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THE CITY OF TROY
TROY UTILITIES

STANDARD SPECIFICATIONS

APRIL 2018

WATER DISTRIBUTION IMPROVEMENTS
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Specifications contained herein supersede all previously published versions.

CITY OF TROY

STANDARD SPECIFICATIONS
WATER DISTRIBUTION IMPROVEMENTS

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STANDARD SPECIFICATIONS WATER DISTRIBUTION SYSTEM

WATER DISTRIBUTION IMPROVEMENTS FOR THE CITY OF TROY, ALABAMA

PREFACE

Presented herein are Standard Specifications for the Water Distribution Improvements for the City of Troy, Alabama, hereinafter known as the "City". These specifications are to ensure the quality of material, workmanship, and compatibility of products with the existing materials installed in the City.

Water mains installed in conjunction with private development, extension of existing service, private upgrading of existing service, or for any other purpose to be tied to water mains being operated and maintained by the "City" shall conform to these specifications. It shall be the responsibility of the Owner/Developer/Contractor to ensure that all materials and methods of installation of water mains shall strictly conform to these specifications. Any deviations not approved by the City, in writing, shall be grounds for rejection of any part or all water facilities installed. Rejection, at the City's discretion, shall result in the water facilities in question not being connected to mains owned and/or operated by the City.

Prior to any laying operation, the Owner/Developer shall submit to the City for approval a set of plans showing size and location of all proposed material and submittal data showing manufacture and model number of all material to be used. The submittal of material and plans in no way relieves the Owner/Developer/Contractor of his responsibility to adhere to these specifications. The Owner/Developer must have written approval from the City of all proposed plans and all proposed material and submittal data prior to the commencement of any work. Upon delivery of material, the Owner/Developer/Contractor shall notify the City and make this material available to its representative for inspection.

Section 1 General and Administrative

1.1 Scope

A. These specifications shall govern the handling, installation, distribution and testing of water distribution systems including pipe, valves, hydrants, and accessories described herein, and as shown on the accompanying plans and details.

B. This work shall consist of laying transmission and distribution lines, fittings, valves, hydrants, and accessories and making connections.

1.2 Work Included

A. All labor, equipment and material necessary to complete the work stipulated herein. The Contractor shall remove so much of the pavement as may be necessary; excavate the trenches and pits to the required dimensions; excavate the bell holes; construct and maintain all bridges required for traffic control; sheet, brace and support the adjoining ground or structures where necessary; handle all drainage or ground water; guard the site; unload, haul, distribute, lay and test the pipe, fittings, valves, hydrants, and accessories; rearrange the branch connections to main sewers, or rearrange other conduits, ducts or pipes where necessary; replace all damage drains, sewers, or other structures; backfill and compact the trench pits; restore the roadway surface; remove surplus excavated material; clean the site of the work; chlorinate the completed pipe line, and have samples checked and approved for bacteriological analysis by the State Department of Health.

1.3 Inspection of The Work

A. The Owner/Developer/Contractor shall make available to the City reasonable inspection opportunities. The City also requires <u>all work</u> to be inspected by a qualified representative of the Design Engineer to ensure that the work complies with the City's specifications and the plans as submitted to the City.

1.4 Contractor Credentials

A. The City has directed the General Manager and/or his/her appointee to examine the credentials of the contractor, selected by the developer to perform the construction and installation of water/sewer piping, to determine the experience and competency of such contractor. Contractors seeking to install utilities connected to the Board's systems shall provide written proof of satisfactory installations of an equivalent scope of work, as defined in the project proposal, along with names, addresses, and telephone numbers of associated references.

1.5 Engineers Certificate of Engineering Design and Construction

A. The Design Engineer shall be required to certify that the work complies with plans and specifications by providing the following statement:

ENGINEER'S CERTIFICATE OF

ENGINEERING DESIGN AND CONSTRUCTION

I, _____, a professional engineer licensed in the State of Alabama, License Number _____ , do hereby certify that to the best of my knowledge, the Water Distribution System Improvements have been constructed in accordance with these Standard Specifications as submitted to the City.

Failure to provide the above certificate shall result in rejection by the City. Rejection, at the City's discretion, shall result in the water facilities in question not being connected to mains owned and operated by the City.

The Contractor shall notify the City 48 hours prior to beginning any work.

The City shall not be responsible or liable in any way for damage caused by the Contractor to private or public property, or to any person or entity. The Owner/Developer and the Contractor shall indemnify, hold harmless, and defend the City, its officers, employees, Council members, and agents from and against any and all claims, actions, suits, damage judgements, liabilities, causes of action, liens, assessments, fines, loss, injuries (including death), costs and/or expenses (including without limitation attorney's fees and all other costs and expenses), amounts paid in settlement or otherwise incurred by the City caused by, arising out of, or by reason of any act, omission, or failure to act on the part of the Contractor and/or Owner/Developer in any way related to the work of Contractor. Contractor shall maintain comprehensive public liability insurance in an amount not less than One Million Dollars for bodily injury to or death of persons and for damages to or loss of property resulting from or on account of any act, omission, or failure to act on the part of Contractor, naming the City as additional insured.

