract.*
 - *Attach resumes in **APPENDIX A**.*

Proposed Candidate	Name, Title	Reference Name, Title, Company, Phone Number, Email
Project Manager		
Contract Manager		

1.5 References

Client contact details	<u>Reference #1:</u>	<u>Reference #2:</u>	<u>Reference #3:</u>
Name			
Title			
Phone number			
Email address			
Number of meters or MIUs			
Equipment Deployed (vendor & model)			
Network			
MIU			
Meter			
Date(s) Started			
Project Status (% Complete or Date Completed)			
Key Subcontractors			

1.6 Financial Information

- a. Is the Proposer an incorporated subsidiary or joint venture? **YES / NO**
 - i. If YES, proposer shall include relevant financial information of its parent companies attached in **APPENDIX D: Financial Data**
- b. In support of the financial stability of the firm, Proposer must provide a minimum of one (1) of the following as a separate document:
 - i. **Option A)**
A statement regarding the firm's financial stability, including information as to any current or prior bankruptcy proceedings
 - ii. **Option B)**
A Dun & Bradstreet (D&B) Supplier Evaluation Report (SER), or similar type report. All costs associated with this report shall be borne by the Proposer
 - iii. **Option C)**
A copy of a certified financial statement for each of the last three years prepared by an independent certified public accounting firm or Federal Tax Return for previous years
- c. Indicate which option applies to proposer: **Option A / B / C**
 - i. Submit any applicable paperwork for Options A, B or C in **APPENDIX B: Attestation Regarding Disputes**

1.7 Loss of Agreement and/or Inability to Fulfill Requirements

- *The Authority shall evaluate the facts and at its sole discretion may reject the Proposer's response if the facts discovered indicate that completion of an agreement resulting from this RFP may be jeopardized by selection of Proposer.*
 - *Submit all applicable responses/explanations regarding any pending terminations or defaults to be in **APPENDIX B: Attestation Regarding Disputes***
- a. Does the Proposer have any pending terminations? **YES / NO**
 - b. Has the Proposer experienced any such settlement or termination for default in the past five (5) years as defined below? **YES / NO**
 - i. **IF YES TO EITHER OF THE ABOVE QUESTIONS:**
Proposer shall submit full details of all terminations for default, settlements to avoid litigation, or pending terminations experienced in the past five (5) years including the other party's name, address, and telephone number.

Termination for default is defined as "notice to stop performance due to Proposer's non-performance or poor performance", and the issue was either: (a) not litigated; or (b) litigated and such litigation determined Proposer to be in default.
Proposer shall also present its position on the matter.

2 **FIELD INSTALLATION**

The directions below should be deleted prior to submission of RFP response

- Please use an easily printable and readable **blue (or blue)** for all responses throughout this proposal.

For Example:

Name of Company	

- The Authority recognizes that the AMI system features, characteristics, and actual performance levels are the result of the interaction of system components and are to be addressed in this section.
- All questions and requests for specificity must be answered in accordance with AMI RFP Instructions
- Proposers must respond to all statements incorporating “provide,” “indicate,” etc.
- Answer questions as they are specifically asked and include answers directly below the questions in the space provided
- All specifications incorporating “should,” “desires,” etc., are highly desirable features.
- **All specifications incorporating “shall,” “must,” etc., are requirements, and failure to comply with these must be specifically noted as exceptions**
 - In the case of a specific requirement not followed by a request for an explanation, Proposer must explicitly affirm that the system or component meets that requirement by selecting the provided Y / N option.
 - Simply taking exception to a requirement without providing an explanation and, where appropriate, alternative specifications and language, shall be deemed non-responsive, and may result in rejection of the proposal.
- **Any exceptions to complying with Technical and Performance Requirements should be noted in 2 places:**
 - 1: In that specific section in table provided
 - 2: Compiled and dropped into **APPENDIX C: Exceptions to Technical & Performance Requirements**

To avoid repetition, Proposers are strongly advised to read through the entire RFP Technical Requirements before responding.

If an answer has already been provided in response to an earlier question, make reference to it – do NOT repeat text. Adding a link to that section is encouraged but not necessary.

Section	Comply? Y/N	Requirement
2		a. The following provisions will apply to work performed by either Proposer’s own staff or any subcontractor(s).

Section	Comply? Y/N	Requirement
		i. Proposer shall manage installation of AMI equipment. The Proposer shall: ii. Specify the installation methods iii. Train the installation service providers iv. Manage the installation performance v. Be responsible for the quality control and quality assurance of the MIU installations
Any Proposed Alternative Specification or Language:		

b. Describe the proposed approach to managing the network, meter and MIU installations.

2.1 Authority Project Manager

- *The Authority will designate an employee or agent who will manage the project on behalf of the Authority, coordinate with the Proposer and ensure compliance by the Proposer with the specifications.*
- *The designation of a Project Manager shall not relieve the Proposer of its full responsibility to comply with the terms of the Contract and all plans and specifications.*

2.2 Proposer Staff

Section	Comply? Y/N	Requirement
2.2		a. Proposer will designate an Installation Manager, who shall be responsible for managing the entire installation project on a day-to-day basis on behalf of the Proposer and for seeing that all installations are carried out in a professional manner and in compliance with the procedures required by the AMI system manufacturer, the Authority, and all other applicable local, state, and federal regulations.
		b. The Installation Manager i. Should be onsite continuously throughout the duration of the project, except for holidays and vacations, during which the Proposer shall provide a qualified substitute. ii. Shall be experienced in supervising water meter installation contracts, and familiar with applicable regulations and safe and proper installation procedures.
		c. The Authority shall approve the Installation Manager or a change in the Installation Manager.

Section	Comply? Y/N	Requirement
		d. Successful Proposer shall submit résumé and references of candidate(s) for Installation Manager.
		e. All of the Proposer's employees or subcontractors shall be fully trained i. by the Proposer in the removal of existing meters and the installation of new meters and MIUs. ii. in retrofitting newer meters as requested by the Authority with AMI-compatible registers and MIUs, regardless of size.
		f. Proposer's employees or subcontractors are not permitted to engage any Authority customer in an argumentative way. Should those conditions evolve, Proposer's employee shall immediately call a Authority Field Representative to handle the situation.
		g. The Authority reserves the right to require Proposer to retrain, reassign, or remove from the project any employee or subcontractor who fails to perform in a workmanlike manner.
		h. Proposer shall engage by employment or subcontract at least one person at all times who shall maintain a valid and current Georgia Utility Contractor License.
		i. More than one licensed plumber shall be provided by the Proposer if the work volume warrants it.
		j. This/these person(s) shall be responsible for correcting any problems or damage to plumbing occasioned by the changing of meters or registers or the installation of the AMI equipment under this contract. Proposer shall provide references for each such person.
		k. The Authority reserves the right to approve licensed individuals for work on this project.
Any Proposed Alternative Specification or Language:		

- n. Provide a proposed organization chart for the project. Include Project Manager & Contract Manager identified in Section 1.4

2.3 Installation Procedures Approval and Testing

Section	Comply? Y/N	Requirement
2.3		a. Proposer shall submit detailed scheduling and installation procedures to the Authority for approval within 30 days after Notice to Proceed.
		b. The procedures should be designed to optimize the work of the Installers, the Authority field inspectors, and all other staff working on the project.
		c. Prior to the commencement of full-scale installation of all MIUs, but after the Proposer has installed the the installation control software and it has been tested and accepted by the Authority through the UAT process, the Proposer's installation subcontractor shall install meters and MIUs on no more than 50 accounts per week following the agreed-to procedures.
		d. The Authority will determine which accounts will be included in this Phased Start.
		e. During this test and a period not shorter than twenty (20) working days following it's starting, the Authority and Proposer shall evaluate the procedures for public notification, scheduling installations, meter and MIU installation, inspections and inspection reporting, exception processing, data transfer by the installers to the Authority's billing system, installation data management and project control, and problem resolution, to ensure they are working and effective.
		f. Proposer shall not increase pace beyond 50 installations per week during this evaluation period.
		g. Proposer and the Authority shall develop a test and acceptance plan covering these procedures. The Authority may require the Proposer to modify any procedures that it deems are deficient or ineffective or otherwise unacceptable to the Authority. Full-scale installation of meters and MIUs shall not begin until project control procedures and systems are determined to be performing accurately, and the procedures have been approved by the Authority.
Any Proposed Alternative Specification or Language:		

2.4 Installation Sequence

Section	Comply? Y/N	Requirement
2.4		a. Proposer shall conduct installations by Route Release, defined as a group of meter reading routes, zip code, or other group based on geographic proximity and logistics, to be determined by the Authority in discussion with the Proposer. The Authority will retain the right to prioritize other groups, or to reorganize priorities, both before the project begins and during the project.
		b. No more than two Route Releases at one time shall be available to the Proposer for installations.
		c. Unless approved in writing by the Authority, Proposer shall meet the following requirements in one of the two available Route Releases before a new Route Release can be provided to the Proposer: i. The Proposer shall complete at least 90% of the installations in the Route Release. The remaining 10% of installations in the Route Release shall be completed within 30 days of reaching 90% completion in that Route Release. Exceptions to completion may be granted by the Authority; for example, if a property is vacant or abandoned, has fragile or deteriorated plumbing, has inoperable control valves or curb stops, the Proposer has been denied access after following the agreed-to contact procedures, or other factors as determined by the Authority.
Any Proposed Alternative Specification or Language:		

2.5 Customer Notification

Section	Comply? Y/N	Requirement
2.5		a. Between 4 and 5 weeks prior to the commencement of installations for a particular group of customers, Proposer shall provide an Authority-approved scheduling & leave behind card to those customers informing them of the project and prompting customers to schedule their meter replacement appointment. The Proposer shall provide the scheduling & leave behind cards in person, within the required time frame of notification, to the applicable service address on each work order. Proposer should attempt to coordinate the meter replacement appointment with the customer point of contact during this interaction.

Section	Comply? Y/N	Requirement
		b. At least 2 weeks prior to the commencement of installations for a particular group of customers, Proposer shall provide an Authority-approved postcard to those customers indicating the time period when installations will occur. The postcard shall be mailed in time to meet the required time frame of notification. This notification will state that the customer is requested to call the Proposer to schedule an appointment.
		c. After each installation attempt, the Proposer shall place an Authority-approved door hanger (third notification) on the customer's property indicating the successful or unsuccessful change of the meter.
		d. The Proposer shall place Authority-approved custom yard signs in locations where installations are occurring, or where installations are about to occur, to promote nearby customers to schedule appointments. These yard signs shall be in full color and double-sided and shall be of durable and weather-resistant material, such as corrugated plastic.
		e. The text of these notifications and any other printed communications with customers will be submitted by the Authority Project Manager to the Proposer at least 2 weeks prior to use.
		f. These printed notification materials and any applicable postage shall be in full color and double-sided.
		g. The weight of paper for door hangers shall be a minimum of 300 gsm.
		h. The size of door hangers shall be 4.25" x 11".
		i. The size of postcards shall be 8.5" x 5.5".
		j. The size of yard signs shall be 18" x 24".
		k. Pricing for all printed notification materials and any applicable postage and envelopes shall be included in the Pricing Proposal.
		l. Printing of all printed notifications, excluding yard signs, shall be done in batches, not all at once. There shall be a minimum of four (4) batches for each Printed Notification.
		m. Proposer shall also develop and submit to the Authority the scripts for any telephone or in-person conversations with customers for approval by the Authority's Project Manager at least 1 week prior to use.
Any Proposed Alternative Specification or Language:		

2.6 Installation Schedule

Section	Comply? Y/N	Requirement
2.6		a. The Authority and the Proposer shall establish an overall schedule for installation of the entire project.
		b. On the first workday of each week, the Proposer shall provide the Authority an updated schedule of where work is planned for the next 3 weeks.
		c. By 7:30 AM ET on the first business day of each week, Proposer shall provide the Authority a schedule of where work is planned for that day and each subsequent day of that week, to enable coordination and communication between the Authority and Proposer for the work. If the schedule changes for whatever reason, an updated daily schedule shall be forwarded to the Authority within 24 hours.
Any Proposed Alternative Specification or Language:		

2.7 Work Hours

Section	Comply? Y/N	Requirement
		a. Installers must be available for evening (until at least 8:00 PM) and Saturday installations, as well as for installations that must be conducted at other times because of special needs.
Any Proposed Alternative Specification or Language:		

- b. Indicate normal installation work hours, which must be approved by the Authority.
- c. Indicate the number of installers proposed for all installation periods, including those that will be allocated to evenings and weekend times.

2.8 Account Data File

Section	Comply? Y/N	Requirement
2.8		a. Prior to the start of the installations, the Authority will provide the Proposer with an electronic file containing the information necessary to create work orders for meter/AMI installation.
		b. The Authority will provide the Proposer with periodic updates to this file for routes where the AMI system has not yet been installed.
		c. For each meter, the data file will indicate the meter size, make and serial number, whether or not the meter shall be replaced, the

Section	Comply? Y/N	Requirement
		meter location, access notes to the meter, and the name and phone number that may be listed on the account.
Any Proposed Alternative Specification or Language:		

2.9 Work Order Processing

- *The Authority desires read-only access to the Proposer's database and reserves the right to audit the Proposer's database.*

Section	Comply? Y/N	Requirement
2.9		a. Proposer shall be responsible for ensuring that all data transfers to and from the Authority's information systems are properly working before commencing any installations.
		b. Each Proposer's work order issued to an installer will include, at a minimum, the customer's address, service address, premises identification number, meter location, MIU or remote location, designation of whether meter is to be replaced, existing meter number, existing register number, meter make, model and size, and most recent meter reading.
		c. All work orders shall be provided electronically.
		d. Should the installer find any discrepancies in the information provided in the work order and what is observable at the installation site (e.g., different meter or MIU number, location or other characteristic), the installer or Installation Manager shall immediately contact the Authority Project Manager or designated representative and shall not attempt the installation until the site is inspected by or shown to (e.g., using cellphone camera) a Authority representative and given authorization.
		e. The Authority may request that the installer collect and include in the returned work order reasonable additional field data, such as premises type (residential, commercial, or industrial).
Any Proposed Alternative Specification or Language:		

2.10 Notification of Owners

Section	Comply? Y/N	Requirement
2.10		a. Proposer must notify the owner or representative of a building of its intent to install the AMI system at a particular customer's premises if inside access is required.
		b. The owner may authorize the Proposer to make an appointment with the owner's adult (age 18 or over) representative. Proposer shall document such authorization.
		c. Customers who have multiple meters shall be given the opportunity to schedule the installation of MIUs on all of those meters in a short period of time, provided those meters are located near each other.
Any Proposed Alternative Specification or Language:		

2.11 Appointment Scheduling

➤ *The Authority desires that installation appointments be made with 2-hour precision.*

Section	Comply? Y/N	Requirement
		a. Proposer shall be responsible for scheduling and handling all installation appointments. Installation appointments are required if the meter is not readily accessible, service is to <i>critical</i> residential customers, or when interruption of ongoing service is anticipated.
		b. Whenever possible, Proposer shall notify customers of any changes in schedule at least 1 day in advance of the original appointment.
		c. Proposer will be responsible for installation if the Authority secures an appointment or access to the meter within 30 days of receiving written or electronic notice from Proposer.
Any Proposed Alternative Specification or Language:		

2.12 Items to Be Supplied by Proposer

➤ *The Authority will provide meters, MIUs, remote antennas, and spool kits for fire service meters.*

Section	Comply? Y/N	Requirement
2.12		a. Proposer shall supply the following components and aspects of installation: overall project management; training and direct

Section	Comply? Y/N	Requirement
		supervision of installers; appointment scheduling; problem solving and complaint handling; and inspection, testing, and quality control.
		b. Proposer shall furnish all supplies, materials, tools, and equipment necessary for the successful and timely completion of all meter and AMI installations as specified herein. i. This includes but is not limited to wiring and waterproof connectors between the meter and MIU in situations where the meter and/or wiring has to be replaced, and meter seal wires and seals where the meter has to be replaced.
Any Proposed Alternative Specification or Language:		

2.13 Local Office, Warehousing and Materials Management

Section	Comply? Y/N	Requirement
2.13		a. Proposer shall utilize an Authority-provided warehouse located at 951 5 th Street, Macon GA.
		b. Should the Proposer receive shipments materials for the project, shipments shall remain intact until the Authority has had a reasonable opportunity to inspect them.
		c. Upon receipt of shipments, Proposer shall upload inventory files to their proposed WOMS before using that equipment for installations.
		d. Prior to using inventory for installations, Proposer shall receive confirmation from the Authority that the inventory file has been uploaded to CIS.
		e. Proposer shall at all times maintain security and control of inventory of equipment in its possession, regardless of whether the Authority or Proposer owns equipment. i. Equipment paid for by the Authority prior to installation may be subject to a bailment agreement with the Authority.
Any Proposed Alternative Specification or Language:		

- f. Describe procedures for cross-docking of materials and inventory control and audit, including frequency of inventory counting and reporting.

2.14 Call Center

Section	Comply? Y/N	Requirement
2.14		a. Proposer shall provide a call center, web site, and a toll-free number that customers can call to ask questions concerning the project, to schedule installation appointments, or to report problems concerning installations.
		b. The call center should incorporate an automatic call distribution (ACD) system capable of receiving and queuing calls; routing calls to waiting agents; and collecting and reporting data on call volumes, waiting times, abandoned rates, and durations.
		c. Proposer must answer at least 85 percent of all calls within one minute.
		d. The call center should be staffed at least between the hours of 7:00 a.m. and 8:00 p.m. ET, Monday through Saturday. Indicate proposed call center hours and availability of web access for scheduling appointments and questions.
		e. The Authority prefers a call center physically located within the United States of America.
Any Proposed Alternative Specification or Language:		

2.15 Twenty-Four (24) Hour Customer Access

Section	Comply? Y/N	Requirement
2.15		a. For 5 days after the installation has been accepted by the Authority and the Authority has been notified of a given installation, Proposer must respond on a 24 hour-per-day basis to calls from the customer (or from the Authority) associated with that installation, concerning leaks, loss of service, low pressure, and other problems associated with installation.
		b. Should the Proposer receive a call or complaint from a customer or the Authority regarding installation, the Proposer/Installer shall immediately log the call, including caller's name, address, account number if available, date and time of call, nature of problem, the action taken and the resolution.
		c. Copies of all call logs shall be forwarded to a designated Authority Customer Service Manager not less than once per day using e-mail or another mutually acceptable electronic means.
		d. Proposer must respond within one (1) hour of receiving the call and arrive at customer's premises ready to correct any problems within three (3) hours of receiving the call, unless otherwise directed by the Authority.

Section	Comply? Y/N	Requirement
		e. Should the Proposer fail to respond within the specified timeline, the Authority shall arrive at the customer's premises to address the problem, at the Proposer's cost, in the amount of \$150.
Any Proposed Alternative Specification or Language:		

- e. Describe the procedures for response to customer problems.

2.16 No Solicitation

Section	Comply? Y/N	Requirement
2.16		No contractor, or its employees or agents, may solicit business from the Authority's customers while engaged on any contract associated with this project.
Any Proposed Alternative Specification or Language:		

2.17 Training and Inspection of Employees

- a. Describe training and inspection procedures, and probation provisions for new employees.
- b. Provide a training checklist of what each new installer will be trained to complete as part of the installation process.

2.18 Bonding, Background Checks

Section	Comply? Y/N	Requirement
2.18		a. All Licensed Plumbers shall be bonded. Proposer shall subject all employees to a criminal offense background check and drug and alcohol testing as directed by the Authority.
		b. Proposer shall not employ as an Installer any person who fails to meet the requirements of the Authority.
		c. The Authority shall be entitled to review the background check before the prospective employee is engaged and prevent any person who fails to meet requirements from working on Authority projects.
Any Proposed Alternative Specification or Language:		

- d. Describe Proposer's ongoing random testing programs for drugs and alcohol.

2.19 Uniforms and Identification

Section	Comply? Y/N	Requirement
2.19		a. Proposer's field personnel shall wear easily recognizable uniforms containing the Proposer's name, as well as prominently displayed picture identification badges containing Proposer's name, employee name, title and signature, employee picture, and employee I.D. number at all times when performing contract work.
		b. Proposer's employees who are no longer employed by the Proposer shall be required to return their uniforms and identification cards immediately upon termination of employment, and the Proposer shall immediately notify the Authority of all such terminations and if identification cards were received from terminated employee.
Any Proposed Alternative Specification or Language:		

2.20 Vehicles

Section	Comply? Y/N	Requirement
2.20		a. Proposer shall be responsible for all vehicles it uses on the project.
		b. Proposer should provide service vehicles onsite stocked with common fittings and supplies needed for normal service restoration and/or replacement.
		c. Proposer's vehicles shall be uniform and professional in appearance.
		d. Proposer's vehicles shall have the Proposer's logo and Authority's logo prominently displayed on both sides of the vehicle. The Proposer shall design this combined logo with the Authority's approval.
		e. Proposer's vehicles shall be a model appropriate for the work, be properly maintained, and any mechanical damage to vehicles shall be reasonably repaired prior to returning to field-use.
		f. Temporary signs must be adhesive, not magnetic.
		g. Any employee of the Proposer or its subcontractors who drives a vehicle in connection with this project must have a valid driver's license for the class of vehicle being driven and must be insured as set forth in the Authority's insurance requirements.
Any Proposed Alternative Specification or Language:		

2.21 Parking

Section	Comply? Y/N	Requirement
2.21		a. The Authority requires that Proposer deploy vehicles to minimize parking problems and avoid blocking any streets.
		b. Proposer is required to follow all parking laws.
		c. Proposer shall be responsible for any/all parking violations.
Any Proposed Alternative Specification or Language:		

2.22 Field Communications

Section	Comply? Y/N	Requirement
2.22		The Authority requires that all of the Proposer's installers, plumbers, inspectors, and supervisory personnel be equipped with cellular phones or radios so that problems or questions can be addressed immediately, and the Installation Manager or the Authority's Project Manager can be contacted immediately, if needed.
Any Proposed Alternative Specification or Language:		

2.23 Automated Project Control Process

Section	Comply? Y/N	Requirement
2.23		a. The system should use electronic tags, bar coding, or similar means to capture equipment identification numbers.
		b. The system shall have a redundant backup process, so that all information is preserved in the event of a breakdown in the primary system (such as the loss of a handheld device).
		c. The system should enable the correction of any incorrect information pertaining to meter or service size, meter type, meter location, address, etc.
Any Proposed Alternative Specification or Language:		

d. Describe in detail the installation control process.

2.24 Small Meter Replacement (5/8" and 1")

Section	Comply? Y/N	Requirement
2.24		a. Proposer shall complete meter replacements in accordance with AWWA C715-18 standards in effect on the date of this RFP.
		b. Installer shall ensure he/she is at the correct location and meter and check for running water prior to commencing meter changeout.
		c. Proposer shall test the pressure of the service line before the installation has begun and also following the completion of the installation. Proposer shall collect photos of the pressure readings before and after installation.
		d. Installer must turn off the water to the premise after following the Authority-approved notification procedures.
		e. Installer shall then replace the meter, using new gaskets or washers.
		f. Installer shall put plastic caps on the inlet and outlet of the old meter and handle the meter with care in order to facilitate post-removal testing by the Authority.
		g. All meter adapters, bushings, or other hardware necessary to install the new water meter in the consumer's existing meter setup must be furnished by the Proposer.
		h. Proposer is required to install standard connections (Authority-approved meter couplings) for all 5/8" through 1" meters if none exist currently.
Any Proposed Alternative Specification or Language:		

2.25 Large Meter Replacement (1.5" and larger)

Section	Comply? Y/N	Requirement
2.25		a. Proposer shall complete meter replacements in accordance with AWWA C715-18 standards in effect on the date of this RFP.
		b. Installer shall ensure he/she is at the correct location and meter and check for running water prior to commencing meter changeout.
		c. Proposer shall test the pressure of the service line before the installation has begun and also following the completion of the installation. Proposer shall collect photos of the pressure readings before and after installation.
		d. Installer must turn off the water to the premise, or redirect water through the existing by-pass, after following the Authority-approved notification procedures.

Section	Comply? Y/N	Requirement
		e. Proposer is required to install a permanent by-pass for all 3" and larger meters if none exists currently. All installed by-passes shall conform to the Authority's meter by-pass specifications, included in Appendix E. Under some situations, depending on field conditions, it may become necessary to install a bypass outside the meter box. In such cases, the contractor shall contact the Authority for approval.
		f. Proposer is required to replumb fittings to be flanged for all 1.5" and larger meters if fittings are found to be anything other than flanged. All flanged connections shall conform to the Authority's flanged connections specifications.
		g. Installer shall handle the old meter with care in order to facilitate post-removal testing by the Authority.
		h. All meter adapters, bushings, bolts, or other hardware necessary to install the new water meter in the consumer's existing meter setup shall be furnished by the Proposer. This hardware shall be approved by the Authority prior to use.
		i. For 1.5" and 2" meter replacements, Proposer shall coordinate with the customer to determine if a temporary by-pass will be required to complete the installation.
Any Proposed Alternative Specification or Language:		

2.26 Site Conditions, Exceptions and Anomalies

Section	Comply? Y/N	Requirement
2.26		a. If the meter is to be changed, before or at the time of installation, Proposer's installer shall inspect the existing water meter setting, including piping and control valves.
		b. In the case of any meter or plumbing irregularities, such as rotten plumbing, evidence of tampering (including but not limited to existing meters installed backwards, meters removed and replaced with connecting pipes; registers disconnected from meters; illegal connections before a meter; unmetered connections of a customer's plumbing to a service lateral, fire pipe, or water main), unsafe conditions, etc., the installer or installation supervisor shall not proceed with the installation until the Authority's inspector has been notified and authorizes the installation.
Any Proposed Alternative Specification or Language:		

2.27 Old Meter Reading

Section	Comply? Y/N	Requirement
2.27		a. Proposer shall apply procedures to ensure that any meter being replaced is read properly.
		b. If the meter is to be changed, Proposer shall provide clearly readable digital photographs of the reading on the old meter register.
		c. Proposer shall take pictures of the old equipment while it is still installed when this is practical, but must include alternative procedures, as needed, to ensure that pictures legibly show the meter reading and are appropriately labeled with date, time, and premises information.
Any Proposed Alternative Specification or Language:		

2.28 Verifying Service Working

Section	Comply? Y/N	Requirement
2.28		a. Proposer shall flush water line from the customer's outside spigot if reasonably accessible after installing a new meter to ensure the meter is registering properly and verify service restoration to the entire premises.
Any Proposed Alternative Specification or Language:		

2.29 Existing Meter Reading Equipment; Wiring and Connections

Section	Comply? Y/N	Requirement
2.29		a. If the existing meter is not scheduled for replacement, and is connected to a remote read-out device, touchpad or older MIU using a three-wire cable, the installer shall inspect the cable for integrity.
		b. If the meter is designated for replacement, or the existing cable is compromised, Proposer shall also replace the existing wire cable from the meter to the MIU with three-conductor vinyl shielded cable with not less than 22-gauge solid copper wires of colors red, green and black.
		c. Connectors used outside the premises must comply with UL-486D and IP68.
Any Proposed Alternative Specification or Language:		

2.30 Digital Photographs

Section	Comply? Y/N	Requirement
2.30		a. The Authority requires that digital photographs be taken before and after installation to provide documentation of pre-existing site conditions.
		b. Enough photographs shall be taken to clearly identify the condition of the existing meter and associated piping (if applicable), and obstructions to the work.
		c. The photographs should have accurate date and time stamps, and the file name of the photo shall include the applicable address or premises ID.
		d. Digital photographs shall be made available to the Authority in a database searchable by address, premises identification number, meter number, or account number.
Any Proposed Alternative Specification or Language:		

2.31 Service Line Material Identification

Section	Comply? Y/N	Requirement
2.31		a. Installer shall be responsible for identifying service line pipe material for both Authority side and customer side piping within the meter box as part of the field installation.
		b. The data shall be captured electronically on the handheld device.
Any Proposed Alternative Specification or Language:		

2.32 GPS Coordinate Capture

Section	Comply? Y/N	Requirement
2.32		a. Installer shall be responsible for collecting commercial grade GPS coordinates for each completed installation. This is expected to be within 5 meters.
		b. The data shall be captured electronically and interface to the Authority's GIS and/or CIS to house the data.
Any Proposed Alternative Specification or Language:		

2.33 Completed Work Orders

Section	Comply? Y/N	Requirement
2.33		a. Completed work orders that involve meter change-outs or register replacements shall include: meter size and meter type, verification or correction of existing meter and account information, GPS coordinates, old meter serial number, final reading on old meter, new meter number (if applicable), new meter register number, new meter or register initial reading, premises identification number, MIU ID number, date and time of installation, name of installer, composition of water service line, inspection sign-offs and notice of any problems encountered or repairs made.
		b. Completed work orders that involve only MIU installation shall include verification or correction of existing meter and account information, GPS coordinates, premises identification number, MIU ID number, reading from meter, date and time of installation, name of installer, inspection sign-offs and notice of any problems encountered or repairs made.
		c. Completed work orders must be accompanied by required photographs.
Any Proposed Alternative Specification or Language:		

2.34 Dirt or Water Around Meter

Section	Comply? Y/N	Requirement
2.34		a. For meters in outside boxes, Proposer shall be responsible for removing any dirt needed to access the meter. i. Dirt shall be removed such that there is a minimum of 2" clearance below the valves at the meter.
		b. Proposer shall attempt to expose connection to the service line and any piping between the service line connection and the meter to ensure that they are in a condition that will not be damaged by changing the meter.
		c. If a water meter box or vault is flooded so that the meter is fully or partially submerged, the Proposer must pump it out before changing the meter. Proposer must ensure that the water service is not in any way contaminated, even intermittently, by standing water in the meter vault.
		d. All waste resulting from cleaning the meter box or vault must be disposed of properly by the Proposer.

		e. The existing lid and ring, if replaced, shall be disposed of by the Proposer.
		f. If grass or shrubbery is expected to impact the installation or may be damaged by the installation process, the Proposer must notify the Authority inspector.
		g. The Proposer must return the property to the original condition to the satisfaction of the customer by replanting, re-sodding, reseeding or compensating customer.
		h. The Authority reserves the right to inspect any installation and cleanup work within 7 days before payment is made to the Proposer.
		i. The Authority reserves the right to inspect any installation and cleanup work within 30 days after installation in response to customer complaints of damage.
		j. Proposer shall be responsible for claims resulting from damage caused by installation.
Any Proposed Alternative Specification or Language:		

2.35 Meter Box Lids

Section	Comply? Y/N	Requirement
2.35		a. The Proposer shall install MIUs to obtain the maximum signal strength from MIUs installed in meter boxes or vaults. The Authority will provide lid configurations to the Proposer prior to meter installations beginning.
		b. Proposer shall replace or retrofit (e.g., by installing brackets or drilling) any non-conforming meter box lids.
Any Proposed Alternative Specification or Language:		

2.36 Inaccessible Meter and/or MIU

Section	Comply? Y/N	Requirement
2.36		a. In the event a meter is obstructed or is not accessible, the Proposer will make at least three different types of attempts at any reasonable time within 30 days of encountering the inaccessible meter to notify the customer to remove the obstruction or provide access to the meter.
		b. These attempts must be documented on the work order.

		c. After three documented attempts to make the installation, the Installation Manager may request the Authority Project Manager schedule the meter change-out.
		d. The Proposer shall only be paid for completed installations and is expected to provide all reasonable support in resolving difficult installation situations.
Any Proposed Alternative Specification or Language:		

2.37 Repairs

Section	Comply? Y/N	Requirement
2.37		a. At its option, the Authority may authorize the Proposer to make any valve or service line repairs necessary to install a meter to service lines or piping, order the customer to make such repairs, or undertake such repairs itself. Proposer will be compensated at the rates set forth in the Pricing Proposal.
		b. Old piping per se shall not be grounds for the failure of the Installer to replace a meter designated for replacement. i. Only when old piping is leaking or deteriorated to a point that damage to it could reasonably be expected by changing the meter shall poor piping be accepted as a reason for not replacing the meter. ii. Unless the Authority's Project Manager remands the particular installation to the Authority for further action, the Proposer is still required to install the meter and AMI equipment after the piping has been repaired or replaced at any time during the Installation Period.
Any Proposed Alternative Specification or Language:		

2.38 Valves

Section	Comply? Y/N	Requirement
2.38		a. If the Proposer cannot shut off water using the street-side control valve (details must be documented on a work order), they shall call the Authority Project Manager to arrange a water main shutdown or curb valve shut-off, if available.
		b. If shutoff valves cannot be reopened, the Proposer shall replace such valves following Authority rules, regulations and specifications, upon being authorized by the Authority.

		c. Proposer shall provide in its Pricing Proposal fixed unit pricing for valve replacement by size.
Any Proposed Alternative Specification or Language:		

2.39 Service Line Damage

Section	Comply? Y/N	Requirement
2.39		a. Proposer shall be responsible for repairing any water service lines it damages at its sole cost and expense, unless the Installation Manager has reported, prior to commencement of installation, a condition of antiquated or inferior plumbing to the Authority's inspector or Project Manager and has been authorized to proceed with the work.
		b. Proposer shall be responsible for repairing up to 2 feet of damaged service line from either side of the meter.
		c. In the event a service line fails during or after the authorized installation, Proposer's licensed plumber shall oversee the repair work required to restore the water service line to working order.
		d. Proposer shall include in its Pricing Proposal a schedule of compensation for service line repairs by foot of service line and size. The cost of this work will be reimbursed to the Proposer at the price set out in the schedule.
		e. This price will include site preparation, all labor and permits as required. All work must comply with the Authority's standards for service repairs or replacement.
		f. All plumbing work other than the replacement of a water meter must be authorized by the Authority and inspected by a Authority field inspector and payment will be subject to Authority approval.
		g. Any damage done by the Proposer outside the area and scope of the work of the contract shall be repaired or replaced at the Proposer's sole cost and expense.
Any Proposed Alternative Specification or Language:		

2.40 Confined Space

Section	Comply? Y/N	Requirement
2.40		a. Confined space shall be defined in accordance with the Authority's Safety Manual, Revision 5, Section 8-C Confined Space Entry, included in Appendix E.

		b. Any vault requiring entry to complete an installation that meets these criteria shall be designated and documented as confined space.
		c. Documentation of the completed installation meeting criteria for confined space shall be provided to the Authority in order for any additional confined space charge to be invoiced.
Any Proposed Alternative Specification or Language:		

2.41 Meter Salvage

Section	Comply? Y/N	Requirement
2.41		a. Proposer shall scrap all replaced meters and meter box lids and credit the Authority for salvage value based on unit values submitted in the Pricing Proposal.
		b. Proposer must provide auditable documentation of quantities scrapped.
Any Proposed Alternative Specification or Language:		

2.42 Disposal of Existing MIUs

Section	Comply? Y/N	Requirement
2.42		a. Proposer shall collect and arrange for the proper disposal of all removed MIUs. Include unit cost for this in the Pricing Proposal.
		b. Proposer must provide auditable documentation of quantities scrapped.
Any Proposed Alternative Specification or Language:		

2.43 Quality Control

Section	Comply? Y/N	Requirement
2.43		a. Proposer shall be responsible for replacing any meter, MIU, or appurtenances improperly set by its installer at no additional cost to the Authority.
		b. Proposer shall correct any damage to couplings, threads, unions, or meters by use of improper tools or cross threading by an installer.
		c. Proposer shall be responsible for correcting any leaks at the valves, couplings, or service lines that could reasonably be

		attributed to the meter installation if reported by the Authority or customers within 30 days of installation at no additional cost to the Authority.
Any Proposed Alternative Specification or Language:		

- d. Describe the procedures and protocol for inspecting installations, including installation by new employees, recording and reporting inspection findings, and remediating any issues discovered through inspections.

2.44 Installation Data Control and Audit Procedures

- a. Describe in detail the proposed system for ensuring that all data pertaining to installation are correctly recorded during installation, and that all data transferred to the Authority Customer Information System (CIS) are accurate.
- b. Describe procedures for eliminating any opportunities for a meter or MIU to be associated in the HES, MDMS or the CIS with the wrong address or account number.

2.45 Installation Acceptance

Section	Comply? Y/N	Requirement
2.45		a. Each installation will be accepted by the Authority conditioned upon: i. Electronic submission of a list of completed installations containing for that installation the premises identification number, address, meter serial number, old and new meter readings, MIU serial number, MIU and meter GPS coordinates or location description, installer's name, Proposer's inspector's name, and all other information relevant to the installation; ii. Receipt or access to required digital photographs taken before and after installation; iii. Satisfactory inspection by Proposer and the Authority in the case of anomalies or if part of inspection sample; iv. Confirmation that MIU ID numbers, meter register numbers, and other information have been correctly captured in the AMI HES and/or the Authority's project management database for each customer's premises; and, v. Successful communication of the MIU for at least 5 consecutive days. The readings shall be gathered by the Authority operating the AMI system in a normal way. vi. However, if the Authority finds discrepancies in the conditions of acceptance for 12 months after the date it

Section	Comply? Y/N	Requirement
		was notified of installation, the Authority shall notify the Proposer for corrective work which shall be completed by the Proposer at no cost to the Authority.
		b. Payment for installation services shall be based on accepted installations.
		c. Proposer shall provide documentation to the Authority including the list of individual jobs completed, the unit price for each job, a date and time stamp showing MIU communication & readings, overall route network coverage, and other details to be specified.
Any Proposed Alternative Specification or Language:		

2.46 Payments

Section	Comply? Y/N	Requirement
2.46		a. Proposer shall provide to the Authority electronically on a monthly basis its list of newly completed installations and any authorized additional work in an itemized format.
		b. This list shall be attached to an electronic draft invoice.
		c. The Authority shall notify the Proposer of any listed items that do not meet the conditions of this section above, so that the Proposer may resolve any discrepancies.
		d. The Authority may at its discretion reject the entirety of any list on which there are discrepancies in more than 10 percent of the entries.
		e. The Authority shall process all other items as acceptable and arrange payment for these.
		f. Payments will be based on the price schedules submitted by the Proposer.
Any Proposed Alternative Specification or Language:		

3 PORTABLE FIELD PROGRAMMING DEVICES

- *Portable programming units may be required to program MIUs or meter registers.*
- *Portable field test units may be required to diagnose problems with meter registers, MIUs, or the system.*
- *The possible functions are aggregated in this section.*
- *Proposer shall respond to this subsection separately for each separate device if there is more than one, denoting the responses as appropriate.*

3.1 Physical Characteristics

- Indicate if the programmer and/or handheld interrogators are dedicated units, or software that can be put on a third-party phone, tablet, or other device.
- If third-party tablets or other devices may be used for programming, meter reading and diagnostics, what are the minimum hardware requirements?
- In the below table, describe the dimensions, weight, environmental tolerances, resistance to dropping and submergence, and other physical characteristics of the proposed unit(s).

Proposed Unit(s)	Dimensions	Weight	Environmental Tolerances	Resistance to Dropping	Other Physical Characteristics

- Provide pictures of the proposed unit(s).

3.2 Functions/Modes of Operation

- Describe the functions of the unit(s).
 - Provide representative screen shots.

3.3 Field Programming and Installation

- *The Authority prefers that the new meter reading and register number be captured automatically through the MIU and visually displayed.*

- Is the unit capable of programming the MIU with any information required for operation that was not factory pre-programmed into the MIU? **Y / N**

The following table notes the requirements for programming and installation

Section	Comply? Y/N	Requirement
3.3		The unit shall be capable of capturing, at a minimum, the new meter reading, register number, old meter reading and address manually.
Any Proposed Alternative Specification or Language:		

3.4 Field Testing and Diagnostics

- Is the unit able to ascertain the remaining life of the battery in an MIU? **Y/N**

The following table notes the requirements for field testing and diagnostics

Section	Comply? Y/N	Requirement
3.4		The unit shall be able to diagnose problems with a meter register or MIU, unless the system incorporates an alternate way to make such diagnoses.
Any Proposed Alternative Specification or Language:		

3.5 Portable Interrogation

- Is the unit capable of alerting (if necessary) and receiving the signals from MIUs? **Y/N**

- b. Is the unit capable of downloading all the consumption profile data stored in an MIU, if that is a capability of the MIU? Y/N
- c. How far away can an MIU be and still be read by the device?

3.6 GPS Receiver

Section	Comply? Y/N	Requirement
3.6		The unit shall be capable of capturing GPS coordinates within 3-meter accuracy.
Any Proposed Alternative Specification or Language:		

3.7 Capacity

- a. Identify how much data, or how many work orders, each unit can accommodate, and how many meter readings a portable interrogator can accommodate.

3.8 Bar Code Reader

Section	Comply? Y/N	Requirement
3.8		The unit shall include or be capable of capturing and recognizing bar codes to capture meter or MIU identification numbers from bar code labels on these components.
Any Proposed Alternative Specification or Language:		

3.9 Camera

Section	Comply? Y/N	Requirement
3.9		The unit shall be equipped with a digital camera, including flash, for capturing medium-resolution images of meter registers, meters, site conditions, etc., in conjunction with installation, maintenance and troubleshooting.
Any Proposed Alternative Specification or Language:		

3.10 Accessories

- a. What connecting hardware and software, including cables, modem, cradle, battery, charger, etc., are required?

3.11 Batteries

- a. Use the following table to
 - i. Provide the unit operation life in hours on a fully charged battery when the unit is involved in installation and programming, including taking up to 5 pictures of each installation.
 - ii. Provide time it takes to fully recharge the unit's battery after a full day of normal use.

- iii. Indicate if the battery can be recharged outside of the unit and/or from a 12-volt vehicle system.

Hours of Operational Battery Life	Recharge Time	Batter Recharged outside of unit?	Batter Recharged from 12-volt vehicle system?

- b. Explain how the unit ensures against accidental data loss in case of a dead battery.
- c. Explain how a battery can be replaced.

3.12 User Interface

- a. Indicate the angular range of readability.
- b. Describe any audible tones used by the unit (e.g., confirming a reading or successful programming, warning of an out-of-limits condition, low battery, etc.).

3.13 Manual Entry

- a. Can the unit permit manual entry of meter readings and other information (for example, the information necessary to complete a meter or MIU investigation or repair work order)? Y/N
- i. Provide screen shots for this other information, including notes or comments.

3.14 Portable Interrogator Vehicle Mounting

- a. Describe any provisions for mounting and operating the unit within a vehicle.

3.15 Number of Units

The following table notes the requirements for number of units.

Section	Comply? Y/N	Requirement
3.15		a. Proposer shall supply all units required for Proposer and its installers.
Any Proposed Alternative Specification or Language:		

4 INSTALLATION/FIELD TESTING SOFTWARE

- Please use this section for responses related to the software application used to manage field installations of MIUs and manage portable field test units/interrogators/programmers detailed in Section 3.

4.1 System Description

- a. Provide a detailed description of any hardware (e.g., cradles) or software needed to support portable programmer/reader/field test units.
- b. Describe in detail the functions of the software used to manage this operation, and the reports produced.

4.2 Interface to AMI Head-End System

- a. Describe the mechanism and procedure for downloading and uploading data from installation hardware to the AMI HES and/or any other information system normally used in the maintenance of the AMI system.

4.3 Interface to CIS

Section	Comply? Y/N	Requirement
4.3		a. Proposer shall download and upload data from the WOMS to the Authority's customer information system.
		b. Proposer shall import data from Cayenta into the Proposer's WOMS using the Authority-specified file format in "Attachment 1 – WOMS Import File Format.csv".
		c. Proposer shall export data to Cayenta from the Proposer's WOMS using the Authority-specified file format in "Attachment 2 – WOMS Export File Format.csv".
Any Proposed Alternative Specification or Language:		

5 TRAINING

5.1 Training Requirement Details

Comply? Y/N	Requirement
Prerequisite to Installation	
	a. Proposer must provide proper training to designated Authority staff prior to the commencement of installations.
Any Proposed Alternative Specification or Language:	
Training Location and Equipment	
	b. All training shall be performed at the Authority's offices and facilities, or in the field in the Authority's service territory.

Comply? Y/N	Requirement
	c. Proposer shall provide all additional training on the Authority's AMI system equipment (including the HES and database) after it is installed, tested, and accepted by the Authority.
	d. Training should use real data from the Authority's own system.
	e. Proposer shall restore, repair, or replace any Authority equipment damaged in training, and restore any hardware or software modified in training.
	f. At its discretion, the Authority may videotape and/or record all on-site training
	Any Proposed Alternative Specification or Language:
Instructors	
	g. Proposer shall provide trained and experienced instructor(s) and ensure that they do not perform other duties during the training period that will interrupt instruction.
	h. Instructor will provide a checklist to trainees to evaluate presentation of course materials for effective feedback from the Authority.
	Any Proposed Alternative Specification or Language:
Training Objectives and Outline	
	i. Proposer shall provide a detailed outline of each training session's objectives and content at least 2 weeks prior to the training session to the Authority for review and approval.
	Any Proposed Alternative Specification or Language:
Training Aids	
	a. Proposer shall provide trainees' workbooks, training aids (including software and video), and system technical manuals prior to or during the training session at no additional cost.
	b. Proposer shall provide copies of workbooks for the number of employees trained for each type of training plus 5 extra copies.
	c. If training aids include the technical manuals, then Proposer shall provide the appropriate manual for each trainee in the training class that the manual covers.
	Any Proposed Alternative Specification or Language:
Testing/Evaluation	
	d. Proposer's training shall include an evaluation of trainees to ensure that they have learned the course content and can perform all necessary functions on the system. Evaluation criteria and testing shall be approved in advance by the Authority. Proposer shall notify the Authority of any employees who fail this evaluation and provide them additional training as required. Proposer shall repeat a training session at no additional cost to the Authority if a

Comply? Y/N	Requirement
	majority of the trainees in a particular subject have not attained the skills from the training session or fail the evaluation at the end of the training.
	Any Proposed Alternative Specification or Language:
	Supplemental Training
	e. Proposer shall provide a schedule of costs for additional training beyond the initial training proposed. List each training type and provide the cost for each.
	Any Proposed Alternative Specification or Language:
	Training Curriculum
	f. Proposer shall provide thorough training of Authority employees in all areas required to install, operate and maintain the system and obtain and use data from it.
	Any Proposed Alternative Specification or Language:

5.2 Training Areas and Methods

- a. Using the following table, specify the teaching method and duration for each of these training sessions, which shall include but not be limited to the following areas for the designated number of people.

Training Areas	Teaching Method
i. Use of the Proposer's installation management and project control software or work order management system (WOMS) in association with proposer's handheld programming devices for a minimum of 10 Authority employees or agents.	

6 PROJECT MANAGEMENT

6.1 Reports

- a. Provide sample layouts of all anticipated reports for managing the project pertaining to schedule, budget, and performance requirements.

6.2 Project Goals and Milestones

Section	Comply? Y/N	Requirement
6.2		The successful Proposer shall propose detailed goals and milestones for deliveries or accomplishments within the Project schedule established by the Authority, and subject to approval of the Authority.

Any Proposed Alternative Specification or Language:

6.3 Project Management Meetings

Section	Comply? Y/N	Requirement
6.3		a. Proposer's Project Manager and other personnel, as requested by the Authority, shall meet with the Authority's Project Management staff not less than bi-weekly from the time of Notice to Proceed through the project closeout.
		b. Contract Manager shall meet with Authority personnel periodically and not less than monthly to update them on progress against the project schedule.
Any Proposed Alternative Specification or Language:		

- c. Describe the proposed meeting plan including reporting requirements, expected participants, and expected topics of meetings.

6.4 Installation Management Meetings

Section	Comply? Y/N	Requirement
6.4		a. Proposer Installation Manager and other personnel, as requested by the Authority, shall meet with the Authority's Project Management staff not less than weekly from one month prior to the start of the procedural pilot through the Installation Period.
Any Proposed Alternative Specification or Language:		

- b. Describe the proposed meeting plan including reporting requirements, expected participants, and expected topics of meetings.

APPENDIX A: Resumes

- This Appendix should include the following:
- Resumes for Proposer's Key Personnel including
 - Project Manager
 - Contract Manager
- Resumes for Primary Subcontractor's Key Personnel

APPENDIX B: Attestation Regarding Disputes

This should include information from Section 1.6 and 1.7.

APPENDIX C: Exceptions to Technical & Performance Requirements

Copy / Paste / Drop Here tables from any sections that note exceptions to technical and performance requirements.

