

## TECHNICAL SPECIFICATIONS

### The Standard Specifications for Water and Sanitary Sewer Installations

- (A) *The Standard Specifications for Water and Sanitary Sewer Installations* (the *Specifications*) is subject to revisions and corrections. At the beginning of a project, users should verify that they have the latest edition.
- (B) The Standard Details are complementary to the *Specifications* written herein. If the developer or designer notes any discrepancies or desires an interpretation of a specification, they should submit their question to the City Utilities Engineer in writing for a decision by the City.
- (C) The *Specifications* are intended to convey the general design and construction requirements for a typical project. It also lists specific City of Calhoun requirements relating to plan review, inspection, testing and acceptance of facilities. It is not intended as a substitute for site-specific engineering and construction techniques.
- (D) Failure by the City to notice any deviations from the *Specifications* during the plan review process does not alleviate the Developer's responsibility to adhere to the *Specifications*.
- (E) List Of Commonly Used Terms
  - (1) "City" shall mean the City of Calhoun.
  - (2) "Contractor" shall mean the individual, firm or corporation undertaking the execution of the Work under the terms of the contract and acting through its agents and employees.
  - (3) "Developer" shall mean the individual, firm or corporation financing the execution of the Work.
  - (4) "Engineer" shall refer to the City of Calhoun Utilities Engineer and to his properly authorized agents.
  - (5) "Owner" shall refer to the City of Calhoun.
  - (6) "Plans" shall refer to those drawings that show the character and scope of the work and shall include all drawings identified in the contract documents.
  - (7) "Specifications" and "Standards" shall refer to the City of Calhoun Standard Specifications for Water and Sanitary Sewer Installations.

### **103. Water Distribution Systems**

#### **A. Part 1 – General**

##### 1.1 Section Includes:

- A. Furnishing and installing water distribution pipes, valves, fittings, and other appurtenances, including reaction blocking, testing, and disinfection.

##### 1.2 Related Work:

- A. SECTION 108 TRENCHING, BACKFILLING AND COMPACTION
- B. SECTION 104 WATER SERVICE CONNECTIONS

##### 1.3 Reference Standards:

- A. All materials and installation shall conform to requirements of Georgia Rules for Safe Drinking Water Chapter-391-3-5, revised October 16, 1997 and Environmental Protection Division's *Minimum Standards for Public Water Systems*, January, 1998 edition.
- B. Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water (AWWA C104-95).
- C. Ductile-Iron Compact Fittings, 3 In. Through 24 In., for Water Service (AIRWA C153-94)
- D. Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings (AWWA C111-95).
- E. Ductile-Iron Pipe, Centrifugally Cast, for Water or Other Liquids (AWWA C151-96).
- F. Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure Rated Pipe (SDR Series) (ASTM-D 2241). **(Must be white in color).**
- G. Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds (ASTM D 1784).
- H. Poly (Vinyl Chloride) (PVC) Pressure Pipe, 4 In. Through 12 In. for Water Distribution (AWWA C900-89). **(Must be white in color).**
- I. Metal-Seated Gate Valves for Water Supply Service (AWWA C500-93).
- J. Dry-Barrel Fire Hydrants (AWWA C502-94).
- K. Resilient-Seated Gate Valves for Water Supply Service (AWWA C509-94).
- L. Air Release, Air/Vacuum, and Combination Air Valves for Water Works Service (AWWA C512-92)
- M. Installation of Ductile-Iron Water Mains and Their Appurtenances (AWWA C600-93).
- N. Underground Installation of PVC Pressure Pipe and Fittings for Water (AWWA C605-94).
- O. Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seal (ASTM D 3139).
- P. Elastomeric Seals (Gaskets) for Joining Plastic Pipe (ASTM F 477).
- Q. Disinfecting Water Mains (AWWA C651-92).

1.4 Submittals:

- A. Submit complete descriptions, including manufacturer's catalog data and operation and maintenance instructions, for all products for approval prior to shipment.

- B. Submit manufacturer's certification for all pipe, valves, hydrants, and fittings shipped to the job stating that specified tests have been made and the results thereof comply with applicable specifications.
- C. All similar products on a project shall be furnished by a single manufacturer, unless otherwise approved by the Engineer. For example, all of the PVC pipe on a given project shall come from one manufacturer.