1.6 Regulatory Requirements

In addition to the specifications, all current requirements of the applicable regulatory agencies, Alabama Department of Environmental Regulation, Public Water Suppliers Division, shall be met by the contractor. This shall include, but not limited to the Environmental Protection Agency (EPA) and Alabama Department of Environmental Management (ADEM).

1.7 As-Built Drawings

A complete set of As-built drawings is required for all projects. A complete set shall consist of water infrastructure as constructed, all engineering design specifications (i.e., plans, details, valves, fireplug diagrams, etc.) and the engineer's signature and seal. All As-Builts must be approved by the City of Troy prior to any service connection to the lines.

A hardcopy (standard 22" x 34"D-size) and an Auto Cad file of the As-Built must also be provided to the City upon request.

1.8 Burden of Testing

All testing requirements shall be arranged and paid by the contractor. The testing laboratory shall be approved by the City. Results from all required testing shall be provided to the City for review.

1.9 Amendments

These specifications may be amended from time to time by the City when the City determines appropriate. It shall be the contractor's responsibility to obtain the latest amendments and/or updates from the City

1.10 Layout

All systems shall be placed to provide a looped system where practical. Any dead end lines shall be equipped with a fire hydrant at the end of line.

1.11 Abbreviations

Found below, for the readers' convenience, are the abbreviations used within these specifications:

AASHTO	American Association of State Highway and Transportation Officials
ADEM	Alabama Department of Environmental Management
AWWA	American Water Works Association
AWS	American Welding Society
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
NFPA	National Fire Protection Association
NSF	National Sanitation Foundation
USEPA	United States Environmental Protection Agency

Section 2 Inspection and Handling of Materials

2.1 Material Inspection

A. All materials shall meet the requirements hereinafter specified, and the Contractor shall have made, by a Laboratory approved by the City, tests showing the material does meet the specifications. The records of the test shall be furnished prior to the pipe being laid. The cost of such test will be borne by the Contractor.

1. Of Material at Factory: At the discretion of the City, all materials are subject to inspection and approval at the plant of the manufacturer.

2. Of Materials at Delivery Point: During the process of unloading, all pipe and accessories shall be inspected by the Contractor for loss or damage in transit. All Pipe and accessories are subject to inspection at the point of delivery by the City. The City may perform tests as specified in the referenced Standards to ensure conformance with those standards.

3. Field Inspection: All pipe and accessories shall be laid, jointed, tested for defects and for leakage with pressure and chlorinated in the manner herein specified. Testing shall occur in the presence of a representative of the City.

4. Disposition of Defective Materials: All material found during the progress of the work to have cracks, flaws, or other defects will be rejected, and the

Contractor shall promptly remove from the site of the work such defective material.

2.2 Handling Pipe and Accessories

A. Care: All pipe, fittings, valves, hydrants, and other accessories shall, unless otherwise directed, be unloaded at the pint of delivery, hauled to and distributed at the site of the project by the Contractor; they shall at all times be handled with care to avoid damage. In loading and unloading, they shall be lifted by hoists, or slid, or rolled on skidways in such a manner as to avoid shock. Under no circumstances shall they be dropped. Pipe handled on skidways must not be skidded or rolled against pipe already on the ground.

B. At Site of Work: In distributing the material at the site of the work, each piece shall be unloaded opposite or near the place where it is to be laid in the trench.

C. Care of Pipe Coating: Pipe shall be handled in such a manner that a minimum amount of damage to the coating will result. Damaged coating shall be repaired in a manner satisfactory to the City.

D. Bell Ends, How Faced: Pipe shall be placed on the site of the work parallel with the trench alignment and with bell ends facing the direction in which the work will proceed unless otherwise directed.

E. Pipe Kept Clean: The interior of all pipe, fittings, and other accessories shall be kept free from dirt and foreign matter at all times. Provisions shall be made to prevent degradation of PVC pipe from ultraviolet light.

Section 3 Trenching and Installation

3.1 Preparation for Underground Construction

A. Call Alabama One Call service at 1-800-292-8525 and the City not less than three working days before performing Work.

1. Request underground utilities to be located and marked within and surrounding construction areas.

2. Compliance with all federal, state and local laws and regulations is mandatory for underground construction.

B. Identify required lines, levels, contours, and datum locations.

C. Protect plant life, lawns, and other features.

D. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

E. Maintain and protect above and below grade utilities.

F. Establish temporary traffic control and detours when trenching is performed in public right-of-way. Relocate controls and reroute traffic as required during progress of Work.

3.2 Trenching

A. Erect erosion control devices prior to any excavation.

B. Excavate subsoil required for utilities to the depth indicated on the Drawings.

C. Remove lumped subsoil, boulders, and rock up of 1/6 cubic yard, measured by volume.

D. Perform excavation within 24 inches of existing utility in accordance with utility's requirements.

E. Do not advance open trench more than 50 feet ahead of installed pipe.

F. Excavate trenches to uniform width, sufficiently wide to provide ample working room and a minimum of 12 inches of clearance on both sides of pipe or conduit.

G. Remove water or materials that interfere with Work.

H. Excavate trenches and conduit to depth indicated or required to establish indicated slope and invert elevations and to support bottom of pipe or conduit on undisturbed soil and bedding material.

I. Do not interfere with 45 degree bearing splay of building foundations or roadbeds.

J. Cut out soft areas of subgrade not capable of compaction in place. Backfill with suitable material and compact to density equal to or greater than requirements for subsequent backfill material.