For Example:

Section	Comply? Y/N	Requirement
2.5	N	a. The data collection network shall be designed to provide 100% coverage of the Authority's existing customer meters.
Any Proposed Alternative Specification or Language: Explanation details		

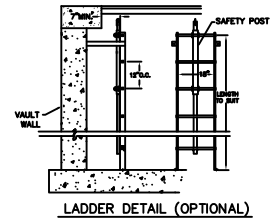
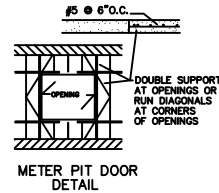
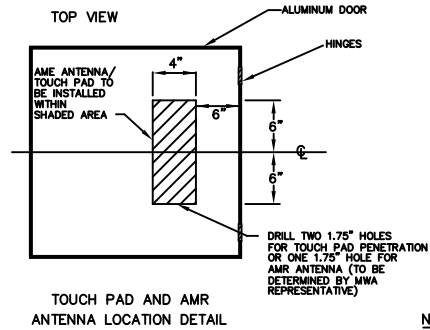
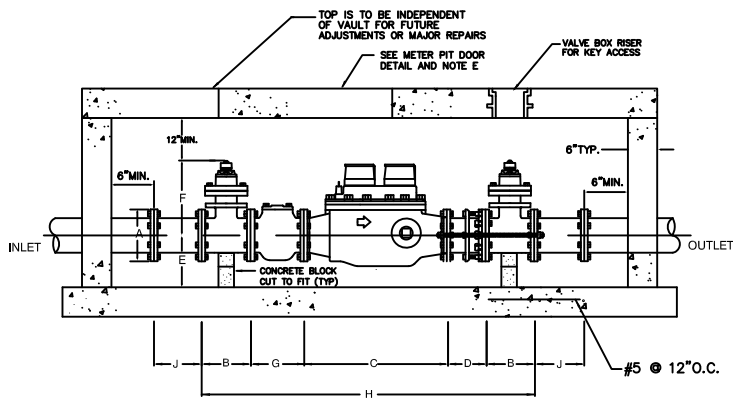
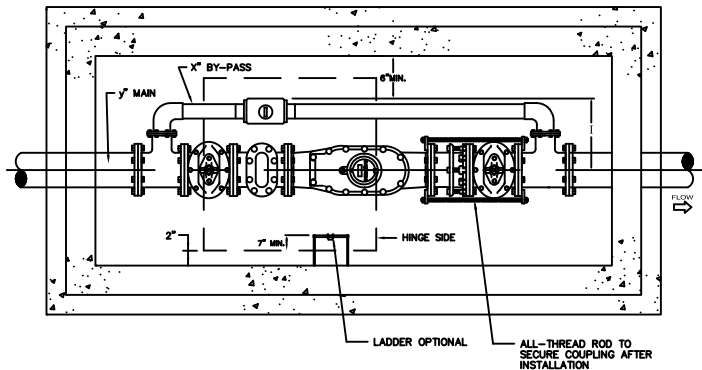
APPENDIX D: Financial Data

This should include any applicable information from Section 1.6

APPENDIX E: Supplemental Specifications

This includes all Authority specifications and drawings provided as part of the RFP package:

- Meter By-Pass
- MWA_SafetyManual
- Stds-for-Design-Construction-Specs_Updated-052522
- Water-Details_Updated-120111



NOTES:

- THE VAULT SHALL BE CONSTRUCTED WITH 4000 PSI REINFORCED CONCRETE. USE OF BLOCK MUST BE APPROVED IN WRITING BY MWA BEFORE CONSTRUCTION.
- WALLS SHALL BE A SINGLE POUR. SEAL WITH RAM-NEK OR CONSEAL BETWEEN WALLS AND BOTTOM AND WALLS AND LID CONTINUOUS AROUND PERIMETER.
- IN NON-TRAFFIC AREA USE ALUMINUM LIGHT TRAFFIC (300 PSI) DOOR. IN TRAFFIC AREA USE AASHTO-H20 LOAD RATING ALUMINUM DOOR.
- DOORS ARE TO BE LOCATED SO METER CAN BE READ AND STRAINER CAN BE LIFTED STRAIGHT OUT. USE 3' X 3' DOOR. USE ONLY MWA APPROVED DOORS BY USF FABRICATION AND BILCO. HINGES SHALL BE LOCATED ON OUTLET SIDE OF DOOR OPENING.
- DOORS SHALL BE PROVIDED BY CONTRACTOR
- ALUMINUM LADDER W/SAFETY POST SHALL BE USED IN VAULTS 5' DEEP OR DEEPER. LADDER SHALL BE PLACED ON OPPOSITE SIDE OF METER FROM BYPASS.
- USE NON-SHRINKING HYDRAULIC CEMENT-WATER STOP AT VAULT PENETRATIONS.
- DIMENSION "C" IS FOR NEPTUNE COMPOUND METERS. DIMENSIONS MAY VARY SLIGHTLY WITH TYPES OF FITTINGS USED.
- VALVE AND DOOR STATUS AFTER INSTALLATION
 - VALVE BETWEEN MAIN AND VAULT FULLY OPEN
 - METER INLET VALVE FULLY OPEN
 - BYPASS GATE VALVE FULLY CLOSED
 - METER OUTLET VALVE FULLY OPEN
 - DOOR LOCKED USING STAR-SHAPED LOCKING BOLT
- ANY DEVIATION FROM THESE PLANS MUST BE APPROVED BY MWA PRIOR TO INSTALLATION.
- NO VAULT IS TO BE INSTALLED WITHOUT PRIOR APPROVAL OF MWA FIELD INSPECTOR.

"Y" MAIN	3"	4"	6"	8"
"X" BY-PASS	2"	2"	4"/6"	6"/8"
A	7.5"	10"	14.5"	TBD
B	8"	10"	15"	TBD
C	17"	22"	33"	TBD
D	11"	14"	21"	TBD
E	8"	10"	15"	TBD
F	12.5"	16"	24"	TBD
G	6"	8"	12"	TBD
H	50"	66"	100"	TBD
I	8.5"	12"	18"	TBD
J	11"	14"	21"	TBD

STATUS	BY	APPROVED	DATE
ORIGINAL			
REVISION			

MACON WATER AUTHORITY STANDARD DETAILS

3"-8" COMPOUND METER WITH BYPASS
N.T.S.

RECOMMENDED BY THE MACON
WATER AUTHORITY ENGINEERING
DEPT.

DRAWING NUMBER W-14



Macon Water Authority

SAFETY MANUAL

REVISION 5

NOVEMBER 1, 2024



I understand that this Manual supersedes any, and all prior safety manuals, procedures, guidelines, or other fleet rules related documents and that MWA reserves the right to change this document at any time.

Signature: _____

B. Anderson

Date: _____

2/11/25

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1. Introduction

A. Management's Statement of Safety Policy

Safety is an integral part of our business. Safety, quality, and service are integral components of successful operations. Mishaps have devastating consequences on personnel, materials, equipment, and the environment. The Macon Water Authority (Authority or MWA) is dedicated to eliminating this threat by providing a healthy, safe, and mishap-free working environment.

Safety is everyone's responsibility. While the Authority is committed to providing a safe and healthy workplace for all employees, each employee is responsible for knowing and observing the rules of conduct and safety; to help reduce the threat of mishaps by identifying and reporting potential hazards; to report all accidents immediately.

B. Purpose and Scope

This manual provides standards and procedures to assist Macon Water Authority employees and supervisors in controlling loss exposures. This manual is used in conjunction with other policies and procedures applicable to Macon Water Authority operations, such as the Risk Management Plan (RMP) and the MWA Employee Handbook. Many policies and procedures overlap into the safety area, and some are repeated in this manual due to their importance.

C. Employee Orientation

Each employee will be given a safety orientation by the Risk Management and Safety Coordinator and the Training Officer when first hired. The orientation will include topics such as reporting injuries and ways of performing job duties safely. Safety orientation lasts for approximately one hour. The employee is to sign and initial the outline. A copy will be retained in the employee's file. The Risk Management and Safety Coordinator should also sign and date the form as indicated. The orientation outline is only a guide. If additional training is required, the Department Manager/Director and/or Training Officer will coordinate and document the training. A safety orientation outline is provided on ADP and the Public Drive.

Safety orientation of all employees is essential to our operations. Your supervisor has been instructed to give you a brief introduction of safety concerns that will affect your job and work area. Each item on this list must be discussed between you and your manager/supervisor during your first day of work. Your signature at the bottom of this page indicates you have received a safety orientation for your job and work area.

Initials

_____ 1.	Discussion of Macon Water Authority's Safety Rules and Regulations
_____ 2.	Reporting of injuries/first aid

- _____ 3. Reporting of unsafe conditions and practices
- _____ 4. Demonstration of the safe way to do job
- _____ 5. Dress code
- _____ 6. Fire prevention fire hazards (smoking)
- _____ 7. Back Safety
- _____ 8. Respiratory Certification
- _____ 9. Hepatitis Prevention
- _____ 10. Fuel dispensing and handling
- _____ 11. Hazardous materials (including SDS)
- _____ 12. Housekeeping
- _____ 13. Electrical safety
- _____ 14. Ladder safety
- _____ 15. Fall protection
- _____ 16. Hazard awareness
- _____ 17. Personal Protective Equipment
- _____ 18. Safety Card

Signature of Risk Management and Safety Coordinator:

Date

Signature of Employee:

Date

2. Safety organization, Responsibilities, and Accountability

A. Organization

- i. The safety function is part of the Human Resources Department. The Risk Management and Safety Coordinator is responsible for orchestrating, supporting, monitoring, and coordinating the overall safety and loss control program.
- ii. Safety at departmental levels is coordinated by the director/manager and supervisors, with the manager holding ultimate responsibility for safety.

B. Responsibilities

- i. **General:** Every MWA employee is responsible for applicable portions of the Safety and Loss Control Program. General responsibilities for implementation and administration of the Safety and Loss Control Program are outlined in the following pages. They are guidelines and shall not limit an individual's initiative to implement more comprehensive procedures.
- ii. **Management:** Management is responsible for the success of the overall Safety and Loss Control Program. Specific responsibilities include:

1. Development of strong and effective Safety and Loss Control programs
 2. Support of the Safety and Loss Control programs by offering guidance, training and corrective action as necessary
 3. Monitoring ongoing Safety and Loss Control programs and making changes as necessary to provide effective safety policies and procedures.
- iii. **Risk Management & Safety Coordinator:** Overall responsibilities include recommending and developing safety policies for Macon Water Authority, as well as monitoring existing safety programs. Specific responsibilities include, but are not limited to:
1. Serving as a chair of the Safety Committee and facilitating safety meetings.
 2. Ensuring compliance with the Authority's occupational mishap/injury workers' compensation programs.
 3. Conducting investigations as appropriate for mishaps/incidents.
 4. Conducting safety orientation for new hires.
 5. Creating, implementing, and maintaining safety plans while ensuring that they are being followed.
 6. Conducting safety inspections and job site analysis.
 7. Educating employees on safety standards and expectations.
 8. Acting as a liaison between management and external safety agencies such as fire and insurance personnel.
 9. Recording the minutes of Safety Committee Meetings, posting for employee review, and making accessible on the Public Drive. The meeting minutes and records shall be maintained for a minimum of three years.
- iv. **Training Officer:** The Training Officer is responsible for the effective development, coordination, and presentation of safety training for employees. Specific responsibilities include:
1. Facilitates and conducts company-wide safety training.
 2. Assists departments with coordinating required trainings.
 3. Interprets safety rules, regulations, and standards.
 4. Maintains database of employee safety training records.
- v. **Managers:** Managers and supervisors are responsible for implementing the Safety and Loss Control Program in their department. They are responsible for on-the-job training, development of proper safety attitudes and identification/reporting of hazardous or unsafe work conditions. Specific responsibilities include:
1. Ensuring safe and healthy working areas for employees.
 2. Accountability for mishap prevention.
 3. Enforcement of safety policies and standards.
 4. Provide training necessary for safe job performance.

5. Ongoing inspections of work areas for unsafe conditions and unsafe acts. Managers should perform a walk-through inspection of their work areas at least once a month. Formal inspections will be done on an annual basis.
 6. Instructing employees to report all mishaps, no matter how minor.
 7. Prompt reporting of all employee accidents to the Risk Management and Safety Coordinator. Forms are to be completed and submitted no later than 24 hours after the occurrence. *Forms may be found on the network under the Human Resources Public folder.*
 8. Conduct regular and effective safety meetings
- vi. **Employee:** Employees are required to exercise due care in the course of work. Employees must:
1. Follow safety rules and standards. Know the safety rules and regulations pertaining to your job. If you are unaware of specific rules/standards, ask your manager.
 2. Attend safety meetings and participate in safety and loss control programs of the Authority.
 3. Notice substandard conditions in the work area. Before starting any task, know the proper way to get the job done. Do not perform any task or job that you feel is unsafe. If you are not sure of how to do a job correctly, ask your supervisor.
 4. Operate equipment in a safe manner (as directed by the manufacturer).
 5. Immediately report all accidents to your supervisor.
 6. Wear Personal Protective Equipment (PPE) as required by the task.
 7. Horseplay, fighting, or practical jokes are prohibited.
 8. Lead by example working in a safe and efficient manner.
 9. Monitor the safety of outside contractors and notify the Department Manager/Director and/or Risk Management and Safety Coordinator with issues or concerns.

3. Safety Committee Organization and Functions

A. Overview

A safety committee has been established as an extension of MWA's commitment to provide a safe work environment for our workers and to assist with holding everyone at MWA responsible for health and safety in the workplace. To be successful, the safety committee will require both management and worker support.

B. Organization

- i. The Safety Committee consists of the Risk Management and Safety Coordinator, as chair, and a representative from each department. Appointment to the committee is made by the Risk Management and Safety Coordinator, Department Managers, and/or Directors.
- ii. Meetings will generally be held on the second Thursday of the month.
- iii. Items addressed during meetings may include:

1. Accident Investigation/Prevention
2. Departmental safety issues
3. Employee Training
4. Hazardous Materials
5. Inspections and Follow-up on previous investigations
6. Ongoing Safety Program
7. Special Projects
8. Outside Contractors
9. Incentives

C. Responsibilities

Each safety committee member will actively participate in safety committee meetings and participate in the following safety committee responsibilities:

- i. Promote the use of safety standards.
- ii. Participate in post incident reviews, recommend and assist with implementation of safety and health control measures to prevent similar occurrences in the future.
- iii. Periodically inspect the workplace to determine compliance with established safety and health policies and procedures and report findings to the committee.
- iv. Communicate safety and health training needs.
- v. Review alleged hazardous conditions brought to the attention of any safety committee member, discuss necessary corrective actions and recommendations with the committee.
- vi. Stop any worker's work that poses an imminent hazard to either the worker or any other individual

4. Accident Reporting, Investigations, and Treatment

A. Employee Accident and Reporting Responsibilities

Employees must report all accidents to his/her immediate supervisor or manager. If the circumstances prevent an immediate report, the employee must report the injury the next workday. The employee will be required to submit an Employee Incident and Injury Report.

B. Manager's Actions, Responsibilities, and Procedures

After the injury has been reported to the manager, the following actions should be taken:

- i. Determine immediate medical needs. If emergency treatment is needed, ensure the employee is taken to the nearest Emergency Room for treatment. If non-emergent treatment is needed, the employee must select a physician from the MWA Panel of Physicians and provide signature for the selection.
- ii. Take action to secure the scene and render first aid as necessary
- iii. Inform Risk Management and Safety Coordinator or next available HR Contact listed in the Incident Response SOP.

- iv. Instruct the employee to complete an EMPLOYEE INCIDENT AND INJURY REPORT located under the Human Resources Public folder and forward to the Risk Management & Safety Coordinator

C. Return to Work Program

The purpose of MWA's Return to Work program is to control the effects of disability and absenteeism in the work place by safely returning employees who have experienced a work related injury back to work through transitional or regular employment. The Return to Work program allows employees access to transitional duties, which are approved by his or her physician. The following actions will be taken to return an employee to work:

- i. When an employee is injured on the job, they are evaluated by a physician to determine their work status. If the work status is regular duty, the employee may return to work, resuming their normal responsibilities. If an employee's work status is determined to be light, restricted, or sedentary, the remaining steps will take place:
- ii. The Risk Management & Safety Coordinator, Training Officer, and the injured employee's department head will develop a Transitional Duty job description using the guidelines provided by the doctor.
- iii. Once the physician has approved of the Transitional Duty job description, the employee will be asked to return to work.
- iv. The injured employee will receive a copy of the Transitional Duty job description, the physician's approval and notes, and will have 10 days to report to work. If the employee does not report to work, their benefits will be suspended.
- v. When the employee returns to work on transitional duty, they will work 40 hours per week at the rate of pay they earned at the time of their injury.
- vi. If the employee shows up to work for transitional duty and works less than a full shift or less than 8 hours, whichever is greater, their benefits will be suspended.
- vii. If an employee is released to "permanent restrictions", the department head and HR will evaluate the situation for reasonable accommodation in their current role and review vacant positions within the company that the employee could be qualified to transition into.

5. General Safe Work Practices

Employees are required to exercise due care in the course of their work, preventing injuries to themselves and their fellow workers. The Macon Water Authority partners with OSHA regulations and guidelines to enforce the safety and well being of its employees. Note references. In the event of a preventable property damage incident, the employee may be obligated to cover repair costs and/or be subject to disciplinary action. For incidents resulting in more than \$1,000 in repair costs, and for employees who have more than two offenses in a thirty-six (36)-month period, the incident(s) will be subject to review by Management and/or the Safety Review Board to determine the appropriate disciplinary action.

A. Electrical Equipment

- i. Extension cords must be adequately protected to prevent tripping or creating unsafe conditions. Do not run cords under rugs or through doorways. Extension cords will not be used as a replacement for permanent wiring.

§1910.302 (Electric utilization systems)

- ii. All electrical cabinets and enclosures containing live parts shall be appropriately guarded to prevent inadvertent contact. A minimum clearance of three feet shall be provided in front of all cabinets and enclosures.
- iii. Ground fault circuit interrupters (GFCI's) shall be provided as required by the National Electric Code (NEC).

§1910.304 (Wiring design and protection)

- iv. Electrical switch and junction box covers are to be kept in place at all times.
- v. For safety purposes, jewelry may not be worn if they come in contact with exposed energized parts.

§1910.333 (Selection and use of work practices - electrical)

- vi. Do not operate any power tool or equipment unless you are trained in its operation.

B. Equipment

- i. Do not operate any equipment that appears to be in an unsafe condition. It is the responsibility of the employee to maintain his/her hand tools. Inspect hand tools regularly and report any unsafe conditions to your supervisor.
- ii. The operation of equipment/machinery that is not properly guarded is strictly prohibited. Barrier or enclosure guards are required on all V-belt drives, chain drives, sprockets, flat belt drives, shaft projections, couplings, or other rotating parts located within seven feet of the floor or working platform.

§1926.307 (Mechanical power-transmission apparatus)

- iii. Equipment and machinery must be turned off and locked out while being repaired or cleaned. Refer to lockout/tagout safety procedure for details.

§1910.333 (Selection and use of work practices)

C. Exits

Exits and the way of approach and travel from exits shall be unobstructed and accessible. Doors shall not be padlocked or blocked by any means from the inside. All doors shall swing in the direction of exit travel and all exits shall be marked with appropriate exit signs. Emergency lighting shall also be provided as required. Do not block aisles, traffic lanes, fire exits, gangways, or stairs.

D. Fire Prevention and Protection

- i. Fire prevention is the responsibility of every employee. Report any potential fire hazard immediately. Use good housekeeping practices, removing sources of ignition from flammable and combustible material.
- ii. An outside contractor maintains fire extinguishers. Departments are responsible for completing monthly inspections of fire extinguishers in their areas. If you see an extinguisher that needs to be recharged, call the number

on the service tag for immediate replacement/recharge. Know where extinguishers are located and how to use them.

- iii. Smoking is permitted only in designated areas. Smoking is not permitted near the storage of flammable or combustible material. When smoking, use the disposal devices in the area to extinguish fires and/or sparks.

E. Flammable and Combustible Liquids

Flammable and combustible liquids used for incidental purposes shall be kept to a minimum. Properly labeled approved safety cans are required. All liquids shall be kept in enclosed containers when not actually in use. Bulk amounts of liquid shall be kept outside or in approved storage cabinets. Safety bungs shall be provided on drums of flammable and combustible liquid.

F. Floor Loading Limits

Floors used for storage purposes, such as on balconies or mezzanines, shall be posted to show the maximum safe floor loads.

G. Fuel Dispensing and Handling

- i. Do not dispense fuel into unauthorized containers.
- ii. Do not allow any person to smoke while dispensing fuels.
- iii. Ensure that all engines are turned off during the fueling process.

H. Hazardous Materials

Know where the Safety Data Sheets (SDS) are located and how to read them. Know the correct use as well as hazards of the materials and methods of protection. Refer to the Hazardous Communications program on page 36.

I. Personal Protective Equipment

Personal protective equipment (PPE) will be used as required by the task. PPE that becomes unserviceable will be removed from service and immediately replaced by Macon Water Authority. Suitable clothing and adequate footwear (for your department) must be worn at all times. Hard hats, safety glasses, or goggles must be used when a potential hazard exists. Hearing protection (earplugs) must be used in high noise areas. Wear gloves when needed.

§1910.132 (General requirements)

J. Sign-Tags-Barricades

- i. Defective equipment will be clearly marked as defective or unsafe to use. Tagged equipment will not be used until properly repaired.
- ii. Signs and barricades shall be used to indicate an unsafe condition such as a hole or slippery condition. Safety tape or marking may also be used to indicate a danger area.

K. Storage

- i. All stored materials stacked in tiers shall be stacked, blocked, interlocked, and limited in height to secure it against sliding and collapse.

- ii. Storage areas shall be kept free from accumulation of materials that constitute hazards from tripping, fire, explosion, or pest harborage.
- iii. Where mechanical handling equipment is used, sufficient safe clearance shall be allowed for aisles, through doorways, and wherever turns or passage must be made.

L. Welding and Cutting

Proper precautions for fire protection shall be taken in areas where welding or other "hot work" is being done. No welding, cutting, or heating shall be done where there is the presence of flammable or combustible vapors, presence of flammable compounds, or dust concentrations that may create a fire or explosion hazard. Welding and cutting procedures apply to contractors as well as Macon Water Authority employees.

6. Employee Training

A. Training Policy

Managers have the responsibility of training; however, every employee must share that responsibility by applying the training. Training is a key feature of any successful safety program and must be executed on a continuing basis. Employee training is divided into Initial and Continual.

B. Initial Training

Initial Training is defined as training given to employees before assigning them to a work area or job.

As mentioned earlier, each employee will go through a safety orientation session upon hire. Refer to EMPLOYEE SAFETY ORIENTATION under the INTRODUCTION section of this manual.

C. Continual Training

Continual Training is given to employees after assignment to a work area or job. This training may involve new procedures or methods of performance for existing employees, refresher training, general safety, or any type of ongoing training program.

- i. Employee safety training is part of continual training. Safety training may be in the form of weekly or monthly safety meetings held by the manager or others interested in safety. These meetings will last from 10-30 minutes and will be devoted entirely to safety issues.
- ii. Documentation is necessary for all types of training, particularly safety meetings.

D. Training Methods

- i. On the Job Training (OJT) is accomplished once the employee is working on the job. The material covered in this area will vary depending on the need.

- ii. Formal Training is available from a variety of sources depending upon the employee's position and duties.

SPECIAL NOTE: Regardless of the method used, all employees are to be trained in safe procedures, job safety rules, how to effectively and safely use all equipment, hazard awareness, hazardous materials, Safety Data Sheets (SDS) and accident prevention.

7. Hazardous Materials

All employees should be familiar with the Authority's Hazard Communication Program. Each employee and manager should be familiar with:

- A. The written Hazard Communication Program.
- B. Hazardous material list of those hazardous materials present at the location.
- C. Safety Data Sheets for hazardous chemicals on the list. Employees will be trained in how to read the SDS. The SDS must be readily available to the employees.
- D. Labels on Hazardous chemicals and how to read them.
- E. Special training on how to use hazardous chemicals.
- F. All training must be documented.

8. Safety Procedure Appendix

A. Back Injury Prevention

i. Background

Material handling mishaps involve back strain, muscle strains, hernias, and overexertion injuries. These type injuries account for 20-30% of work-related mishaps. They include pushing, lifting reaching, carrying, lowering, twisting, turning, and pulling. Statistics show that the causes of strain and other similar injuries are also responsible for other type injuries such as struck by object, slips, falls, and cuts.

ii. Evaluation and Selection

- 1. Evaluate the load to be handled. Determine the weight, size, destination, and work area. Ask yourself, "what means do I have for moving the material and equipment?" and "am I capable of moving it myself or not?"
- 2. Select the proper equipment to do the job. If the load is heavy or awkward, ask for assistance from a fellow worker or mechanical aid.

If you decide you are capable of lifting a light load, make sure you lift correctly following the procedure below.

iii. Procedure for safe lifting

- 1. Move in so that your feet are close to the base of the object to be lifted.
- 2. Face the object squarely. Bend your knees and squat over the item to be lifted. In this position, the back gets added lifting strength and power from the legs and arms.

3. Move up close to the item, because the backbone must act as a supporting column, and it takes the least strain close in.
4. Tilt the item on edge with its long axis straight up so that the center of the weight is as high as possible above the ground.
5. Still squatting, the feet should be set with legs pointed right at the load, with the back straightened, the worker may then grasp the load with both arms and slowly stand up with it, pushing up with the leg muscles. If you can't lift slowly, you can't lift safely.

iv. Don'ts

1. Don't twist the back or bend sideways - turn your feet, not hips or shoulders.
2. Don't perform awkward lifts.
3. Don't lift at arm's length.
4. Don't continue lifting when the load is too heavy.

B. Bloodborne Pathogens

§1910.1030

Bloodborne Pathogens Exposure Control Plan

Facility Name: Macon Water Authority

i. Exposure Determination

A determination performed by supervisors to identify employees who may incur occupational exposure to blood or other potentially infectious materials. All job classifications where employees may be expected to incur such occupational exposure, regardless of frequency, are subject to this procedure.

ii. Implementation Schedule and Methodology

Compliance Methods:

Universal Precautions will be observed by the Macon Water Authority in order to prevent contact with blood or other potentially infectious materials. All blood or other potentially infectious material will be considered infectious regardless of the perceived status of the source individual.

Engineering and work practice controls will be used to minimize/eliminate exposure. Where occupational exposure remains after institution of these controls, personal protective equipment shall also be used.

Controls will be examined and maintained on a regular schedule.

Handwashing facilities should be available to the employees who incur exposure to blood or other potentially infectious materials. If hand washing facilities are not feasible, the Authority is required to provide either

antiseptic cleanser in conjunction with clean cloth/paper towels or antiseptic towelettes. If these alternatives are used, hands should be washed with soap and running water as soon as practical.

After the removal of personal protective gloves, employees shall wash hands and any other potentially contaminated skin area as soon as feasible using soap and water.

If employees incur exposure to their skin or mucous membranes, then those areas shall be washed or flushed with water as soon as feasible following contact.

iii. Hepatitis B Vaccine

All employees who have been identified as having exposure to blood or other potentially infectious materials will be offered the Hepatitis B vaccine, at no cost to the employee. The vaccine will be offered within 10 working days of their initial assignment to work involving the potential for occupational exposure to blood or other potentially infectious materials, unless the employee has previously had the vaccine or wishes to submit to antibody testing that shows the employee to have sufficient immunity.

Employees who decline the Hepatitis B vaccine will sign a waiver. Employees who initially decline the vaccine but who later wish to have it while still covered under standard may then have the vaccine provided at no cost.

iv. Post-Exposure Evaluation and Follow Up

When the employee incurs an exposure incident, it shall be reported. All employees who incur an exposure incident will be offered post-exposure evaluation and follow-up. This follow-up will include documentation of the route of exposure and the circumstances related to the incident.

Results of testing of the source individual will be made available to the exposed employee with the exposed employee informed about the applicable laws and regulations concerning disclosure of the identity and infectivity of the source individual.

The employee will be offered the option of having their blood collected for testing of the employee's HIV/EBV serological status. The blood sample will be preserved for up to 90 days to allow the employee to decide if the blood should be tested for HIV serological status. However, if the employee decides before that time that testing will or will not be conducted, then the appropriate action can be taken and the blood sample discarded.

The employee will be offered post-exposure prophylaxis in accordance with the current recommendations of the U S Public Health Service.

The employee will be given appropriate counseling concerning precautions to take during the period after the exposure incident. The employee will also be given information on what potential illness to be alert for and to report any related experiences to appropriate personnel.

v. Interaction with Health Care Professionals

A written opinion shall be obtained from the health care professional that evaluates employees of this facility. Written opinions will be obtained in the following instances:

1. When the employee is sent to obtain the Hepatitis B vaccine.
2. Whenever the employee is sent to a health care professional following an exposure incident. Health care professionals shall be instructed to limit their opinions to:
 - a. Whether the Hepatitis B vaccine is indicated and if the employee has received the vaccine, or for evaluation following an incident.
 - b. That the employee has been informed of the results of the evaluation.
 - c. That the employee has been told about any medical conditions resulting from exposure to blood or other potentially infectious materials. (Note that the written opinion to the employer is not to reference any personal medical information).

C. Confined Space Entry

§1910.146

i. Policy

Any permit-required MWA space may be entered only after a written Confined Space Entry Work Permit has been approved. All entries into confined spaces must be conducted in a safe manner consistent with applicable regulations and recognized good work practices.

ii. Scope

This policy sets forth the requirements necessary for working in confined spaces at the MWA to prevent exposure of personnel to dangerous air contamination, oxygen deficiency, and physical hazards associated with confined spaces. A Confined Space is a space that (1) is large enough and so configured that an employee can enter bodily, (2) has limited or restricted means for entry or exit (e.g., tanks, vessels, vaults, pits), and (3) is not designed for continuous occupancy. Confined spaces include, but are not limited to, tanks, ducts, pipelines, sumps, sewers, trenches, vaults, and similar areas not intended for continuous human occupancy and meeting the criteria described in 29 CFR 1910.146.

iii. Classification

1. Permit-Required Confined Spaces (PRCS):

Permit-required confined spaces are confined spaces where actual hazards have been identified, or where the probability of a hazard is significant. Evaluation using the Confined Space Entry Permit is required. Both the on-site supervisor and the safety manager (or designee) should sign the permit.

2. Procedural Confined Space:

For confined spaces where a permit is required, but hazards have been evaluated as low risk, the on-site supervisor may approve a procedural confined space permit. The following conditions must be met:

The work is performed by MWA employees who have completed Confined Space Entry Hazards Training. The entry permit must be completed and signed. All conditions for a permit-required confined space are met.

3. Non-Permit Required Confined Space (NPRCS):

Confined spaces that do not contain hazards, or have a potential to contain hazards, do not require an approved Confined Space Entry Permit. However, a permit must be completed by the on-site supervisor, and, if hazards are not found to exist, clearly marked as a "Non-permit Space" and posted at the worksite.

Note: These spaces become permit-required confined spaces if hazards are brought in or exposed by the work. Examples include gasoline-powered earth compactors (carbon monoxide); solvent-based coatings, epoxies, and paints; open sewer lines in the bottom of trenches; contaminated soil; welding; etc.

iv. Confined Space Entry Work Permit System

A Confined Space Entry Work Permit must be completed for all confined-spaces before entry. Entry is defined as the action by which a person passes through an opening into a permit-required confined space. Entry is considered to have occurred as soon as any body part of the entrant's body breaks the plane of an opening into the space.

A written permit must be completed and posted at the worksite before a confined space is entered (see Appendix A.) This written permit documents the location(s) and type of work to be done, certifies that all existing hazards have been evaluated by the responsible qualified person(s), and ensures that necessary protective measures have been taken to protect the safety of each employee. Non-permit confined spaces must be identified as such by documenting that chemical and physical hazards (e.g., oxygen levels, etc.) do not exist and by writing "Non-Permit Space" in bold print across the work permit.

Permits will expire when the entrance is closed or at the end of the work shift, whichever is sooner. In certain instances (e.g., if the confined space

will remain isolated and the type of work will not change), the permit may be extended.

1. Confined-Space Team:

List the person(s) entering the space (entrant) and the designated standby (attendant) person(s). If applicable, the rotation by the designated attendant(s) with personnel working in the confined space must be specified.

2. Requirements Completed Prior to Entry:

This section of the permit is a checklist of items to be considered prior to entry. The checklist is designed to determine the hazard level of the permit-required confined space [i.e., procedural (low-hazard) or permit-required (high hazard)]. For example, if a requirement indicated by a footnote is marked “yes,” then the confined space is permit-required (even if it was previously classified as a procedural confined space), and both the supervisor and an industrial hygienist must sign off on the permit prior to entry.

1. Lockout and tagout/blockout must be done in accordance with established lockout and tagout procedures. Lines, pipes, etc., must be blanked/capped to the extent feasible before the confined space is entered.
2. If mechanical ventilation is required, site-specific details, such as the direction of airflow and the placement of the air intake, must be documented in the “Additional Information” section. The air supply must be from a clean source: exhaust from vehicles, cranes, earth compactors, and other potential sources of contaminants must be considered when locating the blower. The confined space must be emptied and purged of all hazardous materials to the extent possible prior to entry.
3. Continuous air monitoring may be required if the confined space cannot be isolated from potential contaminants. For example, flowing sewers often cannot be blanked off, and continuous air monitoring is recommended.
4. When entrance covers are removed, openings must be guarded by temporary barriers that will protect the entrants from external hazards, such as vehicles, and protect pedestrians from falling into the opening.
5. A fire extinguisher must be present if “hot work” is being performed.
6. When protective clothing is specified, site-specific information (e.g., type of coveralls, gloves, etc.) must be specified in the “Additional Information” section.
7. At least one standby person must be present at all times while the PRCS is occupied. The primary responsibility of the standby personnel is the safety of the occupants in

the confined space. Standby personnel must be in constant visual/radio contact with the occupants and must immediately notify emergency services (911) if there are any problems. The standby person may never enter a confined space to attempt a rescue. However, the standby can initiate a non-entry rescue, such as by operating a hoist or lift.

8. If respiratory protection is required, site-specific details, such as the type of respirator and cartridges, must be specified in the "Additional Information" section.
9. All confined spaces become permit-required confined spaces when hot work is performed in them. In addition, welding gas cylinders may never be brought into a confined space.
10. Personnel entering the space must receive confined-space training prior to entering a permit-required or procedural confined space. Attendants must also receive training prior to fulfilling the role as an attendant. In addition to this training in the hazards and classification of confined spaces, personnel must review the Confined Space Entry Work Permit, as well as any special procedures written for the space(s) prior to entry. In certain instances, employees may receive site-specific confined-space training until they can be scheduled for the confined space training class.
11. Additional lighting equipment may be needed to enable employees to see well enough to work safely and to exit the space quickly in an emergency. In certain instances, explosion-proof lighting may be required.
12. The gas monitor must be calibrated monthly, and function checked prior to each daily use.

3. Monitoring Results:

Atmospheric monitoring is required for all permit-required confined spaces (i.e., procedural and permit-required). When testing for atmospheric hazards, test first for oxygen, then for flammable gases and vapors, and finally for toxic gases and vapors [29 CFR 1910.146 (d) 5 (iii)]. Many modern direct-reading instruments provide a simultaneous reading of oxygen, flammable gases, and select toxic gases. All levels of a confined space must be tested: since gases and vapors can be lighter or heavier than air, they may tend to accumulate at one level. Atmospheric monitoring is required before mechanical ventilation is put into operation.

Any deviation from "normal" atmospheric readings must be investigated further to determine the cause of contamination and to ensure that the confined space is truly isolated.

4. Additional Information:

Include site-specific details required by the checklist here.

5. Approval:

Approval signatures go in this section.

For procedural confined spaces, the supervisor may sign. For permit-required confined spaces, both the supervisor and the safety manager or designee may sign.

The permit must be completed and approved before the confined space can be entered.

v. Documentation and Record-Keeping

The original copy of the completed Confined Space Entry Work Permit must be posted at the job site for the duration of the work. Another copy of the signed permit must be kept on file by the safety manager for at least one year.

vi. Non-permit Confined Spaces

Work requirements for non-permit confined spaces are as follows:

Non-permit confined spaces must be identified as such by documenting that chemical and physical hazards (e.g., oxygen, etc.) do not exist and by writing "Non-Permit Space" in bold print across the work permit.

Barricades and isolation (if appropriate).

Ground fault circuit interrupters (GFCI) on power hand tools and other electrical equipment.

Proposed activities must not introduce hazards to the area, thereby converting it into a high-hazard confined space.

Prior approval by the Industrial Hygienist is required.

vii. Training

Supervisors who authorize entry into confined spaces and employees who enter confined spaces or serve as attendants must have completed the Confined Space Training class. This training provides information on the hazards and classification of confined spaces, recommended safe work practices, and the correct use of a Confined Space Entry Work Permit.

Depending on responsibilities and the type of confined-space entry, additional training may be required, such as:

First aid and CPR certification

Respirator training

Lockout/Tagout

viii. Responsible Parties

1. Attendant (Standby)

An individual stationed outside one or more confined spaces to monitor authorized entrants, and who performs all attendants' duties assigned in the confined-space program.

Read the Confined Space Entry Work Permit before starting work, and abide by its conditions.

Stop work and request that workers exit the confined space if conditions under which the permit was written change, or if any danger is perceived.

Remain outside the confined space until relieved by another attendant.

Summon emergency services if it is determined that employees in the confined space may need assistance in escaping.

Be knowledgeable of the hazards that may be encountered during the entry, including the signs, symptoms, and consequences of exposure to these hazards.

Perform non-entry rescues, if possible.

Maintain contact with the workers in the confined space.

2. Safety manager

Authorize entry for procedural (low-hazard) confined spaces, and jointly approve entry with the supervisor for permit-required confined spaces.

Approve site-specific written entry procedures for procedural confined spaces.

Provide technical guidance.

Assist in monitoring and evaluating of confined-space hazards (e.g., oxygen deficiency, toxins).

Conduct the Confined Space Entry Hazards class.

Conduct the Permit Writer training class.

Administer the Confined Space Entry Program.

Maintain copies of all Confined Space Entry Work Permits for at least one year.

Maintain the inventory of permit-required confined spaces.
Perform the initial and periodic evaluation of the hazards associated with each confined space.

3. Personnel Entering Confined Spaces

Read the Confined Space Entry Work Permit before starting work, and abide by its conditions.

Stop work and exit the confined space if conditions under which the permit was written change or if any danger is perceived.

Report this to the attendant and supervisor.

Ensure that the Confined Space Entry Work Permit is posted at the worksite, and that other safety precautions, such as isolation of the space, lockout/tagout, barricades, etc., are performed, if required.

Confer with the person completing the permit to ensure that all hazards have been considered.

Be knowledgeable of the hazards that may be encountered during the entry, including the signs, symptoms, and consequences of exposure to these hazards.

Remove permits/barriers after the work has been completed.
Maintain contact with the attendant.

Forward a copy of the Confined Space Permit to the safety manager.

4. Supervisors

Ensure that employees who may work or authorize entry into confined spaces have completed the Confined Space Entry Hazards and any additional safety classes that may be required.

Ensure that employees who may perform atmospheric monitoring in confined spaces have completed the Permit Writer training.

Authorize entry for procedural (low-hazard) confined spaces, and jointly approve entry with an industrial hygienist for permit-required confined spaces.

Ensure equipment used for confined-space entries is kept in good operational condition and is calibrated according to manufacturers' recommendations.

If necessary, write a site-specific procedure for entry into a procedural confined space, and obtain pre-approval from the safety manager.

Note: This type of procedure is generally most applicable to temporary, unique research equipment.

Ensure that operations comply with the terms and conditions on the permit.

Permit-required confined spaces (PRCS). Confined spaces where actual hazards have been identified or the probability for a serious accident or hazard being present is high. Written authorization on the permit by both the supervisor and an EH&S industrial hygienist is required. Types of hazards may include

- Hazardous atmosphere
- Physical hazards, such as radiation, acids, combustible dusts, engulfment, crushing, falling etc.
- Oxygen deficiency

Examples of these types of confined spaces include sewers, degreasers, waste treatment tanks, and sumps.

Note: A space classified as a permit-required confined space may be reclassified as a non-permit confined space if the permit space poses no actual or potential atmospheric hazards and if all hazards within the space are eliminated without entry into the space [29 CFR 1910.146 c (7) i].

Procedural confined spaces. A type of permit-required confined space that meets the definition of a confined space but in which hazards are unlikely to be present. Written authorization on the permit may be by the supervisor or the safety manager. Examples of these types of spaces include electrical vaults, communication (phone) vaults, water valve vaults, etc.

Note: A procedural confined space becomes a permit-required confined space if hazards are brought in by the work. Examples include welding, epoxies, paints, solvent cleaning, etc.

D. Hazardous Materials & Communication

i. Background

It is essential that each employee work under safe and healthy conditions at all times. It is up to employees to follow the guidelines as established.

The Hazardous Materials Program outlines policies and procedures. All employees will be trained on hazardous materials (if any) that are used in their jobs.

ii. Responsibilities

1. Risk Management and Safety Coordinator: The Risk Management and Safety Coordinator is responsible for maintaining and updating a written master hazardous communication program and master list of chemicals or materials used at the Authority.
2. Purchasing Department: The Purchasing Department will state in the purchase order or requisition requirements that a Safety Data Sheet will be provided on all hazardous materials. Information should be forwarded to the appropriate manager prior to receiving hazardous chemicals.
3. Managers/Supervisors: Each should be aware of the hazardous chemicals used in his or her department. The list of hazardous chemicals will be reviewed and updated in each work area monthly. The applicable Safety Data Sheets will be made readily available to workers in each area. The chemicals listed should coincide with labels found on the containers of hazardous chemicals
4. Employee: The employee is responsible for complying with proper safeguards when using hazardous chemicals and identifying them as such on a continuing basis. Employees are responsible for identifying problem areas and reporting these unsafe conditions to supervisors for correction.

iii. Defining Hazardous Chemicals

The Authority will use basic SDS definitions for defining hazardous chemicals. These are divided into health hazards and physical hazards.

1. Health Hazard: A chemical for which there is statistically significant evidence, based on at least one study conducted in accordance with established scientific principles, that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatoxins, nepurotoxins, neurotoxins, agents that act with the hematopoietic system and agents which damage the lungs, skin, eyes or mucous membranes.
2. Physical Hazard: A chemical, for which there is scientifically valid evidence, that it is a combustible liquid, a compressed gas, explosive, flammable, or an organic peroxide, and oxidizer, pyrophoric, unstable or water-reactive.

The Authority will be required to maintain Safety Data Sheets on any chemical that proposes a health hazard or physical hazard. It will be necessary for supervisors to train employees in the use of such chemicals.

iv. Labels and Other Warnings

Chemical manufacturers are required to label and/or tag hazardous chemicals used in the workplace. Labels must contain suitable information to identify the chemical, state hazard warnings, and list the name and address of importer or responsible party and recommended personal protective equipment. Each employee and/or supervisor should read labels and obtain information. Information found on the label should be cross-referenced to the Safety Data Sheets. Safety Data Sheets provide additional information. If chemicals are transferred to another container, it should be properly labeled.

v. Employee Training

Employees will be provided with information on hazardous chemicals in their work area at the time of their initial assignment and whenever a new hazardous material is introduced. Specific training will include methods and observations used to detect the presence of hazardous chemicals as well as the physical and health hazards concerning them. Measures employees can take to protect themselves from hazards should be included in the training, such as proper eye protection, gloves, aprons, and so forth. Employees will be instructed where to find the Safety Data Sheets and how to use them.

Employee training records should be kept on a continuing basis to indicate that employees have been trained in how to use and identify hazardous chemicals.

E. Ladder Safety

§1910.25

i. Selection of Ladders

1. Each self-supporting or non-self supporting portable ladder shall be rated for at least four times the maximum intended load, except that each extra-heavy-duty type IA metal or plastic ladder shall contain at least 3.3 times the maximum intended load.
2. There may be a portable ladder provided at the job site by other crafts, such as plumbers, pipefitters, general contractors, and others. Supervisors and foremen will be responsible for inspecting the ladders to see if they are satisfactory to use. Do not use a defective ladder. It may be necessary to select and use your own ladder rather than using ladders belonging to others.

ii. Employee Training

1. All employees on job sites will receive training in the use of ladders. The program will include instruction for each employee in recognizing hazards relating to ladders. Competent employees shall train employees on the site.
2. Specific training will include the following areas:
 - a. Nature of fall hazards in the work area

- b. Proper construction, use, placement, and care in handling ladders
- c. Maximum intended load-carrying capacities of ladders used
- d. Training and re-training of all necessary safety areas to include a thorough understanding and knowledge concerning portable ladders.

iii. Construction and Care

1. The minimum clear distance between side rails for all portable ladders shall be 11.5 inches.
2. Rungs and steps of portable metal ladders shall be corrugated, knurled, dimpled, coated with skid-resistant material, or otherwise treated to minimize slipping.
3. A metal spreader or locking device shall be provided on each stepladder to hold the front and back sections in an open position when the ladder is in use.
4. Ladder components shall be surfaced to prevent injuries to an employee from punctures, lacerations, and to prevent snagging of clothing.
5. Wood ladders shall not be coated with any opaque covering, except for identification or warning labels which may be placed on one space side rail only.

iv. Inspection

1. Ladders will be discarded immediately if they indicate deterioration such as splintering, cracks and broken side rails or rungs, or defective conditions. Rungs that are worn 20% of their original dimension are considered unsafe.
2. Ladders shall be inspected daily by individual employees who use ladders. Employees should not use ladders with defects.
3. Portable ladders with structural defects, such as, but not limited to, broken or missing rungs, cleats, or steps, broken or split rails, corroded components, or other faulty or defective components, shall either be immediately marked in a manner that readily identifies them as defective, or be tagged with "Do Not Use" or similar language and shall be withdrawn from service until replaced.

v. Use of Ladders

1. It shall be the responsibility of every employee to inspect the ladder before using it visually. Any ladder found defective shall not be used and shall be taken out of service immediately after tagging as defective.
2. When portable ladders are used for access to an upper landing surface, the ladder side rail shall extend at least three feet above the upper landing surface to which the ladder is used to gain access.

3. When using a ladder, use both hands and face the ladder when ascending or descending. Employees shall not carry any objects or loads that could cause the employee to lose balance and fall. When working on a ladder, try to keep at least three points (one hand and two feet or two hands and one foot) on the ladder at all times. Don't overreach, move the ladder as work progresses.
4. Only one person at a time is permitted on a ladder. When one employee is tying or untying a ladder, another employee should hold the ladder until such time as the ladder is secure.
5. Ladder rungs or steps should be kept clean of mud, clay, grease, and other materials that could cause an employee to slip. The bottom of one's shoes or boots should be checked before using any Ladder.
6. Placement
 - a. Portable ladders and extension ladders should be placed at the proper angle before using it. Ladders should be placed so the distance of the base of the ladder from the object against which the ladder is leaning is $\frac{1}{4}$ of the length of the ladder. For example, the bottom of a 12-foot ladder should be set three feet from the wall. See illustration on the following page.
 - b. Ladders placed in any location where they can be displaced by workplace activities or traffic, such as in passageways, doorways, or driveways shall be secured to prevent displacement or a barricade shall be used to keep activities or traffic away from the ladder.
 - c. Make sure that all ladders will not slip while being used. Provide special non-slip safety ladder feet or by securing ladder at top and bottom to prevent displacement. Place ladders on firm, level ground, and never upon moveable objects. Make sure the ladder is straight - use a leveling device if necessary.
 - d. Do not place a ladder close to live electrical wiring, or where it can damage equipment or insulation such as sprinkler head or operational piping.
 - e. Do not place a ladder resting on one rung or cleat. Both side rails at the top must be supported.
 - f. Ladder rungs, cleats, and steps shall be parallel, level and uniformly spaced when the ladder is in position for use.
 - g. Ladders shall not be loaded beyond the maximum intended load, or their manufacturer's rated capacity.
 - h. The area around the top and bottom of ladders should be kept clear.
 - i. The ladder shall not be moved, shifted, or extended while occupied.
 - j. The top or top step of a stepladder shall not be used as a step.
 - k. Single rail ladders will not be used.

vi. Storage

Ladders should not be stored outdoors or exposed to the elements. They should be stored in an orderly manner and in well-ventilated location. This will prevent cracking, warping and deterioration.

F. Lockout/Tagout Procedures

§1910.147

i. Policy

1. Macon Water Authority policy requires a lockout/tagout device for employees servicing or maintaining machines or equipment in which the unexpected energization, start-up, or release of stored energy could cause injury to employees. This policy requires a lockout/tagout device that utilizes a lock and key and a lockout capable of isolating energy that cannot be operated unless such a lockout device is removed.
2. The lockout policy applies to the control of energy sources during servicing or maintenance of machines or equipment. Energy sources include any electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy sources that could cause injury to personnel. If servicing and/or maintenance procedures are performed during normal production, lockouts/tagouts are required if:
 - a. An employee is required to remove or bypass a guard or other safety device
 - b. An employee is required to place any part of his or her body in a danger zone.
3. The lockout/tagout safety policy and procedure does not apply to:
 - a. Work on cord and plug connected equipment, which is unplugged and under control of the employee.
 - b. The basic rule for using lockout or tagout policy and procedure applies to all equipment to protect against mishaps or inadvertent operation when such operation could cause injury to personnel. Employees shall not attempt to operate any switch, valve, or other energy-isolating devices if it is locked or tagged out.

ii. Definitions Applicable to Lockout/Tagout

1. Affected Employee - An employee whose job requires him/her to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout or tagout, or whose job requires him/her to work in an area in which servicing or maintenance is being performed.
2. Authorized Employee - A person who locks or implements a tagout system procedure on machines or equipment in order to perform the servicing or maintenance on that machine or equipment. An authorized employee and an affected employee may be the same

person when the affected employee's duties also include performing maintenance or service on a machine or equipment that must be locked or a tagout system implemented.