1.5 Delivery, Storage, and Handling:

- A. Properly and safely unload, and store all material furnished until incorporated into the Work and accepted.
- B. Unload pipe, fittings, valves, and hydrants by lifting with hoists or skidding to avoid damage. Do not roll or drop off trucks. Do not skid or roll against pipe already on the ground.
- C. Unload material at the site of the Work near the place where it will be installed. Do not interfere with traffic or create safety hazard. Provide signs, lights, and barricades as necessary to protect the public.
- D. Keep interior of pipe, fittings, valves, hydrants, etc. free of all dirt or foreign matter at all times. Do not store materials in drainage ways or ditches.

- 1.6 Site Conditions: Reasonable quantities of water for construction, testing, flushing, and disinfection will be furnished by the City through connections to the Cities water system made by the City or the Cities Contractor upon coordination with City. Excessive usage may result in charges for water used.

**B. Part 2 – Products**

a) 2.1 Ductile Iron Pipe (DIP)

Manufactured in USA in conformance with AWWA C151 and cement mortar lined in accordance with AWWA C104, standard thickness, with seal coat.

- A. Provide Pressure Class 350 for 4-in to 12-in. dia. pipe.
- B. Unless otherwise specified, the pipe shall have push-on compression type joints conforming to AWWA C111.
- C. Restrained joint (RJ) pipe, where specified, or indicated on drawings, shall consist of push-on compression type joint with a locking gasket with stainless steel locking segments vulcanized into the gasket to grip the pipe to prevent joint separation. Restrained joints shall be Fast Grip Gasket by American Cast Iron Pipe Co. or Field-Lok Gasket by U.S. Pipe Co., or equal approved by the Engineer.
- D. Restraining glands: MEGALUG glands by EBAA Iron Sales, Inc are acceptable for ductile iron pipe; other retainer glands with set screws are not acceptable.

b) 2.2 Plastic Pipe (PVC)

Polyvinyl Chloride (PVC) pipe conforming to all requirements of ASTM D 2241-89. PVC plastic extrusion compound shall meet the requirements of ASTM D 1784 for Class 12454-B (PVC 1120). (Must be white in color).

- A. Pipe and fittings shall be Standard Dimension Ratio 21 (SDR 21)
- B. Pipe and couplings shall bear the National Sanitation Foundation Testing Laboratories, Inc. (NSF) seal of approval for potable water use.
- C. Pipe joints shall be integral push-on type complying with ASTM D 3139, designed to provide for the thermal expansion or contraction experienced with a total temperature change of at least 75°F in each length of pipe.
- D. Gaskets shall be vulcanized natural or synthetic rubber conforming to AWWA C111 and ASTM F 477.

c) 2.3 Ductile Iron Fittings

For DIP and PVC pipe shall be ductile iron fittings manufactured in USA. Fittings shall conform to AWWA C153 for diameters through 24 inches Fittings shall be pressure rated 350 psi.

- A. Fittings shall be cement mortar lined in accordance with AWWA C104, standard thickness, with seal coat. *Interior walls shall be smooth and free of defects.*
- B. Fittings shall be mechanical joint (MJ) unless otherwise specified on the Drawings.
- C. Fittings used on restrained joint (RJ) pipe shall be restrained joint fittings with push-on compression type joints equal to those specified for restrained joint ductile iron pipe.
- D. Rubber gasket joints shall conform to AWWA C111.
- E. Gaskets for PVC pipe shall be plain rubber transition type compatible with the type of pipe and fittings used.

d) 2.5 Gate Valves

Resilient Seat type shall conform to AWWA C509 for resilient-seated, iron body, bronze mounted gate valves by Mueller. All 12 inch and smaller valves shall be rated for 200 psi.

- A. Body Type: Mechanical joint unless specified otherwise on the Drawings.
- B. Resilient Seat: Resilient rubber seat ring.
- C. Stem and Seal: Bronze, non-rising stem (NRS), unless shown otherwise on the Drawings; 0-ring seals.