K. Correct over excavated areas with compacted backfill as specified for authorized excavation or replace with concrete.

L. Remove excess subsoil not intended for reuse, from site.

M. Maintain trench depth sufficient to provide a minimum cover of 30 inches over utility pipe unless otherwise noted in the Drawings. Maintain a minimum of 36 inches cover under highway ditches.

3.3 Stability of Excavations

A. General: Comply with local codes, ordinances, OSHA Standards and Requirements, and the requirement of other agencies having jurisdiction. Design of retaining structures must be performed, signed and sealed by a registered engineer licensed in the state in which the project is located.

B. Slope sides of excavations to comply with local codes, ordinances, OSHA and requirements of agencies having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Maintain sides and slopes of excavations in safe condition until completion of backfilling.

C. Shoring and Bracing: Provide materials for shoring and bracing, such as sheet piling, uprights, stringers, and cross braces, in good serviceable condition. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Extend shoring and bracing as excavation progresses.

1. Provide permanent steel sheet piling or reinforced concrete drilled shaft walls wherever subsequent removal of retaining structure might permit

lateral movement of soil under adjacent structures. Cut off tops a minimum of 2'-6" below final grade and leave permanently in place.

D. Repair damage caused by failure of the sheeting, shoring, or bracing and for settlement of filled excavations or adjacent soil.

E. Repair damage to new and existing Work from settlement, water or earth pressure or other causes resulting from inadequate sheeting, shoring, or bracing.

3.4 Backfilling

A. Backfill trenches to contours and elevations with unfrozen fill materials.

B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.

C. Place fill material in continuous layers and compact in 8-inch maximum loose layer depth.

D. Employ placement method that does not disturb or damage, utilities in trench, or structures near the trench.

E. Do not leave trench open at end of working day.

Section 4 Pipe Materials and Appurtenances

4.1 Water Piping

A. Ductile Iron Pipe: AWWA C151. Bituminous outside coating: AWWA C151. Pipe Mortar Lining:

1. Pipe Class: AWWA C151, for nominal thickness, rated water working pressure and maximum depth of cover. Pressure Class 350 for normal installation.

2. Fittings: Ductile iron, AWWA C110. Compact fittings AWWA C153.

   a. Coating and Lining:

      1) Bituminous Coating: AWWA C110.

      2) Cement Mortar Lining: AWWA C104, double thickness.

   b. Manufacturer:

      1) Fittings to be Sigma C153 350 psi ductile iron or approved equal.

3. Joints:

   a. Mechanical and Push-On Joints: AWWA C111.

   b. Restrained Joints: Boltless, push-on type, joint restraint independent of joint seal.

B. Polyvinyl Chloride (PVC): AWWA C900, ASTM D2241, SDR-21; 200 psig rating:

1. Fittings: AWWA C110, Ductile Iron. All fittings to be Sigma C153 or approved equal.

2. Joints: ASTM D3139 PVC flexible elastomeric seals. Solvent-cement couplings are not permitted.

C. High Density Polyethylene (HDPE) - Water Distribution System Pipe: AWWA C906, DR-9.

D. Municipex (PEXa) by Rehau – Water Service Pipe: AWWA C904-06, ASTM F876, and ASTM F877

1. Pipe: Pipe shall hold a standard designation code of PEX 1006 per ASTM F876 and conform to standard dimension ratio of SDR 9 for diameters ranging from ½" to 3"

2. Fittings and Jointing: Fittings shall be as approved by AWWA C904. The following ASTM directives shall be references for fitting types.

a. ASTM F1807 – Brass or Copper Insert Fittings with Copper Crimp Rings

b. ASTM F1960 – Cold Expansion Fittings with PEX Reinforcing Rings

c. ASTM F2080 – Cold Expansion Fittings with Metal Compression Sleeves

E. Seamless Type K Copper – Water Service Pipe: AWWA C800, ASTM B 88

1. Pipe: Pipe shall be seamless type K soft copper water tube in accordance with ASTM standards and be furnished in coils and be rated for underground service.

2. Fittings and Jointing: Fittings and joints shall be threaded and/or flare connections.

F. Unless specifically approved by the City, minimum water line sizes shall be as follows:

1" - Single Family Subdivision Development

¾" - Multifamily Development

4" - Commercial Development

4.2 Valve Boxes

A. 12-inch diameter Valves and Smaller: Domestic cast iron, two-piece, screw type.

B. Valves larger than 12-inch diameter: Domestic cast iron, three-piece, screw type; round base.

C. Cast iron lid marked "Water".

4.3 Positive Displacement Meters

A. All water meters shall be the iPERL unit accompanied by a 520M Single Port MXU as manufactured by Sensus unless specifically approved otherwise, in writing, by the City

4.4 Underground Pipe Markers

A. Trace Wire: For all PVC and PEX pipe, locator wire shall be 10 gauge solid insulated installed 18" to 24" above pipe.

4.5 Mechanical Joint Restraint

A. Restraint devices for nominal pipe sizes 3" – 36" shall consist of multiple gripping wedges incorporated into a retainer gland meeting the requirements of ANSI/AWWA C111/A21.11.

B. The devices shall have a working pressure-rating equal to that of the pipe on which it is used. Ratings are for water pressure and must include a minimum safety factor of 2:1 in all sizes.