3. Capable of Being Locked Out - An energy isolating device will be considered to be capable of being locked out either if it is designed with a hasp or other attachment or integral part to which or through which a lock can be affixed, or if it has a locking mechanism built into it.
4. Energy Isolating Device - A mechanical device that physically prevents the transmission or release of energy. This includes a manually operated electrical circuit breaker, disconnect switch, or other similar devices used to block or isolate energy. The term does not include a push button, selector switch, and other control circuit type devices.
5. Energy Source - Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.
6. Hot Tap - a procedure used in the repair, maintenance, and service activities that involves welding on a piece of equipment (pipelines, vessels or tanks) under pressure in order to install connections or appurtenances.
7. Lockout - The placement of a lockout device on an energy-isolating device, in accordance with an established procedure, ensuring that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.
8. Lockout Device - A device that utilizes a positive means such as a lock, either key or combination type, to hold an energy-isolating device in the safe position and prevent the energizing of a machine or equipment.
9. Servicing and/or Maintenance - Workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying, and maintaining and/or servicing machines or equipment. These activities include lubrication, cleaning, or unjamming of machines or equipment and making adjustments or tool changes where the employee may be exposed to the unexpected energization or startup of the equipment or release of hazardous energy.
10. Tagout - The placement of a tagout device on an energy-isolating device, in accordance with an established procedure, to indicate that the energy isolating device and the equipment being control lied may not be operated until the tagout device is removed.
11. Tagout Device - A prominent warning device, such as tag and a means of attachment, which can be securely fastened to an energy-isolating device in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.

iii. Responsibility

1. Supervisor - Responsibility is to implement and/or enforce the lockout/tagout policy and procedure. The Supervisor shall first determine what equipment is to be locked/tagged out and what energy sources apply. After determining what sources are used, supervisors shall instruct all employees in the use of the lockout/tagout procedure. Training shall also be included for contractors and/or new or transferred affected employees. Training shall be documented as stated in this procedure by name(s), job title(s) of affected employees.
2. Employee - Responsibility shall be to use the lockout/tagout procedure as outlined in this procedure and/or directed by supervisors.

iv. Inspections

Inspections shall be performed at least annually to ensure that energy control procedures are properly implemented.

v. Training

Macon Water Authority shall provide training to ensure that all employees are trained in how to use lockout/tagout procedures. Authorized employees shall receive training, along with any affected employees. The training shall include periodic retraining for authorized and affected employees.

1. Training will include recognition of hazardous energy sources, type, and magnitude of energy available, methods and means for isolation and control
 - a. Purpose and use of the procedure
 - b. Other employees whose work is in or may be in an area where lockouts/tagouts are used. Instruct about procedure and prohibition concerning starting locked and tagged equipment.
2. Employee retraining shall be provided when there is a change in assignment, change in machines, equipment, or process that present a new hazard, or a change in energy control procedures. Also, retrain when inspections reveal a need or whenever the employer sees a need. Retraining shall re-establish proficiency and introduce new or revised control methods.
3. When tagout systems are used, train on the limitation of tags.
 - a. Tags are warning devices and do not provide physical restraint.
 - b. Tags must not be removed without authorization of the worker using it and never be bypassed, ignored, or otherwise defeated.
 - c. Tags must be legible to be effective.
 - d. Tags and their means of attachment must withstand the environment.

- e. Tags may evoke a false sense of security and must be understood as part of an overall program.

vi. Procedure

1. Preparation for Lockout

A survey shall be made to locate and identify all energy sources to be certain which switch, valve, or other energy isolating devices apply to equipment to be locked out. An authorized employee, under the supervision of a supervisor, should perform this survey. More than one energy source (electrical, mechanical, or others) may be involved. Questionable energy source problems shall be resolved before job authorization is obtained, and lockout commences. Complete simple lockout/tagout procedure if more than one energy source is used.

2. Sequence of Lockout Procedure

- a. Notify all affected employees that a lockout is required and the reason, therefore. The authorized employee shall know the type and magnitude of energy that the machine or equipment utilizes and shall understand the hazards thereof.
- b. If the equipment is operating, shut it down by the normal stopping procedures, such as depress stop button, open toggle switch, and so forth.
- c. Operate the switch, valve, or other energy-isolating device so that the energy source (electrical, mechanical, hydraulic, etc.) is disconnected or isolated from the equipment. Stored energy, such as that in capacitors, springs, elevated machines members, locating flywheels, hydraulic systems, and air, gas, steam, or water pressure, etc. must be dissipated or restrained by methods such as grounding, repositioning, blocking, bleeding down, etc.
- d. Lockout the energy-isolating device with an assigned individual lock. Use only the approved lock and key system. Also, tag the energy source with date, name, and nature of the problem and sign name.
- e. After ensuring that no personnel are exposed and as a check on having disconnected the energy sources, operate the push button or normal operating controls to make sure the equipment will not operate.
- f. CAUTION: Return operating controls to the neutral position after the test.
- g. The equipment is now locked, and the employee may perform maintenance on equipment.

3. Restoring Equipment to Service Procedure

- a. When the job is complete, and the equipment is ready for testing or normal service, check the equipment area to see that no one is exposed.

- b. When equipment is all clear, remove all locks. The energy-isolating devices may be operated to restore energy to the equipment.
- c. A lockout or tagout device may only be removed from the energy-isolating device by the employee who applied the device. When the employee who applied the lockout or tagout device is not available, that device may be removed under the direction of the maintenance supervisor or the shift supervisor on duty. The supervisor shall demonstrate that the procedure provides equivalent safety to the removal of the device by the authorized employee who applied it. The specific procedure shall include at least the following elements:
 - i. Verification by the supervisor that the authorized employee who applied the device is not at the facility.
 - ii. Making all reasonable efforts to contact the authorized employee to inform him/her that his/her lockout or tagout device has been removed; and
 - iii. Ensuring that the authorized employee has this knowledge before he/she resumes work at the facility.

4. Procedure Involving More than One Person and Duplicate Keys

- a. If more than one individual is required to lockout equipment, each shall place his or her own personal lockout energy isolating device(s). Each individual shall have his or her own personal lock and key. No duplicate keys should be made. The supervisor within the applicable department shall not keep a duplicate key. A duplicate key can be kept by an authorized employee who works outside the department (i.e. safety manager).
- b. If more than one shift is involved, each individual responsible for maintaining equipment on that shift should apply his or her lock and have the other removed. Communication will be present on both shifts to make certain the equipment is locked-out at all times.

G. Respiratory Protection Program

§1910.134

i. Respiratory Protection Requirements

Respirators are required in, but not limited to all of the following conditions:

- 1. When respiratory protection is required by heavy concentration of hazardous material.

2. When working with or handling hazardous materials as defined under the *Hazard Communications Program*. Examples of hazardous materials do include hazardous water or sewage treatment and other hazardous materials as specified as hazardous in the Safety Data Sheet supplied by the manufacturer and/or supplier. Respiratory protection is required as stated by the manufacturer of the material.
3. When atmospheres are in excess of the Threshold Limit Value or Permissible Exposure Limit or believed to be in excess of either. A detection of this exposure may be determined by actual samples by monitoring the area, odor specific with the chemical or visible signs of the hazardous material.
4. In areas where limited ventilation is present such as a mechanical room or enclosed pipe areas.
5. In confined spaces, as stated explicitly in the Safety Manuals or Threshold Limit Values latest revision.

ii. Assignment of Respirators

1. Employees shall not be assigned tasks requiring respirators unless it has been determined that they are physically able to perform the work and use the equipment.
2. During the pre-employment physical, a spirometry or pulmonary function test must be given and successfully passed before any employee is issued a respirator.
3. Where practicable, respirators shall be permanently assigned to each individual employee. Employees shall use the provided respiratory protection in accordance with instructions and training received.

iii. Selection of Respirators

1. It shall be the responsibility of the manager or supervisor in charge of the area to select the proper respiratory protection based on physical and chemical properties of the air contaminants and the concentration level likely to be encountered. The responsible supervisor will review the respiratory equipment whenever there is a change in materials handled.
2. Respirators shall be selected on the basis of hazard exposure in accordance with ANSI standards.
3. Nature of the hazardous operation - to include operation or process characteristics, work area, materials used or produced, worker duties and actions, and any abnormal situations such as emergencies.
4. Location of any hazardous areas - this mainly applies to any hazardous materials situated in plants that may be present in the construction process.
5. Only NIOSH (National Institute for Occupational Safety and Health) and MSHA (Mine Safety and Health Administration) respirators shall be used in accordance with the hazards present. The manufacturer or supplier of the hazardous materials should be contacted to recommend a type of respiratory protection. Normally,

the Material Safety Data Sheet will specify the specific type of respirator. 3M/Scott AV-200 Respirator with 742-SD1 Filter Cartridge is currently Macon Water Authority's chosen PPE.

6. The supervisor in charge of the work area shall issue a respirator to each employee who is placed as a new hire or transfer to a job that requires respiratory protection. Replacement respirators/pre-filters will be made available as required.

iv. Limitations and Capabilities

All respiratory protection is designed for special use. The supervisor or manager should inform each employee of the special limitations and capabilities of the particular respiratory protection provided. This will be done during training and carefully documented. Employees that are required to have a respirator shall report to work without facial hair. Supervisory personnel will ensure that all employees issued respirators will be free of facial hair between the skin and face piece sealing surface. If needed, employees will shave before their shift.

v. Training

All employees shall be trained in the proper use and maintenance of all respirators before assigning them to a job. The Training Officer will schedule training with the Macon-Bibb fire department and area supervisors will supplement as needed. Training will be repeated on an annual basis. Training will include the following areas:

1. The respirator and all functional parts, including straps and adjustments.
2. Discussion of capabilities and limitations to include identification of contaminants, limitations on the service life of the cartridge, canister, or filter, and warning properties of the contaminants.
3. Demonstrated proper use:
 - a. Tight fit and proper location of strap
 - b. Proper fit of nose piece, if any
4. Procedure for inspection and maintenance
5. Procedure for storage:
 - a. Where supplies of respirators or masks are located.
 - b. Keeping dust out and other elements when respirators are not in use, and
 - c. Replacement of the equipment when dirty.
6. Employees shall also be trained in:
 - a. Handling the respirator,
 - b. Instructors shall fit respirators to each employee,
 - c. Instructions on proper fitting
 - d. Testing of the face piece to face seal, in accordance with the manufacturer's instructions.
 - e. Practice wearing time and actual use in atmosphere
 - f. How to tell when you have a good face to face seal.

vi. Cleaning

Respirators should be cleaned and disinfected after each day's use or more often if necessary. This applies only to those respirators that are routinely used throughout the day. Cleaning at less than daily frequency is acceptable if proper protection is still afforded to the employee.

vii. Storage

1. All respirators are to be stored in a clean and sanitary location using hermetically - sealed plastic bag or plastic bags capable of being sealed; plastic containers with tight-fitting lids such as a freezer container; or cans with tight-fitting lids.(Ex. Granger Storage Bag)
2. Respirators should be packed or stored so that the facepiece exhalation valves will rest in a normal position. Respirators are not to be hung by the straps.
3. Emergency use SCBA's should be stored where they are easily accessible, with the location easily marked.

viii. Inspection and Maintenance

1. All respirators shall be inspected according to the manufacturer's recommendations and after each use. The individual employee is to inspect their own respirator and to notify their supervisor if defects are found.
2. Supervisors in the various areas shall inspect respirators on a periodic basis.
3. Replacement or repairs for respirators shall be done only by an experienced, trained person with parts designed for the respirator. No attempt shall be made to replace components or make adjustments or repairs beyond the manufacturer's recommendations.

ix. Employee Fit Testing

Employees required to wear respirators must be fitted properly and tested for a face seal prior to the use of the respirator in a contaminated area. Manufacturers provide fitting instructions and use limitations on the product packaging. Quantitative Fit Testing will be the testing method of choice using the PortaCount Respirator Fit Tester 8040. This will be done annually to ensure safety and reliability.

x. Emergency Respiratory Equipment

Self-contained breathing apparatus may be required in specific areas for emergency use. Only trained personnel will use this equipment when it is necessary to enter hazardous atmospheres. The following points should be considered:

1. All potential users will be fully trained in the use of this equipment.
2. Employees will use their company issued respirators with SCBA's.
3. When the equipment is used, it will be tested in an uncontaminated atmosphere prior to entering the hazardous area if possible.
4. An employee will not work with this apparatus in a hazardous atmosphere on an individual. At least one additional employee suitably equipped with a similar breathing apparatus must be in

contact with the first employee and must be available to render assistance if necessary.

5. This equipment will be inspected monthly by trained department or group personnel. Inspection and maintenance information will be recorded in the Risk Management logbook.

H. Safety Inspections

The objective of any safety inspection is to identify and eliminate/control physical hazards and unsafe work practices.

Inspection reports generated by members of the safety committee, supervisors and/or employees should be forwarded to the committee chairperson for appropriate action and record.

Supervisors should perform monthly inspections. Committee members and others desiring to participate in the inspection role may also provide inspections.

Correction of unsafe conditions and practices plays a key role in mishap prevention. Follow-up on all recommendations is essential for a successful program.

i. Components of a Safety Inspection

1. Physical Hazards (unsafe conditions)
2. Dangerous acts (practices)
3. Equipment guarding
4. Fire protection, Fire prevention
5. Electrical equipment (portable and stationary)
6. Means of egress (exits)
7. Welding and cutting equipment
8. Housekeeping
9. Hazardous materials (chemicals)

ii. Types of Safety Inspections

1. Departmental Inspections

The supervisor is tasked with conducting periodic departmental inspections. Formal departmental inspections are conducted by the supervisor, manager, or designated employee at least monthly. Unsafe acts and unsafe conditions observed should be forwarded to the person in charge of the department and/or the safety committee. The written report should state the condition and/or acts observed, recommending solutions for correction.

2. General Inspections

General inspections are performed either by the supervisor or safety committee on a periodic basis. During these inspections, various departments and/or areas should be inspected, identifying unsafe conditions and practices observed. Inspectors may use inspection checklists. Inspections should follow the following steps:

- a. STEP 1: Before starting the inspection, contact the person in charge of the department or area and solicit his or her help.

A supervisor should accompany the inspector covering his or her department.

- b. STEP 2: Inspect systematically and thoroughly, emphasizing causes of loss. Be specific in identifying conditions.
- c. STEP 3: Take notes and make suggestions on correcting the conditions observed. Any checklist used should remain in the inspector's file with a copy given to the supervisor. The inspector should review the report and forward a copy (with corrective actions noted) to the safety manager.

iii. Follow Up for Action

Follow-up is a necessary part of the inspection process. Action may be taken by forwarding recommendations to the department manager and/or safety committee. Document all actions taken for training. If other departments are to be involved in suggested corrective action, make suggestions, and forward a report to the appropriate manager and/or the safety committee for action. Additional follow-up should be accomplished every two weeks until the situations are corrected.

iv. Inspection Checklists

The following checklist covers all the areas necessary for a successful safety inspection. A few of the items listed may not apply directly to your department. Some items you may check only once a year. Feel free to modify the checklist to fit the needs of your department.

Facility Inspected:

Inspection Team:

Inspection Team:

Date inspection completed:

Inspection Team:

**GENERAL FACILITY
EVALUATION**

EXCELLENT GOOD AVERAGE FAIR POOR

A. HOUSEKEEPING/ORDER

**B. FIRE
PROTECTION/CONTROL**

C. LIFE SAFETY

D. MECHANICAL/ELECTRIC

E. ACCIDENT PREVENTION

A. HOUSEKEEPING/ORDER

Yes No N/A

1. Is combustible waste removed efficiently?
2. Are walkways kept free of obstructions, oil, and standing water?
3. Are the following areas kept free of rubbish, waste paper, old furniture, misc. storage?
 - a) Basement, utility, boiler, and janitorial rooms
 - b) Elevator control room, and pits

- c) Kitchens
- d) Offices and public areas
- e) Loading dock
- 4. Oily and solvent rags kept in appropriate metal receptacles
- 5. All Closets free of oily mops and miscellaneous flammable material

COMMENTS:

B. FIRE PROTECTION AND CONTROL

Yes No N/A

- 1. Fire alarm pull stations unclogged and accessible
- 2. Smoke detectors operational
- 3. All control panels operational
- 4. Doors to alarm control panels, sprinkler valves locked
- 5. Sprinkler system fully pressurized
- 6. Sprinkler main control valve secured in the open position
- 7. Sprinkler heads free of obstruction by high piled storage, partition, or lights
- 8. Any fire department connections/post indicator valves accessible, free from defects and visible
- 9. Stairwell standpipe fire department connections in the closed position, tightly capped, and appropriately safety wired
- 10. In standpipe hose closet:
 - a) Hoses dry and in good condition
 - b) Nozzles on tight and in the closed position
 - c) Door handles tight and operable
- 11. Any special portable fire extinguishing systems properly charged and powered?

12. All portable fire extinguishers fully charged, accessible, and tagged with the inspection record
13. Flammable liquids:
 - a) Identified and carry appropriate warning labels
 - b) Dispensed from approved safety cans or drums
 - c) Stored in areas that are not confined, and away from electrical motors and other ignition sources
14. All building's lightning rod system components in order

COMMENTS:

C. LIFE SAFETY

Yes No N/A

1. All exit lamps on, and glass intact
2. Exit ways (corridors, ramps, stairwells) free and unobstructed from all parts of the building
3. All emergency lighting systems operable
4. Are fire doors free from any blockage or obstruction? (wedges)
5. All hardware apparatus (holdbacks, coordinating hardware, special signage) in working order?
6. All stairwell or other fire doors automatically close tightly

COMMENTS:

D. MECHANIC/ELECTRICAL

Yes No N/A

1. All exposed motors kept clean and adequately ventilated to reduce overheating
2. HVAC filters sufficiently clean to assure good ventilation
3. Exposed belts, pulleys, and other rotating machinery parts properly segregated and guarded
4. On use and storage of compressed gas cylinders:
 - a) Cylinders secured to prevent falling
 - b) Oxygen separated from flammable gas by at least 20 ft. or a fire wall

- c) Safety caps in place when cylinders are not in use
- d) Contents clearly identified on each cylinder
- 5. All guard rails in good repair
- 6. Doors to all utility rooms locked at all times
- 7. Workspaces around electrical boxes, circuit breakers, and control panels clear and accessible
- 8. Overloading of electrical circuits with octopus-type extensions avoided
- 9. Extension cords protected from damage (no cords under rugs, or wedged by furniture, pinched by doors, or near heat sources)
- 10. All wall receptacles and switches covered with plates
- 11. Microwave ovens free from any microwave radiation leakage

COMMENTS:

E. ACCIDENT PREVENTION

Yes No N/A

- 1. Walkways kept free of obstructions, oil and standing water
- 2. Adequate lighting in undercover areas (parking decks, work areas)
- 3. Handrails and treads secure on ramps and stairways
- 4. "NO SMOKING" areas prominently posted with appropriate safety signage
- 5. All first aid kits fully stocked, kept clean, and mounted in readily visible locations
- 6. Personal protective equipment supplied, maintained in a sanitary condition and used where necessary
- 7. Major first aid equipment (gas masks, stretchers, backboards, etc. in their proper place and maintained
- 8. All potentially harmful substances clearly labeled with precautionary (danger, warning, poison) information

COMMENTS:

I. Slip & Fall Prevention

§1926.451

i. Preventing Slips and Falls

1. Do's

- a. Be considerate of the people you work with, and think ahead by cleaning up or reporting spills.
- b. Recognize hazards on and off the job. Pay attention and ensure you can see the path ahead.
- c. Avoid hazards by walking around them. Slow down and keep your balance.
- d. Control hazards by marking them clearly.
- e. Wear slip-resistant shoes.
- f. Keep work area well-lit and clean.
- g. Use the right climbing equipment for the job.

2. Don'ts

- a. Don't walk fast or run through high hazard areas.
- b. Don't carry large, awkward loads, especially on slippery surfaces.
- c. Don't take shortcuts by cutting across areas not designated as a pathway.
- d. Don't use makeshift ladders, such as standing on a chair or box.
- e. Don't stand on top of a stepladder or use an extension ladder that is too short.

J. Soil Excavation and Trenching Safety

i. General Protection Requirements

1. The basic standard issued by the Occupational Safety and Health Administration (OSHA), Subpart P-Excavations, Trenching, and Shoring will be used as a guideline for excavation and trenching. Other standards, such as the Corps of Engineers Safety Requirements and Associated General Contractors of America may also be used. Brief requirements are outlined in this Safety procedure.
2. Prior to opening an excavation or trench, GUCC will be contacted for a locate of all lines.
3. Employees shall wear adequate personal protective equipment for protection of the head, eyes, hands, ears, feet, and other parts of the body as exposed while excavating or trenching.
4. Trenches and excavations shall be checked for oxygen content and harmful gases prior to entry and during occupation.
5. Employees shall be provided and wear warning vests marked with or made of reflectorized and high visibility material, and shall be trained DOT flagmen where required.
6. Adequate shoring or a trench box must be used in excavations that are four feet deep or greater. No person shall be permitted under loads handled by power shovels, derricks, or hoists.

7. A Supervisor or certified competent person shall make daily inspections of excavations and trenching. If there is evidence of possible cave-in or slides, all work shall cease until necessary precautions are taken.

ii. Specific Excavation and Trenching Requirements

1. Excavation

- a. The walls and faces of all excavations shall be guarded by a shoring system, sloping of the ground, or some other equivalent means.
- b. Excavations shall be inspected by a certified competent person prior to entry and after rain or other hazard increasing occurrences.
- c. Excavated material should be effectively stored and retained at least two feet or more from the edge of all excavations.

2. Trenching

- a. Banks of four feet or more high shall be shored, or some other equivalent means of protection shall be provided. Trenches less than 4 feet in depth shall also be effectively protected when examination of the ground indicates hazardous ground movement may be expected.
- b. Sides of trenches in unstable or soft material, four feet or more in depth, shall be shored, sheeted, braced, sloped, or otherwise supported by means of sufficient strength to protect employees working within.
- c. Sides of trenches in hard or compact soil, including embankments, shall be shored or otherwise supported when the trench is more than four feet in depth. In class A and B soil, the sides of the trench above the five foot level may be sloped to preclude collapse, but shall not be steeper than one foot rise to each 1/2 foot horizontal.
- d. Materials used for sheeting and sheet piling, bracing, shoring, and underpinning, shall be in serviceable condition and timbers used shall be of sound and free from large or loose knots, and shall be designed and installed as to be effective to the bottom of the excavation.
- e. Additional precautions by way of shoring and bracing shall be provided to prevent slides or cave-ins when excavations or trenches are made in locations adjacent to back tilling excavations or when excavations are subject to vibrations from railroad or highway traffic, operation of machinery, or any other source.
- f. When employees are required to be in trenches four feet deep or more, adequate means of exit, such as a ladder or steps shall be provided and located so as to require no more than 25 feet of lateral travel.

- g. Portable trench boxes or sliding trench shields may be used for the protection of personnel in lieu of a shoring system or sloping. Where trench boxes or shields are used they shall be designed, constructed, and maintained in a manner that will provide protection equal to or greater than sheeting or shoring required for the trench.
- h. Backfilling and removal of trench supports shall progress together from the bottom of the trench. Jacks or braces shall be released slowly and, in unstable soil, ropes shall be used to pull out the jacks or braces from above, after employees have cleared the trench.
- i.

iii. Definitions

1. Angle of repose - The greatest angle above the horizontal plane at which a material will lie without sliding.
2. Bank - A mass of soil rising above a digging level.
3. Braces (trench) - The horizontal members of the shoring system whose ends bear against the uprights or stringers.
4. Excavation - Any man-made cavity or depression in the earth's surface, including its sides, walls, or faces, formed by earth removal and producing unsupported earth conditions by reasons of the excavation. If installed forms or similar structures reduce the depth to width relationship, an excavation may become a trench.
5. Slope - The angle with the horizontal at which a particular earth material will stand indefinitely without movement.
6. Trench - A narrow excavation made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench is not greater than 15 feet.
7. Trench jack - Screw or hydraulic type jacks used as cross bracing in a trench shoring system.
8. Trench shield - A shoring system composed of steel plates and bracing, welded or bolted together, which support the walls of a trench from the ground level to the trench bottom and which can be moved along as work progresses.
9. Unstable soil - Earth material, other than running, that because of its nature or the influence of related conditions cannot be depended upon to remain in place without extra support, such as would be furnished by a system of shoring. See the illustration of unstable soil below.

K. Welding Safety

§1910.252

This safety procedure covers electric and gas welding, oxygen cutting and burning processes.

i. Preparation for Welding

Before providing any welding or cutting operation, an evaluation must be made by the appropriate supervisory personnel for the type of welding or burning necessary and safety precautions necessary to complete the job. Included shall be the following features:

1. Location of Activity
2. Type welding, burning, or cutting equipment needed
3. Hazardous materials
4. Confined spaces
5. Ventilation requirements
6. Safety precautions for adjacent areas
7. Personal Protective Equipment for employees
8. Fire Protection Necessary
9. Employee Training Requirements
10. Equipment Maintenance

ii. Employee Training

Requirements for training include:

1. Fire watch and fire extinguishing equipment. - Fire Watchers shall be trained in the use of fire extinguishing equipment. They shall have fire extinguishing equipment readily available and be trained in its use. They shall be familiar with the facilities for sounding an alarm in the event of a fire.
2. Workers in charge of oxygen or fuel-gas supply equipment must be instructed and competent. They shall be instructed and judged competent by their management before being left in charge of the job or area. Rules and instructions covering the operation and maintenance of oxygen or fuel gas supply equipment and the distribution system shall be readily available.
3. Employees who operate arc-welding (electric) equipment shall be instructed and required to know safety procedures. This includes the operation and maintenance of equipment itself.
4. Operators shall report equipment defects, and ensure proper safeguards are provided. Repairs on such equipment shall only be done by trained employees.
5. Qualified electricians shall make installations for electrical welding machines.
6. Employees operating resistance welding equipment must be instructed and competent.
7. Equipment inspections shall be made by qualified individuals. The operator of such equipment shall be instructed to report any defects to his or her supervisor, and the equipment shall be tagged and taken out of service until repairs have been completed.

iii. Safety Rules and Practices

1. Ventilation and respiratory protection

Adequate ventilation will be provided during the welding operation. This may be done by general or local exhaust ventilation. Gases, dust, and fumes should be kept below the Threshold Limit Values.

If gases, dust, and fumes cannot be kept below the Threshold Limit Values, welders and cutters shall wear approved respiratory protective equipment certified for the exposure by NIOSH. Where oxygen is also deficient, such as in confined spaces, self-contained breathing apparatus or hose masks with blowers are to be provided.

2. Eye Protection

- a. Goggles, helmets, and shields that give maximum eye protection for each welding and cutting process shall be worn by operators, welders, and their helpers. These items should conform to ANSI Z-87. 1, Practice for Occupational and Educational Eye and Face Protection, and Z-89.1, Protective Headwear for Industrial Workers.
- b. Guidelines for correct filter Lenses are outlined as follows:

Task	Lens Shade Number
Electrical Welding	10, 11, 12, or 14
Gas Welding	5, 6, or 8
Oxygen Cutting	5 or 6

Refer to manufacturer or other references for exact shade numbers depending on the type of welding or cutting performed.

3. Protective Clothing

- a. Welders are required to wear flame-resistant leather gloves or other suitable material. Aprons made of leather or other material will withstand radiated heat and sparks. For heavy work, fire-resistant leggings, high boots, or similar protection is required. Low-cut shoes with unprotected tops shall not be used. Never allow pants legs to be inside of boot tops.
- b. For overhead work, capes, or shoulder covers of leather or other suitable material is required. Skullcaps of leather or flame-resistant fabric may be worn underneath helmets to prevent head bumps. Also, for overhead welding ear protection is sometimes required.
- c. Safety hats or other head protection may be necessary for jobs where sharp objects or exposure to falling objects may be a problem.

4. Fire Protection

A portable fire extinguisher will be available at all times when welding or cutting of any type. This is required on job sites as well as within the shop areas. There shall be a fire watch at all times when performing welding or cutting task. Employees should be required to maintain fire watches and sound an alarm if necessary.

After the job is finished, a fire watch shall be maintained for 30 minutes to check for smoldering fires. Portable fire extinguishers will be maintained as necessary.

L. Extreme Weather Procedures

Purpose: MWA personnel must work in weather conditions that are not always ideal but guidance must be established to limit exposure to circumstances that are considered critical to maintaining the operational integrity of Water, Wastewater, Storm Water, related treatment, delivery and collection systems. This SOP will establish procedures that will allow essential activities while limiting those that are non-essential.

The President and EVP will collectively make a decision, considering all local and national alerts, on potential operational impact and the continuation or shut down of operations due to weather.

Extreme Weather Definition: For the purpose of this procedure, extreme weather is defined as:

- i. A combination of high heat and humidity that have the significant potential of negative health effects due to exposure.
- ii. Low temperatures that have the significant potential of negative health effects due to exposure.
- iii. Conditions in which ice/snow make travel hazardous.
- iv. Tornado watch/warning in an area.
- v. Thunderstorms
- vi. Other undefined extreme events such as hurricane or tropical storms.

vii. Condition Assessment Procedures

1. **Heat Index** - Temperature/humidity levels will be monitored and work limitations will be dictated by NOAA Heat Index Activity Guidelines (included below). Alerts will be communicated if “Extreme Caution”, “Danger” or “Extreme Danger” conditions are present or expected to develop within the work day.
 - a. **Extreme Caution** – Supervisors WILL communicate with each crew member working outdoors that conditions may be conducive to heat related illness and standard hydration/rest period precautions must be taken.
 - b. **Danger** - Supervisors MUST limit the activities of each crew member to short working periods with cooling breaks and provide relief workers to be sure exposure is limited.
 - c. **Extreme Danger** - Supervisors MUST instruct crews to completely eliminate their exposure and seek an alternate work environment that is protected from conditions.
2. **Cold Alerts** - Alerts will be communicated if the temperature (including sustained wind chill factor) is expected to be below 20 degrees Fahrenheit. Supervisors will limit crew activities to essential functions and provide warming stations and relief staff

members. If conditions are 10 degrees or below, outdoor work will be stopped and will resume after temperatures increase to above alert thresholds. The Department Manager is authorized to direct that certain emergency activities are accomplished as long as appropriate precautions/relief measures are taken.

3. **Ice and Snow** - National Weather Service advisories will be monitored. CCWA vehicle use will be restricted if conditions are determined to be hazardous. Crews may be recalled if conditions are expected to deteriorate during the normal work day. CCWA vehicles that are used during conditions deemed to be hazardous must be equipped with tire chains or similar equipment and be used only at the specific direction of supervisor/manager.
4. **Tornado Watch/Warning** - Supervisors will communicate to crews the likelihood of these conditions based on National Weather Service alerts.
5. **Thunderstorms** - Due to rapidly changing summer conditions, these develop in a short period of time and are extremely localized in nature. Crews/employees that detect thunderstorms in their immediate area should seek appropriate shelter until the thunder/lightening is no longer a threat.

viii. Condition Monitoring Procedures

The Risk Management & Safety Coordinator will monitor local and national weather outlets to provide updates to personnel. They will also stay in communication with the Macon-Bibb Emergency Management Agency for real time updates that may have a direct impact on MWA operations.

For the period of May 15th through September 15th, heat condition forecast inquiry will be made by 7:30 AM and alerts will be issued to supervisory/management staff. Heat index alerts will be issued as soon as “Danger” or “Extreme Danger” conditions are reported. During this period, all supervisors/crews/employees should anticipate that at least “Extreme Caution” conditions will develop during the day.

Cold conditions will be accessed through National Weather Service inquiries and alerts will be made as soon as practical and if possible by 2:00 PM, the previous day.

1. **Ice and Snow** – Alerts will be made as soon as practical after National Weather Service reports conditions are likely
2. **Tornado Watch/Warning** – National Weather Service reports will be monitored. Alert status will be communicated to the President and EVP by the Risk Management and Safety Coordinator who will initiate general alert procedures using the One Call Now notification software.
3. **Thunderstorms** - Due to the scattered and fast forming nature of these conditions, individual crew/employees must independently

monitor these conditions. Crews/employees are authorized to individually make their assessments but must report their status to supervisors if work is interrupted due to thunderstorms.

ix. Alert Procedure

The Risk Management & Safety Coordinator will deliver notifications via email during regular business hours. In the event that an emergency notification is needed outside of regular business hours, the notification will be sent using the One Call Now emergency notification software.

NOAA's National Weather Service

Heat Index
Temperature (°F)

Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution
 Extreme Caution
 Danger
 Extreme Danger

M. Vehicle Safety

Refer to the latest revision of the MWA Fleet Manual.

9. Glossary

Accident - an undesirable or unfortunate happening that occurs unintentionally and usually results in harm, injury, damage, or loss; casualty; mishap.

Bank - A mass of soil rising above a digging level.

Barricade - anything that restrains or obstructs progress, access.

Confined Space - Any area that has limited openings for entry and exit that allow hazardous atmospheres to form and would make escape difficult in an emergency.

De-energized – Free from any electrical connection to a source of potential difference and from electric charge.

Derricks – An apparatus consisting of mast or equivalent member held at the head by guys or braces, with or without a boom, for use with a hoisting mechanism and operating ropes.

Energized - to supply electrical current to or store electrical energy in.

Engulfment - to plunge or immerse.

Epoxies - an organic chemical that contains a group consisting of an oxygen atom bound to two already connected atoms, usually carbon.

Ground Fault Circuit Interrupter – A device whose function is to interrupt the electric circuit to the load when a fault current to the ground exceeds some predetermined value that is less than that required to operate the overcurrent protective device of the supply circuit.

Hazard - an unavoidable danger or risk, even though often foreseeable.

Isolation – means the process by which a permit space is removed from service and completely protected against the release of energy and material into space.

Lockout - The placement of a lockout device on an energy-isolating device, in accordance with an established procedure, ensuring that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.

Material Safety Data Sheet (MSDS) - written on printed material concerning a hazardous chemical which is prepared in accordance §1910.1200.

Non-permitted (confined space) - Confined spaces that do not contain hazards, or have a potential to contain hazards, do not require an approved Confined Space Entry Permit.

Permitted (confined space) - Confined spaces where actual hazards have been identified, or the probability for a serious accident or hazard being present is high.

Risk Management Plan - A risk is defined as "an uncertain event or condition that, if it occurs, has a positive or negative effect on a project's objectives. Risk Management Plan is a document prepared by a project manager to predict risks, to estimate the effectiveness, and to create response plans to lessen them.

Shaft – a rotating or oscillating round, straight bar for transmitting motion and torque, usually supported on bearings and carrying gears, wheels, or the like, as a propeller shaft on a ship, or a drive shaft of an engine.

Spirometry - an instrument for determining the capacity of the lungs.

Sprocket - Also called chainwheel, sprocket wheel . a toothed wheel engaging with a conveyor or power chain.

Tagout – The placement of a tagout device, such as a tag and a means of attachment, which can be securely fastened to an energy isolating device in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.

Trench - a long, narrow excavation in the ground, the earth from which is thrown up in front to serve as a shelter from enemy fire or attack.

Vault – An enclosure above or below ground which personnel may enter, and which is used for the purpose of installing, operating, and/or maintaining equipment and/or cable which need not be of a submersible design.

Ventilation - to provide (a room, mine, etc.) with fresh air in place of air that has been used or contaminated.

Acknowledgment and Consent Agreement

I have read or had this Safety Manual read to me. I have had the opportunity to ask questions and fully understand the meaning and intent of this manual. Additionally, I understand I should contact my supervisor with any further or future questions regarding the MWA Safety Manual. By signing below, I acknowledge having receipt of this manual and consent to fully abide by the contents. I understand this Manual supersedes any, and all prior fleet safety manuals, procedures, guidelines, policies, or other fleet rules related documents and that MWA reserves the right to change this document at any time.

Name printed _____

Signature _____ Date _____

APPROVED
STATE OF GEORGIA
ENVIRONMENTAL PROTECTION DIVISION

MAR 25 2022

DRINKING WATER PROGRAM
ENGINEER SIG.
VALID ONLY FOR DRINKING WATER PORTION OF PROJECT



Macon Water Authority
790 Second Street
Macon, Georgia 31202
(478) 464-5620 * FAX (478) 741-1239

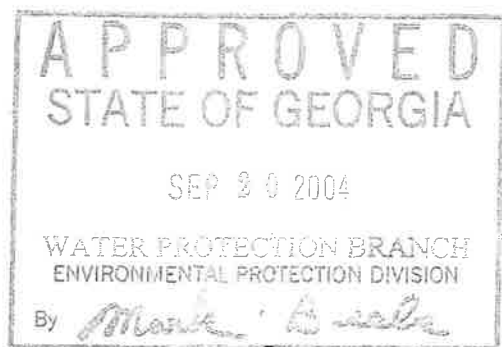
STANDARDS FOR DESIGN

AND

CONSTRUCTION SPECIFICATIONS

I WATER DISTRIBUTION

II WASTEWATER COLLECTION



Original 1984
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Revised May 2004



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ARTICLE I
STANDARDS FOR DESIGN
AND
CONSTRUCTION SPECIFICATIONS
FOR
WATER DISTRIBUTION

PREFACE: This Guideline and Standards Book contains information to assist planners and engineers with the design and construction of water facilities. The Macon Water Authority's intent is to ensure uniformity of design concepts, formats, methodologies, procedures, construction materials, types of equipment and quality of work products. These standards have been produced and adopted to encourage exceptional quality while using current technology for all Macon Water Authority facilities.

These Guidelines and Standards are not a substitute for good Engineering. Sound judgment must be exercised in all applications to create quality and cost efficient facilities.

Macon Water Authority management encourages the creation of relationships between project stakeholders that promotes engineering excellence and timely completion of projects. Macon Water Authority staff and consultants are encouraged to take the time at the beginning of all projects to identify common goals, common interests, lines of communication, and a commitment to cooperative problem solving.

SECTION 1.01 - PURPOSE:

This section of the Specifications describes products to be incorporated into the water lines and requirements for the installation and use of these items. The Contractor/Developer shall furnish all products and perform all labor necessary to fulfill the requirements of these Specifications. The word "Authority" used herein shall mean the Macon Water Authority.

SECTION 1.02 - GENERAL:

A Applicable Standards:

Supply all products and perform all work in accordance with applicable American Society for Testing and Materials (ASTM), American Water Works Association (AWWA), National Sanitation Foundation, American National Standards Institution (ANSI), Macon Water Authority (MWA) Cross Connection Control and Backflow Prevention Policy, or other recognized standards. Latest revisions of all standards are applicable. If requested by the Authority, submit evidence that manufacturers have consistently produced products of satisfactory quality and performance for a period of at least two years.

B. Substitutions:

Whenever a product is identified in the Specifications by reference to manufacturer's or vendor's names, catalog numbers, etc., the Contractor/Developer may freely choose from these referenced products which ones he wishes to provide.

Any item or product other than those so designated shall be considered a substitution. The Contractor/Developer shall obtain prior approval for an approved equal from the Authority for all substitutions.

C. Warranty:

Water distribution systems installed by Contractors/Developers which are accepted by the Authority for ownership, operation and maintenance shall be warranted and guaranteed for a period of one year from the date of final acceptance that the completed system is free from all defects due to faulty products or workmanship, and that the Contractor/Developer shall make such corrections as may be necessary by reason of such defects upon notice by the Authority.

D. Easements and Rights of Way:

Water distribution systems installed by a Contractor/Developer which are accepted by the Authority for ownership, operation and maintenance shall be installed in either dedicated streets or easements. Easements shall be properly executed and recorded. The easements shall be cleared of all structures, trees, shrubs, brush, logs, upturned stumps and roots of downed trees and similar items.

No permanent structure shall be built on the easement. Temporary structures such as fence, driveway, etc. can be installed on the permanent easements; but it shall be the responsibility of the owner to remove, if necessary, or repair such structures if they are disturbed when the Authority works on the water and sewer mains within the easement. The Owner shall obtain a written permission of the Authority before the installation of such temporary structures.

The minimum easement width shall be (20) feet for main up to 15 ft deep.

The minimum easement width shall be (30) feet for main up to 20 ft deep.

SECTION 1.03 - CONSTRUCTION DRAWINGS:

The term construction drawings shall mean drawings, prints, descriptive literature, test reports, samples, calculations, schedules, material lists and information and items of similar meaning.

A. Submittals Required:

The Contractor/Developer shall furnish to the Authority for review, in accordance with the procedure outlined below, drawings and descriptive literature for all manufactured or fabricated products. Additional information, such as special drawings, schedules, calculations and curves, shall be provided as specifically requested by the Authority.

B. Contractor/Developer's Review:

The Contractor/Developer shall review and check drawings and submittals. He shall indicate his approval by initials and date. The Contractor/Developer shall furnish the Authority with a minimum of four copies of all submittals. A transmittal form shall accompany each submittal or group of submittals.

C. Authority's Review:

All submittals will be reviewed, stamped, and dated by the Authority before they are returned to the Contractor/Developer.

Acceptable submittals will be approved in writing with two copies returned to the Contractor/Developer and the remaining copies retained by the Authority.

Submittals requiring minor corrections before being acceptable will be so noted. Drawings must be resubmitted for review and approval prior to installation or use.

D. Drawings For Construction:

Drawings or other submittals not bearing the Authority's approval notation shall not be issued to subcontractors or utilized for construction purposes. The Contractor/Developer shall maintain at the job site a complete set of construction drawings bearing the

Authority's approval. The drawings shall be submitted on a 24 inch x 36 inch paper and drawn to a one inch to a (50) ft horizontal and (10) ft vertical scale.

E. "As-Built" Drawings:

The Contractor / Developer shall submit two copies of "as-built" plans and one digital copy in AutoCAD format after the completion of construction but before the project is accepted for operation and maintenance by the Macon Water Authority. The "as-built" plans shall be prepared and stamped by a registered Land Surveyor or Professional Engineer. The plans shall include the following information for the water portion of a project: location of water mains, fire hydrants, valves, bends, width of easements, and any pertinent information.

All water mains (type, size) including gate valves, hydrants, blow offs, water meters, curb stops, shall be located and tied to Georgia State Plane Coordinates.

All other relative information, such as rights-of-way, property corners, stake plans along easements, etc. shall be located and tied to Bibb County State Plane Coordinates.

SECTION 1.04 - MATERIALS:

All materials used which come into contact with drinking water during its distribution shall not adversely affect drinking water quality and public health and must be certified for conformance with American National Standards Institute/National Sanitation Foundation Standard 61 (ANSI/NSF Standard 61). Any pipe, solder, or flux which is used in the installation or repair of the water distribution system shall be lead free with not more than 8.0% lead in pipes and fittings and not more than 0.2% lead in solders and flux.

All materials, unless otherwise specified or approved equal, shall be in accordance with the Buy America requirements of Federal regulations 23 U.S.C. 313 and 23 CFR 635.410. Acceptance will be on the basis of the Authority's inspection and receipt of the manufacturer's written certification that the material was manufactured and tested in accordance with the applicable standards. All pipe, fittings, valves, tapping sleeves, hydrants and all other materials required for completion of the work must comply with the following:

NOTE: Water mains less than 4 inches in diameter will not be allowed within the Macon Water Authority's Water Distribution System.

A. Ductile Iron Pipe (DIP):

Ductile iron pipe shall conform to ANSI/AWWA C151/A21.51 and shall be a minimum of Pressure Class 350 up to a diameter of 12 inches and Pressure Class 350 above 12" diameter. Sizes will be as shown on the Drawings. Pipe and fittings shall be cement lined in accordance with ANSI/AWWA - C104/A21.4. Fittings shall conform to ANSI/AWWA C110/A21.0 or ANSI/AWWA C153/A21.53 with rated working pressure of 350 psi. Pipe and fittings shall be furnished with a bituminous outside coating.

Joints shall be push-on type for pipe and standard mechanical or flanged joints for fittings. Push-on and mechanical joints shall conform to ANSI/AWWA C111/A21.11. Restrained joint pipe (RJP) shall be either the bolted joint type, or modified push-on type with joint restrained using ductile iron components. Restrained joint pipe on piers shall have bolted joints and shall be specifically designed for clear spans of at least 36 feet. Restrained joint pipe where required shall be American, U.S. Pipe, Clow, or approved equal.

Gaskets for mechanical or flange joints shall be made of 1/8- inch thick cloth reinforced rubber; gaskets may be ring type or full face type.

Bolts for flange connections shall be steel with American Regular unfinished square or hexagon heads. Nuts shall be steel with American Standard Regular hexagonal dimensions, all as specified in ANSI B 17.2. All bolts and all nuts shall be threaded in accordance with ANSI B 1.1, Coarse Thread Series, Class 2A and 2B fit.

All pipe shall be furnished in lengths of 18 or 20 feet.

Acceptance will be on the basis of the Authority's inspection and the manufacturer's written certification that the pipe was manufactured and tested in accordance with the applicable standards.

Ductile iron pipe shall be used on all water systems, including systems behind master meters. The systems behind master meters shall be pressure tested, disinfected and the results shall be available for Macon Water Authority's review.

B. Gate Valves (GV):

- (1) Valves (4" through 12") shall be mechanical joint end (Flange x mechanical joint), resilient seated, iron body gate valves with non-rising stem flanged mechanical joint o-ring stem seals and open left. The valve shall be designed for a water working pressure of 250 psi and a test pressure of 500 psi, and shall be designed for installing in a vertical position. This valve shall conform to the lateral Revision of AWWA C-509, for "Ordinary Water Works Service", and shall be Mueller A-2370-20 or an approved equal.
- (2) Valves (14" and larger) shall be mechanical joint, resilient seated, D.I. body, bronze mounted, non-rising stem with O-ring stem seals and open left. The valve shall be designed for water working pressure of 250 psi and a test pressure of 500 psi. The valve shall be designed for horizontal installation and equipped with bevel gearing, gear case, tracks, rollers, scrapers and by-pass valves. The valve shall conform to AWWA standard specification C-500, latest revision for "Ordinary Water Works Service" and shall be Mueller No. A-2380-20 or an approved equal. American Flow Control resilient wedge gate valve series 2500 rated for 250 PSI working pressure can be used in lieu of double disc, iron body gate valve.

(3) Valve Boxes (VB):

All valves shall be equipped with valve boxes. Valve boxes shall be heavy roadway type. The valve boxes shall be heavy roadway type. The valve boxes shall be adjustable to 6" up or down from the nominal required cover over the pipe. Provide a 4 inch thick, 18 inch square or round concrete pad around the valve box. This must be placed at grade. Note: Gate valves Larger than 16" shall be placed in a MH and stack out to grade – See Manholes specs in wastewater section.

(4) Tapping Sleeves and Valves (TS &V)

(a) Tapping sleeves shall be the split sleeve, mechanical joint type. Valves shall be gate valves furnished in accordance with the above specifications. The valves shall have flange x mechanical joint ends. Tapping sleeves shall be Mueller No. 615 or approved equal. Tapping crosses shall be Mueller No. 716 or approved equal. Tapping valves shall be Mueller No. 687 or approved equal. (Mechanical Sleeve required for mains above 16")

(b) As an alternative to the conventional tapping sleeve and valve, a stainless steel tapping sleeve with mechanical joint outlet and a standard MJ gate valve could be installed. The MJ tapping sleeve shall meet or exceed the following material specifications for use with a standard mechanical Joint x mechanical joint, resilient wedge gate valves per ANSI (AWWA C509-94). The mechanical joint outlet shall be a one piece casting with a plain end and MJ gland. The tapping sleeve shall have a MJ outlet gasket. The armor plate, lugs, nuts, bolts shall be 203 (18-8) stainless steel, and gaskets shall be virgin nitrile, Buna-N or equal.

(5) "All stainless tapping sleeves" may be used in lieu of the above and shall conform to the following specifications: Body: 18-8 type 304 s.s. flange CF 8 cast stainless steel equivalent to 18-8 type 304 s.s. with ANSI 150 lb drilling; recessed for tapping valve per MSS-SP-60. Bolts: Type 304 s.s. Branch outlet: Heavy s.s. pipe. Gasket: Full circumferential gasket compounded for use with water, salt solutions, mild acids, bases and sewage.

(6) Tapping Saddles:

For 1-inch and below:

Use service clamps double strapped cc thread or direct tap.

For 1 1/2-inch to 2-inch:

Use service clamps double strapped cc thread.

Above 2-inch:

Tapping saddles shall be ductile iron body type with O-ring gasket and stainless steel straps. Connection shall be flanged or mechanical joint as required.

C. Backflow Preventers:

(1) General:

Backflow preventers shall be selected on the basis of impurities involved and the type of cross connection and shall be approved by the Macon Water Authority.

(2) Approval of Devices:

The backflow preventers shall be certified by the American Society of Sanitary Engineers, as having been tested by a nationally recognized laboratory in accordance with applicable ASSE Standards. Each device shall bear the ASSE seal of approval and shall be individually factory tested.

(3) Specifications and Installation of Devices:

- (a)** Dual check backflow preventer (3/4 inch and 1 inch) shall have bronze body with two compact checks, a union, and "o" ring seals shall be installed at the downstream side of residential water meters to prevent backflow of polluted water into potable water supply. The device shall not be buried but may be installed in a pit below grade. A positive shut-off valve and a union shall be installed on the inlet side of the device.

The device shall meet or exceed the requirements of ANSI/ASSE.

- (b)** Double check valve assembly backflow preventer (1 inch, 1 ½ inch and 2 inch) shall have brass body with replaceable seats, ball valve test cocks, and bronze strainers. The device shall be installed on the downstream side of all residential water meters to prevent backflow of polluted water into potable water supply. This device shall not be buried, but may be installed in a pit below grade, provided ball valve test cocks fitted with brass plugs are used, it should also include a positive shutoff valve and shall be equipped with three (3) leak proof test cocks. A fourth cock shall be provided on the upstream side of the inlet shutoff valve. A strainer with (20) mesh stainless steel screen shall be installed.

The device shall meet or exceed the requirements of ASSE, AWWA or USCFCC Manual for Cross Connection Control.