C. Gland body, wedges and wedge actuating components shall be cast from grade 65-45-12 ductile iron.

D. Mechanical joint restraint shall be Series 2000PV as produced by EBAA Iron, Inc. or equal.

4.6 Flange Adapter

A. Flange adaptors may be used in lieu of threaded or welded flanges of plain end ductile pipe where allowed by the City.

B. The restraints shall be manufactured of ductile iron conforming to ASTM A536.

C. The bolt circles and bolt holes shall conform to ANSI/AWWA C110/A21.10.

D. The restraint shall be Series 1000-EZ Flange as manufactured by EBAA Iron, Inc. or equal.

4.7 Plugs

A. Plugs shall be made of brass and conform to ASTM B62, ASME B16.15, or ANSI B 1.20.1

4.8 Accessories

A. Steel rods, bolt, lugs and brackets: ASTM A36/A36M or ASTM A307 carbon steel.

B. Protective Coating: Bituminous coating.

4.9 Preparation

A. Pre-Construction Site Photos:

1. Take photographs along centerline of proposed pipe trench; minimum one photograph for each 100 feet of pipe trench. More as required.

2. Show mailboxes, curbing, lawns, driveways, signs, culverts, and other existing site features.

3. Include date taken and sequential number on back of each photograph or within digital filing system.

B. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs. Use only equipment specifically designed for pipe cutting. The use of chisels or handsaws will not be permitted. Grind edges smooth with beveled end for push-on connections.

C. Remove scale and dirt on inside and outside before assembly.

D. Prepare pipe connections to equipment with flanges or unions.

E. Do not interrupt existing utilities without permission and without making arrangements to provide temporary utility services.

1. Notify City not less than two days in advance of proposed utility interruption.

4.10 Bedding

A. Dewater excavations to maintain dry conditions and preserve final grades at bottom of excavation.

B. Place bedding material at trench bottom, level fill materials in one continuous layer not exceeding 8 inches compacted depth; compact to 95 percent.

4.11 Installation – Pipe

A. Install pipe in accordance with AWWA C600.

B. Handle and assemble pipe in accordance with manufacturer's instructions.

C. Steel Rods, Bolt, Lugs, and Brackets: Coat buried steel with one coat of coal tar coating before backfilling.

D. Install ductile iron piping and fittings to AWWA C600.

E. All fittings to be Sigma C153 or approved equal unless dictated otherwise by materials of construction.

F. Weld pipe in accordance with AWWA C206. Weld joints in accordance with AWWA C205.

G. Route pipe in straight line. Relay pipe that is out of alignment or grade.

H. Install pipe with no high points.

I. Install pipe to have bearing along entire length of pipe. Excavate bell holes to permit proper joint installation. Do not lay pipe in wet or frozen trench.

J. Prevent foreign material from entering pipe during placement.

K. Install pipe to allow for expansion and contraction without stressing pipe or joints.

L. Close pipe openings with watertight plugs during work stoppages.

M. Establish elevations of buried piping with not less than three ft of cover. Measure depth of cover from final surface grade to top of pipe barrel.

N. Install trace wire continuous 18” to 24” inches above pipeline.

4.12 Thrust Restraint

A. Provide valves, tees, bends, caps, and plugs with concrete thrust blocks. Pour concrete thrust blocks against undisturbed earth. Locate thrust blocks at each elbow or change of pipe direction to resist resultant force and so pipe and fitting joints will be accessible for repair.

B. Install tie rods, clamps, set screw retainer glands, or restrained joints. Protect metal restrained joint components against corrosion by applying a bituminous coating, or by concrete mortar encasement of metal area. Do not encase pipe and fitting joints to flanges.

4.13 Backfilling

A. Backfill around sides and to top of pipe with cover fill in minimum lifts of 12 inches, tamp in place and compact to 90 percent. Place and compact material immediately adjacent to pipes to avoid damage to pipe and prevent pipe misalignment.

B. Maintain optimum moisture content of bedding material to attain required compaction density.

Section 5 Cutting and Replacement of Existing Pavements

5.1 The open cutting of existing pavements may be permitted for water line installations across designated City of Troy streets and State maintained roadways as approved by the City of Troy and other agencies. The cutting and replacement of such pavements shall conform to the Standard Details provided herein. Written permission will be mandatory from all stakeholders prior to construction activities.

Section 6 Replacement of Concrete Driveways and Sidewalks

6.1 All concrete sidewalk and concrete driveways shall be constructed of Class “A”, Type 2, 3,000-psi concrete, mixed, transported, placed and cured in accordance with Section 501 of the Alabama Department of Transportation Standard Specifications. Old concrete shall be cut to a neat line. The base material on which the concrete is placed shall be prepared so that the base is firm and free from any spongy materials. Form work shall be true and new concrete surfaces shall conform as nearly as possible to the old materials replaced. All flat concrete shall be the same thickness as the old concrete replaced, but in no case less than four (4) inches thick.

Section 7 Installation of Steel Casing by Boring and Jacking

7.1 All design calculations related to the design of piping and piping systems that cross underneath roadways, railroads, etc. shall be submitted for review and approval by the City. Carrier pipe shall be restrained joint ductile iron pipe.