- (c)** Double check valve backflow preventer assembly (2 ½ inches, 3 inches, 4 inches, 6 inches, 8 inches and 10 inches)

Shall have bronze body (2 ½" and 3 inches) epoxy coated. Cast iron or ductile iron (4 to 10 inches) body bronze seats, and stainless steel internal parts. The device shall be installed on the downstream side of all residential water meters to prevent backflow or polluted water to potable water supply.

This device shall not be buried, but may be installed in a pit below grade provided ball valve test cocks fitted with brass plugs are used. The assembly shall be equipped with three (3) leak proof test cocks, a fourth test shall be provided on the upstream side of the inlet shut-off valve. Also a 20 mesh stainless steel screen shall be installed. The device shall meet or exceed the requirements of ASSE, AWWA or USCFCC Manual of cross connection control.

(d) Double Detector Check Valve Backflow Preventer Assembly (DDC):

A double detector check valve assembly shall be installed at the property line for a building sprinkler system or private fire hydrant system installed for fire protection only. The DDC prevents reverse flow of fire protection system substances (stagnant water) from being pumped or siphoned into the potable water line, also provides a detection point for unauthorized water use.

Shall have bronze body (3 inches) or epoxy coated cast iron body (4 to 10 inches) bronze seats, and stainless steel internal parts. This device shall not be buried, but may be installed in a pit below grade provided ball valve test cocks fitted with brass plugs are used. The unit shall be a complete assembly including US listed OS & Y shut off valves (resilient seated) and test cocks, an auxiliary line consisting of an approved water meter and a backflow preventer. The device shall meet the requirements of AWWA or USCFCC Manual for cross connection control.

(e) Reduced Pressure Zone Backflow Preventer (RPZ):

The RPZ backflow preventer shall be installed at the property line for a service which is considered as "hazardous" to prevent the backsiphonage and back pressure backflow of contaminated water into the potable water supply.

Shall have bronze body (3/4 inch through 2 inches) of epoxy coated cast iron body (2 inches and above), stainless steel springs. This device shall be installed in a vault, above ground with positive drainage. The device shall consist of a pressure differential valve located in a zone between two tightly closing shut off valve (resilient seated) before and after the device, test cocks, protective strainer upstream of No. 1 Gate Valve. The device shall meet or exceed the requirements of AWWA or ASSE.

(f) Reduced Pressure Zone Detector Double Check Valve Assembly:

A reduced pressure principle detector double check valve assembly shall be used to prevent the reverse flow of fire protection system substances (glycerin, wetting agents, water of non-potable quality) from being pumped or siphoned into the potable water line.

This device can detect leaks, and provides a detection point for unauthorized use.

The unit shall have fused epoxy coated cast iron body, removable bronze sheets, stainless steel internal parts, maximum flow at low pressure drop with a 5/8" x 3/4" record all by-pass meter.

The unit shall be a complete assembly, including UL listed OS & Y shut-off valves with FM approval, including an auxiliary line consisting of an approved backflow preventer and a water meter. The device shall meet the basic requirements of AWWA or USCFCC Manual for cross connection control.

D. Corporation Stops:

Corporation stops shall be ball type made of bronze conforming to ASTM B61 or B62; and shall be rated at 150 psi. Ends shall be suitable for solder-joint. Threaded ends for inlet and outlet of corporation stops shall conform to AWWA C800; coupling shall conform to ANSI B16.26.

E. Valve Boxes:

Valve boxes shall be cast iron and shall be adjustable to 6 inches up and down from the nominal required cover over the pipe. Valve stem extension is required for all valves that are over 3 feet in depth.

F. Fire Hydrants (FH):

All fire hydrants shall conform to the requirements of AWWA C502 for 250 psi working pressure. Hydrants shall be the compression type, closing with line pressure. The valve opening shall not be less than 5 1/4 inches. All valves shall open left.

In the event of a traffic accident, the hydrant barrel shall break away from the standpipe at a point above grade and in a manner which will prevent damage to the barrel and stem, preclude opening of the valve, and permit rapid and inexpensive restoration without digging or cutting off the water.

The means for attaching the barrel to the standpipe shall permit facing the hydrant a minimum of eight different directions.

Hydrants shall be fully bronze mounted with all working parts of bronze. Valve seat ring shall be bronze and shall screw into a bronze retainer.

In general, fire hydrants are located at street intersections, but no more than 500 feet apart in single-family residential areas nor more than 300 feet (or as specified on plans) apart in multi-family residential, commercial, and industrial areas.

All working parts, including the seat ring shall be removable through the top without disturbing the barrel of the hydrant. The operating nut shall match those on the existing hydrants. The operating threads shall be totally enclosed in an operating chamber separated from the hydrant barrel by a rubber o-ring stem seal and lubricated by a grease or oil reservoir. A stop nut shall be positioned in the top operating mechanism so that the valve cannot contact the bottom of the shoe when fully open.

Hydrant shall be a non-freezing design and provided with a simple, positive and automatic drain which shall be fully closed whenever the main valve is opened.

Hose and pump connections shall be breech-locked, pinned, or threaded and pinned, to seal them permanently into the hydrant barrel. Each hydrant shall have two 2 ½ inch hose connections using Macon Standard Threads conforming to:

Coupling on 2 ½" hose	Macon Standard Threads
Outside diameter of male end	Three inches
Threaded per inch	Eight
Angle or Pitch	60 degrees

and one 4 inch pumper connection with National Standard threads. Equip each connection with cap and chain.

Hydrants shall be furnished with a mechanical joint shoe connection to the spigot of the 6-inch hydrant lead. A fire hydrant tee shall be installed on the main. The fire hydrant valve shall be directly connected to the tee and to the hydrant lead. All joints shall be fastened with retainer glands and rod all fittings to fire hydrant using threaded rods. A minimum pipe size of 6" is required for the installation of all fire hydrants.

Minimum depth of bury shall be 4.0 feet. Provide extension section where necessary for vertical installation and in accordance with manufacturer's recommendations.

All outside surfaces of the barrel above grade shall be painted with Koppers Glamortex 501 enamel or approved equal, in Safety Yellow ASE #1663 or color as selected by the Owner.

Hydrants shall be Mueller Centurion, Model A-423 (5 1/4") Traffic Model, Dresser M & H 129-01 (5 1/4") Traffic Model, American Flow Control (5 1/4") B-84-B, Metropolitan #250, M-94.

G. Fire Hydrants Location:

All fire hydrants shall be located on the backside of the ditch area one foot within the Right-of-way. Fire hydrants are also required at the end of all water mains.

H. Valves at the end of the Main:

Where future water main extensions are anticipated, or are deemed possible, valves are placed so that no customers are out of service for the connection work. In all cases, this calls for a mechanical joint resilient gate valve with a plug valve at the end of the main.

I. Valves Placement:

Valves are to be placed at street intersections and on each smaller main as it leaves other larger mains. In commercial, residential and industrial locations, all tees and crosses are all valved on all sides.

Valves shall be placed at both ends of the crossing:

1. Under a road, creek and railroad tracks.
2. When crossing a bridge.

Maximum spacing of valves along a water main shall be no more than 1600 feet.

When a fire hydrant is relocated, the old valve shall be kept in service, and a new valve shall be placed within two to three feet of the new fire hydrant.

SECTION 1.05 - HANDLING MATERIALS:

A. Unloading:

Furnish equipment and facilities for unloading, handling, distributing and storing pipe, fittings, valves and accessories. Make equipment available at all times for use in unloading. Do not drop or dump materials. Any materials dropped or dumped will be subject to rejection without additional justification.

B. Handling:

Handle pipe, fittings, valves and accessories carefully to prevent shock or damage. Handle pipe by rolling on skids, forklift, or front loader. Do not use material damaged in handling. Damaged material will not be accepted for installation, and shall be removed and replaced with acceptable materials at the contractors' expense.

C. Distribution:

Distribute and place pipe and materials without interference to traffic. Do not string pipe more than 1,000 feet beyond the area where pipe is being laid. Do not obstruct drainage ditches.

D. Storage:

Store all pipe which cannot be distributed along the route. Make arrangements for the use of suitable storage areas.

SECTION 1.06 - CONSTRUCTION ALONG HIGHWAY, STREETS AND ROADWAY:

Install pipe lines and accessories along highways, streets, roadways in accordance with the applicable regulations of the city of Macon, Bibb County and/or the Department of Transportation with reference to construction operations, safety, traffic control, road maintenance and repair.

A. Protection of Traffic:

Provide and maintain suitable signs, barricades and lights for protection of traffic. Replace all highway signs removed for construction as soon as possible. Do not close or block any highway, street, or roadway without first obtaining permission from the proper authorities.

B. Construction Operations:

Perform all work along highways, streets and roadways to least interfere with traffic.

(1) Stripping:

Where the pipe line is laid along road shoulders, strip and stockpile all sod, topsoil and other material suitable for shoulder restoration.

(2) Trenching, Laying and Backfilling:

Do not open the trench any further ahead of pipe laying operations than is necessary. Backfill and remove excess material immediately behind laying operations. Complete excavation and backfill for any portion of the trench in the same day.

(3) Shaping:

Reshape damaged slopes, side ditches, and ditch lines immediately after completing backfilling operations. Replace topsoil, sod and any other materials removed from shoulders.

(4) Saw cut all driveway, paved parking areas, paved roadways and paved sidewalks.

C. Excavated Materials:

Do not place excavated material along highways, streets and roadways in a manner which obstructs traffic. Sweep all scattered excavated material off of the pavement.

D. Drainage Structures:

Keep all side ditches, culverts, cross drains, and other drainage structures clear of excavated material and free to drain at all times.

E. Maintaining Highways, Streets, Roadways and Driveways:

Maintain streets, highways and roadways in suitable condition for movement of traffic until completion and final acceptance of the work. Use steel running plate to maintain traffic until pavement replacement is completed.

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

SECTION 1.07 - CLEARING:

Clearing of the construction easement is permitted with special care taken to adhere to the requirements of Section 1.19.

SECTION 1.08 - EXCAVATION:

Excavate all materials encountered, including rock, and dispose of excess excavated material not required for backfilling. Perform all excavation in accordance with applicable local, state, and federal regulations, including Occupational Safety and Health Act of 1970 (PL 91-596), as amended.

A. Depth of Trenches:

Excavate trenches to provide a minimum cover of four feet. Within the right-of-way of highways, streets, or roadways, excavate to place the top of the pipe a minimum of four feet below the nearest pavement edge.

B. Width of Trenches:

Excavate trenches wide enough to allow proper installation of pipe, fittings, and other materials, and not less than 6 inches or more than one foot from outside barrel of the pipe on any side at any point.

C. Bell holes:

At each joint, excavate bell holes of ample depth and width to permit the joint to be made properly and to relieve pipe bell of any load.

D. Earth Excavation:

Excavate and prepare the trench bottom to support the pipe uniformly throughout its length.

For ductile iron pipe, the trench shall meet all requirements of Standard Laying Condition Type 2 in accordance with AWWA C 151.

If the trench is excavated to excessive width or depth, provide crushed stone meeting the requirements of Georgia DOT Specification 800.01 for No. 57 stone to achieve Standard Laying Condition Type 4 in accordance with AWWA C151.

E. Rock Excavation:

(1) Definition of Rock:

Any material which cannot be excavated with a backhoe having a bucket curling force rated at not less than 18,300 pounds (caterpillar Model 215 or equal), and occupying an original volume of at least one-half cubic yard.

(2) Excavation:

Where rock is encountered, excavate to the minimum depth and width which will provide 6 inches clearance beyond the outside diameter of the pipe bell.

(3) Blasting:

Blasting must be performed by a certified and bonded contractor. Conduct blasting operations in accordance with all existing ordinances and regulations. Protect all structures from the effects of the blast. Repair any resulting damage.

(4) Removal of Rock:

Do not use excavated rock as backfill material. Dispose of rock which is surplus or not suitable for use as rip rap.

SECTION 1.09 - EXISTING UNDERGROUND UTILITIES AND OBSTRUCTION:

It is the responsibility of the Contractor/Developer to locate all existing utilities along the path of his construction. His drawings shall indicate underground utilities or obstructions that are known to exist. Where these or unforeseen underground utilities are encountered, the location and alignment of the water main may be changed, upon written approval of the Authority, to avoid interference. It is the responsibility of the Contractor to contact the Utilities Protection Centers, Inc. ("Call Before You Dig" - 1-800-282-7411 or 811) prior to the start of any excavation or construction.

A horizontal separation of 10 feet shall be maintained between water mains and sanitary sewers. The distance shall be measured edge to edge. When a water main must cross a sewer, the water main and/or sewer shall be laid such that the top of the sewer is at least 18" below the bottom of the water main. When this requirement cannot be met both the water main and the sewer shall be constructed of ductile iron pipe with ductile iron pipe for a distance of 10 feet on each side of the point of crossing on both the water main and sewer.

SECTION 1.10 - LAYING AND JOINTING PIPE AND FITTINGS:

Lay all pipe fittings to accurately conform to the lines and grades approved by the Authority as follows:

A. Handling:

Use suitable tools and equipment to handle and lay pipe, preventing damage to the pipe and the cement lining. Examine all pipes carefully for cracks and other defects as it is laid. Do not lay pipe or other materials which are known to be defective. Lower pipe, fittings, valves and accessories into the trench by suitable means. Do not drop or dump pipe or accessories into the trench.

Clean pipe and fittings thoroughly before laying. Keep the pipe line clean until final acceptance.

If any pipe or other material is discovered to be defective or damaged after being laid, remove and replace it.

B. Alignment and Gradient:

Lay pipe straight in alignment and gradient or follow true curves as nearly as practicable. Do not deflect any joint more than 2/3 the maximum deflection recommended by the manufacturer.

Maintain a transit and accessories on the job to lay out angles and ensure that deflection allowances are not exceeded.

The minimum cover for water distribution mains shall be Forty- eight (48) inches.

C. Expediting of Work:

Excavate, lay the pipe, and backfill as closely together as possible. Do not leave unjointed pipe in the trench overnight. Backfill and compact the trench as soon as possible after laying and jointing is completed. Cover the exposed end of the installed pipe each day at the close of work and at all other times when work is not in progress. If necessary to backfill over the end of an uncompleted pipe, close the end with a mechanical joint plug.

D. Laying Pipe in Trenches:

Lay the pipe with solid bearing throughout its length.

(1) Earth Trenches:

Grade the bottom of the trench to a true line. Lay the pipe in clean bedding

material, free of rock, organics and other unsuitable materials.

(2) Rock Trenches:

Bed the pipe in at least six inches of granular bedding material. Backfill with the same material to at least six inches above the pipe.

(3) Wet Trenches:

Do not lay pipe in water. Provide dewatering equipment to maintain a ground water level below the bottom of the pipe while pipe is being laid.

(4) Pipe Joints:

Joints shall be made in accordance with the manufacturer's recommendations.

(5) Cutting:

Cut ductile iron pipe using an abrasive wheel saw. Remove all burrs and smooth the end before jointing.

SECTION 1.11 - CONNECTIONS TO EXISTING PIPE LINES:

Before laying pipe, the Contractor/Developer shall locate the points of connection to existing pipe lines and uncover as necessary for the Authority or an approved contractor to confirm the nature of the connection to be made. The Authority or Contractor shall furnish materials and make the connection to all existing pipe lines. The Contractor/Developer will be charged with a connection fee to cover the expenses of the Authority, only if Authority makes tap.

SECTION 1.12 - THRUST RESTRAINT:

Provide restraint at all points where hydraulic thrust may develop.

A. Retainer Glands:

Install retainer glands on fire hydrants and all associated fittings, valves and related piping. Retainer glands shall be ACIPCO A 90857 or an approved equal.

B. Zinc plated 3/4 inch all threaded rods with USS course thread shall be used where it is required to restrain joints.

C. Concrete Blocking:

Provide concrete blocking for all other bends, tees, valves, and other points where thrust may develop, or as directed by the Engineer. Retainer glands, including mega-lug

retainers, may be used in lieu of concrete blocking, only as approved by the Engineer.

D. Restrained Joints:

Restrained joints type pipe such as American Lock Ring, or Lok-Fast, or an approval equal may be used in accordance with manufacturer's recommendation.

Concrete for blocking shall have a compressive strength of not less than 3000 psi, with not less than 5.5 bags of cement per cubic yard and a slump between 3 and 5 inches. For job mixed concrete, submit the concrete mix design for approval by the Authority. Ready-mixed concrete shall be mixed and transported in accordance with ASTM C94. Reinforcing steel shall conform to the requirements of ASTM A 615, grade 40.

Form and pour concrete blocking at fittings as shown on the Typical Blocking Detail in Appendix A and as directed by the Authority. Pour blocking against undisturbed earth. Increase dimensions when required by over excavation.

SECTION 1.13 - BACKFILLING:

Backfill and compact to prevent settlement and displacement of the pipe.

A. Material:

Backfill trenches with earth only. Do not use rock excavated from trenches in the backfill. If necessary, furnish suitable earth material to backfill the trench.

B. Backfill:

Place backfill material in the bottom of the trench and up to two feet above the pipe in 6-inch layers. Compact with two hand operated air hammers with tamping feet, one on each side of the pipe, operated simultaneously.

Backfill above, shall be compacted as follows:

- (1) In 6-inch layers, if using light power tamping equipment, such as a "jumping jack".
- (2) In two foot layers, if using heavy tamping equipment, such as hammer with tamping feet.

C. Backfill Under Roads:

Backfill under roads shall be compacted to 95% up to top 2' below grade and 98% for top of the maximum dry density as determined by the Standard Proctor Compaction Test (ASTM D698).

D. Settlement:

If trenches settle, refill and grade the surface to conform to the adjacent surface.

E. Compaction:

The backfill in all the trenches shall be compacted as stated herein: shall be 100 percent of the maximum dry-density as determined by Standard Proctor Compaction Test (ASTM D698) for the base material under the pavement. The top (24) inches of backfill shall be compacted to a minimum of (98) percent of the maximum dry density. It shall be 95% outside the pavement but within the road right-of-way and 85% outside road right-of-way. The testing agency shall run as a minimum (1) Proctor for each type of soil encountered or could use "Family of Curves Method - GHD - 67" as approved and utilized by the Georgia Department of Transportation and the U. S. Army Corps of Engineers.

During the backfilling, loose lifts shall not exceed (8) inches in thickness. Field density determination (compaction tests) should be made a minimum of one (1) test per 200 linear feet per two (2) compacted vertical feet. This is a minimum requirement for all the areas. Additional tests may be required for special conditions such as in streets and other critical areas as desired by the Engineer. The range of moisture contents should be maintained within plus or minus three (3) percent of the optimum moisture content as determined in accordance with GHD - 67.

SECTION 1.14 - REMOVING AND REPLACING PAVEMENT:

- A.** Removing Pavement: Remove existing pavement as necessary for installing the pipeline and appurtenances.

(1) Marking:

Before removing any pavement, mark the pavement neatly paralleling pipe lines and exiting street lines. Space the marks the width of the trench.

(2) Breaking:

Break asphalt pavement along the marks using jack hammers or other suitable tools. Break concrete pavement along the marks by use of jack hammers or by scoring with a rotary saw and breaking below the score by the use of jack hammers or other suitable tools.

(3) Machine Pulling:

Do not pull pavement with machines until completely broken and separated from pavement to remain.

(4) Damage to Adjacent Pavement:

Do not disturb or damage the adjacent pavement. If the adjacent pavement is disturbed or damaged, remove and replace the damaged pavement.

(5) Sidewalk:

Remove and replace sidewalks for their full width.

(6) Curbs:

Remove and replace or tunnel under any curb encountered.

B. Replacing Pavement:

Upon completion of backfilling and consolidation of the backfill, arrange to have the compaction tested by an independent testing laboratory approved by the Authority. After compaction testing has been satisfactorily completed, replace all pavements, sidewalks and curbs removed.

(1) Materials:

Place material for pavement replacement to dimensions shown on the Drawings. Typical replacement details are included in Appendix A.

(a) Graded Aggregate Sub-Base:

Furnish graded aggregate sub-base in two sizes of such gradation that when combined in approximately equal quantities, the resulting mixture is well graded from coarse to fine, meeting the gradation requirements of Section 816 of the State Highway Department of Georgia Standard Specifications.

(b) Black Base:

The base for all paved roadways shall conform to the requirements of the Georgia State Highway Department Specifications for the Black Base (Hot Mix). Use a Pug Mill Rotary Drum type mixer with minimum capacity of not less than 50 tons per hour for asphalt production. Apply and compact the base in two courses by asphalt spreader equipment of design and operation approved by the Authority. After compaction, the

black base shall be smooth and true to established profiles and Sections.

(c) Surface Course:

The surface course for all pavement, including Paint or tack coat when required by the Authority, shall conform to the requirements of the Georgia State Highway Department Specifications for Asphaltic Concrete, Section 400, Type "E" (Modified Top). Produce surface course in an asphalt plant of the same type as noted above for Black Base. Apply and compact the surface course in a manner approved by the Authority. Immediately correct any high, low or defective areas by cutting out the course, replacing with fresh hot mix, and immediately compacting to conform and thoroughly bond to the surrounding area.

(d) Concrete:

Provide concrete and reinforcing for concrete pavement in accordance with the requirements of Georgia State Highway Department Specifications for Portland Concrete Pavement, Section 430.

(2) Supervision and Approval:

Pavement restoration shall meet the requirements of the regulatory agency responsible for the pavement. Obtain agency approval of pavement restorations before requesting final inspection. Obtain the Authority's approval for restoration of pavement such as private roads and drives.

Complete pavement restoration as soon as possible after backfilling.

(3) Replacement:

Prior to replacing pavement, make a final cut in concrete pavement nine inches back from the edge of damaged pavement. Make the cut using a rotary saw. Remove asphalt pavement nine inches back from the edge of damaged pavement using jack hammers or other suitable tools.

Replace all street and roadway pavement as shown on the Drawings. Replace driveways, sidewalks, and curbs with the same material and to the same dimensions as existing.

(4) Failure of Pavement:

Should any pavement restoration or repairs fail or settle during the life of the contract, including the bonded and warranty period, promptly restore or repair defects.

SECTION 1.15 - BORING:

Furnish and install pipe casing and install the pipe line therein in accordance with the drawings and the following specifications:

A. General:

Where groundwater is encountered, operate well points or drainage systems in the vicinity of the casing to prevent the accumulation of ground water in the casing.

B. Pipe Casing:

Furnish all material and equipment and perform all labor required to install steel pipe casing at locations indicated on the Drawings and as specified.

(1) Boring:

The steel casing pipe shall be Schedule 30 steel pipe manufactured from steel plate having minimum yield strength of 35,000 PSI. The steel plate shall also meet the chemical requirements of ASTM A36. Size and thickness shall be as follows:

UNDER RAILROADS

Pipe Dia. In.	Casing Dia In.	Wall Thickness In.
6	14	0.250
8	18	0.250
10	20	0.281
12	22	0.312
14	24	0.344
16	30	0.406
18	30	0.406
20	32	0.469
24	36	0.469
30	42	0.500

UNDER HIGHWAYS

Pipe Dia	Casing Dia	Wall Thickness
In.	In.	In.
6	12	0.250
8	16	0.250
10	16	0.250
12	18	0.250
14	22	0.250
16	24	0.250
18	30	0.312
20	30	0.312
24	36	0.375
30	42	0.375

C. Installation of Pipe:

(1) In Casing:

After installation of the casing is complete, install the pipe line by a method which has received prior approval of the Authority. The carrier pipe shall be supported at each joint or as recommended by the manufacturer. All stainless steel casing spacers as manufactured by Cascade or approved equivalent shall be used.

Close the ends of the casing with 4 inch brick walls, plastered with Portland Cement mortar and waterproofed with asphaltic roofing cement.

Leave a 4 inch x 8 inch opening at the bottom of the lowest closure for drainage.

SECTION 1.16 - STREAM AND DITCH CROSSING:

At all points where banks of streams or drainage ditches are disturbed by excavation or where natural vegetation is removed, carefully compact backfill and place rip rap or an approved erosion control fabric where applicable to prevent subsequent settlement and erosion.

This requirement applies equally to construction alongside a stream or drainage ditch as well as crossing stream or drainage ditch. Place rip rap a distance of not less than 10 feet upstream and 10 feet downstream from any disturbed area. Extend rip rap from 1 foot below streambed to top of bank. Place to conform with the natural slope of the stream bank. Use only one method, either (a) or (b), throughout the job.

A. Stone Rip Rap:

Use sound, tough, durable stones resistant to the action of air and water. Slabby or shaley pieces will not be acceptable. Specific gravity shall be 2.0 or higher.

Maximum weight of individual stones shall be 50 pounds. The maximum allowable dimension for an individual stone is 24 inches. The minimum allowable dimension for an individual stone is 6 inches. At least 50% of the stones shall have a minimum dimension of 12 inches. A geotextile fabric shall be placed over the entire ditch and extend outward on either side a minimum of 10 feet.

Rip rap shall be placed on a (6) inch layer of soil, crushed stone, or sand overlaying the fabric. Rip rap shall be placed with its top elevation conforming with the finished grade or the natural existing slope of the stream bank and stream bottom. The stone shall be dropped no more than three feet during construction.

Embed stone rip rap by hand so as to form a compact layer at least 12 inches thick. Place rip rap in such a way that the smaller stones are not segregated but evenly distributed. Place chinking stones in the crevices between the larger stones so that a dense, well graded mass is produced.

B. Sand-Cement Bag Rip Rap:

Use cement sacks or burlap bags having a capacity of from 1 to 2 cubic feet. Do not use bags previously used for sugar or chemicals. Fill bags with a mixture of one part Portland Cement to five parts sand.

Embed bags by hand to form a compact layer at least 12 inches thick. Place with overlapping joints. The finished surface shall not deviate from that specified by more than 3 inches at any point.

- C.** When the depth of cover on the pipe at the bottom of the creek is less than 24 inches, encase the pipe with concrete. The width and depth shall be a minimum of pipe OD+16" or as directed by the Engineer.

SECTION 1.17 - TESTING:

When a length of pipe approved by the Authority is ready for testing, fill the line with water, bleed out all air and make a leakage test.

A. Preparation:

Provide a test pump, an accurate water meter, and all other accessories required to make

the test. Provide a corporation stop at each high point on the pipe to bleed off air. Provide and remove all temporary bulkheads, plugs, and flanges required to perform the pressure test.

B. Test Pressure and Leakage: (According to AWWA C600)

Or test the pipeline at 150 psi measured at the highest point or 1.25 times the normal static pressure whichever is greater. The pressure can't drop more than 5 psi or leakage shall not exceed 0.12 gallons per hour per inch diameter per thousand feet. Test for a minimum of two hours.

The gate valve when tested at the rated working pressure or at a minimum of 250 psi shall show no leakage through the metal or at flange joints.

If leaks are detected, locate, repair and retest. If results are not totally satisfactory, the Authority may require additional testing.

C. Existing Valves:

Do not operate valves in the existing system without the specific authorization and direct supervision of the Authority.

- D. Tapping Sleeve and Tapping Valve:** All tapping sleeves and tapping valves shall be air or water tested to a pressure of 200 psi prior to making the tap into an existing main. Any leaks shall be detected by applying a soap solution to all sealing surfaces. The seal and the valve shall be adjusted and retested as necessary until no leaks are observed. After the sleeve and valve have been tested satisfactorily, the existing main can be tapped. All testing and tapping shall be done in the presence and at the discretion of a representative of Macon Water Authority.

SECTION 1.18 - DISINFECTION OF WATER MAINS:

- A.** All new water mains shall be disinfected before they are placed in service. All water mains taken out of service for inspection, repair or other activities that might lead to contamination of water shall be disinfected before they are returned to service.
- B.** Disinfection of the new mains and the disposal of the heavily chlorinated water, following the disinfection, shall be accomplished in accordance with the latest edition of AWWA Standard C651. Field Dechlorination shall be in accordance with AWWA C655-09 or latest edition.

SECTION 1.19 - PROTECTION AND RESTORATION OF WORK AREA:

Protection and Restoration of Work Area shall be in accordance with Section 2.23.

ARTICLE II
STANDARDS FOR DESIGN
AND
CONSTRUCTION SPECIFICATIONS
FOR
WASTEWATER COLLECTION

PREFACE: This Sewer Design Guide is a guide for the Engineer when planning and designing wastewater facilities. This guide summarizes and outlines policy, applicable Codes and Engineering and operational practices and procedures that have been developed to establish a cost effective, reliable, and safe wastewater collection system. Also to be considered and used in conjunction with this design guide are all applicable current standard drawings, specifications, and industry requirements for the planning and design of wastewater infrastructure.

This guide is not a substitute for professional experience, nor is it meant to relieve the engineer from his/her responsibility to use good engineering judgment. The Engineer shall be responsible for providing a design that, within industry standards, can be safely repaired and maintained, will provide good service and life, and will not create a public nuisance or hazard. Under most conditions, this guide serves as a minimum standard.

SECTION 2.01 - PURPOSE:

This section of the Specifications describes products to be incorporated into the sewers and requirements for their installation and use. The Contractor/Developer shall furnish all products and perform all labor necessary to fulfill the requirements of these Specifications. The word "Authority" used herein shall mean the Macon Water Authority.

SECTION 2.02 - GENERAL:

A. Applicable Standards:

Supply all products and perform all work in accordance with applicable American Society for Testing and Materials (ASTM), American Water Works Association (AWWA), American National Standards Institute (ANSI), or other recognized standards. Latest revisions of all standards are applicable. If requested by the Authority, submit evidence that manufacturer has consistently produced products of satisfactory quality and performance over a period of at least two years.

B. Substitutions:

Whenever a product is identified in the Specifications by reference to manufacturer's or vendor's names, trade names, catalog numbers, etc., the Contractor/Developer may freely choose from those referenced products which ones he wishes to provide.

Any item or product other than those so designated shall be considered a substitution. The Contractor/Developer shall obtain prior approval from the Authority for all substitutions.

C. Warranty:

Wastewater collection systems installed by a Contractor/Developer which are accepted by the Authority for ownership, operation and maintenance shall be warranted and guaranteed for a period of one year from the date of final acceptance that the completed system is free from all defects due to faulty products or workmanship and the Contractor/Developer shall make such corrections as may be necessary by reason of such defects upon notice by the Authority.

D. Easements and Rights-of-Way:

Wastewater collection systems installed by a Contractor/Developer which are accepted by the Authority for ownership, operation and maintenance shall be installed in either dedicated streets or easements. Easements shall be properly executed and recorded.

The minimum easement width shall be (20) feet. Additional width may be required depending on depth of the line, soil conditions and accessibility. The easements shall be cleared of all structures, trees, shrubs, brush, logs, upturned stumps and roots of downed trees and similar items.

No permanent structure shall be built on the easement. Temporary structures such as fence, driveway, etc. can be installed on the permanent easements; but it shall be the responsibility of the owner to remove, if necessary, or repair such structures if they are disturbed when the Authority works on the water and sewer mains within the easement. The owner shall obtain written permission of the Authority before the installation of such temporary structures.

SECTION 2.03 - DRAWINGS AND SUBMITTALS:

A. Contractor/Developer's Review:

The Contractor/Developer shall review and check drawings and submittals. He shall indicate his approval by initials and date. The Contractor/Developer shall furnish the Authority with a minimum of four copies of all submittals. A transmittal form shall accompany each submittal or group of submittals.

B. Authority's Review:

All submittals will be reviewed, stamped, and dated by the Authority before they are returned to the Contractor/Developer.

Acceptable submittals will be approved in writing with one copy returned to the Contractor/Developer and the remaining copies retained by the Authority. Submittals requiring minor corrections before being acceptable will be so noted. Drawings must be resubmitted for review and approval prior to installation or use of products.

C. Drawings for Construction:

Drawings or other submittals not bearing the Authority's approval notation shall not be issued to subcontractors or utilized for construction purposes. The Contractor/Developer shall maintain at the job site a complete set of construction drawings bearing the Authority's approval.

D. The Owner/Contractor shall submit two copies of "as-built" plans and one digital copy in AutoCAD format after the completion of construction but before the project is accepted for operation and maintenance by the Macon Water Authority. The "as-built" plans shall be prepared and stamped by a registered Land Surveyor or Professional Engineer. The plans shall include the following information for the sewer portion of a project: Location of sewer mains, manholes, including rim and invert elevations, distance and angles between manholes, distance of each sewer lateral from manholes and their length, width of easements and any pertinent information.

All sewer mains (type, size) and appurtenances such as manholes, laterals, cleanouts, pump stations, etc. shall be located and tied to Bibb County State Plane Coordinates. Also distance between manholes, rim and invert elevations and sewer profiles.

All other relative information, such as rights-of-way, property corners, stake plans along easements, etc. shall also be located and tied to Bibb County State Plane Coordinates.

SECTION 2.04 - PIPE AND ACCESSORIES:

All materials, unless otherwise specified or approved equal, shall be in accordance with the Buy America requirements of Federal regulations 23 U.S.C. 313 and 23 CFR 635.410. Acceptance will be on the basis of the Authority's inspection and receipt of the manufacturer's written certification that the material was manufactured and tested in accordance with the applicable standards. All pipe shall be subject to the inspection of the Authority at the pipe plant, job site, or other point of delivery for the purpose of rejecting pipe not conforming to these Specifications.

A. Ductile Iron Pipe:

Ductile iron pipe shall be utilized in force mains, stream crossings, railroad crossings, all piping inside (carrier pipe) steel casing, and other applications deemed necessary by the Authority. Ductile iron pipe shall be installed at locations where depth of cover is less than 3 feet and more than 20 feet. All pipe shall be furnished in lengths of at least 20 feet. All ductile iron pipe shall be lined with Protecto 401 Epoxy to include fittings for gravity pipe and force mains. **(In any and all applications, ductile iron pipe shall be used only at the direction of the Authority).**

(1) Pipe:

Ductile iron pipe shall conform to ANSI/AWWA C151/A21.51 and shall be a minimum of Pressure Class 350 up to a diameter of (12) inches and Pressure Class 350 above (12) inches diameter. Pipe shall be furnished with a bituminous outside coating and lined with Protecto 401 Ceramic Epoxy coating on the inside.

(2) Joints:

Joints shall be push-on type for pipe and standard mechanical joints for fittings. Joints shall conform to ANSI/AWWA C111/A21.11. Retrained joint pipe (RJP) shall be either the bolted joint type, or modified push-on type with joint restraint using ductile iron components. Retrained joint pipe on piers shall have bolted joints and shall be specifically designed for clear spans of at least 36 feet. Retrained joint pipe where required shall be American, U.S. Pipe, Clow, or equal.

When installed in a casing the pipe shall be supported at every joint, as recommended by the manufacturer. Casing spacers shall be stainless steel as manufactured by Cascade, or approved equal.

(3) Acceptance:

Acceptance will be on the basis of the Authority's inspection and receipt of the manufacturer's written certification that the pipe was manufactured and tested in accordance with the applicable standards.

B. Polyvinyl Chloride Gravity Sewer Pipe:

PVC gravity sewer pipe shall be supplied in lengths not longer than 13 feet. The PVC pipe can be installed between a minimum depth of 3 feet to a maximum depth of 20 feet. Ductile iron pipe shall be installed in depths up to 3 ft and depths beyond 20 feet (**only at the direction of the Authority**).

(1) Pipe:

PVC gravity sewer pipe shall be manufactured with ASTM D3034, SDR 26 pipe.

Nominal Size	Outside Diameter Average Tolerance	Minimum Wall Thickness
8"	8.400 +/- 0.018	0.323
10"	10.500 +/- 0.020	0.404
12"	12.500 +/- 0.024	0.481

Minimum "pipe stiffness" (F/Y) at 5% deflection shall be 46 for all sizes when tested in accordance with ASTM Designation D-2412. External loading properties of plastic pipe shall be determined by Parallel Plate Loading Test.

Installation of PVC sewer pipe shall be in accordance with the provisions of ASTM-2321, "Underground Installation of Flexible Thermoplastic Sewer Pipe" with additional bedding as required in these specifications.

(2) Joints:

Joints for pipe and fittings shall be of the bell and spigot type with a confined elastomeric gasket having the capability of absorbing expansion and contraction without leakage. The joint system shall be subject to the approval of the Authority and shall be identical for pipe and fittings.

Fittings for pipe eight inches and less in diameter shall be of the bell and spigot type with a confined elastomeric gasket having the capability of absorbing expansion and contraction without leakage. The joint system shall be subject to the approval of the Authority and shall be identical for pipe and fittings.

Fittings for pipe eight inches and less in diameter shall be one piece with no solvent-welded joints. Fittings for pipe ten inches and larger may be fabricated using solvent welding. No field fabrication or fittings will be allowed. All such fabrication shall be performed at the factory and the fittings delivered ready for use.

(3) Detection Tape:

Detectable Mylar encased aluminum foil marking tape will be installed over all sewer pipe and sewer lateral. Tape will be "green" in color, at least 3-inches wide and shall bear the printed identification "Caution: Buried Sewer Line Below" (reverse printed), so as to be readable through the Mylar. Surface printing on the tape shall be equal to Lineguard Type II Detectable. Refer to (S-14).

(4) Acceptance:

Acceptance will be on the basis of the Authority's inspection and receipt of the manufacturer's written certification that the pipe was manufactured and tested in accordance with the applicable standards.

C. Check Valves:

Check valves shall be hinged disc type with cast iron body and bronze or bronze-fitted disc. Valves shall be designed for the operating head indicated and shall not slam shut on pump shutdown. Valves shall be equipped with ½-inch stop cock at the high point of the valve for bleeding air from the line.

Valves of the outside weight and lever cushioned type shall have the cushion chamber attached to the side of the valve body externally and constructed with a piston operating in a chamber that will effectively prevent hammering action at the pump discharge heads specified. The cushioning shall be by air, and the cushion chamber shall be so arranged that the closing speed will be adjustable to meet the service requirements.

Weight and lever cushioned type valves shall be manufactured by G-A Industries, or equal.

Spring and lever type valves shall be manufactured by G-A Industries, Dresser M & H, Mueller.

D. Automatic Air and Vacuum Valves:

Valves shall be automatic air and vacuum valves designed to allow escape of air, close water-tight when liquid enters the valve and allow air to enter in the vent of a vacuum. The valve body shall be cast iron, designed to facilitate disassembly for cleaning and maintenance. The float shall be stainless steel; the valve seat and all working parts shall be of corrosion resistant materials. Valves shall be recommended by the manufacturer for wastewater service. Air and vacuum valves shall be equal to Apco Valve Corporation, or Val-Matic, or approved equal.

E. Adaptor Couplings:

Adaptors shall be elastomeric plastic sleeves designed to connect pipes of dis-similar materials. Adaptors shall provide a positive seal against infiltration and exfiltration, be root-proof and remain leak proof up to 10 psi. The adaptor manufacturer shall provide steel clamps, adaptor donuts and other required accessories.

Couplings for a DIP/PVC transition joint shall be ductile iron as manufactured by Ford Meter Box Co. or JCM Industries, Inc., or approved equal and shall be installed in accordance with the manufacturer's recommendations.

- F.** In lieu of Ford Transition Coupling, a transition coupling, Flex Seal ARC, manufactured by Mission Rubber Company could be used. The coupling shall be stainless steel shielded sewer coupling with a gasket meeting ASTM C-425-91. The stainless steel shear ring shall have a minimum thickness of 0.012 inches. Nuts, bolts, shearing, clamps shall be of 316 grade stainless steel meeting or exceeding all requirements of ASTM A-167.

G. Materials for Manholes:

Provide materials for construction of manholes in accordance with the following: (ASTM A615, ASTM D4101)

(1) Precast Concrete Sections:

Precast concrete sections shall meet the requirements of ASTM C 478. The minimum compressive strength of the concrete in precast sections shall be 4,000 psi. The minimum shell thickness shall be one twelfth of the inside diameter of the riser.

Seal joints between precast sections by means of rubber "o" ring gaskets or flexible butyl rubber sealant. Butyl rubber sealants shall meet the requirements of ASSHTO -198. Sealant shall be pre-formed type with a minimum nominal diameter of 1-inch. Butyl rubber sealant shall be equal to Kent Seal No. 2 or Kor-N-Seal 300.

(2) Brick and Mortar:

Brick shall be whole and hardburned, conforming to ASTM C32 Grade MS. Concrete bricks, when used, shall conform to the specification for concrete building brick ASTM C55, Grade A. Mortar shall be made of one part Portland Cement and two parts clean sharp sand. Cement shall be type 1 and shall conform to ASTM C150. Sand shall meet ASTM C53.

(3) Iron Castings:

Cast iron manhole frames and covers shall be gray iron, conforming to ASTM A 48 for Class 35B gray iron and applicable local standards. All castings shall be tough, close grained, smooth and free from blow holes, blisters, shrinkage, strains, cracks, cold shots and other imperfections. No casting will be accepted which weighs less than 95% of the design weight. Shop drawings must indicate the design weight and provide sufficient dimensions to permit checking.

Manhole frames and covers shall be equal to the following:

<u>Type</u>	<u>Design Weight</u>	<u>Standard</u>	<u>Clear Opening (In.)</u>	<u>Manufacturer's Reference</u>
Non-Traffic	325 lbs.	ASTM 48, Class 35B	22.375	USF 195E
Traffic	425 lbs.	ASTM 48, Class 35B	22	USF 604
Watertight	360 lbs.	ASTM 48, Class 35B	24	USF 576BH
Watertight Traffic	360 lbs.	ASTM 48, Class 35B	24	USF 576BH
Watertight	400 lbs.	ASTM 48, Class 35B	20.625	USF 420C
Watertight Traffic	400 lbs.	ASTM 48, Class 35B	20.625	USF 420C
Watertight Traffic	380 lbs.	ASTM 48, Class 35B	30	USF 692
Non-Traffic	308 lbs.	ASTM 48, Class 35B	20	Neenah R-1700-A
Traffic	309 lbs.	ASTM 48, Class 35B	21	Neenah R-1713
Traffic	335 lbs.	ASTM 48, Class 35B	22.25	Neenah-R-1726-A
Watertight	342 lbs.	ASTM 48, Class 35B	24	Neenah R-1916-F
Watertight Traffic	342 lbs.	ASTM 48, Class 35B	24	Neenah R-1916-F
Traffic	580 lbs.	ASTM 48, Class 35B	30	Neenah R-1916-H
Watertight (Bolted lid)	580 lbs.	ASTM 48, Class 35B	30	Neenah R-1916-H

All frames and covers shall have machined horizontal bearing surfaces.

Bolt-down covers shall be equipped with four ½ inch stainless steel bolts and a 1/8-inch neoprene o-ring gasket. Covers shall be rotatable and interchangeable. Bolt holes shall be bored through so that debris entering the bolt hole will fall into

the manhole.

Provide neoprene boot seal where sewer enters manhole. Openings for pipes entering or leaving the manholes shall be core drilled at the plant or site. All pipes entering and leaving the manhole shall be provided with neoprene boot seal.

(4) Manhole Steps:

The Authority does not allow manhole steps to be used within our sanitary sewer system. The Macon Water Authority policy mandates that all steps be deleted from the manhole before final inspection of the manhole is performed. Holes shall be grouted with hydraulic cement or approved equivalent.

SECTION 2.05 - LOCATION AND GRADE:

A. The Drawings shall show the alignment and grade of the sewer and the position of manholes and other appurtenances. The grade line shown on the profile and/or called for in the plan shall be the grade of the invert of the pipe. The grade shall be sufficient to maintain a minimum gravity flow velocity of two feet per second when the pipe is flowing half-full.

B. Slopes:

All sewers shall be designed and constructed to generate mean velocities when flowing half-full of not less than 2.0 feet per second based on Manning's formula using an "n" value of 0.013. The following are minimum slopes which should be provided, however, slopes greater than these are desirable.

Sewer Size In.	Minimum Slope Ft./100 Ft.
8	0.40
10	0.28
12	0.22
14	0.17
15	0.15
16	0.14
18	0.12
21	0.10
24 and larger	0.08

Slopes less than 0.08 for pipe sizes larger than 24-inches may be approved by the Authority on a case by case basis. Slopes resulting in mean velocities when flowing full of greater than 10 feet per second must be approved by the Authority before construction. Sewers shall be laid with uniform slope between manholes.

Sewers on slopes of 20 percent or greater shall be anchored securely with concrete anchors or equal. Anchor spacing shall be as follows:

Minimum Center to Center Spacing	Slope
36 feet	20% to 35%
24 feet	35% to 50%
16 feet	Greater than 50%

SECTION 2.06 - EXISTING UNDERGROUND UTILITIES AND OBSTRUCTIONS:

It is the responsibility of the Contractor/Developer to locate all existing utilities along the path of his construction. The drawings of the Contractor/Developer shall indicate underground utilities or obstructions that are known to exist. Where unforeseen underground utilities or obstructions are encountered, the location and alignment of the sewer may be changed, upon written approval of the Authority, to avoid interference. It is the responsibility of the Contractor to contact the Utilities Protection Centers, Inc. ("Call Before You Dig" - 1-800-282-7411 or 811) prior to the start of any excavation or construction.

A horizontal separation of 10 feet shall be maintained between water mains and sanitary sewer. The distance shall be measured edge to edge. When a water main must cross a sewer, the water main and/or sewer shall be laid such that the top of the sewer is at least 18" below the bottom of the water main. When this requirement cannot be met both the water main and the sewer shall be constructed of ductile iron pipe with ductile iron pipe for a distance of 10 feet on each side of the point of the crossing on both the water main and sewer. **(At the discretion of the Authority, the sewer main shall be encased in concrete per MWA standard detail S-11. In any and all applications, ductile iron pipe shall be used only at the direction of the Authority).**

SECTION 2.07 - CONSTRUCTION ALONG HIGHWAYS, STREETS AND ROADWAYS:

Install pipe lines and accessories along highways, streets and roadways in accordance with the applicable regulations of the City of Macon, Bibb County and/or the Department of Transportation with reference to construction operations, safety, traffic control, road maintenance and repair.

A. Protection of Traffic:

Provide and maintain suitable signs, barricades and lights for protection of traffic. Replace all highway signs removed for construction as soon as possible. Do not close or block any highway, street, or roadway without first obtaining permission from the proper authorities.

Provide qualified/certified flagmen to direct and expedite the flow of traffic.

B. Construction Operations:

Perform all work along highways, streets and roadways to least interfere with traffic.

(1) Stripping:

Where the pipe line is laid along road shoulders, strip and stockpile all sod, topsoil and other material suitable for shoulder restoration.

(2) Trenching, Laying and Backfilling:

Do not open the trench any further ahead of pipelaying operations than is necessary. Backfill and remove excess material immediately behind laying operations. Complete excavation and backfill for any portion of the trench in the same day.

(3) Shaping:

Reshape damaged slopes, side ditches and ditch lines immediately after completing backfilling operations. Replace topsoil, sod and any other materials removed from shoulders.

C. Excavated Materials:

Do not place excavated material along highways, streets and roadways in a manner which obstructs traffic. Sweep all scattered excavated material off the pavement.

D. Drainage Structures:

Keep all side ditches, culverts, cross drains, and other drainage structures clear of excavated material and free to drain at all times.

E. Maintaining Highways, Streets, Roadways and Driveways:

Maintain streets, highways, and roadways in suitable condition for movement of the work. Use steel running plate to maintain traffic until pavement replacement is completed.

Repair all driveways that are cut or damaged immediately. Maintain them in a suitable condition for use until completion and final acceptance of the work. Saw cut all driveways, paved parking areas, paved roadways and paved sidewalks.

SECTION 2.08 - CLEARING:

Clear the permanent easement before excavating. Remove all trees, growth, debris, stumps and other objectionable matter. Clear the construction easement only if necessary and take special

care to adhere to the requirements of Paragraph 1.19.

SECTION 2.09 - EXCAVATION:

Excavate trenches by open cut. Perform all excavation in accordance with the Occupational Safety and Health Act of 1970 (PL 91-596), and any subsequent amendments to this Act.

A. Dimensions:

Excavate trenches to the depths shown on the drawings for each class of bedding and for manholes and other structures. Excavate the top portion of the trench to any width within the construction easement which will not cause unnecessary damage to adjoining structures, roadways, pavements, utilities, trees, or private property.

Excavate the lower portion of the trench to a width no greater than the outside diameter of the pipe plus 18 inches. Maintain this width up to two feet above the pipe.

If trenches are excavated to excessive dimensions or collapse because of inadequate or improperly placed bracing and sheeting, lay the pipe with the next better class of bedding. If excavation for manholes and other structures is made to excessive depth, backfill with compacted bedding material to the required grade.

B. Bracing and Sheeting:

When required by regulations or to prevent damage to adjoining structures, roadways, pavements, utilities, trees, or private property, which are specifically required to remain, provide bracing and sheeting.

(1) Timber:

Timber for shoring, sheeting or bracing shall be sound and free of large or loose knots and in good condition. Size and spacing shall be in accordance with OSHA regulations.

Remove bracing and sheeting in units when backfill reaches the point necessary to protect the pipe and adjacent property. Leave sheeting in place when in the opinion of the Authority it cannot be safely removed. Cut off sheeting left in place at least two feet below the surface.

(2) Steel Sheet Piling:

Continuous lockjoint steel sheet piling may be substituted for timber sheeting when approved by the Authority. Steel piling may be removed, without cutting, provided the rate of removal is kept in place with the tamping and backfilling operations to assure complete filling of the void created by the withdrawal of the piling. Complete withdrawal of the piling in advance of the tamping and

backfilling will not be permitted. Piling, where ordered to be left in place by the Authority for reasons of safety, will be cut off where directed.