Section 8 Fire Hydrants

8.1 Qualifications

A. Manufacturer: company specializing in manufacturing Products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing work of this section with minimum three years documented experience.

8.2 Delivery, Storage and Handling

A. Prepare hydrants and accessories for shipment according to AWWA Standards and seal hydrant and ends to prevent entry of foreign matter into product body.

B. Store products in areas protected from weather, moisture, or possible damage; do not store products directly on ground; handle products to prevent damage to interior or exterior surfaces.

8.3 Environmental Requirements

A. Conduct operations not to interfere with, interrupt, damage, destroy, or endanger integrity of surface or subsurface structures or utilities, and landscape in immediate or adjacent areas.

8.4 Fire Hydrants

A. Manufacturers:

1. Mueller Co., Super Centurion, American Darling, or M & H with integral Storz pumper connection.

B. Dry-barrel Break-away Type: AWWA C502; ductile-iron body, compression type valve.

1. Inlet Connection: 6 inches.
2. Valve Opening: 5-1/4 inches diameter.
3. Ends: Mechanical Joint or Bell End.
4. Bolts and Nuts: Corrosion resistant.
5. Coating: AWWA C550; interior.
6. Direction of Opening: Counterclockwise unless otherwise indicated.
7. Pressure Rating: 200 psig.

C. Nozzle Requirement: One Storz integral pumper (4-1/2") and no less than two hose (2½").

1. Thread type shall be National Standard.
2. Attach nozzle caps by separate chains.

D. Finish: Primer and two coats of enamel color in accordance with utility company requirements. Provide with a uniform color scheme for fire hydrants in accordance with NFPA 281.

E. Hydrant shall be designed so that, when in place, no excavation will be required to remove the main valve or add extensions.

F. Hydrants shall be ordered to meet minimum height specifications in accordance with site grade. Use of hydrant extension kits are not permitted by the City, unless otherwise approved.

8.5 Preparation

A. Identify required lines, levels, contours and datum locations.

B. Locate, identify, and protect utilities to remain from damage.

C. Do not interrupt existing utilities without permission and without making arrangements to provide temporary utility services.

1. Notify City not less than two days in advance of proposed utility interruption.

8.6 Installation

A. Fire Hydrants:

1. All hydrant set locations shall be pre-approved by the City.

2. When installed on non-curbed roadways, hydrants shall be installed at the back of the City's utility right-of-way. Other installations shall reference Water System Details 100-02 and 100-03.

3. A minimum of a 3-foot clear radius is required around all newly installed hydrants.

4. Install fire hydrants; provide support blocking and drainage gravel; do not block drain hole.

5. Set hydrants plumb with pumper nozzle facing roadway; set hydrants with centerline of pumper nozzle 18 inches above finished grade and safety flange not more than 6 inches nor less than 2 inches above grade.

6. Paint hydrants in accordance with local color scheme and NFPA 281.

7. After hydrostatic testing, flush hydrants and check for proper drainage.

Section 9 Valves

9.1 Qualifications

A. Manufacturer: company specializing in manufacturing Products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing work of this section with minimum three years documented experience.

9.2 Delivery, Storage and Handling

A. Prepare valves and accessories for shipment according to AWWA Standards and seal valve to prevent entry of foreign matter into product body.

B. Store products in areas protected from weather, moisture, or possible damage; do not store products directly on ground; handle products to prevent damage to interior or exterior surfaces.

9.3 Environmental Requirements

A. Conduct operations not to interfere with, interrupt, damage, destroy, or endanger integrity of surface or subsurface structures or utilities, and landscape in immediate or adjacent areas.

9.4 Tapping Sleeves and Valves

A. Tapping Sleeves:

1. Ductile iron, full circumferential gasket, mechanical joint outlet.
2. Manufacturers:
    a. Mueller Co. Model H-615 or approved equal
3. Outlet Flange Dimensions and Drilling: ANSI B16.1, Class 125 and MSS SP-60.

B. Tapping Valves:

1. AWWA C500, resilient wedge with non-rising stem. Epoxy coated ductile iron body. Inlet flanges shall conform to ANSI B16.1, Class 150 and MSS SP-60. Mechanical joint outlets shall conform to AWWA C111.
2. Manufacturers:
    a. Mueller Co. or approved equal

9.5 Resilient Wedge Gate Valves

A. Manufacturers:

1. American Darling or approved equal

B. Resilient Wedge Gate Valves: AWWA C509; iron body, bronze or ductile iron.

1. Resilient seats.
2. Stem: Non-rising bronze stem.
3. Underground Valve-Operating Nut: Square; open counterclockwise unless otherwise indicated.
4. Installed Inside Structure – Flanged joint and operating hand wheel. Turn counter clockwise to open and shall have an arrow cast on the hand wheel.
5. Ends: Flanged, mechanical joint or bell end connections.
6. Coating: Fusion bonded, heat cured, thermo setting material meeting AWWA C550; interior/exterior.
7. Wedge: Cast iron, completely encapsulated with resilient material.
8. All internal parts shall be accessible without removing the body from the line.

9. Sizes 12-inch diameter and smaller: 200 psig working pressure.

9.6 Valve Boxes

A. 12-inch diameter Valves and Smaller Valves: Domestic cast iron, two-piece, screw type.

B. Valves larger than 12-inch diameter Valves: Domestic cast iron, three-piece, screw type; round base.

C. Cast iron lid, marked "Water".

9.7 Preparation

A. Identify required lines, levels, contours and datum locations.

B. Locate, identify, and protect utilities to remain from damage.

C. Do not interrupt existing utilities without permission and without making arrangements to provide temporary utility services.

1. Notify City not less than two days in advance of proposed utility interruption.

9.8 Installation

1. Install valves in conjunction with pipe laying; set valves plumb.

2. Provide buried valves with valve boxes installed flush with finished grade.

Section 10 Backflow Preventers

10.1 Reference Standards

The publications listed below form part of this specification to the extent referenced and are referred to in the text by the basic designation only. Reference shall be made to the latest edition of said standards unless otherwise called for.

- AWWA C510 -Double Check Valve Backflow-Prevention Assembly AWWA C511-Reduced-Pressure Principle Backflow-Prevention Assembly
- AWWA M14 -Recommended Practice for Backflow Prevention and Cross-Connection Control
- AWWA Publication - Cross-Connection and Backflow Prevention

10.2 Service Application

A. Reduced-pressure backflow prevention assemblies shall be provided on all commercial and industrial water services. Depending on degree of hazard, a double check valve assembly may be required in place of a reduced-pressure backflow assembly.

B. Reduced-pressure backflow prevention assemblies shall be provided on irrigation services where served by potable water.

C. Reduced-pressure backflow prevention assemblies shall be provided on potable water services where well water or any other water supply is served to the same property.

D. Double check valve assemblies shall be provided at all points of connections to City sources at construction sites.

E. Reduced-pressure detector assemblies shall be provided on all fire services. Backflow prevention on fire services shall be as required by the City.

F. The City shall be the final authority as to the location, installation, and type of backflow prevention device required.

10.3 General Design Considerations

A. The design and construction of the backflow prevention assembly shall meet the requirements called for in this specification except that any modifications specifically shown on the Approved Plans shall take precedence over these general standards.

B. The nominal size of the backflow prevention device shall be equal to or greater than the size of the purchased meter. For example, a 25mm (1") meter shall have a 25mm (1") or larger backflow device.

C. The assembly shall include same size valves located on either side of the backflow prevention assemblies. Four test cocks shall be appropriately located on the assembly for testing and certification.

D. The nominal size of reduced-pressure principle detector assemblies shall be as shown on the Approved Plans or as directed by the Fire Department of jurisdiction.

E. Enclosures and concrete slabs shall be provided only as shown on the Approved Plans or as required by the agency of jurisdiction.

F. Devices shall conform to any and all requirements stated in the City of Troy specifications noted as “Service Connections.”

10.4 Delivery, Storage and Handling of Backflow Devices

Backflow prevention assemblies shall be delivered and stored in accordance with AWWA C210, AWWA C213, and AWWA C550. The port openings shall be covered with plastic, cardboard, or wood while in transit and during storage in the field. These covers shall remain in place until the backflow assembly is ready to be installed. Backflow assemblies shall not be stored in contact with bare ground. Backflow assemblies shall not be stacked.

10.5 Installation

A. Installation shall comply with the latest edition of the Uniform Plumbing Code, applicable local agency and City requirements.

B. Backflow prevention assemblies shall be installed in accordance with the manufacturer’s Standard Drawings. The City requires backflow prevention assemblies to be installed below ground unless otherwise specified.

C. Water service and fire service shut-off valves will be secured closed during installation until an approved backflow prevention device is installed and tested in compliance with this specification.

D. When static pressure exceeds 1.03MPa (150psi), or when recommended by the backflow device manufacture, a pressure-reducing valve shall be installed as shown on the manufacturer's Standard Drawings.

10.6 Enclosures

Enclosures shall be installed as directed by the City.

10.7 Testing

The City will inspect and initially test each backflow prevention assembly after inspection of its proper installation is complete. Prior to testing, the City's Water Department shall be notified 48 hours in advance.

Required maintenance of the backflow prevention device and appurtenances and annual testing of the device shall be the Owner's responsibility.

Section 11 Service Connections

All service connections shall be noted by permanently placing a "W" in the curb at the location of the service connection to the distribution system.

11.1 Cross-Linked Polyethylene Pipe by Rehau (PEX)

- 250 psig pressure rating
- AWWA C904-06, Conforming to SDR 9, ASTM F876, ASTM F877
- Joints: As outlined in Section 4.11
- Trace Wire: As outlined in Section 4.4

11.2 Corporation Stop Assembly

A. Manufacturers: Mueller Co., Ford Meter Box Company, or approved equal.

B. Corporation Stops

1. Brass or red brass alloy body conforming to ASTM B62.
2. Inlet end threaded for tapping according to AWWA C800.

C. Service Saddles:

1. Mueller Co. Style BR2B Bronze Double Strap, Ford Style S70 Brass Double Strap, or approved equal

D. "Y" Fitting

1. McDonald Mfg. Co. Brass, Ford Brass Fittings, or approved equal.

11.3 Curb Stop Assembly

A. Manufacturers:

1. Mueller Co. ¾" with double lock-wing, Ford Meter Box Company ¾" with double lock-wing, McDonald Mfg. Co. ¾" with double lock-wing or approved equal.