C. Dewatering Trenches:

Dewater excavation continuously to maintain a water level below the bottom of the trench. Dewater running sand by well pointing. Where soil conditions do not permit use of well point, construct french drains of crushed stone or gravel to conduct water to the sumps.

D. Trench Stabilization:

Wherever the material at the bottom of the trench is unsuitable for the proper installation of the pipe, the Authority will direct the removal and replacement of the unsuitable material.

When so directed, undercut the trench and backfill with bedding material. Place and compact this material to bring the trench to the required grade.

E. Rock Excavation:

(1) Definition of Rock:

Any material which cannot be excavated with a backhoe, having a bucket curling force rated at not less than 18,300 pounds (Caterpillar Model 215 or equal), and occupying an original volume of at least one-half cubic yard.

(2) Excavation:

Where rock is encountered in trenches excavate to the minimum depth which will provide clearance below the pipe barrel of 8 inches for pipe 21 inches in diameter and smaller and 12 inches for larger pipe and manholes. Remove boulders and stones to provide a minimum of 6 inches clearance between the rock and any part of the pipe or manhole.

(3) Blasting:

Provide experienced workmen to perform blasting. Conduct blasting operations in accordance with all existing ordinances and regulations. Protect all structures from the effects of the blast. Repair any resulting damage.

If the Contractor persistently uses excessive blasting charges or blasts in any unsafe or improper manner, the Authority may direct that Contractor/Developer to employ an independent blasting consultant to supervise the preparation for each blast and approve the quantity of each charge.

(4) Removal of Rock:

Do not use excavated rock as backfill material. Dispose of rock which is surplus or not suitable for use as rip rap.

SECTION 2.10 - BEDDING OF SEWER:

Bed pipeline in accordance with the detail drawings included in Appendix A and the following specifications:

A. Bedding Materials:

(1) Ductile Iron Gravity Sewer:

All bedding materials shall be crushed stone unless shown or specified otherwise. Crushed stone bedding material shall meet the requirements of Georgia Department of Transportation Specification 800.01 for No. 57 stone.

(2) PVC:

Bedding materials shall be crushed stone per ASTM D 2774 unless shown or specified otherwise. Crushed stone bedding material shall meet the requirements of Georgia Department of Transportation Specification 800.01 for No. 78 stone.

(3) Manholes:

Bedding material shall be crushed stone unless shown or specified otherwise. Crushed stone bedding material shall meet the requirements of Georgia Department of Transportation Specification 800.01 for No. 57 stone.

(4) Ductile Iron Force Main:

Bedding material shall be coarse sands and gravels with a maximum particle size of 1 ½ inch, including variously graded sands and gravels containing small percentages of fines. These include Unified Soil Classification System (USCS) Soil Types SW, GP, SW, and SP.

B. General:

Compact stone bedding material by tamping or slicing with a flat-blade shovel. Prepare the trench bottom to support the pipe uniformly throughout its length. Provide bell holes to relieve pipe bells of all load. If the trench is excavated to excessive width or depth, provide the next better class of bedding. In rock trenches, bed pipe in at least six inches of suitable earth material.

C. Bedding Classifications:

Bedding shall be prepared in accordance with the following:

(1) Ductile Iron Pipe:

Excavate the trench to a depth of one-fourth the nominal diameter of the pipe or six inches whichever is greater. Place and compact the bedding material to proper grade. Place the pipe over bedding material. Bedding material shall then be placed and hand compacted to provide full support under the pipe and up to one third (1/3) Outside Diameter of the pipe. See detail (OT-2)

(2) PVC Pipe:

Excavate the bottom of the trench flat at a minimum depth shown on the Drawings below the bottom of the pipe barrel. Place and compact bedding material to the proper grade. Bedding shall then be carefully placed by hand and compacted to provide full support under the pipe and to a minimum depth of six inches above the crown of the pipe. See detail (OT-2)

(3) Flexible Pipe:

Embedment materials listed here include a number of processed materials plus the soil types defined according to the Unified Soil Classification System (USCS) in ASTM D2487, Standard Method for Classification of Soils for Engineering Purposes. (See Table 2.10-1 for description of soil classification). These materials are grouped into five broad categories according to their suitability for this application.

- (a) Class I** – Angular, $\frac{1}{4}$ to 1 $\frac{1}{2}$ inches (6 to 40 mm) graded stone, including a number of fill materials that have regional significance such as coral, slag, cinders, crushed shells, and crushed stone.

NOTE – The size range and resulting high voids ratio of Class I material make it suitable for use to dewater trenches during pipe installation. This permeable characteristic dictates that its use be limited to locations where pipe support will not be lost by migration of fine grained natural material from the trench walls and bottom of migration of other embedment materials into the Class I material. When such migration is possible, the material's minimum size range should be reduced to finer than $\frac{1}{4}$ inch (6 mm) and the gradation properly designed to limit the size of the voids.

- (b) Class II** – coarse sands and gravels with maximum particle size of 1 $\frac{1}{2}$ in (40 mm), including variously graded sands and gravels containing small percentages of fines, generally granular and noncohesive, either wet or dry. Soil Types SW, GP, SW and SP and included in this class.

NOTE – Sands and gravels which are clean, or borderline between clean and with fines, should be included. Coarse-grained soils with less than 12% but more than 5% fines are neglected in ASTM D2487 and the USCS and should be included. The gradation of Class II material includes its density and pipe support strength when loosely placed. The gradation of Class II material may be critical to the pipe support and stability of the foundation and embedment, if the material is imported and is not native to the trench excavation. A gradation other than well graded, such as uniformly graded or gap graded, may permit loss of support by migration into void spaces of a finer grained natural material from the trench wall and bottom.

(c) Class III – Fine sand and clayey (clay filled) gravels, including fine sands, sand-clay mixtures, and gravel-clay mixtures. Soil Types GM, GC, SM and SC are included in this class.

(d) Class IV – Silt, silty clays, and clays, including inorganic clays and silts of low to high plasticity and liquid limits. Soil Types MH, ML, CH and CL are included in this class.

NOTE – Caution should be used in the design and selection of the degree and method of compaction for Class IV soils because of the difficulty in properly controlling the moisture content under field conditions. Some Class IV soils with medium to high plasticity and with liquid limits greater than 50% (CH, MH, CH-MH) exhibit reduced strength when wet and should only be used for bedding, haunching, and initial backfill in arid locations where the pipe embedment will not be saturated by ground water, rainfall, and/or exfiltration from the pipeline system. Class IV soils with low to medium plasticity and with liquid limits lower than 50% (CL, ML, CH-ML) also require careful consideration in design and installation to control moisture content but need not be restricted in use to arid locations.

(e) Class V – This class includes the organic soils OL, OH, and PT as well as soils containing frozen earth, debris, rocks larger than 1 ½ in. (40 mm) in diameter, and other foreign materials. These materials are not recommended for bedding, haunching or initial backfill.

Table 2.10-1 Soil Classification

DESCRIPTION OF EMBEDMENT MATERIAL CLASSIFICATIONS

SOIL CLASS	SOIL TYPE	DESCRIPTION OF MATERIAL CLASSIFICATION
CLASS I SOILS *	—	Manufactured angular, granular material, ¼ to 1½ inches (6 to 40 mm) size, including materials having regional significance such as crushed stone or rock, broken coral, crushed slag, cinders, or crushed shells.
CLASS II SOILS **	GW	Well-graded gravels and gravel-sand mixtures, little or no fines. 50% or more retained on No. 4 sieve. More than 95% retained on No. 200 sieve. Clean.
	GP	Poorly graded gravels and gravel-sand mixtures, little or no fines. 50% or more retained on No. 4 sieve. More than 95% retained on No. 200 sieve. Clean.
	SW	Well-graded sands and gravelly sands, little or no fines. More than 50% passes No. 4 sieve. More than 95% retained on No. 200 sieve. Clean.
	SP	Poorly graded sands and gravelly sands, little or no fines. More than 50% passes No. 4 sieve. More than 95% retained on No. 200 sieve. Clean.
CLASS III SOILS ***	GM	Silty gravels, gravel-sand-silt mixtures. 50% or more retained on No. 4 sieve. More than 50% retained on No. 200 sieve.
	GC	Clayey gravels, gravel-sand-clay mixtures. 50% or more retained on No. 4 sieve. More than 50% retained on No. 200 sieve.
	SM	Silty sands, sand-silt mixtures. More than 50% passes No. 4 sieve. More than 50% retained on No. 200 sieve.
	SC	Clayey sands, sand-clay mixtures. More than 50% passes No. 4 sieve. More than 50% retained on No. 200 sieve.
CLASS IV SOILS	ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands. Liquid limit 50% or less. 50% or more passes No. 200 sieve.
	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays. Liquid limit 50% or less. 50% or more passes No. 200 sieve.
	MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts. Liquid limit greater than 50%. 50% or more passes No. 200 sieve.
	CH	Inorganic clays of high plasticity, fat clays. Liquid limit greater than 50%. 50% or more passes No. 200 sieve.
CLASS V SOILS	OL	Organic silts and organic silty clays of low plasticity. Liquid limit 50% or less. 50% or more passes No. 200 sieve.
	OH	Organic clays of medium to high plasticity. Liquid limit greater than 50%. 50% or more passes No. 200 sieve.
	PT	Peat, muck and other highly organic soils.

* Soils defined as Class I materials are not defined in ASTM D2487.

** In accordance with ASTM D2487, less than 5% pass No. 200 sieve.

*** In accordance with ASTM D2487, more than 12% pass No. 200 sieve. Soils with 5% to 12% pass No. 200 sieve fall in borderline classification, e.g., GP-GC.

PVC pipe requires No. 78 crushed stone.

DIP pipe requires No. 57 crushed stone.

Rigid Pipe:

Bedding requirements for rigid pipe materials shall be in accordance to ASTM D 2774. The Macon Water Authority permits the usage of Class “CS” bedding for all rigid pipe materials.

Class “CS” Bedding procedures: The pipe shall be bedded in granular material *carefully placed and* compacted on a firm trench bottom with a minimum thickness beneath the pipe of 4 inches sliced into the haunches of the pipe with a shovel or other suitable tool to the two inches above the crown of the pipe.

Class “D” bedding is NOT allowed for any pipe bedding.

(4) Suitable and Unsuitable Soil Materials:

The major properties of a soil proposed for use as a bedding material that are of concern to the design or construction engineer are its strength, permeability, and consolidation and compaction characteristics. Other features may be investigated for a specific problem, but in general, some or all of the properties mentioned are of primary importance. It is common practice to evaluate the properties of the soils in question by means of laboratory or field tests and to use the results of such tests as a basis for design and construction. The factors that influence strength, consolidation, and other characteristics are numerous, and some of them are not completely understood; consequently it is impractical to evaluate these features by means of a general soils classification. However, the soil groups in a given classification do have reasonably similar behavior characteristics. While such information is not sufficient for design purposes, it will give the engineer an indication of the behavior of a soil when used as a component in construction. This is especially true in the preliminary examination for a project when neither time nor money for a detailed soils-testing program is available.

(See Table 2.10-2)

Major Divisions (1)	(2)	Symbols		Name (5)	Value As Subgrade When not Subject to Frost Action (7)	Value As Subbase When not Subject to Frost Action (8)	Value As Base When not Subject to Frost Action (9)	Potential Frost Action (10)	Compressibility and Expansion (11)	Drainage Characteristics (12)	Compaction Equipment (13)	Dry Unit Weight (pcf) (14)	Typical Design Values	
		Letter (3)	Hatching Color (4)										CBR (15)	Subgrade Modulus k (lb per cu in) (16)
Coarse-Grained Soils	Gravel and Gravelly Soils	GW		Red	Well-graded gravels or gravel-sand mixtures, little or no fines	Excellent	Good	None to very slight	Almost none	Excellent	Crawler-type tractor, rubber-tired roller, steel-wheeled roller	125-140	40-80	300-500
		GP		Red	Poorly graded gravels or gravel-sand mixtures, little or no fines	Good to excellent	Fair to Good	None to very slight	Almost none	Excellent	Crawler-type tractor, rubber-tired roller, steel-wheeled roller	110-140	30-60	300-500
		GM _d		Yellow	Silty gravels, gravel-sand-silt mixtures	Good to excellent	Fair to Good	Slight to medium	Very slight	Fair to poor	Rubber-tired roller, sheepfoot roller, close control of moisture	125-145	40-60	300-500
		GM _u		Yellow	Clayey gravels, gravel-sand-clay mixtures	Good	Fair	Slight to medium	Slight	Poor to practically impervious	Rubber-tired roller, sheepfoot roller	115-135	30-50	200-500
	Sand and Sandy Soils	GC		Yellow	Well-graded sands or gravelly sands, little or no fines	Good	Fair	Poor to not suitable	Slight to medium	Poor to practically impervious	Rubber-tired roller, sheepfoot roller	130-145	20-40	200-500
		SW		Red	Poorly graded sands or gravelly sands, little or no fines	Good	Fair to good	None to very slight	Almost none	Excellent	Crawler-type tractor, rubber-tired roller, steel-wheeled roller	110-130	20-40	200-400
		SP		Red	Poorly graded sands or gravelly sands, little or no fines	Fair to good	Fair	None to very slight	Almost none	Excellent	Crawler-type tractor, rubber-tired roller, steel-wheeled roller	105-135	10-40	150-400
		SM _d		Yellow	Silty sands, sand-silt mixtures	Fair to good	Fair to good	Slight to high	Very slight	Fair to poor	Rubber-tired roller, sheepfoot roller, close control of moisture	120-135	15-40	150-400
		SM _u		Yellow	Silty sands, sand-silt mixtures	Fair	Poor to fair	Slight to high	Slight to medium	Poor to practically impervious	Rubber-tired roller, sheepfoot roller	100-130	10-20	100-300
		SC		Yellow	Clayey sands, sand-silt mixtures	Poor to fair	Poor	Slight to high	Slight to medium	Poor to practically impervious	Rubber-tired roller, sheepfoot roller	100-135	5-20	100-300
Fine-Grained Soils	Sills and Clays LL < 50	ML		Green	Inorganic sills and very fine sands, rock flour, silty or clayey fine sands or clayey sills with slight plasticity	Poor to fair	Not suitable	Medium to very high	Slight to medium	Fair to poor	Rubber-tired roller, sheepfoot roller, close control of moisture	90-130	15 or less	100-200
		CL		Green	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	Poor to fair	Not suitable	Medium to high	Medium	Practically impervious	Rubber-tired roller, sheepfoot roller	90-130	15 or less	50-150
		OL		Green	Organic sills and organic silt-clays of low plasticity	Poor	Not suitable	Medium to high	Medium to high	Poor	Rubber-tired roller, sheepfoot roller	90-105	5 or less	50-100
		MH		Blue	Inorganic sills, micaceous or diatomaceous fine sandy or silty soils, elastic sills	Poor	Not suitable	Medium to very high	High	Fair to poor	Rubber-tired roller, sheepfoot roller	80-105	10 or less	50-100
	Sills and Clays LL ≥ 50	CH		Blue	Inorganic clays of high plasticity, fat clays	Poor to fair	Not suitable	Medium	High	Practically impervious	Rubber-tired roller, sheepfoot roller	90-115	15 or less	50-150
		OH		Blue	Organic clays of medium to high plasticity, organic sills	Poor to very poor	Not suitable	Medium	High	Practically impervious	Rubber-tired roller, sheepfoot roller	80-110	5 or less	25-100
		PI		Orange	Peat and other highly-organic soils	Not suitable	Not suitable	Slight	Very high	Fair to poor	Compaction not practical	-	-	-
Highly Organic Soils														

NOTES: 1. Divisions of the GM and SM groups (column 3) into subdivisions of d and u are applicable to roads and airfields only. Subdivision is based on the LL and PI; suffix d (for example, GMd) will be used when the LL is 25 or less and the PI is 5 or less; the suffix u will be used otherwise.

D. Manholes:

Excavate to a minimum of 12 inches below the planned elevation of the base of the manhole. Place and compact stone bedding material to the required grade before constructing the manhole.

E. Force Mains:

Force mains shall be bedded in accordance with the detail in Appendix A and the following:

(1) Earth Trenches:

Grade the bottom of the trench to a true line. Lay the pipe in the bedding material.

(2) Rock Trenches:

Bed the pipe in at least six inches of bedding material. Backfill with the same material to at least six inches above the pipe.

(3) Wet Trenches:

Do not lay pipe in water. Provide dewatering equipment to maintain a ground water level below the bottom of the pipe while pipe is being laid.

(4) At end of each workday all open end pipe shall be capped with a plug.

F. Compaction:

Bedding under pipe and manholes shall be compacted to a minimum of 95 percent of the maximum dry density as determined by the Standard Proctor Compaction Test, ASTM D698. The Backfill in all trenches shall be compacted in accordance with section 1.13-C.

SECTION 2.11 - BACKFILL MATERIAL

- A.** The requirements of this Article shall apply to all backfill materials unless otherwise specified.
- B.** All material shall be suitable and free from roots, wood, scrap material, and other vegetable matter and refuse.
- C.** Acceptable material shall generally be a natural or artificial mixture of soil types normally found in natural deposits in the project vicinity or material obtained from the Contractor's excavations.

- D.** All material shall be sufficiently dry for compaction and shall not contain excessive amounts of soft or highly plastic clays.
- E.** Maximum size of stone shall not exceed four (4) inches.

SECTION 2.12 - SEWER ON PILING:

If unusually poor soil conditions are encountered and adequate dewatering fails to establish a soil condition suitable for laying pipe, the Authority may direct the Contractor/Developer to provide piling supports for pipe and manholes. Dewatering will not be considered adequate unless the water table is lowered to an elevation at least two feet below the trench bottom.

A. Drawings:

Submit to the Authority for review and approval construction drawings for the layout of piling, details of support slabs, saddles and beams, reinforcing and tie straps when required.

B. Piling:

Piles shall meet the requirements of ASTM D25 friction type. Piles shall be pressure treated with creosote to retain 12 pounds of oil per cubic foot. Pressure treatment shall meet the requirements of the American Wood Preserver's Association Standard C 3. Piles shall be 30 feet in length and shall have a minimum tip diameter of 8 inches.

C. Driving:

Drive piles by a mechanical hammer having a rated energy of 15,000 - 20,000 foot pounds. A drop hammer is not acceptable. Submit technical literature on the hammer proposed for use for review by the Authority and determination of specific refusal criteria.

D. Saddles and Manhole Support Slabs:

After driving, cut the pile at the required elevation and pour a concrete saddle or manhole support slab in accordance with the approved construction drawings.

E. Installation of Pipe:

After concrete work is completed, install pipe and manholes in accordance with the details shown on the approved construction drawings. After pipe is secured in position, proceed with backfilling as specified elsewhere.

SECTION 2.13 - MANHOLES:

A. General Design Considerations:

All manholes shall be constructed in accordance with the Macon Water Authority Standards. Typical manhole details are included in appendix A-MWA S2.

B. Required Location:

Manholes shall be required at all of the following locations:

- 1) Change of grade
- 2) Changes in pipe size
- 3) At the intersection of mains
- 4) At the terminus of dead-end sewers
- 5) Change of flow direction

C. Prohibited Locations:

- 1) Inaccessible areas
- 2) Gutters and other depressions or areas subject to inundation
- 3) In freeway ramp
- 4) Between railroad tracks or within the right-of-way of railroad tracks.

D. Distance Between Manholes:

The distance between manholes shall not be greater than those shown in Table A.

TABLE A

Sewer Size (Inches)	Maximum Distance Between Manholes in Feet
8 - 12	400
15 and over	450

E. Precast Concrete:

Handle sections carefully to prevent cracking or chipping. Provide uniform bedding of the bottom section to prevent uneven loading. If preformed openings must be enlarged or altered, or if new openings must be made in the field, minimize the amount of material removed to provide closely matched surfaces for grouting. Install gaskets in accordance with manufacturer's recommendations to produce a watertight structure. Manhole gaskets shall be installed as an integral part of the base section for a proper seal between pipe and the manhole.

F. Brick:

Bed the bottom and sides of every brick in mortar. Apply a smooth coat of mortar, $\frac{3}{4}$ inches thick, on the inside and outside.

G. Inverts:

Form channels as shown on the drawings, rounded and troweled smooth. Maintain consistent grade through the invert. Seal the connection of pipes to the manhole with brick and mortar on the inside and outside.

H. Future Laterals:

Where future laterals have been identified, provide the first length of pipe for future lateral sewers, properly laid to alignment and grade and plugged using a plug specifically designed for the size and material of the pipe. Plug the end of the pipe at the manhole. Extend the lateral up to the road right-of-way or property line and install a cleanout at the property line as shown in Appendix A.

I. Top Elevations:

Build manholes outside of paved area to 18 inches above ground unless otherwise shown on the plans or directed by the Authority. Build manholes in paved areas to existing grades.

J. Drop Connections:

Manholes requiring drop connections shall be shown on the drawings. Construct drop connection of the same materials as the upstream sewer and in accordance with the details shown in Appendix A.

K. PVC Connections:

Make all manhole connections to PVC pipe with the connector specified. Couplings shall be grouted into the manhole opening after jointing with the PVC pipe.

SECTION 2.14 - PUMPING STATIONS:

Pumping stations will be constructed only in locations approved by the Authority. Plans, design criteria and detailed description of the proposed installation and the equipment to be incorporated shall be submitted and written approval of the Authority obtained before any related construction is begun. Installations must meet the following minimum requirements:

A. Site Improvements:

The site shall be fenced with minimum 6-foot high chain link fencing with 16-foot double gate. Access to the site and the size of the fenced area shall permit access by maintenance vehicles. The area within the fence shall have a minimum 6-inch layer of crushed stone placed over a 10 mil sheet of polyethylene. All piping within the fenced area shall be DIP or copper.

B. The Contractor shall furnish and install one factory-built automatic pumping station. The station shall be complete with all needed equipment, factory installed in a fiberglass enclosure.

The principal items of equipment shall include two vertical close-coupled, motor-driven, vacuum primed, "Non-Clog" sewage pumps, valves, internal piping, central control panel with circuit breakers, motor starters and automatic pumping level controls, priming pumps and appurtenances, ventilator heater and all internal wiring.

The unit shall be as manufactured by Smith & Loveless of Lenexa, Kansas, or the Gorman-Rupp Company, Mansfield, Ohio, or approved equal.

C. Operating Conditions:

The pumping station shall be a duplex station designed for the following conditions:

<u>No. of</u> <u>Pumps</u>	<u>Capacity</u>	<u>Total Head</u>	<u>RPM</u>	<u>Min.</u> <u>HP</u>	<u>Voltage</u>

(Fill in the design conditions for the station)

All openings and passages shall be large enough to permit the passage of a sphere 3" in diameter and any trash or stringy material which can pass through a 4" house-collection system.

D. Pump Chamber:

The station shall be constructed in one complete factory-built assembly. It shall be sized to reason on the top of a standard 6' diameter manhole. The pump chamber shall have a low profile, as shown on the drawings and shall be of fiberglass construction. The floor plate shall be a minimum 3/8" thickness steel plate. The plate chamber shall have a suitable drip lip around the edge and shall have provisions for a weatherproof pin tumbler lock.

The cover shall have a latch mechanism to keep the cover open under any normal load. A cover plate, exterior to the pump chamber, complete with hasp and staple shall be provided integral with station base to provide access to the wet well. Adjustable ventilating louvers shall be provided on each end of the fiberglass cover which are capable of being closed during cold weather operation.

A stanchion with lifting arm shall be provided to lift each pump. The lifting arm shall have a hook over the center of the motor to support a hoist to facilitate easy removal of the motors, impellers and pumps from the station.

E. Welding:

All steel structural members shall be joined by electrical arc welding with welds of adequate section for the joint involved.

F. Protection Against Corrosion:

After welding, all inside and outside surfaces of the structure shall be blasted with steel grit to remove rust, mill scale and weld slag. All weld spatter and surface roughness shall be removed by grinding. Immediately following the cleaning, a single heavy inert coating shall be factory-applied to all inside and outside surfaces prior to shipment. This coating shall be of epoxy resin for abrasion and corrosion resistance. The dry coating shall contain a minimum of 85% epoxy resin with the balance being pigments and thixotropic agents.

A touch-up kit shall be provided for repair of any marks or scratches occurring during installation. The touch-up coating shall contain a minimum of 85% epoxy resin, which is compatible with the original coating.

G. Pumps:

The pumps shall be vertical, non-clog sewage pumps of heavy cast iron construction, especially designed for the use of mechanical seals and vacuum priming. In order to minimize seal wear caused by lineal movement of the shaft, the shaft bearing nearest the pump impeller shall be locked in place so that end play is limited to the clearance within the bearing. To minimize seal wear resulting from shaft deflection caused by the radial thrust of the pump, the shaft from the top of the impeller to the lower bearing supporting the impeller shall have a minimum diameter of 1 7/8" for motor frame sizes 213 through 286; 2 1/8" for motor frame sizes 324 and 326; and 3" for frame 364 and larger. The dimension from the lowest bearing to the top of the impeller shall not exceed 6".

The bearing nearest the impeller shall be designed for the combined thrust and radial load. The upper bearing shall be free to move linearly with the thermal expansion of the shaft and shall carry only radial loads.

The shaft shall be solid stainless steel through motor, pump and bottom bearing to eliminate corrosion within the pump or the mechanical seal. Removable shaft sleeves will not be acceptable if the shaft under the sleeve does not meet the specified minimum diameter.

The pump impellers shall be of the enclosed type made of cross-grained cast iron and

shall be balanced. The impeller shall be keyed with a stainless steel key and secured to the motor shaft by a stainless steel cap screw equipped with a Nylock or other suitable self-locking device. The impeller shall not be screwed or pinned to the motor pump shaft and shall be readily removable without the use of special tools. To prevent the buildup of stringy materials, grit and other foreign particles around the pump shaft, all impellers less than full diameter shall be trimmed inside the impeller shroud. The shroud shall remain full diameter so that close minimum clearance from shroud to volute is maintained. Both the end of the shaft and the bore of the impeller shall be tapered to permit easy removal of the impeller from the shaft.

The pump shall be so constructed so as to permit priming from the low pressure area behind the impeller. Priming from high pressure connections, tending to cause solids to enter and clog the priming system, will not be acceptable. The priming bowl shall be transparent to enable the operator to monitor the priming level.

The pump shall be arranged so that the rotating element can easily be removed from the volute without disconnecting the electrical wiring or disassembling the motor, impeller, backhead or seal, so that any foreign may be removed from the pump or suction line.

The pump shaft shall be sealed against leakage by a single mechanical seal constructed so as to be automatically drained and primed each time the pump is drained and primed. Water which lubricates the mechanical seal shall be automatically drained from around the seal if the pump loses prime, in order to allow both the pump and the seal to be drained, thereby preventing freezing and breakage of the seal during power outages in sub-freezing temperatures.

The seal shall be of carbon and ceramic materials with the mating surfaces lapped to a flatness tolerance of one light band. The rotating ceramic shall be held in mating position with the stationary carbon by a stainless steel spring.

The pump volute shall be furnished with mounting lugs and be bolted to the station floor plate, forming a gas-tight seal.

H. Motors:

The pump motors shall be vertical, solid shaft, NEMA P-base, squirrel-cage induction type, suitable for 3 phase, 60 cycle, 480-volt electric current. They shall have Class F insulation, suitable for temperatures up to 105 deg C. Insulation temperature shall, however, be maintained below 80 deg C. The motors shall have normal starting torque and low-starting current, as specified by NEMA Design B characteristics. They shall be open drip-proof design with forced air circulation by integral fan. Openings for ventilation shall be uniformly spaced around the motor frame. Leads shall be terminated in a cast connection box and shall be clearly identified.

The motors shall have 1.15 service factor. The service factor shall be reserved for the

Owner's protection. The motors shall not be overloaded beyond their nameplate rating, at the design condition, nor at any head in the operating range as specified under Operating Conditions.

The motor-pump shaft shall be centered, in relation to the motor base, within .005". The shaft runout shall not exceed .003".

The motor shaft shall equal or exceed the diameter specified under sewage pumps, at all points from immediately below the top bearing to the top of the impeller hub.

A bearing cap shall be provided to hold the bottom motor bearing in a fixed position. Bearing housings shall be provided with fitting for lubrication as well as purging old lubricant.

The motor shall be fitted with heavy lifting eyes, each capable of supporting the entire weight of the pump and motor.

I. Controls:

The control equipment shall be mounted in a NEMA Type 1 steel enclosure with a removable access cover. The circuit breakers, starter reset buttons, and control switches shall be operable without removing the access cover, for deadfront operation.

A grounding type convenience outlet shall be provided on the side of the cabinet for operation of 115 volt AC devices. This outlet shall be for the Owner's exclusive use. No manufacturer items shall be plugged into this outlet.

Thermal magnetic air circuit breakers shall be provided for branch disconnect service and short circuit protection of all motor control and auxiliary circuits.

Magnetic across-the-line starters with under-voltage release and overload coils for each phase shall be provided for each pump motor to give protection against single phasing. Each single phase auxiliary motor shall be equipped with an over-current protection device in addition to the branch circuit breaker, or shall be impedance protected. All switches shall be labeled and a coded wiring diagram shall be provided.

To control the operation of the pumps with variations of sewage level in the wet well, a minimum of four (4) mercury, displacement switches shall be provided, as a backup level control system. A minimum of 30' of cord shall be provided with each switch to eliminate the hazards created by splicing. The cord shall have a corrosion resistant vinyl jacket and be multi-stranded in order to prevent fatigue. The displacement switches will work as a backup system to the main liquid level control system.

The primary level control of liquid levels in pump station shall be by air bubbler system. To control the operation of the pumps with variations of liquid level in the wet well, an air bubbler system shall be provided, complete with two air compressors, flow indicator, bubbler line, a sensitive pressure switch for each pump, and a storage tank.

The two air compressors shall be of the close-coupled, oil-less type. Each compressor shall have a minimum capacity of 0.2 cubic feet of air per minute at 10 PSI. It shall

incorporate a single phase, 60 cycle, 115 volt, drip-proof brushless type, electric motor. A motor driven timer shall be provided to automatically alternate the compressors every five minutes. Wiring and piping of the air compressors shall be so arranged that one compressor may be removed without removing the other compressor from service.

The pressure switches shall be of the mercury-tube type, with sensitive pressure elements and independent high and low adjustments for each pump capable of a minimum differential of 18" of water.

A push-button operated air switch shall be provided for high pressure purge of wet well bubbler line. Full storage tank pressure shall be diverted from the system to the purge line when purge button is depressed to dislodge any residue build-up in the submerged bubbler line. The bubbler line within the wet well shall be stainless steel with provisions for a cleanout plug and a tee.

The eccentric plug throttling valve shall be provided with an adjustable mechanical stop so that the minimum flow rate can be set at the minimum pumping condition specified under operating conditions.

The entire automatic flow regulating system shall be designed and installed in such a manner as to permit the pump station to operate as a standard on-off pump station if any component in the automatic flow regulating system should become inoperative for any reason.

A separate and independent priming system shall be furnished for each sewage pump, providing complete standby operation. Each priming system shall include a separate vacuum pump. Vacuum pumps shall have corrosion resistant internal components. They shall each be capable of priming the sewage pump and suction piping in not greater than 60 seconds, underrated static suction lift conditions of 20' at mean sea level.

Each priming system shall be complete with vacuum pump, vacuum control solenoid valve, prime level sensing probe, and a float operated check valve installed in the system ahead of the vacuum pump to prevent liquid from entering the vacuum pump. The float-operated check valve shall have a transparent body for visual inspection of the liquid level and shall be automatically drained when the vacuum pump shuts off.

The priming system shall automatically provide positive lubrication of the mechanical seal each time the sewage pump is primed. To prevent excess stoppage due to grease accumulation, no passageway in the priming system through which sewage must pass shall be smaller than the equivalent of a 3" opening.

An automatic alternator with manual switch shall be provided to change the sequence of operation of the pumps every eight hours. The manual switch shall allow for either pump to be selected as base pump or for automatic alternation. Alternating the pumps at less than 8-hour intervals will not be acceptable.

Provisions shall also be made for the pumps to operate in parallel should the level in the wet well continue to rise above the starting level for the low level pump.

A separate and independent priming system shall be furnished for each sewage pump, providing complete standby operation. Each priming system shall include a separate vacuum pump. Vacuum pumps shall have corrosion resistant internal components. They shall each be capable of priming the sewage pump and suction pumping in not greater than 60 seconds, under rated static suction lift conditions of 20' at mean sea level.

Each priming system shall be complete with vacuum pump, vacuum control solenoid valve, prime level sensing probe, and a float operated check valve installed in the system ahead of the vacuum pump to prevent liquid from entering the vacuum pump. The float-operated check valve shall have a transparent body for visual inspection of the liquid level and shall be automatically drained when the vacuum pump shuts off.

The priming system shall automatically provide positive lubrication of the mechanical seal each time the sewage pump is primed. To prevent excess stoppage due to grease accumulation, no passageway in the priming system through which sewage must pass, shall be smaller than the equivalent of a 3" opening.

J. Environmental Equipment:

A ventilating blower shall be provided, capable of delivering 250 cfm at 0.1" static water pressure, in order to remove the heat generated by continuous motor operation. The ventilating blower shall be turned on and off automatically by a pre-set thermostat. The ventilating blower shall be rigidly mounted from the station floor. The discharge outlet shall have a thick resilient gasket which will match with a louvered opening in the fiberglass cover to seal the discharge to the cover when the cover is closed. An electric heater controlled by a pre-set thermostat shall be furnished. The heater shall be rigidly mounted in the station to prevent removal.

K. Sewage Piping:

The pump suction shall be drilled and tapped for a 125 pound American Standard flange for ready connection of the suction riser. The discharge line for each pump shall be fitted with a clapper-type check valve and eccentric plug valve. Size, location, and quantity of check valves and plug valves shall be as shown on the construction drawing.

The check valve shall be of the spring-loaded type with external lever arm and a replaceable resilient seat for added assurance against vacuum leaks. An operating wrench shall be provided for the plug valves. Protrusions through the floor plate shall be gas-tight where necessary to effect sealing between the equipment chamber and the wet well. Bolted and sealed joints shall be provided at the volutes or suction pipes in order to prevent corrosive, noxious fumes from entering the station. The lift station manufacturer shall extend the suction and discharge connections below the floor plate at the factory, so that field connections can be made without disturbing the gas-tight seals.

The manufacturer of the lift station shall provide a compression-type sleeve coupling for installation in the common discharge pipe.

L. Wiring:

The pump station shall be completely wired at the factory except for the power feeder lines. All wiring in the pump station shall be color coded as indicated on the wiring diagram. Wiring diagrams matching the unit wiring shall be provided. Lag-pump lock-outs to prevent simultaneous starting of both pumps under emergency generator operation shall be installed in the control panel. The emergency generator will not be required unless specified for this project.

M. Factory Tests:

All components of the pump station shall be given an operational test of all equipment at the factory to check for excessive vibration, for leaks in all piping or seals, for correct operation of the vacuum priming and control systems and all auxiliary equipment. Pumps shall take suction from a deep well, simulating actual service conditions.

N. Spare Parts:

The contractor shall furnish the following spare parts:

One (1) complete rotating assembly including motor, backhead, priming assembly and one (1) each clockwise and counter clockwise impeller trimmed to design conditions, and spare parts not to exceed \$2,000.00.

It will be the responsibility of the contractor at the time of construction to contact the Macon Water Authority through the Engineer to determine exactly what the Contractor will be required to supply at that time.

O. Non-Standard Equipment:

The lift station shall also be equipped with a High Water Alarm Sensor; three (3) Lapse Time Meters - One (1) non-resettable for each pump and one (1) meter wired for parallel pump operations; one intruder alarm sensor; one auxiliary blower for venting wetwell designed for continuous operation. Provide on/off switch inside station enclosure.

P. Installation and Operating Instructions: Instructions of the pump chamber shall be done in accordance with the written instructions provided by the manufacturer.
Five (5) sets of Operation and Maintenance Manuals shall be furnished which will include A parts list of components and complete service procedures and trouble shooting guide.
All odor control tanks and fuel tanks shall be protected by an additional catch basin in case of a spill.

Q. Experience and Workmanship:

The pump station shall be the product of a manufacturer with a minimum of five (5) years of experience in the design and building of such automatic, vacuum primed, factory-built sewage pumping stations and all workmanship and materials throughout shall be of the highest quality.

R. Guarantee:

The manufacturer of the lift station shall have a minimum of five (5) years experience in the design and manufacture of vacuum-priming type factory-built automatic pumping stations and shall guarantee the structure and all equipment to be free from defects in materials and workmanship for a period of up to one year from date of start-up.

(1) General:

The contractor is responsible for making all arrangements with the lift station manufacturer for the installation of required contracts for the telemetry system specified in this document as required by the Macon Water Authority. The existing telemetry system shall be transferred to the new pumping station by the Macon Water Authority.

(2) Alarm System:

The lift station manufacturer shall provide pressure switch, relay and contacts for the high water level alarm and intrusion alarm. The pressure switch assembly shall be mounted in the control panel and wired to a coded terminal strip.

S. Remote Terminal Unit (RTU)

(1) Remote Terminal Unit:

The Remote Terminal Unit (RTU) shall serve as an interface between control messages received from the Central Terminal Unit (CTU) and specific control points in the field. The RTU shall translate digital messages into contact closures for control of various devices and shall encode contact closures for transmission of device status to the CTU to confirm any control action taken.

The RTU shall initiate a control action only in response to a CTU oriented command. In addition, a confirming transmission shall be made to the CTU following each command response. RTU reset shall be automatic. An integral radio transmitter designed and manufactured by the RTU supplier shall be supplied. All connections except an antenna RF connector shall be integrated into the RTU wiring and the radio shall be of modular design. The RTU shall provide command, status, analog and accumulative data capability.

(2) System:

- (a) Master Location** - Town Creek WTP with repeaters at 790 Second Street, and sub-masters at Breezy Hill Pump Station, Forsyth Road Pump Station, Heath Road Elevated Tank, Airport North Tank, Bowden Elevated Tank and Poplar Street WWTP.
- (b)** Radio Path Survey is system manufacturer's responsibility.
- (c)** Manufacturer shall ensure that the instrumentation and control (I/C) system is an integral system and should be responsible for the correct operation of the entire system.
- (d)** The system manufacturer should be engaged in regular telemetry system work and shall be in business for a minimum of five (5) years at the time of supplying the system.
- (e) Following are the acceptable manufacturers:**
 - M/R Systems, Norcross, Georgia
 - Industrial Control Systems, Sandston, Virginia
 - Transdyn Controls, Norcross, Georgia
 - GE Automation Services, Pineville, North Carolina
- (f)** Equipment furnished and installed shall be from established manufacturers, with proven history of service and support.
- (g)** Electrical isolation shall be provided between the input systems and processor units. All wiring shall be protected against lightning and other surges.
- (h)** System manufacturer shall provide training courses on site. Length of training shall be for a day for about 10 students.
- (i)** Control panels enclosure can be wall mounted, free standing or walk-in as scheduled and shall be NEMA 12 for panels located indoors and NEMA 4X for outdoor locations.
- (j) Remote Terminal Unit (RTU) Panels:** Small size RTU panels designated as Type 3 enclosures shall accommodate a minimum of two analog and two discharge modicon momentum models. Shall be a minimum 24 inches high, 24 inches wide and 12 inches deep, NEMA (12) for indoor

applications and NEMA 4X for outdoor applications.

- (k) Programmable Logic Controllers (PLC) for RTU's:** The PLC will receive discrete and analog inputs and through the use of internal ladder logic program. Control output relay operation and perform data handling and telemetry functions. Each controller shall have 50 percent spare memory capacity and 10 percent instrumentation operation (I/O) capacity.

The PLC's shall be as manufactured by Modicon Momentum or approved equal.

The components of PLC's shall be from manufacturers who are manufacturing this type of equipment for a minimum of 5 years.

The PLC's shall be of a modular design with a plug-in processing unit, input/output assemblies, and plug-in peripherals. All parts shall have manufacturer's ID number.

The components of PLC shall be capable of continuous operation at temperatures 0 - 60 degrees centigrade and humidity levels 5 to 95 percent.

Electrical supply voltage to individual controllers shall be 115 vac + 10 percent, 48-63 HZ with adequate overload protection. A failure of one controller shall not disrupt operation of other controllers in the system. Reduced process adapters, communication adapters, input/output devices, program development software and program development PC shall be furnished along with the equipment.

(l) Radios:

Radios shall be by Microwave Data Systems Model 9810 or approved equal. Provide all spread spectrum radios with in-line diagnostics.

Refer to Addendum A for Instrumentation and Control, Surge protection, Control Devices, Loop Descriptions, Control Panels and Scada Hardware.

SECTION 2.15 - LAYING PIPE:

Lay the pipe to conform accurately to the alignment and grade approved by the Authority.

A. Handling:

Use suitable tools and equipment to handle and lay pipe. Prevent damage to the pipe. Examine all pipe for cracks and other defects as it is laid. Do not lay pipe or other

materials which are known to be defective.

If any pipe or other material is discovered to be defective or damaged after being laid, remove and replace it.

B. Sequence:

Excavate, lay the pipe, and backfill as closely together as possible. Do not leave unjointed pipe in the trench overnight. Backfill and compact the trench as soon as possible after laying and jointing is completed. The exposed end of installed pipe at the close of work each day and at all other times when work is not in progress must be capped with a sealed cap. If it is necessary to backfill over the end of an uncompleted pipe, close the end with a plug.

C. Placing and Jointing:

Clean pipe and fittings thoroughly before laying. Before making the joint, clean the sealing surfaces of dust, dirt, gravel and other foreign substances. Apply joint lubricant recommended by the pipe manufacturer.

Center the spigot end in the bell of the preceding pipe and shove home. Apply moderate force to ensure proper seating. Complete jointing no later than five minutes after application of the lubricant.

Immediately after jointing bring the pipe to final alignment and grade.

D. Pressure Piping:

Comply with the regulations for excavation, in addition to the following requirements:

- (1) Make all push-on and mechanical joints in accordance with the manufacturer's recommendations.
- (2) Take special precautions to prevent damage to the cement lining of ductile iron pipe.
- (3) Ensure that force mains are laid flat or to a positive grade. Pipe laid incorrectly at negative grade shall be removed and re-laid.
- (4) Minimum depth of cover for force mains shall be four feet unless shown otherwise on the Drawings and approved by the Authority. Within DOT right-of-way, install force mains at a depth four feet below the nearest pavement edge.

E. Buried Valves:

Resilient sealed gate valves are to be used for force mains and in lift stations. Valves are

to be equipped with appropriate end connections, glands, gaskets, bolts, valve box cover, valve operator extensions and all applicable hardware. Valves shall be furnished with a valve box. If cover exceeds two feet, provide an extension stem to within six inches of the surface.

Outside of structural concrete install all floor stands on an 18 inch square by 9 inch deep concrete pad to terminate the valve box and mount the floor stand.

F. House Connections:

Install wyes or tees in locations designated by the Authority for future connection of service line with proper grade and alignment to the property line. Service lines shall be plugged until put into service using plugs specifically designed for the size and type of pipe. The service lines shall include provisions for cleaning out the line in case of an obstruction. Detailed drawings are included in Appendix A (S - 4).

The location of stubout shall be clearly shown on the as-built drawings. A cleanout embedded in concrete shall be installed at the property line and shall be marked on the curb where a curb is installed.

SECTION 2.16 - CONCRETE COLLARS AND BLOCKING:

A. Concrete:

Concrete shall have a compressive strength of not less than 3000 psi, with not less than 5.5 bags of cement per cubic yard and a slump between 3 and 5 inches. For job mixed concrete, submit the concrete mix design for approval by the Authority. Mix and transport ready-mixed concrete in accordance with ASTM A 615, grade 40.

B. Blocking:

Block bends, tees, valves, and other points where hydraulic thrust may develop. Form and pour concrete blocking as shown on the Drawings and as directed by the Authority. Pour blocking against undisturbed earth. Increase dimensions when required by over-excavation. Retrained joints in lieu of blocking is acceptable.

C. Collars:

Provide concrete collars at all joints between dissimilar pipe materials, and for anti-flotation as required. Construct as shown on the detail drawings in Appendix A.

SECTION 2.17 - BACKFILLING:

Backfill carefully to restore the ground surface to its original condition. Dispose of surplus material.

A. Backfill:

Place initial backfill material carefully over the bedding material covering PVC in uniform 6 inch layers to a depth of at least 24 inches above the pipe bell. Compact each layer thoroughly with suitable hand tools. Do not disturb or damage the pipe. Backfill on both sides of the pipe simultaneously to prevent side pressures. Initial backfill material is earth material excavated from the trench which is clean and free of rock, organics, and other unsuitable material. If materials excavated from the trench are not suitable for use as initial backfill material obtain suitable materials elsewhere.

Backfill above, shall be compacted as follows:

- (1) In 6-inch layers, if using light power tamping equipment, such as a "Jumping jack",
- (2) Where required, detection tape shall be buried 4 to 10 inches beneath the ground surface directly over the top of the pipe. Should detection tape need to be installed deeper, the Contractor shall provide 3 inch wide tap. In no case shall detection tape be buried greater than 20 inches from the finished grade surface.

B. Settlement:

If trenches settle, re-fill and grade the surface to conform to the adjacent surfaces.

C. Backfill Under Roads:

Compact backfill underlying pavement and backfill under dirt and gravel roads to 98% of the maximum dry density as determined by the Standard Proctor Compaction Test (ASTM D 698).

- D.** For sewer laterals laid under the pavement area, compact backfill underlying pavement and backfill on dirt and gravel roads to 98% of the maximum dry density as determined by Standard Proctor Compaction Test (ASTM D 698).

E. Additional Materials:

Where final grades above the pre-existing grades are required to maintain minimum cover, additional fill material will be shown on the Drawings. Utilize excess material excavated from the trench if the material is suitable.

If excess excavated materials are not suitable, or if the quantity available is not sufficient, provide suitable additional fill material.

SECTION 2.18 - REMOVING AND REPLACING PAVEMENT:

A. Removing Pavement:

Remove existing pavement as necessary for installing the pipe line and appurtenances.

(1) Marking:

Before removing any pavement, mark the pavement neatly paralleling pipe lines and existing street lines. Space the marks the width of the trench.

(2) Breaking:

Break asphalt pavement along the marks using jack hammers or other suitable tools. Break concrete pavement along the marks by use of jack hammers or by scoring with a rotary saw and breaking below the score by the use of jack hammers or other suitable tools.

(3) Machine Pulling:

Do not pull pavement with machines until completely broken and separated from pavement to remain.

(4) Damage to Adjacent Pavement: Do not disturb or damage the adjacent pavement. If the adjacent pavement is disturbed or damaged, remove and replace the damaged pavement.

(5) Sidewalk:

Remove and replace sidewalks for their full width.

(6) Curbs:

Remove and replace any curb encountered.

B. Upon completion of backfilling and consolidation of the backfill, arrange to have the compaction tested by an independent testing laboratory approved by the Authority. After compaction testing has been satisfactorily completed, replace all pavements, sidewalks and curbs removed.

(1) Materials:

Place materials for pavement replacement to dimensions shown on the Drawings. Typical pavement replacement details are included in Appendix A.

(a) Graded Aggregate Sub-Base:

Furnish graded aggregate sub-base in two sizes of such gradation that when combined in approximately equal quantities, the resulting mixture is well graded from coarse to fine, meeting the gradation requirements of Section 816 of the State Highway Department of Georgia Standard Specifications.

(b) Black Base:

The base for all paved roadways shall conform to the requirements of the Georgia State Highway Department Specifications for the Black Base (Hot Mix). Use a Pug Mill Rotary Drum type mixer with minimum capacity of not less than 50 tons per hour for asphalt production. Apply and compact the base in two courses by asphalt spreader equipment of design and operation approved by the Authority. After compaction, the Black Base shall be smooth and true to established profiles and sections.

(c) Surface Course:

The surface course for all pavement, including paint or tack coat when required by the Authority, shall conform to the requirements of the Georgia State Highway Department Specifications for Asphaltic Concrete, Section 400, Type "E" (Modified Top). Produce surface course in an asphalt plant of the same type as noted above for Black Base. Apply and compact the surface course in a manner approved by the Authority. Immediately correct any high, low or defective areas by cutting out the course, replacing with fresh hot mix, and immediately compacting to conform and thoroughly bond to the surrounding area.

(d) Concrete:

Provide concrete and reinforcing for concrete pavement In accordance with the requirements of Georgia State Highway Department Specifications for Portland Concrete Pavement, Section 430.

(2) Supervision and Approval:

Pavement restoration shall meet the requirements of the regulatory agency responsible for the pavement. Obtain agency approval of pavement restorations before requesting final payment.

Obtain the Authority's approval of restoration of pavement not the responsibility of regulatory agency, such as private roads and drives.

Complete pavement restoration as soon as possible after backfilling.

(3) Replacement:

Prior to replacing pavement, make a final cut in concrete pavement 12 inches back from the edge of damaged pavement. Make the cut using a rotary saw. Replace all street and roadway pavement as shown on the Drawings. Replace driveways, sidewalks, and curbs with the same material and to the same dimensions as existing.

(4) Failure of Pavement:

Should any pavement restoration or repairs fail or settle during construction and warranty periods, promptly restore or repair defects.

SECTION 2.19 - BORING:

Furnish and install pipe casing and install the pipe line therein in accordance with the following specifications:

A. General:

Operate well points or drainage systems in the vicinity of casing construction to prevent the accumulation of flood water in the casing and to maintain the ground water table below the casing in invert. Directional bores will not be allowed, pipe and steel casing shall be jack and bored.