B. Curb Stops:

1. Brass or red brass alloy body conforming to ASTM B62.
2. Plug type valve.
3. Positive pressure sealing.
4. Must include a locking mechanism.
5. Curb stop and meter spud combinations are not permitted by the City.

11.4 Meter Box

A. Schofield cast iron with pre-cut lid, model MB-379T.

11.5 Water Meters

A. All water meters shall be the iPERL meter accompanied by a 520M Single Port MXU as manufactured by Sensus unless approved, in writing by the City.

B. All fittings shall be brass.

11.6 Backflow Preventers

A. Watt Dual Check Valve No. 7, Conbraco Industries/4NLF-300 Series, or approved equal.

11.7 Cutoff Valve

A. Apollo 32-104-01 Bronze, lever handle ball valve, or approved equal

11.8 Preparation

A. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare pipe connections to equipment with flanges or unions.

11.9 Installation – Corporation Stop Assembly

A. Make connection for each different kind of water main using suitable materials, equipment and methods approved by the City.

B. Provide service clamps for mains other than of cast iron or ductile iron mains.

C. Screw corporation stops directly into tapped and threaded iron main at 10 and 2 o'clock position on main's circumference; locate corporation stops at least 12 inches apart longitudinally and staggered.

D. For plastic pipe water mains, provide full support for service clamp for full circumference of pipe, with minimum 2 inches width of bearing area; exercise care against crushing or causing other damage to water mains at time of tapping or installing service clamp or corporation stop.

E. Use proper seals or other devices so no leaks are left in water mains at points of tapping; do not backfill and cover service connection until approved by the City.

11.10 Bedding

A. Place bedding material at trench bottom, level fill materials in one continuous layer not exceeding 8 inches compacted depth; compact to 95 percent.

11.11 Installation – Pipe and Fittings

A. Group piping with other site piping work whenever practical.

B. Route pipe in straight line.

C. Install pipe to allow for expansion and contraction without stressing pipe or joints.

D. Install access fittings to permit disinfection of water system.

E. Form and place concrete for thrust restraints at each elbow or change of direction of pipe main.

11.12 Installation – Curb Stop Assembly

A. Set curb stops and connect to inlet side of meter.

B. Center and plumb meter box over meter/curb stop assembly. Set box cover 1" above finished grade.

11.13 Installation – Water Meters

A. Install meter in location shown on the drawing or as directed by the Owner. Locate as near as possible to existing house water service.

B. Water meters shall be installed in grassed areas, not in driveways or concrete aprons, unless prior approval from the City is obtained.

C. All fittings used for water meter connections shall be brass.

11.14 Installation – Backflow Preventers

A. Install backflow preventer on each meter and in accordance with manufacturer's instructions, unless otherwise instructed by the City's Engineering Department.

11.15 Service Reconnections

A. Reconnect to exiting water meter assembly.

B. Flush and pressure test service line prior to connection of meter.

C. Service lines shall be installed at shallow depth (2' to 3') for ease of future maintenance access.

D. Service lines shall be installed with a loop of service line as slack in the event of future repair needs.

Section 12 Cross Connection and Backflow Prevention

12.1 The City of Troy potable water system shall be protected from all cross connections by a backflow prevention assembly in accordance with the City of Troy Plumbing Code and approved by the City of Troy.

Section 13 Leakage and Pressure Testing

13.1 Pressure Test

1. Prior to pressure testing, the City's Water Department shall be notified 48 hours in advance.

2. After completion of pipeline installation, including backfill, but prior to final connection to existing system, conduct, in presence of City's representative, concurrent hydrostatic pressure and leakage tests in accordance with AWWA C600.

3. Provide equipment required to perform leakage and hydrostatic pressure tests.

4. Test Pressure: Not less than 160 psi unless conditions exist under which material failure would be possible.

5. Conduct hydrostatic test for at least six-hour duration.

6. No pipeline installation will be approved when pressure varies by more than 5 psi at completion of hydrostatic pressure test.

7. Before applying test pressure, completely expel air from section of piping under test. Provide corporation cocks so air can be expelled as pipeline is filled with water. After air has been expelled, close corporation cocks and apply test pressure. At conclusion of tests, remove corporation cocks removed and plug resulting piping openings.

8. Slowly bring piping to test pressure and allow system to stabilize prior to conducting leakage test. Do not open or close valves at differential pressures above rated pressure.

9. Examine exposed piping, fittings, valves, hydrants, and joints carefully during hydrostatic pressure test. Repair or replace damage or defective pipe, fittings, valves, hydrants, or joints discovered, following pressure test.

10. Testing shall be performed with a chart recorder. Chart shall be delivered to the City.

11. No pipeline installation will be approved when leakage is greater than that determined by the following formula:

$$L = \frac{SD\sqrt{P}}{133{,}200}$$

L = allowable, in gallons per hour

S = length of pipe tested, in inches

D = nominal diameter of pipe, in inches

P = average test pressure during leakage test, in pounds per square inch (gauge)

12. When leakage exceeds specified acceptable rate, locate source and make repairs. Repeat test until specified leakage requirements are met.

B. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

Section 14 Disinfection

14.1 Disinfection Procedure

A. All infrastructure disinfection work to be performed in accordance with AWWA C651.

14.2 Laboratory

A. The selected testing firm or laboratory shall be available to produce relevant testing experience relating to testing potable water systems. All test results should be accompanied by the bacteriologist's signature and laboratory identifying information.