B. Boring:

Furnish all material and equipment and perform all labor required to install steel pipe casing at locations indicated on the drawings and as specified.

(1) Materials:

The steel casing pipe shall be Schedule 30 steel pipe manufactured from steel conforming to ASTM A 139, Grade B. Size and thickness shall be as follows:

UNDER RAILROADS

Pipe Dia. In.	Casing Dia. In.	Wall Thick In.
6	14	0.250
8	18	0.250
10	20	0.281
12	22	0.312
14	24	0.344
16	30	0.406
18	30	0.406
20	32	0.469
24	36	0.469
30	42	0.500

UNDER HIGHWAYS

Pipe Dia. In.	Casing Dia. In.	Wall Thick In.
6	12	0.250
8	16	0.250
10	16	0.250
12	18	0.250
14	22	0.250
16	24	0.250
18	30	0.312
20	30	0.312
24	36	0.375
30	42	0.375

- (2) **Installation of Casing:** Install the steel pipe casing by the dry boring method. Bore the hole and install the casing through the soil simultaneously by a cutting head on a continuous auger mounted inside the casing pipe. Fully weld lengths of casing pipe to the preceding section in accordance with the AWS recommended procedures. After the boring and installation of the casing is complete, install a cleaning plug on the rig and clean the casing. All piping inside (carrier pipe) steel casing shall be ductile iron pipe. The carrier pipe shall be supported at each joint and as recommended by manufacturer. Spacers as manufactured by Cascade or approved equivalent shall be used. **(In any and all applications, ductile iron pipe shall be used only at the direction of the Authority).**

In the event that rock is encountered during the installation of the pipe casing which, in the opinion of the Authority, cannot be removed through the casing then the Authority shall direct the Contractor/ Developer to complete the crossing by

installing a tunnel.

C. Installation of Pipe:

(1) Boring:

After installation of the casing is complete, install the pipe line by a method which has received prior approval of the Engineer.

Close the ends of the casing with 4 inch brick walls, plastered with Portland Cement mortar and waterproofed with asphaltic roofing cement.

D. Safety:

(1) Boring: Provide all necessary bracing, bulkheads, and shields to ensure complete safety to all traffic at all times during the work.

Perform the work in such a manner as to not permanently damage the roadbed or interfere with normal traffic over it. If in the opinion of the Engineer the installation is being conducted in an unsafe manner, the Contractor will be required to stop work and bulkhead the heading until suitable agreements are reached between the Contractor and the Engineer. The Owner will not be responsible and shall be saved harmless in the event of delays to the Contractor's work resulting from any cause whatsoever.

SECTION 2.20 - STREAM AND DITCH CROSSING:

At all points where banks of streams or drainage ditches are disturbed by excavation or where natural vegetation is removed, carefully compact backfill and place rip rap to prevent subsequent settlement and erosion.

This requirement applies equally to construction alongside a stream or drainage ditch as well as crossing stream or drainage ditch. Place rip rap a distance of not less than 10 feet upstream and 10 feet downstream from any disturbed area. Extend rip rap from 1 foot below streambed to top of bank. Place to conform with the natural slope of the stream bank. The pipe material for stream and ditch crossings shall be ductile iron pipe. A geotextile fabric shall be placed over the entire ditch and extend outward on either side a minimum of (10) ft. **(In any and all applications, ductile iron pipe shall be used only at the direction of the Authority).**

Use only one method, either (a) or (b), throughout the job.

A. Stone Rip Rap:

Use sound, tough, durable stones resistant to the action of air and water. Slabby or shaley pieces will not be acceptable. Specific gravity shall be 2.0 or higher.

Minimum weight of individual stones shall be 50 pounds. The maximum allowable dimension for an individual stone is 24 inches. The minimum allowable dimension for

an individual stone is 6 inches. At least 50% of the stones shall have a minimum dimension of 12 inches.

Embed stone rip rap by hand so as to form a compact layer at least 12 inches thick. Place rip rap in such a way that the smaller stones are not segregated but evenly distributed. Place chinking stones in the crevices between the larger stones so that a dense, well graded mass is produced.

B. Sand-Cement Bag Rip Rap:

Use cement sacks or burlap bags having a capacity of from 1 to 2 cubic feet. Do not use bags previously used for sugar or chemicals. Fill bags with a mixture of one part Portland Cement to five parts sand.

Embed bags by hand to form a compact layer at least 12 inches thick. Place with overlapping joints. The finished surface shall not deviate from that specified by more than 3 inches at any point.

SECTION 2.21 - CONCRETE PIERS:

Construct piers as shown on the Drawings and in accordance with the following requirements:

A. Material:

Concrete shall have a compressive strength of not less than 3000 psi, with not less than 5.5 bags of cement per cubic yard and a slump between 3 and 5 inches. For job mixed concrete, submit the concrete mix design for approval by the Engineer. Ready-mixed concrete shall be mixed and transported in accordance with ASTM C 94. Reinforcing steel shall conform to the requirements of ASTM A 615, grade 40.

B. Bearing:

(1) Earth:

Where excavation reveals undisturbed earth subsurface, construct piers with spread footing foundations as shown in the Appendix.

(2) Rock:

Where excavation reveals level or benched rock having a minimum safe bearing value of 20,000 psf, construct piers with a foundation bearing directly on rock. Drill a minimum of four holes into the rock under each pier and grout dowels into place to anchor the pier to the rock. Hole and dowel sizes shall be in accordance with the requirements of the table at the end of this section.

Grout holes from the bottom up using a group pump. Take extreme care to ensure that the entire hole is filled with grout prior to inserting the dowel.

C. Installation:

Employ experienced form work carpenters to construct forms.

Build formwork sufficiently strong to resist movement and distortion during pouring and to protect the pier from caving in or lateral movement.

Before placing concrete, dewater the bottom of the hole and clean out all mud, loose earth, and extraneous matter.

Pour concrete as soon as possible after the forms have been approved. Do not leave the excavation open for prolonged periods of time. Protect the excavation from surface water. Do not allow water to accumulate in the excavation or in surrounding areas.

Take all necessary precautions to protect the work and personnel on the site. Cover open holes when work is not in progress. Examine all surrounding excavations and embankments for possible hazards.

ANCHORAGE REQUIREMENTS FOR PIERS ON ROCK

Carrier Pipe Size	Grout Hole Diameter, Inches	Grout Hole Depth, Feet	Reinforcing Bar Dowel Size
8-24	2.5	8	5
27-36	4	8	6
42-48	4	8	6
54	4	8	6

D. Inspection Select and, with the approval of the Engineer, employ a consulting soil and foundation Engineer to perform the following:

- (1) Inspect the bearing material and evaluate its suitability.
- (2) Inspect pneumatically drilled grout holes where applicable.
- (3) Check dimensions and plumbness of forms to ensure conformity with Drawings and Specifications.
- (4) Evaluate material penetrated by excavation with regard to lateral stability and uplift resistance.
- (5) Recommend remedial measures should insufficient lateral stability or uplift resistance exist.

SECTION 2.22 - INSPECTION AND TESTING:

The Authority will televise and will inspect all projects to ensure compliance with these specifications. Unless other provisions have been specifically approved by the Authority, sewer lines and related facilities will be inspected and tested by the Authority before acceptance or tie-in to the Authority's system is permitted. All lines must be clean and all obstruction removed prior to requesting inspection and testing. When requested by the Authority, flush out lines and manholes before testing and inspection. The Authority will televise for construction or material defects, and will inspect all PVC sewers for excessive deflection. A fee for testing and any retesting will be charged by the Authority in accordance with the Sewer Inspection Policy. This fee can be established by contacting the Authority.

Procedure for Final Inspection:

- * During installation the Authority will visually inspect all sewers for construction or material defects
- * After installation and before acceptance, all sewer segments will be televised by closed circuit camera for construction or material defects and acceptable alignment.
- * All sewer segments will undergo low pressure air testing as per Section (b). All segments containing PVC pipe will be tested for excessive deflection.
- * Any re-testing will be charged by the Authority in accordance with the Sewer Inspection Policy. This fee can be established by contacting the Authority.
- * The Contractor shall perform all tests in the presence of a Macon Water Authority Inspector. Copy of such records will be given to the Engineer or the Owner.

A. Gravity Sewers:

Pipe lines shall be straight and show a uniform grade between manholes. Correct any discrepancies discovered during inspection.

- (1) Pipe joints for sewers 30 inches in diameter and larger shall be air tested individually. The joint tester assembly shall be placed over the joint and shall pressurize the joint area to 4 psi. The pressure shall not drop more than 2 psi in 10 seconds. The joint tester assembly shall be equal to Cherne Industries, Inc. and shall be provided by the Contractor.

(a) Lamping

Pipelines shall be straight and show a uniform grade between manholes. Evidence of straight and uniform grade will be determined by placing a closed circuit TV camera in the invert of the first manhole and in the second manhole a light source sufficient to illuminate the manhole. Acceptable alignment is indicated by a full circle (full moon) of light visible and centered in view from manhole one. Televising will be performed by the Authority for a fee according to current Authority policy.

(b) Low Pressure Air

All sewers less than (30) inch diameter shall be subject to low pressure air test as stated herein.

- (i)** Prior to air testing, the section of sewer between manholes shall be thoroughly cleaned and wetted. Immediately after cleaning or while the pipe is water soaked, the sewer shall be tested with low-pressure air. At the Contractor's option, sewers may be tested in lengths between manholes or in short sections (25 feet or less) using Air-Lock balls pulled through the Line from manhole to manhole. Air shall be slowly supplied to the plugged sewer section until internal air pressure reaches approximately 4.0 psi. After this pressure is reached, and the pressure allowed to stabilize (approximately two to five minutes), the pressure may be reduced to 3.5 psi before starting the test. If a 1.0 psi drop does not occur within the test time, then the line has passed the test. If the pressure drops more than 1.0 psi during the test time, the line is presumed to have failed the test, and the Contractor will be required to locate the failure, make necessary repairs, and retest the line. Minimum test time for various pipe sizes, in accordance with ASTM F 1417 is as follows:

Nominal Pipe Size (Inches)	T(time) Min/100 (Feet)	Nominal Pipe Size (Inches)	T(time) Min/100 Fee
8	1.2	27	4.2
10	1.5	30	4.8
12	1.8	33	5.4
15	2.1	36	6.0
18	2.4	39	6.6
21	3.0	42	7.3
24	3.6	48	8.6
		54	9.8

- (ii)** Required test equipment, including Air-Lock balls, braces, air hose, air source, timer, rotometer as applicable, cut-off valves, pressure reducing valve, 0-15 psi pressure gauge with gradations in 0.1 psi and accuracy of plus or minus 2 percent, shall be provided by the Contractor.
- (iii)** The Contractor shall perform all tests in presence of Macon Water Authority personnel. Copy of such records will be given to the Engineer or the Owner. Such records shall show date, line number and stations, operator, and such other pertinent information as required by the Engineer.

- (iv) The Contractor is cautioned to observe proper safety precautions in performance of the air testing. It is imperative that plugs be properly secured and that care be exercised in their removal. Every precaution shall be taken to avoid the possibility of over-pressurizing the sewer line.

B. PVC Deflection Test (Mandrel Test):

Test PVC gravity sewer for excessive deflection by passing a mandrel "pig" through the line with a diameter equal to 95 percent of the normal inside diameter of the pipe. Excavate and install properly any section of pipe not passing this test. Re-test until results are satisfactory. This test shall be performed within the first 10 days of installation and during final inspection, at the completion of this contract. (Refer to ASTM 2122)

- (1) Procedure for Conducting a Mandrel Test: Installed pipe shall be tested ensure that vertical deflections for plastic pipe do not exceed the maximum allowable deflection. Maximum allowable deflections shall be governed by the mandrel requirements stated herein and shall nominally be:
 - (a) 3 percent of the maximum average ID for PVC Composite Pipe.
 - (b) For all plastic pipe PVC Composite Pipe, the percentage listed of maximum average ID shall be as follows:

TABLE 2.21-1

Nominal Pipe Size		Percentage Deflection Allowed
Millimeters	Inches	
Up to and including 300 mm	Up to and including 12 in.	5.0
Over 300 –to and including 750 mm	Over 12 –to and including 30 in.	4.0
Over 750 –to and including 1500 mm	Over 30 –to and including 60 in.	3.0
Over 1500 –to and including 2250 mm	Over 60 –to and including 90 in.	2.5
Over 2250 –to and including 3000 mm	Over 90 –to and including 120 in.	2.0
Over 3000 mm	Over 120 in.	1.5

The maximum average ID shall be equal to the average OD per applicable ASTM Standard minus two minimum wall thicknesses per applicable ASTM Standards. Manufacturing and other tolerances shall not be considered for determining maximum allowable deflections.

Deflection tests shall be performed not sooner than 30 days after completion of Placement and densification of backfill. The pipe shall be cleaned and inspected for Offsets and obstructions prior to testing.

For all pipes 600 mm (24 inch) ID or smaller, a mandrel shall be pulled through the pipe by hand to ensure that maximum allowable deflections have not been exceeded. Prior to use, the mandrel shall be certified by the Engineer or by another entity approved by the Engineer. Use of an uncertified mandrel or a mandrel altered or modified after certification will invalidate the test. If the mandrel fails to pass, the pipe will be deemed to be overdeflected.

Unless otherwise permitted by the Engineer, any overdeflected pipe shall be uncovered and, if not damaged, reinstalled. Damaged pipe shall not be reinstalled, but shall be removed from the Work site. Any pipe subjected to any method or process other than removal, which attempts, even successfully, to reduce or cure any overdeflection, shall be uncovered removed from the Work site, and replaced with new pipe.

The mandrel shall:

- (1) Be a rigid, non-adjustable, odd-numbered leg (9 legs minimum) mandrel having an effective length not less than its nominal diameter
- (2) Have a minimum diameter at any point along the full length as follows:
- (3) Be fabricated of steel, be fitted with pulling rings at each end, be stamped or engraved on some segment other than a runner indicating the pipe material specification, nominal size, and mandrel OD (e.g., PVC D3034-200mm-187.10mm; PVC D3034-8"-7.366"; and be furnished in a suitable carrying case labeled with the same data as stamped or engraved on the mandrel.

Table 2.21-2

Pipe Material	Nominal Size		Minimum Mandrel Diameter
	MM	Inches	Inches
PVC-ASTM D 3034 (SDR 26)	150	6	5.33
	200	8	7.11
	250	10	8.87
	300	12	10.55
	375	15	12.90

C. Force Main Pressure and Leakage Test:

- (1) All sections of pipeline subject to internal pressure shall be pressure tested in accordance with AWWA C 600. A section of line will be considered ready for testing after completion of all thrust restraint and backfilling. Each segment of pipeline between line valves shall be tested individually.
- (2) **Test Preparation:**
 - (a) Flush pipeline section thoroughly at flow velocities adequate to remove

debris from pipe and valve seats. Partially operate valves and hydrants to clean out seats. Provide correctly sized temporary outlets in number adequate to achieve flushing velocities.

- (b) Provide temporary blocking, bulkheads, flanges and plugs as necessary to assure all new pipe, valves and appurtenances will be pressure tested.
- (c) Before applying test pressure, air shall be completely expelled from the pipeline and all appurtenances. Unless permanent air vents are in place, insert temporary corporation stops at highpoints to expel air as line is filled with water.
- (d) Fill pipeline slowly with water. Provide a suitable pump with an accurate water meter to pump the line to the specified pressure. Differential pressure at valves and hydrants shall equal the maximum possible, but shall not exceed manufacturer's pressure rating.

(3) Test Pressure:

Test the pipeline at 150 psi. The test pressure shall not vary by more than 5 psi for the test duration(2 hours). Should the pressure drop more than 5 psi at any time during the test period, the pressure shall be restored to the specified test pressure. Provide an accurate pressure gauge with gradation not less than 5 psi.

(4) Leakage:

- (a) Leakage shall be defined as the quantity of water that must be pumped into the test section equal to the sum of the water, to maintain pressure with 5 psi of the specified test pressure for the test duration plus water required to return line to test pressure at the end of the test. Leakage shall be the total cumulative amount measured on a water meter.
- (b) The Owner assumes no responsibility for leakage occurring through existing valves.

(5) Test Results:

No test section shall be accepted if the leakage exceeds the limits determined under Section 4 of AWWA C600. The leakage test shall be repeated until the test section is accepted. All visible leaks shall be repaired regardless of leakage test results.

(6) Completion:

After a pipeline section has been accepted, relieve test pressure. Record type, size and location of all outlets on record drawings.

D. Manholes:

Prior to testing manholes for a water-tightness all liftholes shall be plugged with a non-shrink grout, all joints between precast sections shall be properly sealed and all pipe openings shall be temporarily plugged and properly braced. Each manhole shall pass one of the following tests. The tests shall be performed after all the backfill and the road bed is in place.

(1) Vacuum Tests:

The manhole, after proper preparation as noted above. The test head shall be placed at the inside of the top of the cone section and the compression head inflated to 40 psi to effect a seal between the vacuum base and the manhole structure. Connect the vacuum pump to the outlet port with the valve open. A vacuum of 10 inches of mercury shall be measured for the vacuum to drop to 9 inches. The manhole shall pass if the time is greater than 60 seconds for 48 inch diameter manholes. If the manhole fails the initial test, necessary repairs shall be made and the manhole re-tested. Re-testing shall proceed until a satisfactory test is obtained. All the tests shall be witnessed by Macon Water Authority inspectors. The Macon Water Authority will not allow the usage of concrete sewer pipe. (Reference ASTM C1244 Standards - Test Method for concrete Sewer Vacuum Testing of Manholes).

(2) Exfiltration Tests:

This test applies to the pump station wet wells only. The manhole, after proper preparation as noted above, shall be filled with water. The maximum allowable leakage shall not exceed 8 gallons per foot of depth per 24 hours for 48-inch diameter manholes. Tests shall last a minimum of eight hours. The manholes may be backfilled prior to testing.

(3) Infiltration Tests:

Measurement shall be performed by the Macon Water Authority on any lines with a visible flow of water. In no case will an infiltration rate greater than 25 gallons per inch diameter of pipe per mile of sewer pipe per day be allowed. All visible or audible leaks must be dug up and repaired unless it is found to be in a joint and can be repaired by chemical grouting. All test procedures shall be in accordance with ASTM C-1091 (Infiltration testing) or ASTM C969.

SECTION 2.23 - PROTECTION AND RESTORATION OF WORK AREA:
(Section applies to water and wastewater design projects)

A. General:

Return all items and all areas disturbed, directly or indirectly, by work under these Specifications, to their original condition or better, as quickly as possible after work is started. Any bypassing of raw wastewater on to the ground or into a receiving stream is prohibited.

B. Man-Made Improvements:

Protect or remove and replace with the Authority's approval, all fences, piers, docks, walkways, mail boxes, pipe lines, drain culverts, power and telephone lines and cables and other improvements that may be encountered in the work.

C. Cultivated Growth:

Do not disturb cultivated trees or shrubbery outside the easement unless approved by the property owner. Any such trees or shrubbery which must be removed shall be heeled in and replanted under the direction of an experienced nurseryman.

D. Cutting of Trees:

Do not cut trees for the performance of the work outside the easement except as absolutely necessary. Protect trees that remain in the vicinity of the work from damage from equipment. Do not store spoil from excavation against the trunks. Remove excavated material stores over the root system of trees within 30 days to allow proper natural watering of the root system. Repair any damaged tree over 3 inches in diameter, not to be removed, under the direction of an experienced nurseryman. All trees and brush that require removal shall be promptly and completely removed by the Contractor. No stumps, wood piles or trash piles will be permitted on the work site or within the easement area unless specifically approved by the Authority.

E. Grassing:

Replant grass removed or damaged in residential areas using the same variety of grass and at the first appropriate season. Outside of residential areas, plant the entire area disturbed by the work in rye, fescue, bermuda, clover or other suitable ground cover on completion of work in any area. In all areas, promptly establish successful strands of grass. Grass areas will be considered acceptable when a viable stand of grass covers at least 98% of the total area with no bare spots exceeding one square foot and the ground surface is fully stabilized against erosion. (Georgia D.O.T. Section 700,890 Manual for Erosion and Sedimentation Control in Georgia).

(1) Description:

This section consists of the furnishing and sowing of grass seed and furnishing and applying mulch, water and fertilizer. Hydroseeding shall be employed where shown on the plans.

(2) Soil Analysis and Report:

The Contractor shall obtain from the Agricultural Extension Service a soil analysis and report. Analysis of fertilizer and application rates shall be as recommended by the County Extension Service Report and in accordance with this schedule:

FERTILIZER REQUIREMENTS				
TYPE OF SPECIES	YEAR	ANALYSIS OR EQUIVALENT N-P-K	RATE	N TOP DRESSING RATE
1. Cool season grasses	First	6-12-12	1,500 lbs/ac	50-100 lbs/ac ^{1,2}
2. Cool season grasses and legumes	First	6-12-12	1,500 lbs/ac	0-50 lbs/ac ¹
3. Ground covers	First	10-10-10	1,300 lbs/ac ³	-
4. Temporary cover crops seeded alone	First	10-10-10	500 lbs/ac	30 lbs/ac ⁴
5. Warm season grasses	First	6-12-12	1,500 lbs/ac	50-100 lbs/ac ^{2,5}

- 1 Apply in spring following seeding.
- 2 Apply in split applications when high rates are used
- 3 Apply in three (3) split applications
- 4 Apply to grass species only
- 5 Apply when plants grow to a height of 2 to 4 inches

(3) Areas to be Grassed:

The areas to be grassed shall be all disturbed areas not occupied by a structure, including but not limited to, the storage areas, easements highway right-of-ways, and designed areas. All disturbed areas will be stabilized as quickly as possible and in no case will ungrassed and unmulched areas be permitted more than 1,000 feet behind the pipe laying operation.

(4) Materials:

- (1) Site Operations and Materials:** The following materials and rates of application are suggested. The Contractor is solely responsible for the success of grassing.

(a) Commercial Fertilizer:

Shall be a slow release, complete fertilizer. The nitrogen content of which shall be derived from either organic or inorganic sources and meet the following minimum requirements of plant food by weight. Should the soil analysis and report indicate a need for a different fertilizer mixture, the recommended mixture shall be furnished and applied at the Contractor's expense. All State and Federal laws relating to fertilizer must be complied with.

(b) Ammonium Nitrate:

Shall be commercial product in dry powder form of recent manufacture and shall be delivered in the original unopened containers each bearing the manufacturer's guaranteed statement of analysis. It shall contain not less than 33.5% Nitrogen.

(c) Ground Limestone:

Shall be ground dolomitic limestone containing not less than 85 percent of total carbonates and shall be ground to a fineness such that more than 50 percent will pass through a 100-mesh sieve and 90 percent will pass through a 20-mesh sieve. Coarser material will be acceptable, provided the specified rates of application are increased proportionately on the basis of quantities passing the 100-mesh sieve.

(d) Seed:

Seed shall be delivered to the site in the original sacks, and each sack shall be tagged in accordance with the agricultural seed laws of the United States and the State of Georgia. Each sack shall be tagged showing the dealer's guarantee as to the year grown, percentage of purity, percentage of germination and the date of the test by which the percentages of purity and germination were determined. All seed sown shall have a date of test within six months of the date of sowing.

Any seed delivered prior to use, shall be stored in such a manner that it will be protected from damage by heat, moisture, rodents, or other cause.

Permanent seeding shall be in accordance with the following schedule:

SEEDS	LBS/ ACRE	DEPTH OF COVER	DATE OF PLANTING
BERMUDA GRASS-HULLED	10	¼" - ½"	3/15 - 5/31
BERMUDA GRASS-UNHULLED	10	¼" - ½"	10/1 - 2/28
BAHIA, PENSACOLA	60	¼" - ½"	3/1 - 6/15

(5) Execution:

(a) Hydroseeding:

Hydroseeding may be used on any area to be grassed. Under this method of seeding, the seed and fertilizer, at the specified rates, with Wood Fiber Mulch shall be distributed over the area to be seeded in the form of a slurry. Seeds of all sizes may be mixed together.

- (i)** Wood Fiber Mulch is required to be used as a metering agent and seedbed when hydroseeding is used. The application rate for Wood Fiber Mulch shall be approximately 500 pound per acre and is required regardless of which mulching method is chosen.
- (ii)** Ground preparations for hydroseeding shall be the same for conventional seeding.
- (iii)** Equipment for mixing and applying the slurry shall be especially designed for this purpose. It shall be capable of applying a uniform mixture over the entire area to be seeded. The slurry mixture shall be agitated during application to keep the ingredients thoroughly mixed. All materials shall be discharged within one hour after being combined in the hydroseeder. Hydroseeding shall not be performed when winds prevent an even, thorough application. The equipment manufacturer's discretions shall be closely observed unless modifications ion methods of application are ordered by the Engineer.
- (iv)** The entire hydroseeded area shall be mulched as specified below.

(b) Fertilizing and Liming:

Approximately two (2) days prior to start of grassing operations, apply ground limestone at a rate of ½ ton per acre. Either in conjunction with the above operation or immediately afterwards, apply the specified commercial fertilizer over all areas. The fertilizer shall consist of a minimum of 85 pounds of nitrogen per acre, 60 pounds of phosphorus per acre, and 80 pounds of potassium per acre or as recommended by the soil analysis. Spread fertilizer and work into the top 4" - 6" of ground using disc harrow.

(c) Water:

The Contractor shall be responsible for providing water to the newly planted grass. On site sources such as stream and groundwater may be available. Permission from governing jurisdictions must be obtained before withdrawing water. The Contractor shall be responsible for providing temporary above-ground irrigation equipment.

(d) Soil Preparation:

Before sowing grass, the existing soil shall be loosened to a minimum 12" depth by using "Knife Point Type Sub-Soiler Attachment" (maximum spacing of tines 8" on centers). Prepare the bed by thoroughly cultivating discing and hand raking, as necessary to produce a smooth even grade free of hollows or other inequalities. Areas sown must be smoothed to a point such that the usage of the Owner's maintenance equipment in the area does not cause abnormal wear or damage to the equipment and does not induce discomfort to the equipment operator. Smoothness shall be developed to the level acceptable to the Owner.

(e) Seeding:

Before any seed is sown, the area to be seeded shall be soil conditioned as required herein, and brought to a pleasing finished grade in conformance with the plans and as directed. In the event that prior conditioned soil has become compacted by rain, equipment or other sources, the entire area or compacted portions thereof shall be again conditioned as directed, in such a manner as to present a finely pulverized, smooth, even seed bed of not less than two inches (2") in depth at time of sowing.

After sowing the seed, the entire area shall be lightly raked or dragged, either by hand or mechanical equipment, to cover all seed in accordance with the table.

All areas within the seeding limits of this project, except paved, building and other areas designated, shall be seeded as herein

specified. Grass seed shall be sown evenly by hand or mechanical broad cast in two operations of equal amounts, and at right angles to each other.

No seeding shall be done when wind velocities exceed five miles per hour, or when poor results are being obtained due to adverse soil or weather conditions.

(f) Mulching:

All areas planted in grass seed shall be mulched within twenty-four (24) hours after seeding operations have been completed. Wheat straw mulch shall be uniform, loose (not matted) and a maximum depth of one (1) inch. Recommended application is two and a half (2 ½) tons per acre. Hay is not acceptable.

(g) Watering:

Soak soil bed to a minimum depth of 6" immediately after seeding. Do not wash away soil or seed. Keep all surfaces continuously moist thereafter until 30 calendar days after the area has been seeded.

(h) Maintenance and Protection:

(i) Maintenance of grass consist of watering, weeding, cutting, repair of any erosion and reseeding, as necessary to establish a uniform stand of the specified grass, and shall continue until acceptance.

(ii) All areas that do not show satisfactory growth within 15 days after sowing shall be re-sown and re-fertilized as directed until a satisfactory growth is established. Approximately 3 weeks after sowing the last seed, but not before the seed has taken hold and the grass is growing well, apply sulphate of ammonia or sodium nitrate at the rate of 300 pounds to the acre and immediately water in. A 12" by 12" grassed area shall be considered established when it is reasonably free from weeds, green in appearance and the specified grass is vigorous and growing well. It is not required that the area be as thick and heavy as an old established lawn, but the runners must be interlaced over the entire area. (At least 98% grass cover with no bare spots exceeding one square foot and the surface is fully stabilized against erosion).

(iii) Established coverage is required in 60 days.

(i) Protection:

All areas shall be protected until accepted. All eroded and damaged areas, regardless of cause, shall be immediately repaired and re-established.

(j) Final Review and Acceptance:

- (i)** As soon as the grassed areas have become established as required above, a final review of the areas will be made, provided a written request for such review is given to the Engineer or representative of the Owner. If the Work is found to be satisfactory and in accordance with all requirements of the contract documents, the Work will be accepted.
- (ii)** The Contractor may request review for acceptance 60 days after completing all seeding Work.
- (iii)** The Engineer may reject any areas of grassing in which any square foot of area is not covered by at least one runner of the type grass specified.

(k) Planting Times:

Planting is recommended between August 15 and October 15 or between May 1 and June 1, or during the season or seasons which are normal for such Work as determined by weather conditions and accepted practice in the locality.

A temporary vegetative cover shall be required if seasonal requirements for planting are not correct at the time grading operations are complete. Seeding shall be performed in the manner outlined in these specifications. Before permanent grassing is begun, the Contractor shall restore and prepare the ground surface as required by these specifications. Temporary grassing shall be at the Contractor's expense. Temporary seeding shall be as follows:

Temporary Seeding	LBS/Acre	Depth of Cover	Date of Planting
Annual Ryegrass	40	1/4" - 1/2"	8/15 - 3/31
Pearl Millet	50	1/4" - 1/2"	5/1 - 8/15

Grassing will be done as soon as practical after grading operation for utility installations and in no case will the grassing operation fall more than 1,000 feet behind the utility installation.

E. Sodding:

(1) **Scope** - Sodding shall consist of establishing certain critical areas with sod as designed on the Drawings.

(2) **Products:**

(a) **Sod:**

(i) Sod shall consist of a live, dense, well-rooted growth of turf grass species as noted on the Drawings. The sod shall be free from Johnson grass, nut grass and other obnoxious grasses and shall be of suitable character for the purpose intended and for the soil in which it is to be planted. It shall be un-injured at the time of planting.

(ii) Sod shall be uniform in thickness, having not over 2 inches or less than 1-inch of soil.

(iii) Sod strips shall have a consistent width of 12 or 18 inches.

(b) **Fertilizer:**

(i) Fertilizer (10-10-10) used in connection with sodding, shall contain 10 percent nitrogen, 10 percent phosphoric acid and 10 percent potash. The fertilizer shall be furnished in standard containers with the name, weight and guaranteed analysis of the contents clearly marked. The containers shall ensure proper protection in handling and transporting the fertilizer. All commercial fertilizer shall comply with local, state and federal fertilizer laws.

(ii) Ammonium nitrate shall be a standard commercial product, shall conform to the requirements for other commercial fertilizers as specified above, and shall have a minimum of 32 ½ percent nitrogen.

(iii) Lime - Agricultural limestone shall be dolomitic and contain not less than 85 percent of calcium carbonate and magnesium carbonate combined, and shall be crushed so that at least 85 percent will pass the No. 10 mesh sieve and 50 percent will pass a No 40 mesh screen.

(3) **Weather Limitations** - Sod shall be planted only when the soil is moist and favorable to growth. No planting shall be done between October 1 and April 1 unless weather and soil conditions are considered favorable and permission is granted by the Engineer.

(4) Execution:

(a) Sodding:

- (i)** The area to be sodded shall be constructed to the lines and grades indicated on the Drawings or as directed by the Engineer, and the surfaces loosened to a depth of not less than 3 inches with a rake or other device. If necessary, it shall be sprinkled until saturated at least 1 inch in depth, and kept moist until the sod is placed thereon. Immediately before placing the sod, the fertilizer shall be uniformly applied at the rate of 12 pounds of Grade 10-10-10, or equivalent, per 1,000 square feet. Agricultural limestone shall be applied at the rate of 50 pounds per 1,000 square feet.
- (ii)** The entire area shall be thoroughly covered with sod. The sod shall be placed on the prepared surface with the edges in close contact and, as far as possible, with staggered joints.
- (iii)** The sod shall be maintained moist from time of removal until reset but shall be placed as soon as practicable after removal from place where growing. Immediately after placing it shall be rolled with a lightweight roller or hand tamped to the satisfaction of the Engineer.
- (iv)** Sod on slopes steeper than 3 to 1 shall be held in place by wooden pins about 1 inch square and 6 inches long, driven through the sod into the soil until they are flush with the top of the sod.

(b) Watering and Maintenance:

- (i)** The sod shall be watered as directed by the Engineer for a period of two weeks after which ammonium nitrate shall be applied at the rate of three pounds per 1,000 square feet and the sod given a final watering.
- (ii)** The Contractor shall not allow any equipment or material to be placed on any planted area and shall erect suitable barricades and guards to prevent Contractor's equipment, labor or the public from traveling on or over any area planted with sod.

- (iii) It shall be the obligation of the Contractor to secure a satisfactory growth of grass before final acceptance of the project.

Tables 2.22-1A ~ Some Permanent Plant Species, Seeding Rates, and Planting Dates

Species	Rates per Acre	Rates per 1,000 sq. ft.	Planting Dates by Region			Remarks
			M-L	P	C	
Bahia, Pensacola Alone or with temporary cover With other perennials	60 lbs. 30 lbs.	1.4 lbs. 0.1 lb.	---	4/1-5/31	3/1-5/31	Low growing; sad producing; will spread into Bermuda lawns.
Bahia, Wilmington Alone or with temporary cover With other perennials	60 lbs. 30 lbs.	1.4 lbs. 0.1 lb.	3/15-5/31	3/1-5/31	---	Same as above.
Bermuda, Common (Hulled seed) Alone With other perennials	10 lbs. 6 lbs.	0.2 lb. 0.1 lb.	---	4/1-5/31	3/15-5/31	Quick cover; low growing; sad forming; needs full sun.
Bermuda, Common (Unhulled seed) With temporary cover With other perennials	10 lbs. 6 lbs.	0.2 lb. 0.1 lb.	---	10/15-2/28	11/1-1/31	Plant with Winter annuals. Plant with Tall Fescue
Bermuda Sprigs Common lawn and Forage hybrids	40 cu. ft. Sad plugs 3'x3'	0.9 cu. ft.	4/1 5-6/1 5	4/1-6/1 5	4/1-5/31	1 cu. ft. = 650 sprigs; 1 bu. = 1.25 cu. ft. or 800 sprigs

Table 2.22-1B ~ Some Permanent Plant Species, Seeding Rates, and Planting Dates (Continued)

Species	Rates per Acre	Rates per 1,000 sq. ft.	Planting Dates by Region			Remarks
			M-L	P	C	
Crown Vetch With winter annuals or cool season grasses	15 lbs.	0.3 lb.	9/1-10/15	9/1-10/15	--	Mix with 30 lbs. Tall Fescue or 15 lbs. Rye; inoculate seed; plant only North of Atlanta.
Fescue, Tall Alone With other perennials	50 lbs. 30 lbs.	1.1 lbs. 0.7 lb.	3/1-4/1 or 8/15-9/30	8/15-10/15 or 2/15-4/15	--	Mix with perennial Lespedezas or Crown Vetch; not for droughty soils or heavy use areas.
Lespedeza, Sericea Scarified	 60 lbs.	 1.4 lbs.	 4/1-5/31	 3/15-5/31	 3/1-5/15	Widely adapted and low maintenance; takes 2-3 years to establish; inoculate seed with EL inoculant.; mix with Weeping Lovegrass, Common Bermuda, Bahia or Tall Fescue.

Table 2.22-1C ~ Some Permanent Plant Species, Seeding Rates, and Planting Dates (Continued)

Species	Rates per Acre	Rates per 1,000 sq. ft.	Planting Dates by Region			Remarks
			M-L	P	C	
Lespedeza, Sericea (cont.) Unscarified	 75 lbs.	 1.7 lbs.	 9/1-2/28	 9/1-2/28	 9/1-2/28	Mix with Tall Fescue or winter annuals.
Seed-bearing hay	3 tons	138 lbs.	10/1-2/1	10/1-2/28	9/15-1/15	Cut when seed is mature but before it shatters. Add Tall Fescue or winter annuals.
Lespedeza, Ambro Virgata or Appalaw Scarified	 60 lbs.	 1.4 lbs.	 4/1-5/31	 3/15-5/31	 3/1-5/15	Spreading growth with height of 18"-24"; good in urban areas; slow to develop good stands; mix with Weeping Lovegrass, Common Bermuda, Bahia Tall Fescue or winter annuals; do not mix with Sericea Lespedeza; inoculate seed with EL inoculant.
Unscarified	75 lbs.	1.7 lbs.	9/1-2/28	9/1-2/28	9/1-2/28	

Table 2.22-1D ~ Some Permanent Plant Species, Seeding Rates, and Planting Dates (Continued)

Species	Rates per Acre	Rates per 1,000 sq. ft.	Planting Dates by Region			Remarks
			M-L	P	C	
Lespedeza, Shrub (Lespedeza Bicolor or Lespedeza Thumbergii) Plants	3'x3' spacing		11/1-3/31	11/1-3/1 5	11 /15-2/28	Plant in small clumps for wildlife food and cover.
Lovegrass, Weeping Alone With other perennials	4 lbs. 2 lbs.	0.10 lb. 0.05 lb.	4/1-5/31	3/15-5/31	3/1-5/31	Quick cover; drought tolerant; grows well with Sericea Lespedeza on road-banks and other steep slopes; short lived.
Maidencane sprigs	2'x3' spacing		2/1-3/31	2/1-3/31	2/1-3/31	For very wet sites such as riverbanks and shorelines. Dig sprigs locally.
Panicgrass, Atlantic Coastal	20 lbs.	0.5 lb.	---	3/1-4/30	3/1-4/30	Grows well on coastal sand dunes; mix with Sericea Lespedeza but not on sand dunes.
Reed Canary Grass Alone With other perennials	50 lbs. 30 lbs.	1.1 lbs. 0.7 lb.	8/1 5-1 0/1 5	9/1-10/15	---	Grows similar to Tall Fescue; for wet sites.

Table 2.22-1E ~ Some Permanent Plant Species, Seeding Rates, and Planting Dates (Continued)

Species	Rates per Acre	Rates per 1,000 sq. ft.	Planting Dates by Region			Remarks
			M-L	P	C	
Sunflower, Aztec Maximillian	10 lbs.	0.2 lb.	4/15-5/31	4/15-5/31	4/1-5/31	Mix with Weeping Lovegrass or other low growing grasses or legumes.
Switch grass	20 lbs.	0.4 lb.	4/1-5/31	4/1-5/31	4/1-5/31	For streambank plantings, drainage ditches, and wet areas.

1. Rates are for broad casted seed. If a seed drill is used, reduce the rates by one-half.

2. PLS is an abbreviation for Pure Live Seed.

Suggested Seedbed Depths

Slope	Seedbed Depth
3:1 or Flatter	Less than 4" Depth
2:1 to 3:1	1 " to 4" Depth
2: 1 or Steeper	Depressions every 6"-8" hand dug, if necessary

G. Erosion Control:

Plan excavation work to prevent erosion and the washing of soil into adjacent streams. Limit the amount of open excavation at any one time. Place spoil in the proper place and keep natural water routes open. Install appropriate erosion barriers or blankets as required to prevent sediment from leaving the immediate work site. All sewer line trenches will not be excavated more than 400 feet in advance of pipe laying.

(1) Submittals and Permits:

- (a)** The Contractor/Developer shall submit description, drawings and schedule for proposed temporary and permanent erosion and sedimentation controls to the MWA. The description and drawings shall meet the requirements of the Georgia Erosion and Sedimentation Act of 1975 as amended, and local soil and sedimentation control ordinances. The Contractor/Developer shall acquire Land Disturbance Permits from the appropriate authority and shall pay any fees for said permits. The Contractor/Developer shall be responsible for submitting to the appropriate authority sufficient documents such that the authority can acquire approval from the local Soil and Water Conservation District. All fines imposed for improper erosion and sedimentation control shall be paid by the Contractor/Developer. All erosion and sedimentation control measures and BMP' s must be in compliance with the Act of 1975.
- (b)** If applicable to project, the Contractor/Developer shall file a Notice of Intent (NOI) with the Environmental Protection Division to be covered under the General Permit for Stormwater Discharge Associated with Construction.
- (c)** Land disturbance activity shall not commence until the Land Disturbance Permit is issued. All erosion and sedimentation control measures will be installed in accordance with the Manual for Erosion and Sedimentation Control in Georgia, latest edition.
- (d)** All erosion and sedimentation controls must be installed prior to initiation of construction activity.

(2) Basic Principles:

- (a)** Conduct the earthwork and excavation activities in such a manner to fit the topography, soil type and condition.
- (b)** Minimize the disturbed area and the duration of exposure to erosion elements.

- (c) Stabilize disturbed areas immediately.
 - (d) Safety convey run-off from the site to an outlet such that erosion will not be increased off site.
 - (e) Retain sediment on site that was generated on site.
 - (f) Minimize encroachment upon watercourses.
 - (g) Clean-up and grassing operations shall be maintained within 1000 feet of the pipe laying operation and shall occur within seven days after the pipe has been installed.
- (3) **Temporary Erosion and Sedimentation Control:** In general, temporary erosion and sedimentation control procedures shall be directed toward:
- (a) Preventing soil erosion at the source
 - (b) Preventing silt and sediment from entering any waterway if soil erosion cannot be prevented.
 - (c) Preventing silt and sediment from migrating downstream in the event it cannot be prevented from entering the waterway.
- (4) **Permanent Erosion Control:**

Permanent erosion control measures shall be implemented to prevent sedimentation of the waterways and to prevent erosion of the Project site.

NOTE: Macon Water Authority policy states that for all projects budgeted by the Macon Water Authority, a consultant shall be hired to monitor the maintenance of erosion control and sedimentation controls on a 24 hour, every day basis. For private projects, the Macon Water Authority requires the contractor/owner to hire an individual to monitor the erosion and sedimentation controls on a 24 hour, every day basis.

H. Disposal of Rubbish:

Dispose of all material cleaned and grubbed during the construction of the project in accordance with the applicable codes and rules of the appropriate regulatory agencies, county, state and federal.

I. Excavated Area:

Any excavated area left open overnight shall be properly protected with flashing lights and barricades.

J. Rip Rap:

(1) Stone Rip Rap:

Use sounds, tough, durable stones resistant to the action of air and water. Slabby or shaley pieces will not be acceptable. Unless shown or specified otherwise, stone rip rap shall be Type 1.

(2) Type 1 Rip Rap: Rip rap size shall conform to Section 805.01 of the Georgia Department of Transportation Standard Specification for Type 1 Stone Dumped Rip Rap.

(3) Type 3 Rip Rap:

Rip rap size shall conform to Section 805.01 of the Georgia Department of Transportation Standard Specifications for Type 3 Stone Dumped Rip Rap.

K. Filter Fabric:

(1) Filter fabric shall conform to the Georgia Department of Transportation Standard Specifications, Section 881.06 for woven fabrics.

(2) Filter fabric shall be an approved product on the Georgia Department of Transportation Qualified Product List No 28, latest edition.

L. Silt Fences:

(1) Sediment Barriers:

A temporary structure constructed of silt fences, straw or hay bales, brush, logs, gravel or other filtering material. They are installed to prevent sediment from leaving the site or from entering natural drainage ways or storm drainage systems. They are not to be used on high-risk areas or where there will be a possibility of failure. A non-reinforced silt fence is installed for areas less than ¼ acre per 100 feet of fence. This applies only if the area is flat or has a slope of less than 2%. For specs greater than 2% refer to Table 1. Two heights of silt fences are available (36 in and 22 in). In order to determine which to use, the project duration, slope gradient, and slope length must be known. Approved silt fence fabrics are listed in the Georgia Department of Transportation List #36.

To install a silt fence properly, a 4 inch or 6 inch trench is due and 2 inches of the fence is folded vertically to the direction of the flow. All undercutting or erosion of the toe anchor trench must be repaired immediately with compacted backfill material. A silt fence is never to be placed in ditches, waterways, across streams, or other areas where concentrated flow is to be expected. In these areas, rock

checkdams, sediment traps or basins are to be used. Silt fencing is to be installed parallel to existing contours or constructed in level alignments. Ends of fencing must be extended 10 feet, traveling upslope at 45 degrees to the alignment of the main fencing section.

The fence is to be inspected after every rainfall and on a weekly basis. Any necessary repairs are to be made immediately. Any unaccumulated sediment is to be removed as required to keep the fence functional (removal of deposits where accumulation reaches 1/2 the above ground height of the fence for wire racked fence and 1/3 of the above ground height for standard fence). The contractor must maintain sediment barriers until the project is vegetated or accepted. Sediment barriers are to be replaced whenever damage has occurred or has deteriorated to such an extent that its effectiveness is greatly reduced.

SLOPE	MAXIMUM SLOPE LENGTH BEHIND FENCE IN FEET
<2	100
2 to 5	75
5 to 10	50
10 to 20	25
>20	15

M. Dust Control:

The Contractor is required to use all means necessary to control dust and other airborne particles on and/or near the work and all off-site borrow areas. The contractor shall thoroughly moisten all surfaces as required to prevent dust being a nuisance to the public, neighbors, and concurrent performance of work on the site.

ADDENDUM A

PUMP STATION INSTRUMENTATION,

PANELS, SURGE CONTROL, LOOP

DESCRIPTIONS, CONTROL DEVICES,

LOGIC CONTROLLERS, GROUNDING

TELEMETRY AND SCADA HARDWARE

PART I GENERAL

1.01 SCOPE

- A. Work provided under this Division includes final system design, furnishing all components, system configuration, system installation services, required support services and complete documentation for the Instrumentation and Control (I/C) system. This work shall include, but not be limited to, all materials, labor and tools required to fabricate, deliver, unload, handle, erect, adjust, calibrate, and test a complete and operable I/C system as indicated on the Drawings and Specifications. Install all panels and designated instrumentation devices and provide all electrical, mechanical and pneumatic interconnection between the various components and their local sources of supply.
- B. It is the intent of these Specification for the System Manufacturer to provide a complete and operational I/C system. Additional items of equipment, materials or labor not specifically called for by these Specifications, and which may reasonably be considered to make the system complete and operational, shall be supplied as part of this work.
- C. Conductors: Discrete signal conductors, twisted pair analog signal conductor terminations are provided under this Section. This shall include, but not be limited to, terminations for all control panels and field devices. Where it is necessary to extend existing wiring, provide any required junction boxes, wiring and conduit. Termination within junction boxes shall be made by using terminal blocks as specified in Section 17100.

1.02 SYSTEM DESCRIPTION

- A. The system consists of one remote site which shall be fitted with new telemetry hardware and polled from an existing master PLC located at the Macon Town Creek Water Plant. Existing operator interface graphics shall be updated at the Town Creek facility, Martin Luther King (MLK) Boulevard facility and Poplar Street WWTP facility.
- B. The existing telemetry system has the following master, repeater and submaster locations:
 - 1. Town Creek WTP (Master).
 - 2. 790 Second Street (Repeater).

3. Breezy Hill Pump Station (Submaster).
4. Forsyth Road Pump Station (Submaster)
5. Heath Road Elevated Tank (Submaster).
6. Airport North Tank (Submaster).
7. Bowden Elevated Tank (Submaster)
8. Poplar Street WWTP Lime Silo (Submaster).

- C. The System Manufacturer shall verify and guarantee all radio paths as a part of this project. Path verification shall include field signal strength verification by the System Manufacturer. The System Manufacturer shall confirm which radio paths are viable and shall inform the Engineer of any sites which may be accessed via radio.
- D. Prior to the bid, a site tour will be set up so that each of the prospective bidders may see what work is required at each site.

1.03

QUALITY ASSURANCE

- A. The System Manufacturer shall ensure that the I/C system is an integrated system, and the System Manufacturer shall provide all of the equipment and appurtenances – regardless of manufacture – and be responsible for correct operation of the entire system.
- B. The System Manufacturer shall be responsible for the detailed design and the proper functioning of the I/C system, programming and/or configuration of all digital hardware, preparation of required submittal data, including operations and maintenance manuals, tests, start-up including operational demonstrations, providing for installation and connection to equipment, and training of the Owner’s operating personnel.
- C. The System Manufacturer shall be regularly engaged in the type of work called for under these Specifications and must have capital facilities, personnel, plant and service capabilities required to successfully prosecute the work. The System Manufacturer shall have employed competent personnel experienced in the design, manufacturer, and programming of equipment and systems required.
- D. Acceptable Manufacturers

1. U. S. Filter Control Systems, Ames, Iowa

1.04

SUBMITTALS

- A. Make submittals in accordance with the requirements of Macon Water Authority's Shop Drawings, Product Data and Samples. Divide submittal into separate sections as listed below. Refer to related work sections for additional requirements.
- B. Field Devices: This volume includes primary elements, transmitters, etc. List all dimensions, enclosure types, ranges, and signal form or value. Provide data on special cables between sensing elements and electronics units and any special equipment used for calibration of a particular device.
- C. Control Panels: This volume includes dimensions, terminal block designations, front panel arrangement, bank panel layout, and ladder logic diagrams for both discrete component type control panels and sensor sampling panels. Provide cut sheets for all panel components, including PLC equipment, indicator ranges and nameplate schedule. All connections for new instruments terminating in the System Manufacturer's panels shall be clearly shown. Any miscellaneous equipment not clearly falling into one of the above volumes should not be included in the control panel section.