14.3 Field Quality Control

A. The following shall be adhered to in the field during any and all disinfection procedures.

1. Upon completion of retention period required for disinfection, flush pipeline until chlorine concentration in water leaving pipeline is no higher than that generally prevailing in existing system or is acceptable for domestic use.

2. Legally dispose of chlorinated water. When chlorinated discharge may cause damage to environment, apply neutralizing chemical to chlorinated water to neutralize chlorine residual remaining in water.

3. After final flushing and before pipeline is connected to existing system, or placed in service, employ an approved independent testing laboratory to sample, test and certify water quality suitable for human consumption.

4. All tests must meet the approval of ADEM.

14.4 Disinfection Chemicals

A. Chemicals shall AWWA B300, Hypochlorite, and AWWA B303, Sodium Chlorite. Use of liquid chlorine is not permitted

14.5 Bacteriological Report

A. Disinfection reports shall be submitted to the City and shall include, at a minimum, the following elements:

1. Date issued, project name, and testing laboratory name, address, and telephone number.

2. Time and date of water sample collection.

3. Name of person collecting samples.

4. Test locations.

5. Initial and 24 hour disinfectant residuals in ppm for each outlet tested.

6. Coliform bacteria test results for each outlet tested.

7. Certify water conforms, or fails to conform, to bacterial standards of Alabama Department of Environmental Management.

Section 15 Final Completion and Acceptance

15.1 When the project is complete, the City of Troy shall inspect the work. IF found to be completed in accordance with the contract documents and/or specifications, the City of Troy shall issue to the Contractor a letter of final acceptances, which shall mark the beginning of the Contractor's one year warranty period. If the work is found to be incomplete or not in accordance with the contract documents and/or specifications, the City of Troy shall notify the Contractor of the reasons for non-acceptance, which reasons shall be promptly remedied by the Contractor and at his expense.

Section 16 Warranty

16.1 The Owner/Developer/Contractor shall be responsible for warranty of the work for one (1) year from date of completion of the work as approved by the City. Any deficiencies in material or workmanship shall be corrected in a timely manner by the Owner/Developer/Contractor.

Section 17 Water Infrastructure Ownership

17.1 Applicability

A. The City of Troy and end users each hold ownership of portions of the water distribution infrastructure which services each end user. Each entity is therefore responsible for the maintenance of portions of this infrastructure to ensure proper water conveyance. The discussion of ownership and responsibility presented herein is applicable to circumstances in which a water service line is connected to a primary distribution point or pipe. This may include the incorporation of piping, valves, meters, backflow preventers, and related appurtenances. Additional items for consideration may be applied in circumstances where service is delivered in a manner which deviates from this general service layout as well as in the case of dedicated piping for fire suppression systems.

17.2 Private and Public Service Piping

A. Potable water service extends to end users through service piping. For the purposes of these Specifications, the service piping is described in two segments, each with unique responsibility assignments. The first segment extends from the City-owned distribution point or pipe to the edge of the right-of-way and is referred to herein as the public service piping. The City of Troy is responsible for maintaining the public service piping. The public service piping includes all infrastructure associated with the service installed within the right-of-way. This may include valves, valve boxes, water service meters, and related items. The portion of the service piping that extends from the edge of the City's right-of-way towards the property of the end user is referred to herein as the private service piping. The end user is responsible for maintaining the private service piping.

17.3 Addressing Water Service Disruptions

A. In the event of a disruption in water service including, but not limited to water leaks, blockages, pressure issues, it shall be the responsibility of the end user to determine the cause and location of the disturbance or condition causing the disturbance. This shall be completed by the utilization of a licensed plumber.

B. If a licensed plumber locates the cause of the issue and it is found to be within the limits of the private service piping, the end user shall bear the costs associated with locating and correcting the issue. In any instance in which the licensed plumber finds a defect or condition within the public service piping to be the cause of a service disruption, the end user shall immediately contact the City of Troy Utilities. The City will make a site visit while the licensed plumber is still on-site and mobilized to show the disruption. Following confirmation that the disruption is within the public service piping, the City of Troy will bear the burden of correcting the issue identified.

Standard Water System Details

Detail ID	Detail
100-01	2” Blow-Off Assembly
100-02	Hydrant Installation
100-03	Hydrant Location
100-04	Yard Hydrant (Non-Freeze)
100-05	Valve Box Installation
100-06	Valve Cover
100-07	Capping Detail
100-08	Thrust Collar Installation
100-09	Thrust Blocking
100-10	Valve Box Marker for Unpaved Areas
100-11	Tapping Sleeve and Post Indicator Valve
100-12	Butterfly Valve with 5’ Manhole Encasement
100-13	Jack and Bore Detail
100-14	Sprinkler Riser and Fire Department Connection
100-15	Curb Side Fire Department Connection
100-16	Water Main Pipe Backfilling
100-17	Air and Vacuum Release Valve Station
100-18	RPZ Backflow Preventer Assembly (3/4” to 2”)
100-19	Water Service Connection
100-20	Water Service Connection (Long Side)
100-21	2” and Larger Meter Installation and Vault - I
100-22	2” and Larger Meter Installation and Vault - II