1.05

RECORD DRAWINGS

- A. Provide all information listed in Article 1.05 above, corrected to reflect the system as-built. Include also any instruction books, operation manuals, and other information pertaining to service and maintenance.
- B. Bind record drawings in three ring, hardback notebooks complete with tabs and index. Include manufacturers name, address, and telephone numbers to contact for service. For all major components, provide a recommended spare parts list.

1.06

ENVIRONMENT

- A. Local Control Panels: Local control panels shall be capable of operating between 32 degrees and 140 degrees F and 5 to 95 percent relative humidity without condensation. A 120 VAC (+ 10 percent) single phase three wire grounded power source will be supplied.
- B. Field Devices: Unless otherwise noted, field devices shall be housed in NEMA 4XD enclosures made of stainless steel, fiberglass or as noted in individual Specifications. Ambient temperature rating shall be suitable for the Project locale. All enclosures located out-of-doors shall be provided with adequate sunscreens.

1.07

WARRANTY AND EXTENDED MAINTENANCE

- A. System Acceptable: See Article 3.04.
- B. Warranty: One year from the date of acceptance of the system by the Owner. The date of system acceptance does not necessarily coincide with the date of substantial completion of the Project.

PART 2 PRODUCTS

2.01 EQUIPMENT

- A. Quality Standards: It is not the intention of these specifications to detail every component, accessory, signal conditioning device, etc that is required to provide a complete system. The System Manufacturer shall select these items from established manufacturers with a proven history of service and support.
- B. Electronic Equipment: All solid state, printed circuit boards and components shall be suitable for the specified environment. Provide complete circuit diagrams for troubleshooting and repair. All parts shall be replaceable with standard commercial components without degrading the performance of the complete assembly.

PART 3 EXECUTION

3.01 INSTALLATION

- A. The system, peripherals, and accessory equipment shall be installed in accordance with the manufacturer's instructions and located as discussed in the pre-bid conference unless otherwise approved by the the Engineer.
- B. All work shall be executed in full accordance with all applicable codes and local rulings. Should any work be performed contrary to said rulings, ordinances, or regulations, the System Manufacturer shall bear the full responsibility for such violations and assume all costs arising therefrom.

3.02 SYSTEM NOISE REJECTION

- A. Electrical isolation shall be provided between input systems and the processor units. Noise rejection for common mode shall be at least 1000 decibels (db), from 0 to 100 Hertz, and up to 175 volts. Normal voltage rejection shall be not less than 35 db at 60 Hertz.

- B. All instrument signal wiring, control wiring and AC power wiring shall be protected against lightning, spikes, and other transient surges at all field and control panel termination points. Lightning and surge protection shall protect the instrumentation and control system from induced surges in analog, discrete and control circuitry and power supply lines. The protective devices shall not interfere with the normal operation of the instrument and control system hardware and shall be designed not to have a maximum clamping voltage in excess of what the protected device is capable of withstanding. Grounding for all surge protection devices shall be per the vendor's recommendations. Protection devices for all analog and discrete control writing and digital data transmission lines which enter or exit buildings or which are located out-of-doors shall be at both ends of the wire and as close as possible to the item being protected. Protection devices for all instrumentation and control system power supplies shall be installed on individual 120 VAC supply wiring to control panels, cabinets and each field instrument. Field instruments and antennas shall be protected by individual surge suppressors.

3.03 **GROUNDING**

- A. Bond all instrument and control panel enclosures to the power system ground.
- B. Ground analog signal conductor shields at the control panel end only.

3.04 **TESTS AND ACCEPTANCE**

- A. The equipment and programs shall be factory tested prior to shipment for compliance with the conditions of this section, these specifications and for environmental conditions.
- B. After installation of the complete system, the System Manufacturer shall provide services of a qualified systems engineer to test the complete system under the observation of the Engineer to verify that all functions specified are performed without error malfunction. As a part of the tests procedure, Contractor's personnel, when requested of the System Manufacturer, shall cause each remote process to change state or value three times to verify all functions during the checkout period, as required. This shall be repeated until the system performs correctly to the satisfaction of the Owner.

3.05 **TRAINING**

- A. The System Manufacturer shall provide training courses for Owner's

personnel as follows. The courses shall be taught by professional, full-time instructors. All course materials as required to adequately support the material presented must be included. The Owner will bear the cost of student transportation and board.

1. Operator Familiarization

- a) Length: 1 day
- b) Number of Students: 10
- c) Location: Owner's plant site
- d) This course will be taught on-site to ensure the plant operating and maintenance personnel will be thoroughly familiar with the system as delivered.

END OF SECTION

PART I GENERAL

1.01 SCOPE

- A. In general, simple analog and discrete control logic and indication requirements are depicted on the Process and Instrumentation Diagrams (P & ID) supplied as part of this package. Where additional information is necessary, it is included in the descriptions that follow.
- B. The items described in Article 1.02 are loop descriptions for typical plant unit operations. It is intended that these descriptions, in conjunction with the P & I Diagrams, provide sufficient system configuration information for the majority of simple control systems. Where additional descriptions are necessary or where control logic deviates from these general descriptions, it is described in Article 1.04.

1.02 LOOP DESCRIPTIONS – GENERAL

- A. Equipment protection interlocks and safety interlocks (motor temperature and moisture switches emergency stops, low-low level shutdowns, etc.) shall be hardwired and shall not reside in the plant control system. Hardwired equipment protection interlocks and safety interlocks shall be functional at all times, regardless of operating mode (hand, auto, local, remote, etc.)
- B. All motor control logic in the plant control system shall include “command disagree” logic. The plant control system shall generate a “command disagree” alarm to alert the operator that a fault has occurred for any of the following conditions:
 - 1. If a motor is called to run by the control system and no run feedback is received by the plant control system within a preset, adjustable period of time. This shall only be applied to those motors that have run feedback to the plant control system.
 - 2. If a motor is running based on a manual command generated through the plant control system or based on an automated sequence in the plant control system,, and run feedback is lost by the plant control system for a preset, adjustable period of time. This shall only be applied to those motors which have run feedback to the plant control system.

3. If a motor is called to run based on a manual command generated through the plant control system or based on an automatic sequence in the plant control system, and the feedback from the “Hand/Off/Auto” or similar field mounted switch indicates that the unit is not in the “Automatic” mode. This shall only be applied to those motors which have “Unit in Auto” feedback to the plant control system.
- C. All analog inputs shall be monitored by the plant control system to identify “out of range” signals (less than 4 mA or more than 20 A). If the control system detects an “out of range” signal which continues for more than five minutes, an alarm signal shall be generated by the plant control system. The alarm shall identify the particular analog signal that is out of range.
- D. In general, all analog input scaling shall be performed in the operator interface software.

1.03

TYPICAL LOOP DESCRIPTIONS

A. Typical Motor Status Monitoring – Constant Speed Motors

1. Motor run (typically designated “XI” and annotated “Run”) and overload (typically designated “XA” and annotated “Over Load”) status will be indicated in the plant control system.
2. Where conditions other than motor overload are sensed in the MCC (e.g., motor temperature or moisture switch activated), the fault condition is combined with motor overload and the resulting fault (typically designated “XA” and designed “Fault”) status will be indicated in the control system.
3. Total unit run time (typically designated “KQI” and annotated (“Run Time”) will be provided for the motor in the plant control system.

B. Typical Motor Status Monitoring – Variable Speed Motors

1. Motor run (typically designated “XI” and annotated “Run) and combination VFD fault and motor overload (typically designated “XA” and annotated “Fault”) status will be indicated in the plant control system.
2. Where conditions other than VFD fault and motor overload are sensed in the MCC (e.g., motor temperature or moisture switch activated), the fault condition is combined with motor overload

and VFD fault and the resulting fault (typically designated “XA” and annotated “Fault”) status will be indicated in the control system.

3. Total unit run time (typically designated “KQI” and annotated “Run Time”) will be provided for the motor in the plant control system.

END OF SECTION

SECTION 17100
Control Panels

PART I GENERAL

1.01 SCOPES

Control panels

1.02 SUBMITTALS

- A. The Contractor shall furnish the following items from the System Manufacturer for approval prior to fabrication:
1. Layout drawings of the front of the panel showing mounting dimensions for all instruments and associated hardware.
 2. Assembly drawings shall include:
 - a) Details of panel fabrication including outline and locations of rear of panel mounted equipment
 - b) Wiring layout
 - c) Wiring and tubing interconnection diagrams
 3. Electrical wiring and termination drawings
 4. Complete bill of materials describing all panel components.

1.03 RECORD DRAWINGS

Submit shop drawings as listed under Article 1.02 above plus operation and maintenance information.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Wrap the completed panel in polyethylene plastic and crate in a wooden shipping crate with sufficient packing to avoid damage in shipment.
- B. Support the base of the shipping crate with the cross members of sufficient strength and clearance to allow movement of the entire crated panel by fork lift trucks.

PART 2 PRODUCTS

ENCLOSURE

- A. Provide wall mounted, free standing, or walk-in enclosures as scheduled.
- B. Provide NEMA 12 enclosures for control panels located indoors and NEMA 4X for outdoor locations unless otherwise noted. All NEMA 4X panels shall be 316 stainless steel. All outdoor panels shall be provided with sunscreens.
- C. In all NEMA 4X outdoor enclosures, provide a thermostat controlled space heater and corrosion inhibitor blocks. Provide NEMA 4 X rated devices or mount devices on interior panel and provide door mounted tempered glass or polycarbonate viewing window.
- D. Free-standing enclosures are a minimum of 24-inches deep.
- E. Steel enclosures shall be fabricated from a minimum 14 gauge steel with all seams ground smooth, all corners rounded and all flat surfaces smooth with no ripples, dimples, or surface imperfections and no screws, bolts, or nuts visible from outside. Thoroughly clean and degrease the steel shell before painting. Apply one coat of a rust inhibiting primer and two coats of air dry enamel or acrylic with flattening agent to produce a smooth semigloss finish. Colors are to be chosen by the Engineer.
- F. Install a continuous hinged front access door. For free-standing enclosure, furnish a three point latch. A single point latch is acceptable for wall-mounted enclosures. Wire door mounted instruments and controls to stationary components with suitable flexible connections and protection where wiring crosses the hinge. Provide double or multiple doors as required for stability and smooth mechanical operation.
- G. Terminate all tubing and electrical connections at the bottom of the panel to bulkhead fittings and terminal boards, with all external connections properly identified for field connections.
- H. Provide a circuit breaker rated 20 amps, single pole, 22,000 AIC, mounted in the rear of the panel to disconnect power. Mount an engraved nameplate (white letters, red background) to read "WARNING – This panel energized by foreign control power sources. Equipment will be live with panel disconnect in either on or off position."
- I. Internal panel sub-feeds of 120 VAC power shall be divided into

separate circuits protected by properly sized circuit breakers or fuses. As a minimum, the following separate circuit divisions shall be provided:

- 1) Panel light(s) and panel fans (where used) shall have a separate, suitably sized circuit breaker.
 - 2) Each receptacle shall be provided with a separate, suitably sized circuit breaker.
 - 3) Power to the panel UPS shall be provided with a separate, suitably sized circuit breaker.
 - 4) Where panels are provided with thermostatically controlled heaters, the heater power feed shall be provided with a separate, suitably sized circuit breaker.
 - 5) Each power supply, include 24 volt power supplies, power supplies for PLC's, power supplies for fiber optic transceivers, etc. shall be provided with separate, suitably sized fuses.
 - 6) Where panels provide 120 volt power to field mounted instruments, each instrument shall be provided with a separate suitably sized fuse.
- J. Provide a ¼ x 3 / 12 inch copper ground bus in the rear of the panel. Bond to the metal enclosure, power system ground, and control and signal circuit grounds.
- K. Provide a minimum 25 percent spare, continuous panel/subpanel mounting area to accommodate future panel expansion.
- L. The System Manufacturer shall investigate the spaces allocated for control panels at the telemetry sites and inform the Engineer of any potential problems.
- M. The System Manufacturer shall wire all furnished I/O to terminal blocks.

2.02

WIRING

- A. Install a minimum of #16 AWG copper stranded, 600 volt, extra flexible type for all control wiring 50 volts and above, and a minimum of #18 AWG twisted shielded pair for analog signal conductors. Color code wires as follows:
- 1) Ground: Green
 - 2) Neutral: White
 - 3) Line Conductor (150 volts or less to ground): Black
 - 4) Control (150 volts AC or less): Red
 - 5) Control (150 volts DC or less): Blue

- 6) Interlock control circuits supplied from external power source: Yellow or pink.
 - 7) Signal, Shielded and Special Cables: Identify with wire markers.
- B. Mark all wires with approved wire markers at all terminations. Clearly mark all terminal blocks with typewritten or ink markings. Label all devices mounted on the steel sub panel. Label all devices mounted on the panel front with engraved lamacoid nameplates, fastened with crews, of colors chosen by the Engineer.
- C. Neatly bundle and secure all wirings with plastic ties. Route back-panel wiring in slotted plastic wireways with snap-on covers.
- D. Terminal blocks shall be provided for all field wiring connections to the panel. This includes shield terminals for shielded cables. Terminal blocks may be mounted horizontally or vertically and shall be easily accessed from panel door(s). Terminal blocks shall be DIN rail mounted, screw clamp, feed through type with 600 volt minimum rating. A minimum of 20 percent extra terminals shall be provided on the terminal blocks. Each terminal shall be clearly and permanently marked. Provide fused terminal blocks for all 120 VAC discrete inputs and outputs. All terminal blocks shall be suitably sized for #12 AWG (minimum) stranded wire. All terminal blocks shall be grouped apart, depending upon type of signal per Paragraph E below.
- E. AC or DC power wiring shall not run in any raceway with any type of instrument wiring. Wiring is to be divided into categories and shall be carried in separate raceways. The minimum acceptable groupings are:
- 1) 120 VAC, 60 Hz AC power wiring and chart drive power wiring.
 - 2) DC power to electronic instruments (does not include loop powered instruments), contact closure input and output wiring.
 - 3) All wiring carrying pulsed information.
 - 4) Standard range analog DC signals, thermocouple and up to 200 mV DC signals.
- F. Provide separate dc power supplies for field transmitter power and for PLC module power.
- G. All PLC modules and associated devices shall be fused per manufacturer's recommendations. This shall include, but not be limited to, fusing for PLC power wiring and fusing for field I/O wiring.

- H. All control panels furnished under this Section shall carry a UL label which certifies the control panel meets the requirements of UL-508A (latest revision).

2.03

RTU PANELS

- A. Small sized RTU panels designated as Type 3 enclosures shall conform to the general requirements of IO.4 with the following comments/exceptions:
 - 1) The panel layout shall accommodate a minimum two analog and two discrete Modicon Momentum modules.
 - 2) Space does not need to be provided for a future bridge/mux unit.
 - 3) The minimum panel size shall be 24 inches high, 24 inches wide and 12 inches deep for NEMA 12 (indoor) applications. The minimum panel size shall be 24 inches high, 24 inches wide and 12 inches deep for NEMA 4X (outdoor) applications.

2.04

DRAWINGS

A. Panel Construction Drawings

- 1) Shop Drawings and Catalog Cuts: Provide detailed shop drawings and catalog cuts for all panels, instrument racks and enclosures. Drawings shall show the location of all front panel and internal sub-panel mounted devices to scale and shall include a panel legend and bill of material. Layout drawings shall show all major dimensions as well as elevations in inches from the base up, of all rows of components.
- 2) The panel legend shall list and identify all front of panel devices by their assigned tag numbers, all nameplate inscriptions, service legends, and annunciator inscriptions.
- 3) The bill of materials shall include all devices including those mounted within the panel that are not listed in the panel legend, and shall include the device tag number, description, manufacturer, and complete model number.

B. Panel Wiring Diagram

- 1) Wiring diagrams shall be similar to those diagrams shown on the Drawings, but with the addition of all auxiliary devices, such as additional relays, alarms, fuses, lights, surge protection, etc.
- 2) Provide complete terminal identification of all external primary elements, panels and junction boxes that interface directly to the panel wiring being shown. Polarity of analog signals shall be shown at each terminal.
- 3) All external wiring that the electrical contractor must provide and wire shall be shown as a dotted line. Special cables that are provided with the instrument shall be clearly identified.
- 4) Panel wiring diagrams shall identify wire numbers and types, terminal numbers, and tag numbers. Wiring diagrams shall show all circuits individually. No common diagrams will be allowed.
- 5) Provide panel power wiring diagrams for all panels. The diagrams shall include the grounding requirements.

C. Interconnecting Wiring Diagrams: Diagrams shall show all component and termination cabinet identification numbers and external wire, fiber and cable numbers. This diagram shall be coordinated with the electrical supplier and shall bear its mark that this has been done.

2.05 **PANEL SCHEDULE**

Panel No.	Mounting Type	Enclosure Rating	Light/Receptacle	Locations
RTU	Stand-Mounted	NEMA 4X	No/No	Pump Station SCADA

PART 3 EXECUTION

3.01 **TESTING AND CALIBRATION**

- A. Thoroughly shop test the complete panel. Confirm that all lamps burn. Remove, box and label all parts that may come loose or detached in shipment, so that after installation, they may be easily replaced.
- B. Perform preliminary calibrations in the fabricator's shop, and final calibrations at start-up by qualified personnel.

END OF SECTION

SECTION 17120

Surge Protection

PART 1 GENERAL

1.01 SCOPE

Comprehensive surge protection for all instrumentation devices supplied as part of these Specifications.

1.02 GENERAL

- A. It is the responsibility of the System Manufacturer to provide appropriate protection against transients and surge for all field instruments, field wiring, and devices interfacing with control panels. All instrument signal wiring, control wiring, telephone wiring and data transmission wiring which enters or exits buildings shall be protected against lightning spike, and other transient surges at all control panel termination points. All instrument signal wiring, control wiring, telephone wiring and data transmission which in outdoor control panels shall be protected against lightning spikes, and other transient surges at all control panel termination points. All AC control power wiring shall be protected against lightning spikes, and other transient surges at all control panel termination points. Lightning and surge devices shall protect the system from induced surges in analog, discrete and control circuitry and power supply lines. The protection devices shall not interfere with the normal operation of the panel hardware and shall be designed not to have a maximum clamping voltage in excess of what the protected device is capable of withstanding.
- B. All field instruments located indoors or out-of-doors provided by the System Manufacturer under this contract shall be supplied with surge protection for 120 VAC power to the instrument.
- C. Surge protectors shall include a combination of surge suppression technologies including metal oxide varistor, gas discharge tubes, diodes, and 3 AG size fuses for line-to-line and line-to-ground protection.

1.03 SUBMITTALS

Submit detailed product data.

PART 2 PRODUCTS

2.01 FIELD INSTRUMENTS – ANALOG SIGNALS

- A. Direct mounted surge protectors for analog signals shall screw directly into the unused conduit entry hub of the instrument. The surge protector housing shall be 304 stainless steel minimum. Surge protectors shall be specifically manufactured for protecting field instruments.
- B. Where direct mount is not possible, the surge protectors for analog signals shall be located as close to the field instrument as practical. The surge protector shall be rated NEMA 4X, or shall be mounted in a 304 stainless steel NEMA 4X enclosure.

2.02 **FIELD INSTRUMENTS – DISCRETE SIGNALS**

Surge protectors for discrete signals wiring shall be located as close to the field instrument as practical. The surge protector shall be NEMA 4X, or shall be mounted in a 304 stainless steel NEMA 4x enclosure.

2.03 **CONTROL PANELS**

- A. All instrument analog and discrete signal wiring, data transmission wiring and 120 VAC power supply wiring which enters or exits buildings or which terminates in outdoor control panels shall be individually protected against lightning spikes and other transient surges at all control panel termination points.
- B. Provide surge protectors for all power wiring to control panels whether located indoors or out-of-doors.
- C. Provide surge protection for all telephone connections.

2.04 **INSTRUMENT POWER WIRING**

Provide surge protectors for all power wiring to individual instrument devices whether located indoors or out-of-doors. For instrument devices, protection shall be located as close to the device as practical. The surge protector shall be NEMA 4X, or shall be mounted in a NEMA 4x enclosure. Outdoor enclosures shall be NEMA 4x, 316 stainless steel. Indoor enclosures shall be NEMA, 4X, fiberglass.

2.05 **ANTENNAS**

Provide RF surge protectors for all antennas.

2.06 **MISCELLANEOUS DIGITAL EQUIPMENT**

Provide surge protection for all computers, printers, uninterruptible

power supplies, digital equipment power supplies, PLC, fiber optic modems, telephone modems, digital signal converters and other miscellaneous digital hardware to include communications wiring and 120 VAC power supply wiring for each device.

2.07 ACCEPTABLE PRODUCTS

SURGE PROTECTOR ACCEPTABLE MODEL NUMBERS		
Field Instrument Analog Signals Directed Mounted	TP48	S-PT1-2PE-24VDC
Field Instrument Analog Signals Remote Mounted	SD Series	UFBK-M2-PE Series
Analog Signals Control Panel	SD Series	UFBK-MS-PE Series
120 VAC Power Control Panel	MA Series	UAK2-PE/S Series
Discrete Inputs/Outputs Control Panel	SD Series	UFBK-2/2 Series
RS-232	NP Series	MT Series, D-UFB Series
RS-485	NP Series	MT Series, D-UFB Series
Telephone Line	DP200 Series	TELETRAB-4X Series
Ethernet	NP Series	D-ETH Series
Antenna Cable	CA Series	COAXTRAB Series

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install all surge protection equipment in strict accordance with manufacturer's guidelines.
- B. For surge protectors located out-of-doors and for antenna surge protectors, surge protector grounding shall use individual ground rods located as close to the surge protector as possible. The grounding conductor shall be sized in accordance with manufacturer's recommendations and be routed via the shortest path possible. Bends in the grounding conductor shall be avoided. If bends in the grounding conductor are unavoidable then the number of bends shall be kept to an absolute minimum.
- C. Provide installation for all field mounted surge protection equipment. Provide for all wiring terminations for surge protection equipment.

- D. If a particular piece of equipment is protected by two surge protectors in series, ensure that the resulting equipment protection is not diminished.

END OF SECTION

**SECTION 17200
CONTROL DEVICES**

PART I GENERAL

1.01 SCOPE

General purpose control components

1.02 SUBMITTALS

Submit product data.

PART 2 PRODUCTS

2.01 GENERAL PURPOSE CONTROL COMPONENTS

- A. Manual Operators: 30.5 mm heavy duty, oil tight; industrial grade pushbuttons and selector switches with octagonal ring; contacts rated 10 amps continuous, 6 amps break at 120 VAC. Provide flush head for “start” pushbuttons, extended head for “stop” pushbuttons and spring return for “jog” selector switches.
- B. Pilot Lights: 30.5 mm, heavy duty, oil tight; industrial grade transformer type pilot light with octagonal ring; 6 volt LED lamp.
- C. Elapsed Time Indicators: Six-digit, hour, non-reset, 3 ½ inch square case; equal to Yokogawa Type 240.
- E. Acceptable Manufacturers (Manual Operators and Pilot Lights): Allen-Bradley, Cutler-Hammer, General Electric, or Square D.

2.02 RELAYS

- A. Relays which interface with motor controls shall be heavy duty industrial grade; 600 volt; contacts rated 10 amps continuous, 6 amps break (5 and 3 amps respectively for time delay forms); 120 VAC; convertible contacts; coils suitable for continuous duty. Relays shall be manufactured by Allen Bradley, General Electric, or Square D.
- B. Interposing relays for non-motor control applications shall be double pole (minimum) relay contacts, rated 10 amps (minimum) at 120 VAC. Coil duty shall be continuous, with coil voltage suitable for application. Open contact breakdown voltage shall be 500 volts rms (minimum) Provide with polycarbonate dust cover, DIN rail mount

socket and holddown spring. The unit shall have a minimum expected life of 100,000 operations at rated loads. Relays shall be equal to Potter & Brumfield, Type KAP or KUP.

2.03 LOOP INSTALLATION

- A. Type: Current-to-current loop isolator
- B. Input: 4-20 mADC.
- C. Output: 4-20 mADC.
- D. Accuracy: +0.1 percent span
- E. Schedule: As Required
- F. Acceptable Manufacturers: Action Instruments, Newport, Moore Industries

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 17250
Programmable Logic Controllers

PART I GENERAL

1.01 SCOPE

Programmable logic controllers (PLC) for the remote terminal units

1.02 SYSTEM DESCRIPTION

- A. This Sections covers the technical requirements for programmable logic controllers (PLC) which will receive discrete and analog inputs, and through the use of an internal ladder logic program, control output relay operations and perform data handling and telemetry functions.
- B. The capabilities of the individual PLCs shall be as required to perform the control functions associated with the particular control panel or system.
- C. The System Manufacturer shall determine the actual amount of memory and I/O requirements necessary for each control panel to function as specified or shown on the Drawings. Each controller shall have 50 percent spare memory capacity (not less than 1K) and 10 percent spare I/O capacity (not less than four discrete inputs and four discrete outputs, and not less than two analog inputs and two analog outputs).

1.03 SUBMITTALS

- A. For each individual equipment item using PLCs, the following shall be furnished in addition to documentation requirements in other Sections.
 - 1. Complete software documentation, including ladder logic diagram printout. Printout shall include, or shall have added to it, a complete set of comments identifying relays, function of logic blocks, I/O points, etc.
 - 2. Narrative description of the sequence of operation. Description shall reference, as applicable, the ladder diagram.
 - 3. Wiring diagrams showing terminal block designations and interconnections to remote devices.
- B. For the PLC system, documentation shall consist of descriptive literature and installation operation and instruction manuals.

- C. The above items shall be included in prints for approval and prints for record. In addition, record drawings shall include PLC manufacturer's recommended list of spare parts with prices, and availability/cost of maintenance contracts and similar support services available.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

PLC to be Modicon Momentum.

2.02 GENERAL REQUIREMENTS

- A. All components in the PLC system shall be the product of a company who regularly manufactures and services this type of equipment. Wherever possible, all assemblies and sub-assemblies performing similar functions in separate controllers purchased under this Section shall be interchangeable.
- B. Components: In compliance with normally recognized industry standards and regularly sold to heavy industry installations. All connecting cables shall be constructed so as to withstand, without damage, all normal use and handling.
- C. The PLC system shall be of a modular design with a plug-in processing unit, input/output frames or assemblies, and plug-in peripherals. All necessary cables shall be included.
- D. Mark all major assemblies, sub-assemblies, circuit cards, and devices with the manufacturer's part or identification number.
- E. All components of the PLC system shall be capable of continuous operation at temperatures of 0-60 degrees C, and humidity levels of 5-95 percent.
- F. Electrical supply voltage to the individual controllers shall be 115 VAC + 10 percent, 48 – 63 Hz. Controller system power supplies shall have circuit breakers or fuses for overload protection.
- G. Each controller, including output devices, shall orderly shut down and alarm in the event of a disruption of program execution or scan, a loss of logic power, loss of communication between controller essential devices, or a memory error. A failure of one controller shall not disrupt operation of other controllers in the system.

2.03

PROCESSOR ADAPTER (PLC)

- A. The Processor Adapter shall be a full-fledged PLC containing a CPU, RAM, and Flash Memory.
- B. The Processor Adapter shall contain a minimum of 256K of RAM, one RS-232 port and one I/O bus port.
- C. One Option Adapter is required for each Processor Adapter. The Option Adapter shall contain a Modbus (RS232/485) Option Adapter, TOD Clock and battery backup.
- D. The status of latch relays and one-shorts, and all data from timers, counters, and math functions shall be retained during any power outage as specified above.

2.04

COMMUNICATION ADAPTERS

- A. Where communications to additional I/O Module Buses is required, it shall be via Interbus (I/O bus) protocol. An Interbus Communication Adapter shall be used with the I/O Module Base.
- B. Where communications to radios, modems, programming PC's, etc. is required, it shall be via Modbus protocol.

2.05

INPUT/OUTPUT (I/O) DEVICES

A. Discrete Inputs/Outputs

- 1) Discrete inputs shall be available in 24 and 115 Vac/dc. Discrete outputs shall be available in 24 Vdc, and 115 Vac. Discrete inputs and outputs shall be 115 Vac unless otherwise noted.
- 2) Discrete inputs shall be guaranteed if at least 78 percent of nominal voltage is present. Discrete inputs shall be guaranteed off if 20 percent or less of the nominal voltage is present.
- 3) Each discrete output shall have an individual interposing relay. See Specification 17200 for interposing relays.

B. Analog Inputs/Outputs

- 1) Analog inputs shall be available in 16 channel single-ended input module. Analog outputs shall be available in 4 channel output 4-20 mA modules.

2) All analog input and output modules shall be isolated. Where isolated input modules are not available, provide individual loop isolators for each input.

- C. All PLC terminal blocks shall be 300 V minimum NEM rated, and accommodate no fewer than #15 gauge wires.
- D. Marker strips shall be attached adjacent to the field wiring and the status indicating lights to allow easy identification of inputs and outputs by the user. These markers shall not change when devices are replaced during repair or maintenance. Color code marker strips according to voltage.
- E. Field wiring shall not have to be disconnected from the terminal in order to replace an I/O device during repair or maintenance.

2.06 **PROGRAM DEVELOPMENT SOFTWARE**

- A. Provide a Windows based programming software which will run on an IBM compatible PC.
- B. The programming software shall be: Modicon (Concept).

2.07 **PROGRAM DEVELOPMENT PC**

A program development PC is not included in this project. An electronic copy of the program development software and the updated (as-built) software program shall be provided to the Owner within 10 days after the I & C System Acceptance Test is complete.

PART 3 EXECUTION

3.01 **INSTALLTION**

See Remote Terminal Unit Drawing for typical RTU panel layout.

END OF SECTION

SECTION 17300
Instrumentation Devices

PART 1 GENERAL

1.01 SCOPE

- A. Primary elements
- B. Transmitters
- C. Receivers

1.02 SYSTEM DESCRIPTION

- A. System consists of all field and panel mounted instrumentation devices as noted, complete with all necessary signal converters, isolators, amplifiers, power supplies, and other appurtenances necessary for interfacing with other components.
- B. Except as noted, scale all indicators in engineering units.

1.02 SUBMITTALS

Submit product data.

PART 2 ALARM HORN

- A. Type: Electro-mechanical diaphragm.
- B. Mounting: As required by schedule, provide cast aluminum neoprene-gasketed weatherproof housing for outside mounted units and gasketed panel mounting kit for panel-mounted units.
- C. Diaphragm Material: Stainless steel
- D. Grille Material: Die-cast aluminum
- E. Power: 120 VAC
- F. Sound Intensity: 100 Db at 10 feet

G. Schedule

Tag
XA-1024

Mounting
Panel

H. Acceptable Manufacturer: Federal Signal Corporation Model 27XST Series C

2.02 **ALARM LIGHT (STROBE TYPE)**

- A. Type: High-intensity strobe warning light
- B. Enclosure: Corrosion-resistant NEMA 4X, suitable for outdoor service. Unit shall be suitable for mounting in Class 1, Group D, Division 2 rated areas.
- C. Power: 120 VAC
- D. Dome Color: Red, blue, or amber, as required by schedule.
- E. Schedule:

Tag	Color
XL-1024	Yellow
AAH-1023A	Red

F. Acceptable Manufacturer: Federal Signal Corporation

PART 3 EXECUTION

3.01 **INSTRUMENT TAGGING**

Provide stainless steel identification tags attached with stainless steel wire or screws for all field instruments.

3.02 **TESTS AND CALIBRATION**

- A. Perform continuity and insulation resistance tests on instrumentation conductors in accordance with Section 17120.
- B. Field calibrate each instrument to its published accuracy. Submit calibration sheets, including the instrument tag number or name, the date, name of individual performing calibration, procedures and equipment used, and results obtained.

END OF SECTION

SECTION 17400
Telemetry and SCADA System Hardware

Part 1 GENERAL

1.01 SCOPE

Telemetry and SCADA hardware.

1.02 SYSTEM DESCRIPTION

- A. The telemetry system hardware consists of radio and telephone telemetry equipment, coaxial cabling, antennas, panels, surge suppression devices, wiring and conduit for housing telemetry equipment and other telemetry equipment required to make a complete and workable system.
- B. All computer hardware shall comply with the latest amendment to Part 15 of the FCC Rules and Regulations, Dockets No. 20780 and 80-284 relating to restricted radiation devices and low power communication devices.

1.03 SUBMITTALS

Submit product data.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. All digital hardware shall be modular construction to provide for future hardware expansion.
- B. All remote telemetry unit PLCs shall continuously perform on-line diagnostics and provide failure reporting to the master operator interface units. Software shall be provided which keeps track of communications statistics for all radio sites, including, but not limited to, communication tries and fails.

2.02 REDUNDANCY/FAIL-OVER REQUIREMENTS

- A. Where redundant equipment is specified, the failure of either device in a redundant pair shall not alter the performance of the plant

control system. The fail-over shall be fully automatic and shall require no action on the part of the operator to effect the transfer from one device to its back-up.

- B. Where a failed device contains real-time control system data, the swap-over to the redundant device shall be such that no more than 3 seconds of data shall be lost.
- C. Where the failed device contains control system intelligence such as graphics or programs, the redundant device shall have this intelligence internally resident and shall not require the downloading of graphics or programming to resume system control.
- D. No degradation in control system performance shall occur when a redundant device is operating in a fail-over mode. No degradation of performance shall occur while redundant equipment is undergoing preventive or corrective maintenance.

2.03 **REMOTE TERMINAL UNITS AND I/O SUBSTRUCTURE**

Remote terminal unit PLCs and I/O substructure shall be per Section 17250.

2.04 **TELEMETRY COMMUNICATIONS**

All telemetry communications shall be Modbus for both radio and telephone telemetry equipment communicating with the master polling PLC.

2.05 **UNINTERRUPTIBLE POWER SUPPLIES**

- A. Provide uninterruptible power supply for each RTU panel containing control system processors, I/O racks or modems. Operator interface units shall have a minimum of one UPS unit for each master operator interface unit and one UPS for the 'slave' station. Each UPS unit shall be sized to provide nominal power requirements for a minimum of 15 minutes. The following devices, as a minimum, shall be provided with UPS based power:
 - 1) Modems for all forms of telemetry and digital LAN communications
 - 2) Loop powered analog devices
 - 3) Power supplies for control system processors and I/O hardware
- B. Acceptable Manufacturer: Best Power Systems

2.06

RADIOS

Radios shall be by Microwave Data Systems, Model 9810. Provide all spread spectrum radios with on-line diagnostics.

2.07

OPERATOR INTERFACE TERMINALS – TYPE 1 RTU PANELS

- A. The System Manufacturer shall provide one Operator Interface Terminal (OIT) in each Type 1 control panel. The OIT shall communicate directly with the associated PLC located in the control panel and shall be used by the operator to make adjustments to PLC software settings and to acknowledge the intrusion alarm.
- B. The OIT shall contain a fully configurable graphics touch screen display. The touch screen shall be configured with a security system login page requiring a correct operator login to proceed. The operator shall log in by selecting his/her name and entering a 4-digit personal identification number. The login page shall be configured for up to 15 operators. A correct login shall automatically acknowledge the intrusion alarm and bring up the system overview page. In addition, the central SCADA terminal at the Town Creek facility shall indicate the individual who has logged on at the remote station.
- C. Operator adjustments shall consist of changing the setpoints for analog switches. This page shall consist of appropriate graphic showing current analog signal status and current analog switch setpoints.
- D. A logout option shall be provided for operator use. The operator shall be able to logout at any time. Logging out shall return the OIT display to the security system login page. The OIT shall also be configured to automatically logout after 10 minutes of idle time. The system shall also be configured to allow the logging out of an operator from the central SCADA terminal at the Town Creek facility.
- E. The OIT shall communicate to the PLC using the PLC manufacturer's standard PLC communications protocol (Mobile Plus, Data Highway Plus, GE Genius, etc.).
- F. The OIT shall be provided with Windows compatible programming software, downloading cable, and 24 VDC power supply.
- G. The OIT shall be mounted on the door of the control panel approximately 5 feet above the floor.

- H. The OIT shall be a 5" LCD monochrome type, 240 x 320 pixel resolution, black and white, NEMA 4/13. The manufacturer shall be Total Control Products (5" Quick Panel Jr).

2.08 **INTRUSION ALARM (TYPE 2 AND TYPE 3 RUT PANELS)**

Provide a small, momentary switch on the exterior of all Type 2 and Type 3 control panels. This switch shall be located in a nondescript location on the bottom of the panel, and shall be wired into the panel PLC. Once an intrusion is detected, if this switch is not activated in a preset, adjustable length of time (initial setting – 2 minutes), an intrusion alarm shall be activated at the central SCADA terminal at the Town Creek facility.

2.09 **MISCELLANEOUS TELEMETRY COMPONENTS**

Provide antennas, coaxial cabling and other miscellaneous components per the Specifications/cut-sheets provided in Section F of the attached Bristol Babcock report.

2.10 **RTU SECURITY**

All outdoor RTU's shall be lockable using padlocks provided by the Owner.

2.11 **ANTENNA GROUNDING**

- A. Provide grounding kits for each site which requires an antenna. Provide grounding kit for each site equal to Andrew Model 204989-2.
- B. Provide grounding for each antenna and antenna surge arrestor at each site which requires an antenna.
- C. Provide ground rods at each site per the following specifications:
 - a. Bare Conductors: ASTM B-8; stranded; hard drawn copper. Size unless otherwise noted is #4/0 AWG.
 - b. Ground Rods: UL 425H; 5/8 inch x 8 feet; high strength steel core with metallically bonded copper jacket.
- D. Observe the following installation requirements:
 - a. Use insulated ground conductors only where installed in a raceway. Use bare conductors for the ground rod

connections. Where a conductor is installed in a raceway use only non-metallic raceways. Provide UL approved connections to ground rods.

- b. Drive ground rods so the top is 3 to 6 inches below finished grade. If rock is encountered then rods may be driven at an angle or grounding plates, as approved by the Engineer, may be used.
- c. Provide at least one driven ground rod per site. The System Manufacturer shall test each site and provide a list of sites to the engineer which have resistance to ground measurements of more than 10 ohms. Make resistance to ground measurements in normal, dry weather conditions not less than 24 hours after rainfall. Make measurements using the fall of potential method per IEEE Standard No. 142.
- d. It shall be the contractor's responsibility to provide as part of SCADA system hardware, the appropriate tower (height, type) for the SCADA antenna.

END OF SECTION

SECTION 17500
Grounding

PART I GENERAL

1.01 SCOPE

- A. Power system grounding.
- B. Electrical equipment and raceway grounding and bonding.

1.02 SYSTEM DESCRIPTION

- A. The system consists of ground clusters for supplemental electrodes, and connections thereto of structures, equipment and electrical systems.
- B. Within this Section the following definitions apply:
 - 1) Ground Cluster: An assembly of three or more driven ground rods; spaced not closer than eight feet apart; each rod connected to the others in a closed delta configuration; and providing a resistance to ground of not more than 10 ohms.
 - 2) Connect or Bond: For underground or otherwise inaccessible locations – a permanent connection made by exothermic welding, brazing, or similar process. For exposed and accessible locations – a connection made with clamps, bolts or similar fittings approved for the purpose.

1.03 SUBMITTALS

Submit product data.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Bare Conductors: ASTM B-8; stranded; hard drawn copper. Size unless otherwise noted is #4/0 AWG.
- B. Ground Rods: UL 425H; 5/8 inch x 8 feet; high strength steel core with metallically bonded copper jacket.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Except as noted, use insulated ground conductors only where installed in a raceway. Use bare conductors for ground rod connections, and bonding of structures etc. Where a bare conductor is installed in a raceway use only non-metallic raceway; do not install bare conductors in metallic raceway.
- B. Drive ground rods so the top is 3 to 6-inches below finished grade. If rock is encountered then rods may be driven at an angle or grounding plates, as approved by the Engineer, may be used.
- C. Construct ground clusters as follows: Start with three driven ground rods and measure the resistance to ground of each rod. If the parallel combination exceeds 10 ohms then add sections and drive the rods deeper, or drive additional rods until the specified value is obtained. Connect each rod to every other rod in the cluster. Exception: not more than three additional rods of sections (six total) are required for any one cluster.
- D. Where bare conductors emerge from concrete encasement, provide a 4-inch length of Schedule 40 PVC conduit set in the concrete to protect the conductor.

3.02 SERVICE ENTRANCE EQUIPMENT

- A. Bond service entrance equipment ground bus to a ground cluster with a I/O conductor, unless otherwise noted.
- B. Provide one ground cluster at the closest practical location to the service entrance equipment and bond to ground bus with a I/O conductor, unless otherwise noted.
- C. Prior to energizing the system, remove the neutral link and meggar the system neutral. Repair any grounds then replace the neutral link.

3.03 SEPARATELY DERIVED SYSTEMS

- A. Ground enclosures where solidly grounded systems are indicated, the secondary neutral to a ground cluster.

3.04

FIELD QUALITY CONTROL

- A. Inspect grounding and bonding system conductors for tightness and proper installation.
- B. Compile and submit a list of ground resistance measurements for each ground rod in ground clusters. Measure and submit resistance to ground of service equipment ground bus.
- C. Make resistance to ground measurements in normal, dry weather conditions not less than 24 hours after rainfall. Make measurements using the fall of potential method per IEEE Standard No. 142.

END OF SECTION

APPROVED
STATE OF GEORGIA
ENVIRONMENTAL PROTECTION DIVISION
MAR 25 2022
DRINKING WATER PROGRAM
ENGINEER SIG. *[Signature]*
VALID ONLY FOR DRINKING WATER PORTION OF PROJECT

Standards for Design and Construction Specifications For Water and Wastewater

ACRONYMS

Abbreviation

Meaning

ACIPCO	American Cast Iron Pipe Company And Transportation Officials
ANSI	American National Standards Institute
ASSE	American Society of Sanitary Engineers
ASSHTO	American Association of State Highway
ASTM	American Society for Testing & Materials
AWS	American Welding Society
AWWA	American Water Works Association
CF	Cubic Feet
CFM	Cubic Feet Per Minute
CTU	Central Terminal Unit
DDC	Double Detector Check Valve
DIA	Diameter
DIP	Ductile Iron Pipe
DOT	Department of Transportation
FH	Fire Hydrant
FM	Force Main
GV	Gate Valve
HP	Horse Power
HZ	Hertz
I/C	Integrated Circuit
I/O	Instrumentation Operation
IN	Inch
MG/L	Milligrams Per Liter
MJ	Mechanical Joint
MWA	Macon Water Authority
NEMA	National Electrical Manufacturers Assn.
OHSA	Occupational Safety and Health Administration
PLC	Programmable Logic Controller
PSI	Pounds per Square Inch
PVC	Polyvinyl Chloride
RJP	Restrained Joint Pipe

RPM	Rotation per Minute
RPZ	Reduced Pressure Zone
RTU	Remote Terminal Unit
SDR	Standard Thermoplastic Pipe Dimension Ratio
TS & V	Tapping Sleeve and Valve
UL	Underwriters Laboratory
USCFCC	University of Southern California
USCS	Unified Soil Classification System
USF	U S Foundry
USS	U S Steel
VAC	Vacuum
VB	Valve Box
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant

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SEWER UTILITY DETAILS:

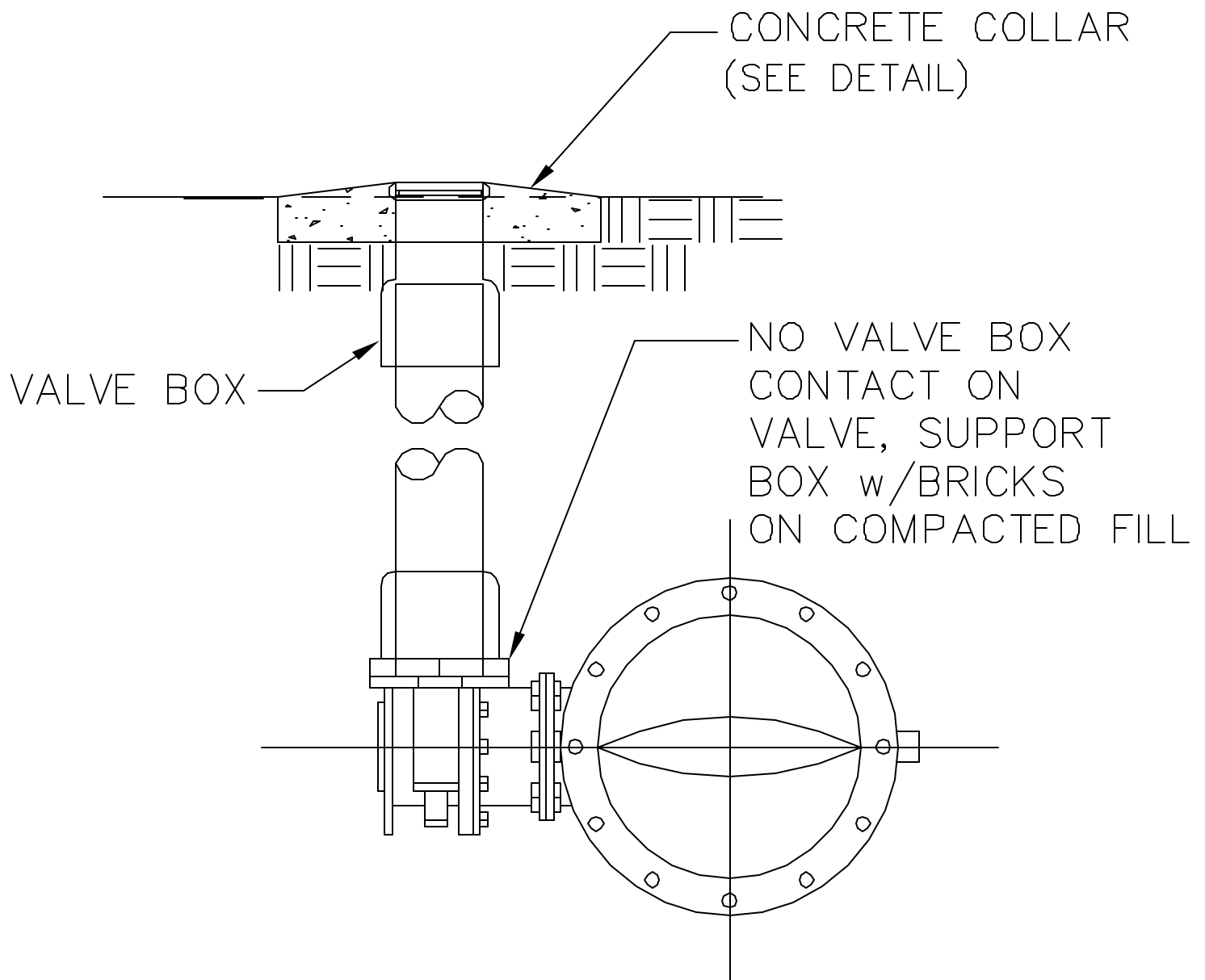
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OPEN TRENCH DETAILS:

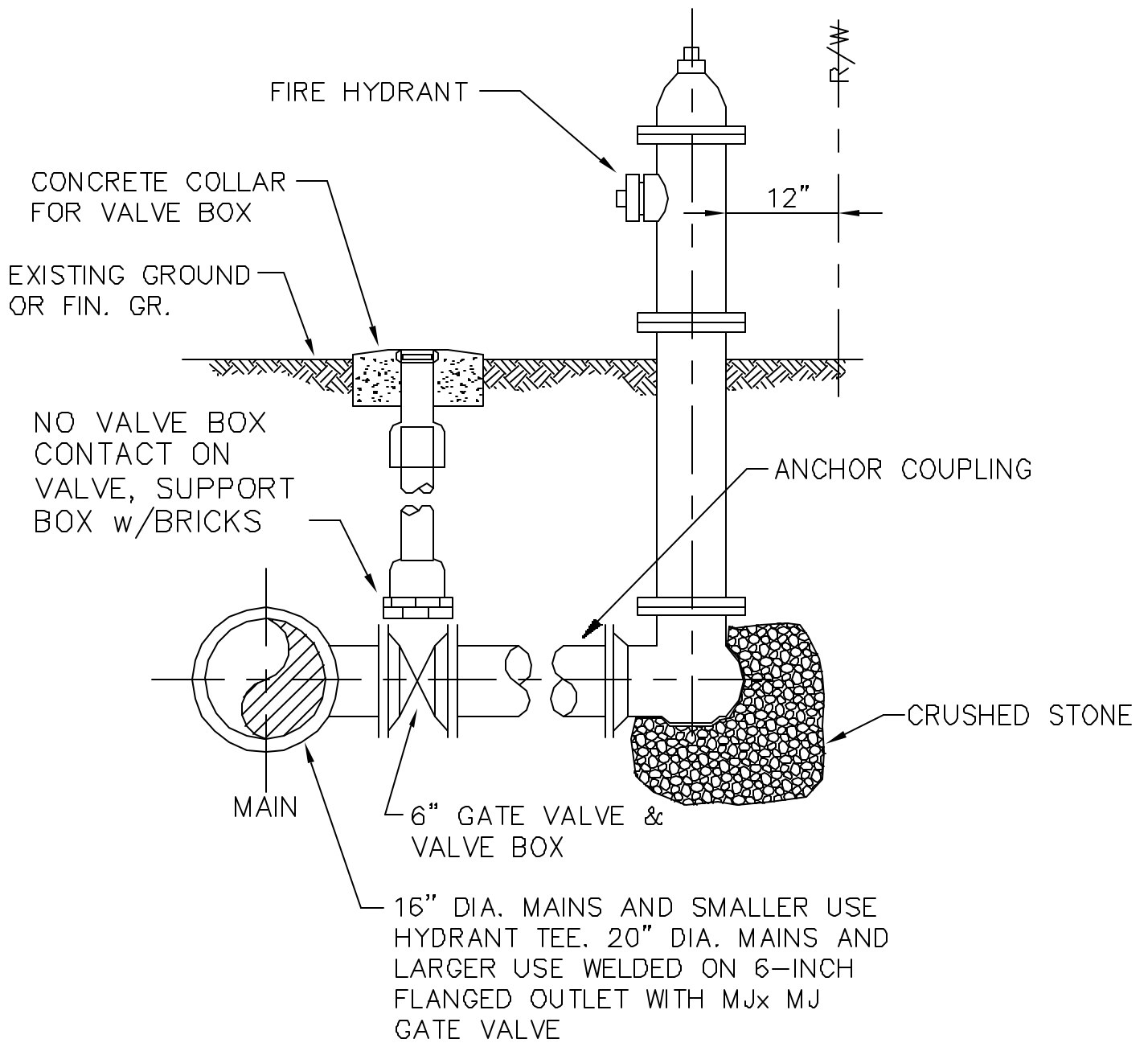
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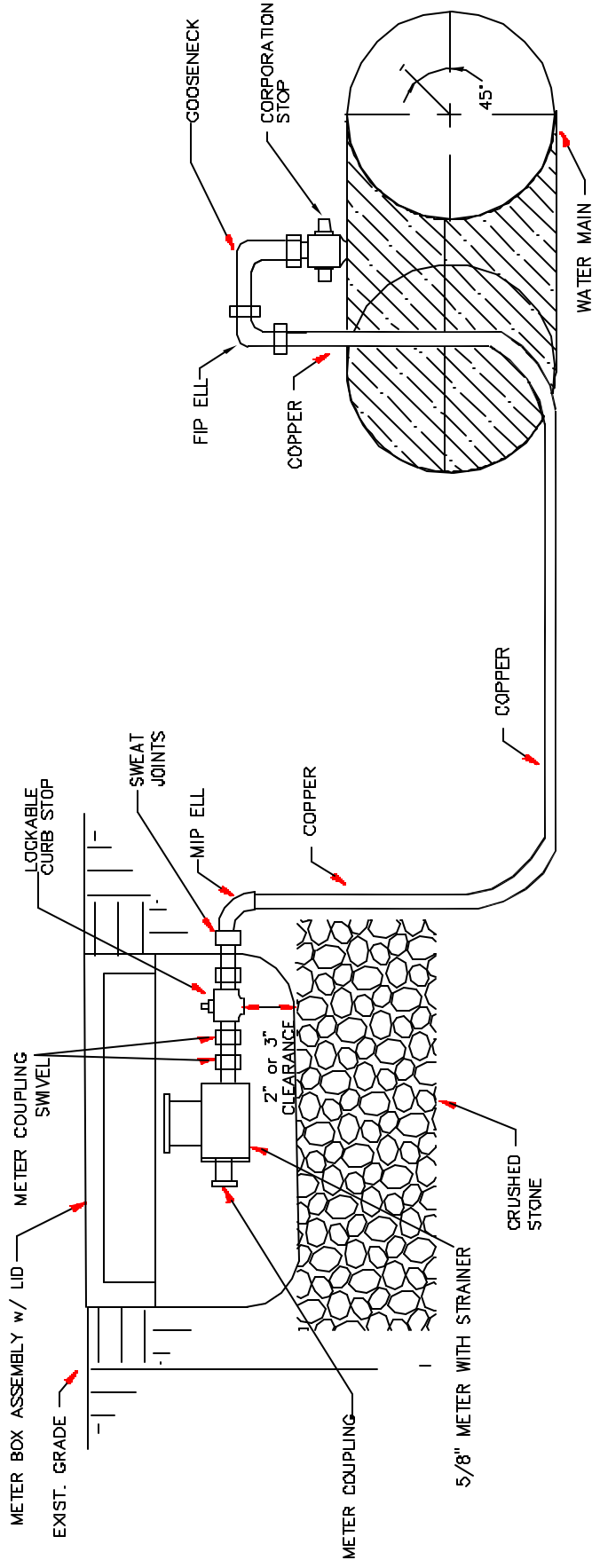


STATUS	BY	APPROVED	DATE	MACON WATER AUTHORITY STANDARD DETAILS	RECOMMENDED BY THE MACON WATER AUTHORITY ENGINEERING DEPT.
ORIGINAL					
REVISION				BUTTERFLY VALVE INSTALLATION DETAIL N.T.S.	DRAWING NUMBER W-1



NOTE: RESTRAIN ALL FITTINGS ACCORDINGLY

STATUS	BY	APPROVED	DATE	MACON WATER AUTHORITY STANDARD DETAILS	RECOMMENDED BY THE MACON WATER AUTHORITY ENGINEERING DEPT.
ORIGINAL					
REVISION				FIRE HYDRANT DETAIL N.T.S.	DRAWING NUMBER W-2



STATUS	BY	APPROVED	DATE
ORIGINAL			
REVISION			

MACON WATER AUTHORITY STANDARD DETAILS

WATER SERVICE & METER CONNECTION DETAILS

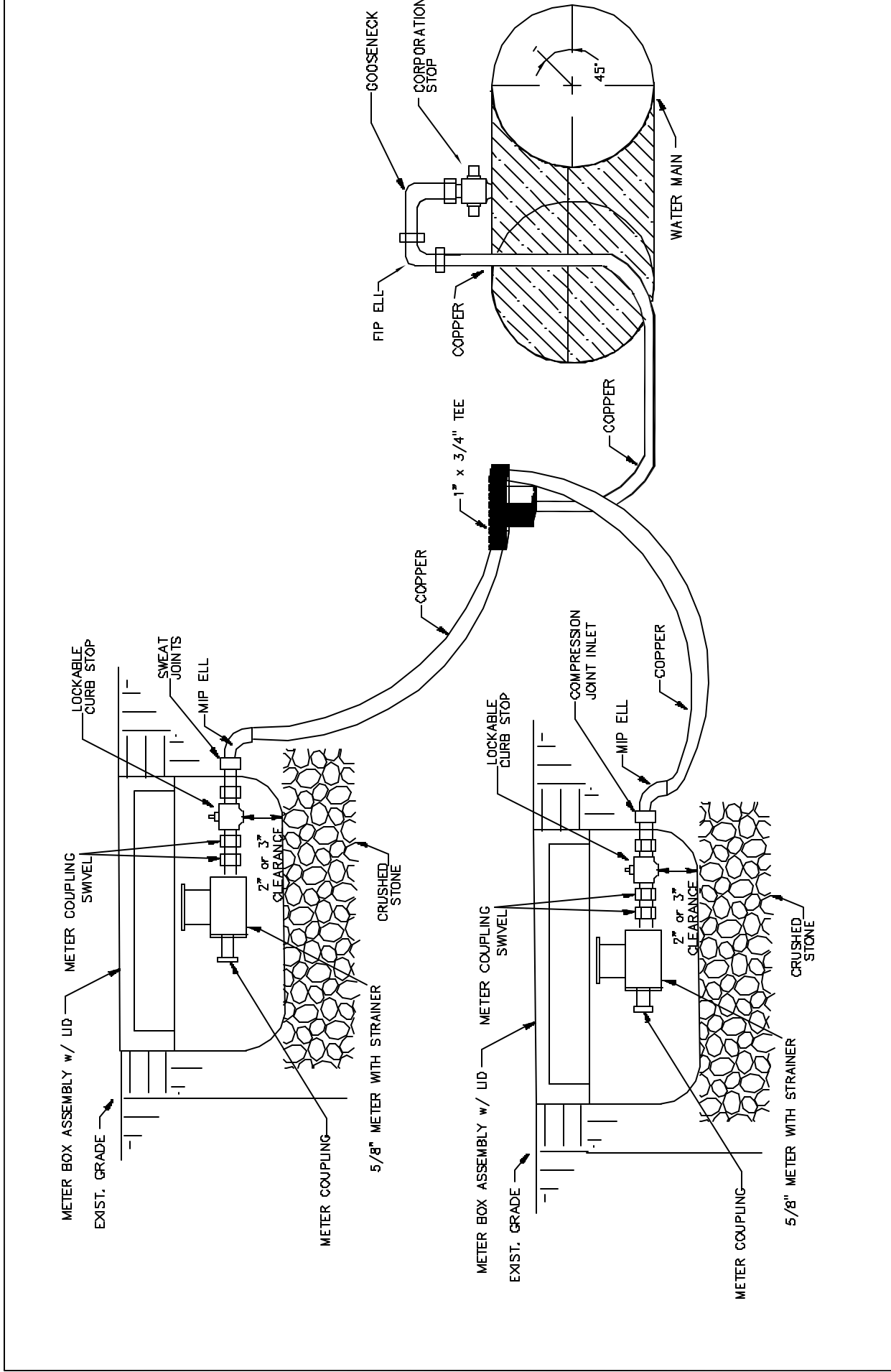
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(SIZES 5/8" & 1")

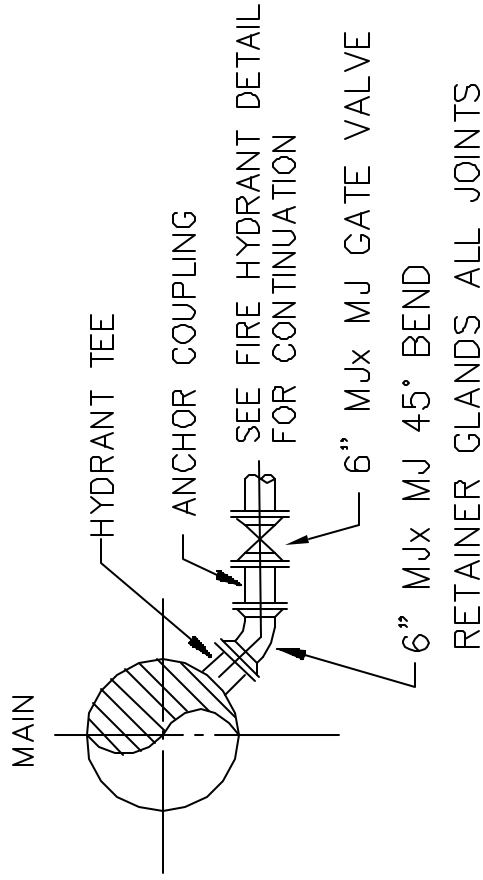
RECOMMENDED BY THE MACON
WATER AUTHORITY ENGINEERING
DEPT.

DRAWING
NUMBER

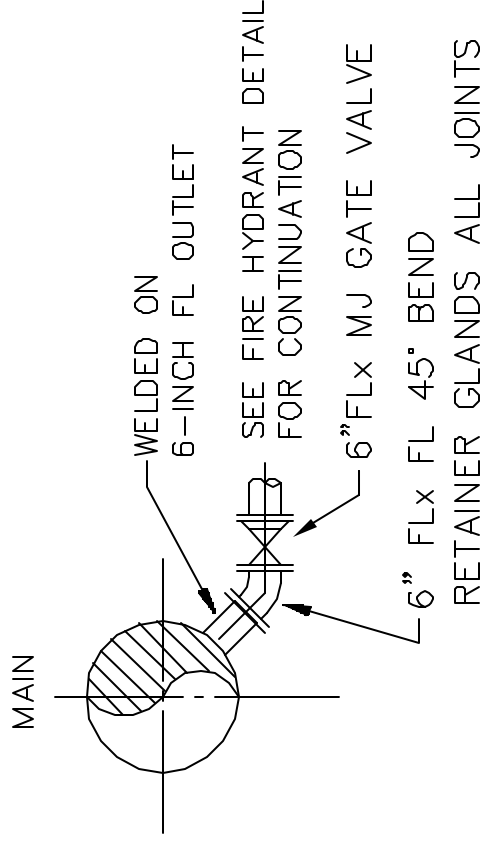
W-3



STATUS		BY	APPROVED	DATE	MACON WATER AUTHORITY STANDARD DETAILS	
ORIGINAL					DOUBLE WATER SERVICE & METER CONNECTION DETAILS (SIZES 5/8" & 1") N.T.S.	
REVISION						
RECOMMENDED BY THE MACON WATER AUTHORITY ENGINEERING DEPT.						DRAWING NUMBER
						W-4

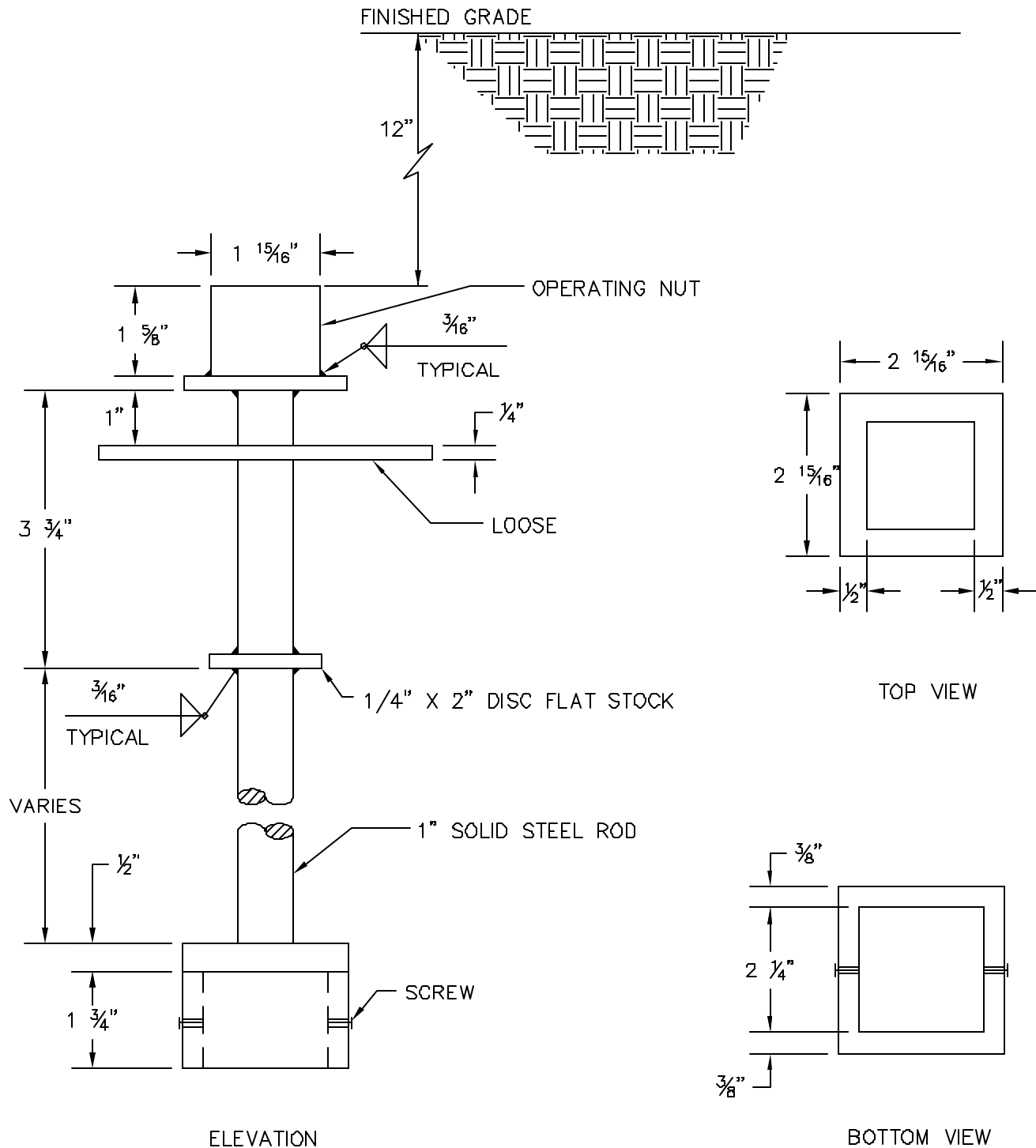


16" DIA. MAINS AND SMALLER



MAINS LARGER THAN 16" DIA.

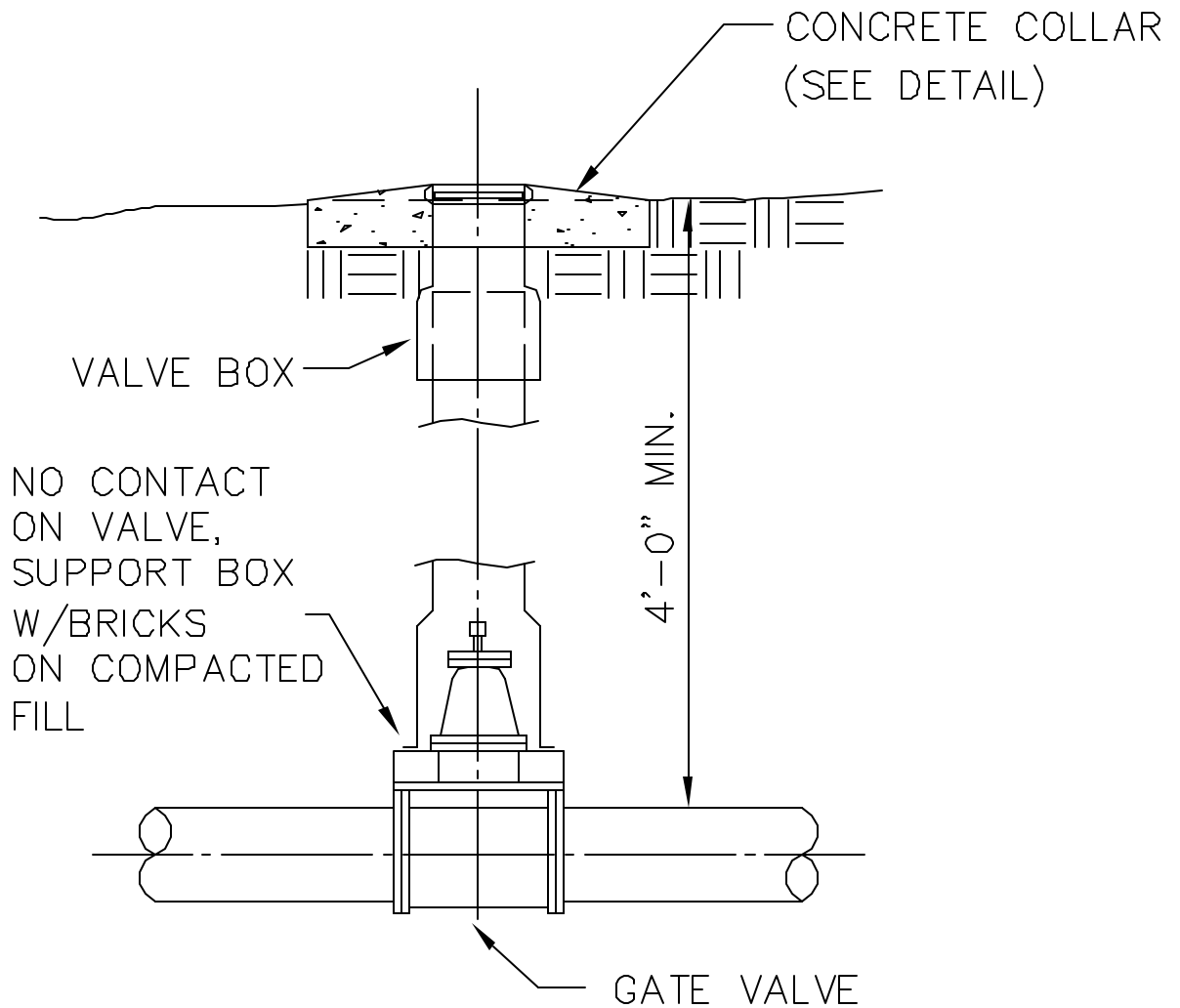
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ORIGINAL					
REVISION				BLOW-OFF CONN. (TYP.)	
				LOW ELEVATION	
				N.T.S.	
					DRAWING NUMBER
					W-5



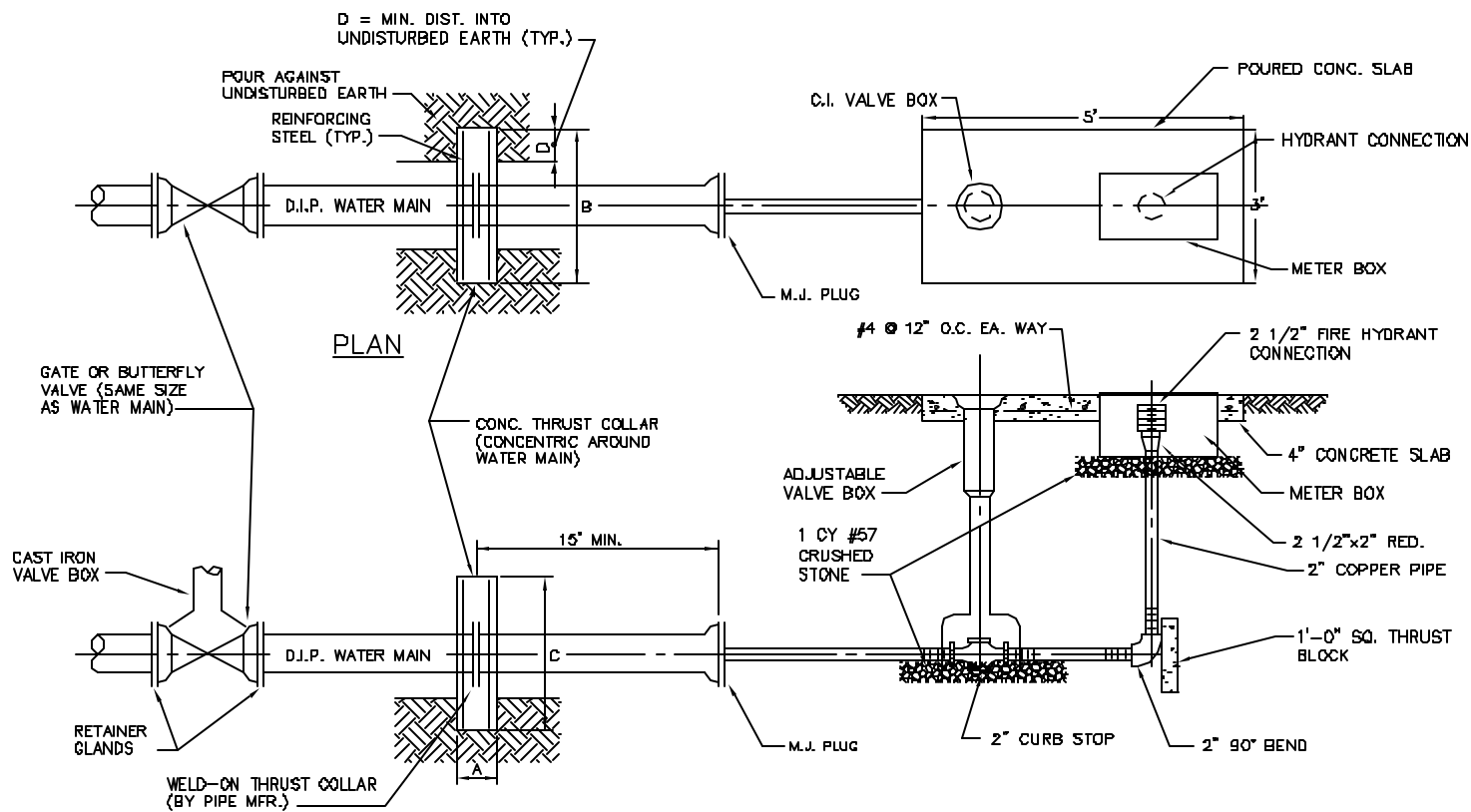
NOTES:

- * ALL WELDS TO CONFORMED TO ANSI/AWWA C206-91.
- * ALL WORK SHALL BE IN ACCORDANCE OF MANUFACTURER'S RECOMMENDATION.

STATUS	BY	APPROVED	DATE	MACON WATER AUTHORITY STANDARD DETAILS	RECOMMENDED BY THE MACON WATER AUTHORITY ENGINEERING DEPT.
ORIGINAL					
REVISION	HILL	WANNA	9/20/04	EXTENSION STEM DETAIL	DRAWING NUMBER W-6
				N.T.S.	



STATUS	BY	APPROVED	DATE	MACON WATER AUTHORITY STANDARD DETAILS	RECOMMENDED BY THE MACON WATER AUTHORITY ENGINEERING DEPT.
ORIGINAL					
REVISION				GATE VALVE INSTALLATION DETAIL N.T.S.	DRAWING NUMBER W-7



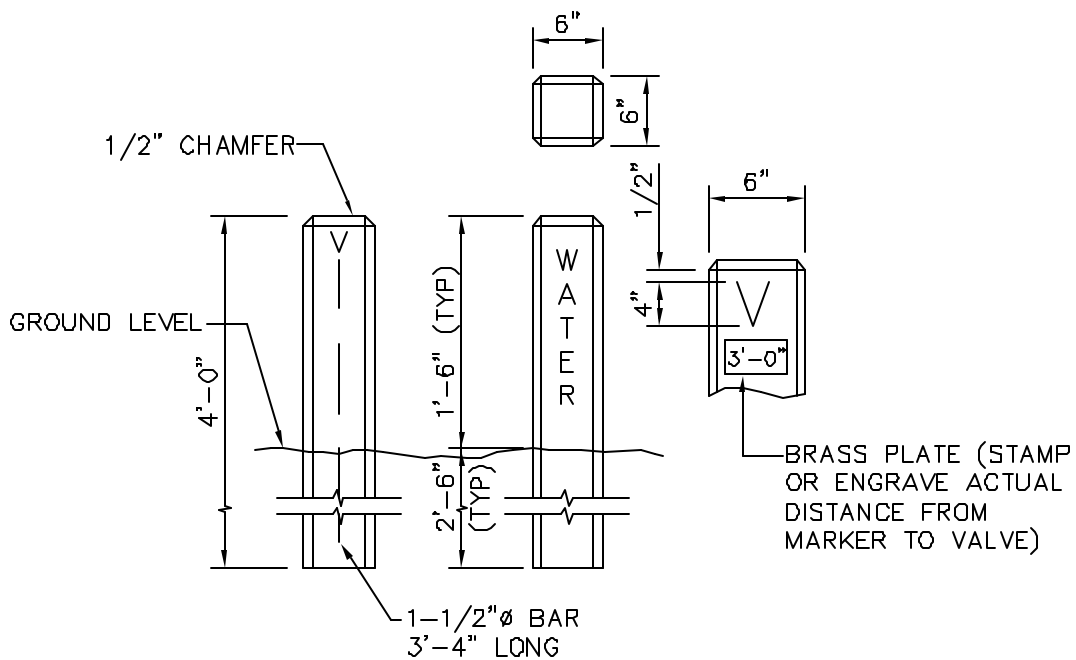
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ORIGINAL					
REVISION				TYPICAL BLOW-OFF DETAIL N.T.S.	DRAWING NUMBER W-8

SECTION

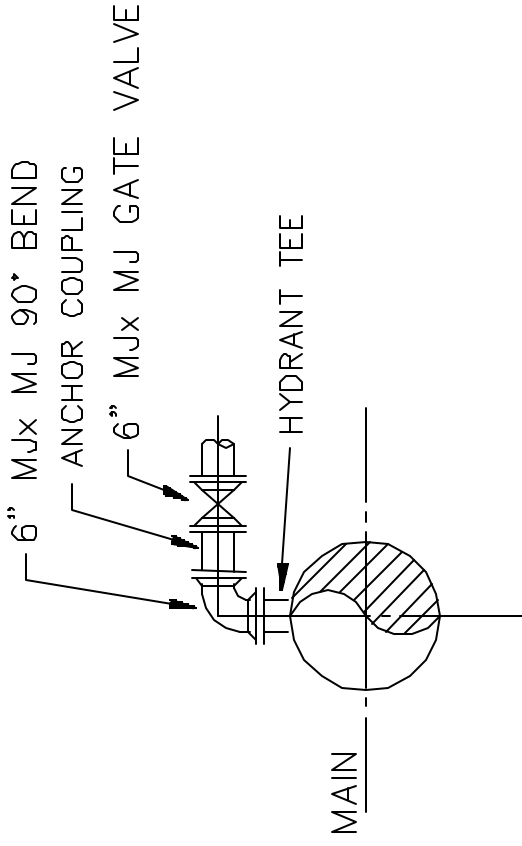
MAIN DIA	CONCRETE COLLAR DIM.				STEEL REINFORCING
	A	B	C	D	
36"	2'-0"	10'-0"	10'-0"	2'-0"	#9 @ 8" O.C. E.W.E.F.
24"	1'-9"	9'-0"	9'-0"	2'-6"	#9 @ 8" O.C. E.W.E.F.
20"	1'-6"	7'-8"	7'-8"	2'-0"	#9 @ 12" O.C. E.W.E.F.
16"	1'-3"	6'-6"	6'-6"	1'-6"	#8 @ 12" O.C. E.W.E.F.
12"	1'-2"	5'-3"	5'-3"	1'-0"	#7 @ 12" O.C. E.W.E.F.
6" or 8"	1'-0"	4'-0"	4'-0"	0'-8"	#6 @ 12" O.C. E.W.E.F.

TEST PRESSURE: 250 P.S.I.
SOIL BEARING PRESSURE: 3000 P.S.F.

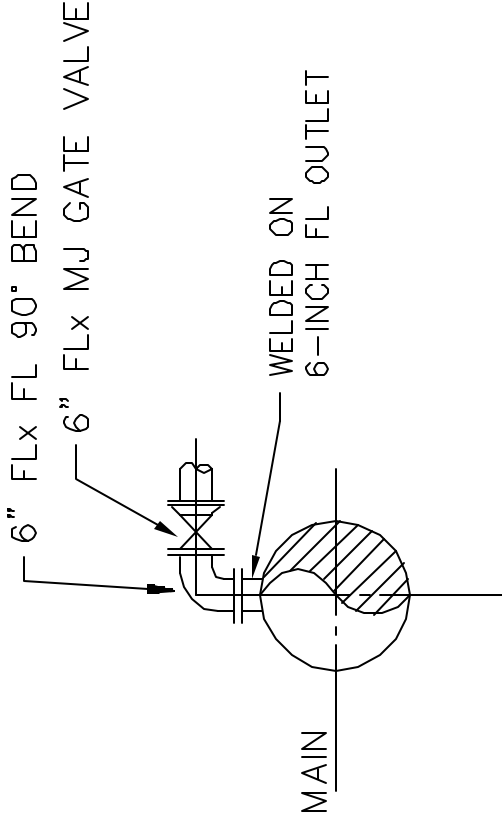
STATUS	BY	APPROVED	DATE	MACON WATER AUTHORITY STANDARD DETAILS	RECOMMENDED BY THE MACON WATER AUTHORITY ENGINEERING DEPT.
ORIGINAL					
REVISION				WATER MAIN TERMINATION DETAIL N.T.S.	DRAWING NUMBER W-9



STATUS	BY	APPROVED	DATE	MACON WATER AUTHORITY STANDARD DETAILS	RECOMMENDED BY THE MACON WATER AUTHORITY ENGINEERING DEPT.
ORIGINAL					
REVISION					
				DETAILS OF WATER VALVE MARKER N.T.S.	
					DRAWING NUMBER W-10



16" DIA. MAINS AND SMALLER



MAINS LARGER THAN 16" DIA.

STATUS	BY	APPROVED	DATE	MACON WATER AUTHORITY STANDARD DETAILS	
	ORIGINAL			AIR RELEASE CONN. (TYP) HIGH ELEVATION N.T.S.	
	REVISION				
RECOMMENDED BY THE MACON WATER AUTHORITY ENGINEERING DEPT.				DRAWING NUMBER	W-11

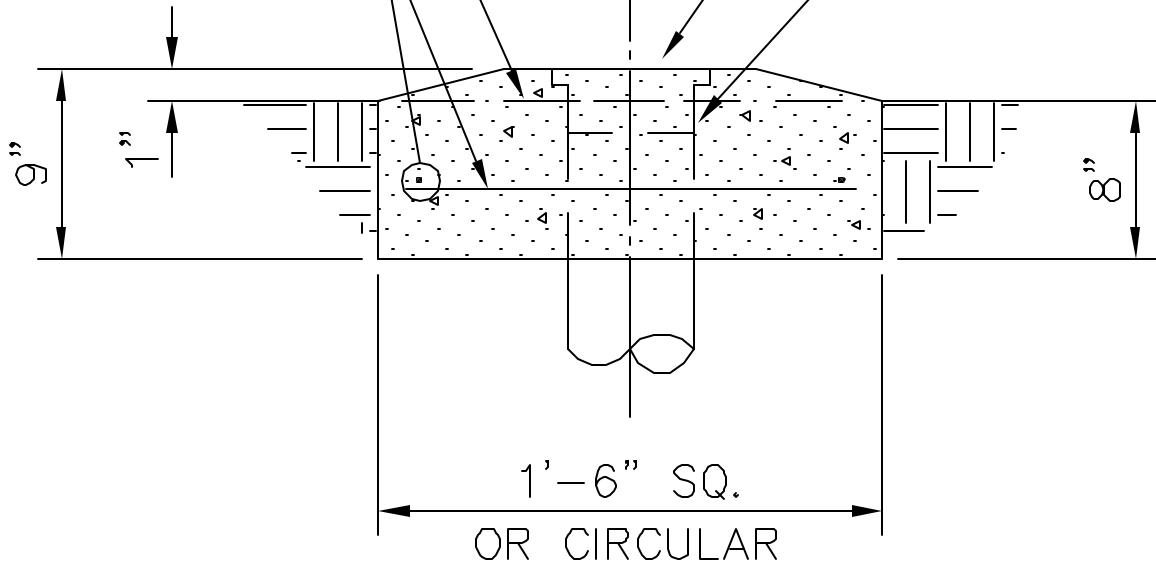
NOTE:

TOP OF CONC. COLLAR TO BE FLUSH WITH
FIN. GR. WHEN INSTALLED IN PAVEMENT.

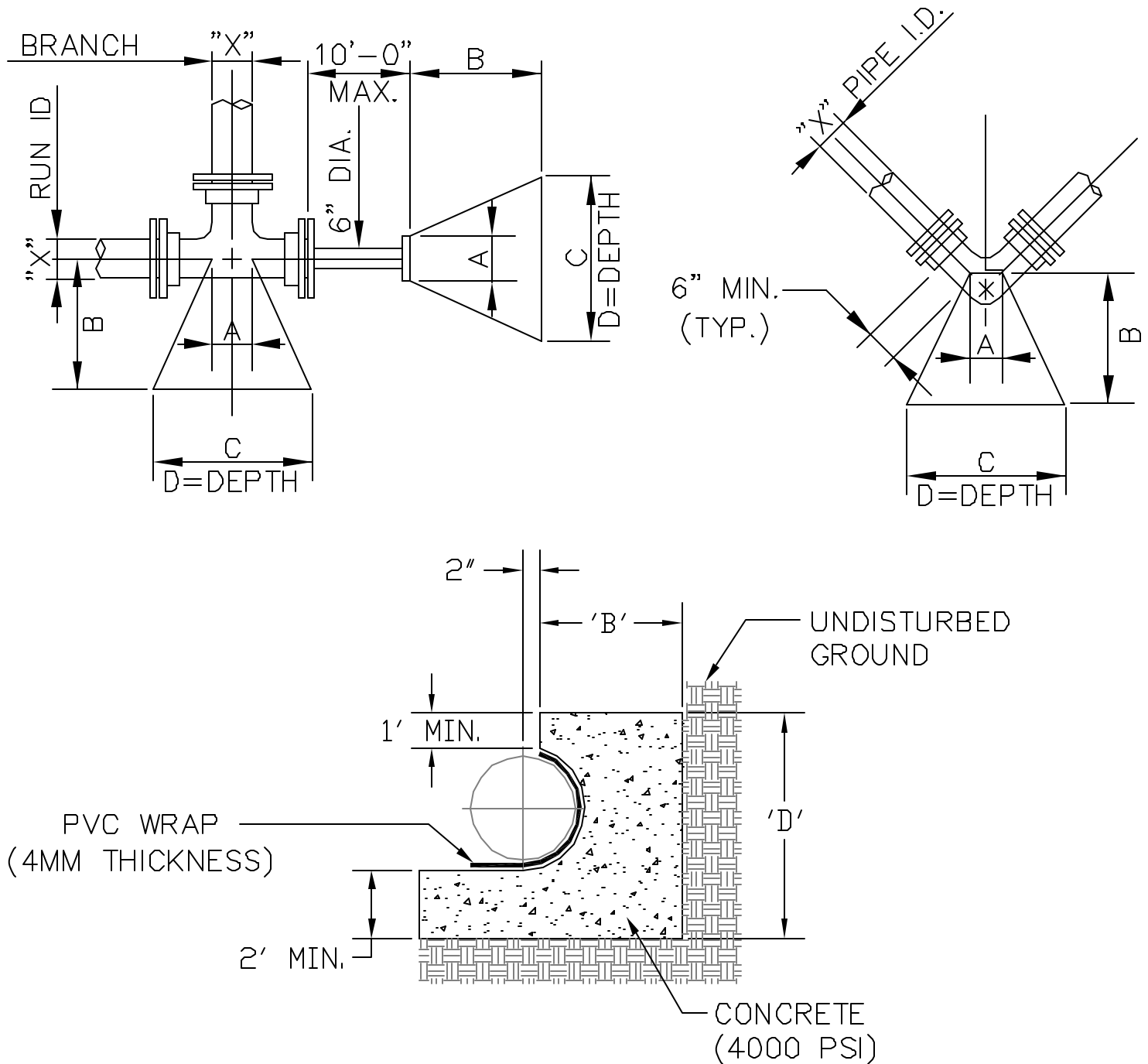
#4 REBAR EA. SIDE

CONCRETE COLLAR

VALVE BOX



STATUS	BY	APPROVED	DATE	MACON WATER AUTHORITY STANDARD DETAILS	RECOMMENDED BY THE MACON WATER AUTHORITY ENGINEERING DEPT.
ORIGINAL					
REVISION				CONCRETE COLLAR FOR VALVE BOX (TYP.) N.T.S.	DRAWING NUMBER W-12



NOTES:

1. 'A', 'B', 'C' & 'D' WILL BE DETERMINED BY THE ENGINEER.
2. MEGALUG RESTRAINTS SHALL BE USED ON ALL BENDS.

STATUS	BY	APPROVED	DATE	MACON WATER AUTHORITY STANDARD DETAILS	RECOMMENDED BY THE MACON WATER AUTHORITY ENGINEERING DEPT.
ORIGINAL					
REVISION				TYPICAL BLOCKING DETAIL N.T.S.	DRAWING NUMBER W-13

**-- End of Scope of Work Description and Requirements &
Applicable APPENDICES --**

RESPONSE PRICING COVER PAGE**RFP title****Name of the proposer****Managing office address****Telephone number****Name and email address of contact person****Date of submission**

Pricing Tables Instructions

1 General

Proposer shall supply unit prices and related annotations that will enable the Authority to reasonably determine the total cost of installing the System. Tables referenced below have been provided in Excel format in the RFP package as Attachment 3. Information required includes:

- Cost to install necessary meters, MIUs, and ancillary components of the AMI system and dispose of existing equipment.
- Cost to provide supplemental services during installation involving configuration, repair or upgrades to meter boxes, lids and appurtenances.

Prices shall include all labor, tools, equipment, and software, taxes, supervision, bonds, insurance, material, rental, parking, permitting, engineering certificates, indirect costs and profits to perform any unit of work. The price tables must be completed in their entirety, in accordance with the instructions below.

Proposer shall provide pricing information in Excel files in a digital format as well as in hard copy within its Pricing Proposal.

Proposer must respond to each line item listed. Indicate “NA” (Not Applicable) if the particular item described is not incorporated in Proposer’s system. Proposer must include any additional equipment and services not listed in the tables below, that are required to provide a complete and working system in accordance with the technical and performance requirements of this RFP; Proposer shall augment the Excel tables by adding rows or columns to accommodate additional system components or unit costs but may not delete any row or column from the provided tables. The Authority reserves the option of accepting or rejecting individual components of each proposal as needed to best serve the needs of the Authority.

2 Meters, Registers, MIUs, Lids – Installation

Installation prices indicated shall be for normal installations, exclusive of repairs to, modification or replacement of service lines, meter boxes (other than the replacement or modification of lids), valves or customers’ plumbing.

Replace Old Meters, Including Labor to Replace or Modify Lids

Proposer’s price shall include removing the existing meter and meter reading device, if any, and connecting the cable to the MIU using waterproof, dust-proof and corrosion resistant connection.

Retrofit Newer Meters with new MIUs

Proposer’s price should include installation of a new MIU while retaining the existing meter and register and connection of the cable coming from the meter to the new MIU using a waterproof, dust-proof and corrosion resistant connection.

Disposal of Existing MIUs

Proposer’s price shall include costs for properly disposing of all removed meter reading devices such as old MIUs. If the old devices contain lithium-ion batteries, Proposer shall propose the cost per unit of disposing of such devices properly.

Replacement Lids

Proposer shall provide pricing to replace non-composite lids with composite lids conforming to the Technical Specifications and to modify non-composite lids by drilling them (provided they are not located in areas where vehicles could travel over or park on top of them). Proposer shall

indicate whether it intends to modify or replace meter box and vault lids. The cost of labor to replace or drill lids shall be included in the unit installation prices. Metal lids removed will be scrapped by Proposer and a credit provided to the Authority.

3 Professional Services

Proposer shall submit pricing for Project Management, Interface setup, training, warehousing, printed notifications to customers, and all call center services.

4 Bonding

Proposer shall submit pricing for Payment and Performance Bonds.

5 Additional Services

The Authority may request the Proposer perform additional services. Proposer shall provide pricing for each optional service listed in the Pricing Tables and identify any conditions that may impact the price quoted on the Optional Bid Tab items listed below:

1. Optional Bid Tab #1: Installation or replacement of as-needed services if the installation requires.
2. Optional Bid Tab #2: Upgrade Scenario for additional services
 - a. Includes installation of a new MIU while retaining the existing meter and register and connection of the cable coming from the meter to the new MIU using a waterproof, dust-proof and corrosion resistant connection.
3. Optional Bid Tab #3: Meter Salvage & MIU Disposal.

CONTRACT PROVISIONS

General Terms and Conditions

Standard language and provisions required by the Authority in a contract should be presented in the RFP. The list includes:

- a. Regulatory Compliance
- b. Insurance Requirements
- c. Performance and Payment Bonds
- d. Inspection & Audit
- e. Indemnification
- f. Limitations on Liability
- g. State and Other Taxes
- h. Governing Law
- i. Conditional on Funding Appropriation
- j. Defaults and Termination for Cause
- k. Termination without Cause
- l. Assignment
- m. Compliance with Law
- n. No Conflicts of Interest
- o. Dispute Resolution
- p. Force Majeure
- q. Patent Indemnity
- r. Intellectual Property
- s. Escrow of Hardware and Software Design
- t. No Third-Party Rights
- u. Non-Endorsement
- v. Severability

1 Specific Terms and Conditions

Terms and conditions specific to the AMI project should be included here. A few are included below.

1.1 Project Milestones

Goals and milestones for deliveries or accomplishments shall be incorporated within the Project Schedule. Should Contractor fail to meet a key milestone within a reasonable period of time, the Authority shall provide notice of Default and shall be entitled to collect liquidated damages in the amount of \$2,000 per day until the milestone is met.

1.2 Meter and MIU Installation Acceptance

Meters and MIUs will be accepted and the installation paid for as they are installed and confirmed to be operational, in accordance with the Technical Requirements, or if Proposer prefers, by meter reading route or other geographic area, provided the successful installations meet or exceed the route saturation criteria.

2 Warranties

The Authority shall have sole discretion to choose the applicable warranty should there be a conflict between warranties.

2.1 Installation

All installation work, including materials used in the installation performed under this contract, shall be guaranteed against defects in workmanship for a period of one (1) year from the date of installation acceptance.

EXCEPTIONS TO CONTRACT

Please note any exceptions to any contract provisions.
For Example:

Section	Comply? Y/N	Requirement
ADD	N	ADD A CONTRACT PROVISION
Any Proposed Alternative Specification or Language: Explanation details		

1a) Replacement Scenario: Full meter change out and add MIU

Labor	Vendor	# of Units	Unit Cost	Total Cost
1 1/2"		738	\$ -	\$ -
2"		910	\$ -	\$ -
3"		263	\$ -	\$ -
4" - Domestic line		49	\$ -	\$ -
4" - Fire service line		40	\$ -	\$ -
6" - Domestic line		19	\$ -	\$ -
6" - Fire service line		68	\$ -	\$ -
8" - Domestic line		9	\$ -	\$ -
8" - Fire service line		52	\$ -	\$ -
10" - Domestic line		7	\$ -	\$ -
10" - Fire service line		8	\$ -	\$ -

Subtotal		2,163	n/a	\$ -

***Services 6" and larger are assumed to be located in confined space**

****Spool pieces for Fire Service Lines to achieve the appropriate lay length will be provided by the Authority**

2) Professional Services

Professional Services	Vendor	Description	# of Units	Unit Cost	Total Cost
Project Management			1	\$ -	\$ -
IT System Interface(s)			1	\$ -	\$ -
Training			1	\$ -	\$ -
Printed Notification 1 (Scheduling and leave behind card)			2,163	\$ -	\$ -
Printed Notification 2 (Postcard mailed to customer)			2,163	\$ -	\$ -
Printed Notification 3 (Post-installation door hanger)			2,379	\$ -	\$ -
Call Center			1	\$ -	\$ -
Payment Bond			1	\$ -	\$ -
Performance Bond			1	\$ -	\$ -

Subtotal		n/a	n/a	\$ -

TOTALS

TOTAL COST		\$ -

OPTIONAL BID #1 - Installation/Replacement**(Perform curb-stop replacement, dual check valve replacment, customer-side valve installation or meter box re-setting)**

One-Time Costs		# of Units	Unit Cost	Total Cost
1.5" Meter Flange re-plumbing	Labor	22	\$ -	\$ -
Meter Box Replacements - Grass/Dirt setting	Labor	200	\$ -	\$ -
Meter Box Replacements - Concrete/Asphalt setting	Labor	30	\$ -	\$ -
Confined Space Addon (1.5"-4")	Labor	250	\$ -	\$ -
Replace dual check valve	Labor	1	\$ -	\$ -
Install/replace shut off valve - 1.5"	Labor	200	\$ -	\$ -
Install/replace shut off valve - 2"	Labor	200	\$ -	\$ -
Install/replace shut off valve - 3"	Labor	100	\$ -	\$ -
Install/replace shut off valve - 4"	Labor	10	\$ -	\$ -
Install/replace shut off valve - 6"	Labor	20	\$ -	\$ -
Install/replace shut off valve - 8"	Labor	12	\$ -	\$ -
Install/replace shut off valve - 10"	Labor	3	\$ -	\$ -
Service line repair by foot (1.5" service line)	Labor	400	\$ -	\$ -
Service line repair by foot (2" service line)	Labor	600	\$ -	\$ -
Service line repair by foot (3" service line)	Labor	200	\$ -	\$ -
Service line repair by foot (4" service line)	Labor	50	\$ -	\$ -
Service line repair by foot (6" service line)	Labor	50	\$ -	\$ -
Service line repair by foot (8" service line)	Labor	50	\$ -	\$ -
Service line repair by foot (10" service line)	Labor	10	\$ -	\$ -
Installation of permanent by-pass - 1.5"	Labor	15	\$ -	\$ -
Installation of permanent by-pass - 2"	Labor	15	\$ -	\$ -
Installation of permanent by-pass - 3"	Labor	60	\$ -	\$ -
Installation of permanent by-pass - 4"	Labor	30	\$ -	\$ -
Installation of permanent by-pass - 6"	Labor	25	\$ -	\$ -
Installation of permanent by-pass - 8"	Labor	20	\$ -	\$ -
Installation of permanent by-pass - 10"	Labor	5	\$ -	\$ -
Traffic Control Addon	Labor	100	\$ -	\$ -
Subtotal		n/a	n/a	\$ -

Optional Bid #2 - Upgrade Scenario for additional services

Labor	# of Units	Unit Cost	Total Cost
5/8" - 1" Meter (Existing Neptune T-10 Procoder R900i) - Keep both the meter and register, but add cellular MIU	10,000	\$ -	\$ -
5/8" Meter (Existing Neptune T-10 Procoder R900i) - Full meter change out with new Mach10 and add cellular MIU	2,000	\$ -	\$ -
Subtotal	n/a	n/a	\$ -

OPTIONAL BID #3 - Meter Salvage & MIU Disposal (if applicable)

(Provide per unit salvage value for each meter size, and labor for disposal of existing MIUs)

Salvaged Equipment	# of Units	Unit Credit	Total Credit
1 1/2" Meter	738	\$ -	\$ -
2" Meter	910	\$ -	\$ -
3" Meter	263	\$ -	\$ -
4" Meter	89	\$ -	\$ -
6" Meter	87	\$ -	\$ -
8" Meter	61	\$ -	\$ -
10" Meter	15	\$ -	\$ -
Metal lid or lid ring (per lb)	TBD	\$ -	n/a
Subtotal	n/a	n/a	\$ -

Disposal of existing AMR MIU	# of Units	Unit Cost	Total Cost
AMR MIU Disposal	Labor	2,163	\$ -