- D. Operator: Manual operating nut, 2 inches square, unless shown otherwise on the Drawings; valve to open when turned to the left (counter-clockwise).
- e) 2.6 Small Gate Valves  
 Valves smaller than 4 inches shall conform to the level of quality and manufacturing standards established for valves 4 inches and smaller, by the respective AWWA Standards. *All small gate valves shall be rated for 200 psi working pressure.*
- A. Two inch valves shall be Stockham Model B-128.
- B. Valves 1-1/2 inch and smaller shall be bronze body, rising stem, solid wedge disc, Crane 428, Jenkins 47, or equal approved by the Engineer.
- f) 2.7 Air Release Valves  
 AWWA C512, designed for minimum 200 psi working pressure, ductile iron body, threaded connections, stainless steel float, Buna N seat; with all internal trim stainless steel or bronze by Crispin or approved equal. Size shall be 1" inlet, 1/2" outlet, 3/16" orifice, unless otherwise specified or shown.
- g) 2.8 Fire Hydrants  
 Conform to all requirements Of AWWA C502 for dry-barrel fire hydrants, traffic type, with safety flange which allows the valve to remain closed when the hydrant is broken or damaged above or near the grade level. All fire hydrants shall be Mueller Super Centurion A-423.
- A. Size: Hydrant main valve opening 5-1/4 inches. Inlet shall be 6 inch, mechanical joint, with strapping lugs. Fire hydrants located in unincorporated Gordon County or connecting counties must be Mueller Super Centurion A-423 with main valve opening as required by that county.
- B. Bury: Unless otherwise specified, bury shall be 3-1/2 feet, with at least 17 inches from centerline of nozzles to bury line. Use adjustable coupling pipe and/or vertical extensions to bring the hydrant to proper finished grade.
- C. Outlet Nozzles: Two 2-1/2 inch dia.; one 4-1/2 inch dia. Nozzle threads shall conform to those in service where the hydrant is to be installed unless otherwise specified. Provide field replaceable nozzle threads.
- D. Stem Seals: O-ring.
- E. Valve: Compression type closing with pressure. Facings shall be rubber.
- F. Color: To be selected by Owner.
- G. Barrel Drain: Provide integral drain outlet.
- H. Anchoring: (See Detail) Use Fire Hydrant Tees and Anchor Couplings unless otherwise approved.

h) 2.10 Piping Accessories

Any accessories required shall be compatible with pipe and fittings used. Small valves, pipe, and fittings shall conform to AWWA Standard C800-89.

- A. Tapping saddle for pipe 8 inches and smaller: Power Seal Type 3401, Bronze strap. (For tapping pipe larger than 8 inches use a DI tapping saddle or tee)
- B. Couplings for 4-in. and smaller pipe: Dresser Style 38.

i) 2.11 Manhole for air released valves or check valves

Precast concrete conforming to ASTM C478-88, with cast iron cover, NEENAH R-6041A for cast-in-slab, or R-1776 if not cast-in-slab type.

j) 2.12 Water meter box for air-release valve

If air release valves meter box is required in non-traffic area, Quazite 27" Round Box; or similar meter box approved by the Engineer.

k) 2.13 Valve Boxes

Cast iron, 5-1/4 inch diameter, two piece screw type adjustable to suit the depth of bury. Provide extension stem if required so that no operating nut is deeper than 5 feet below the cover. Cover shall be cast iron, marked "WATER."

**C. Part 3 - Execution**

a) 3.1 Preparation:

- A. Perform demolition, clearing and grubbing as required.
- B. Install erosion and sediment control measures as required.
- C. Strip and stockpile all sod topsoil suitable for reuse in restoration.
- D. Remove pavement only as necessary for excavating the trench and installing the pipeline and appurtenances. Cut asphalt pavement in straight, uniform lines by means of a suitable pavement saw. Cut concrete pavements to a depth of at least 2 inches along the cut line with a rotary saw, after which the pavement may be broken with a jack hammer.
- E. Provide protection of utilities by notifying all local utility owners and, with an electronic pipe locator and their assistance, locate underground structures, pipes and utility lines, and mark them in advance of trenching operation. Excavate and expose underground utilities in test pits to verify locations and depths. As excavation approaches the marked areas, digging with extreme care if using conventional trenching machines. Promptly restore utilities or structures damaged by construction activities to their original condition before the damage occurred. Upon Contractor's

failure to promptly correct such damage, the City may correct the damage and back-charge the Contractor for costs incurred.

F. As part of the trenching operations, perform removal, relocation, or relaying of pipes, utility lines, and appurtenances which will obstruct the completed water mains or appurtenances.

b) 3.2 Trenching, Back filling and Compaction  
Conform to requirements of Specification Section 6.

c) 3.3 Bedding  
Bedding shall conform to the individual requirements for the pipe or conduit material being used. Unless otherwise specified or shown on the Drawings, bedding shall be Class D for ductile iron pipe and Class C for Plastic Pipe.

d) 3.4 Alignment, Grade and Cover:

A. Install pipe and appurtenances at the locations, positions, alignments, and grades shown on the Drawings. In the event of conflict, install as directed by the Engineer.

B. Provide **36 inches of cover** measured from finished grade to top of pipe barrel unless otherwise shown on drawings. Where obstructions are encountered, the depth may be greater than 36 inches. Depths of cover less than 36 inches may be used only when directed by the Engineer, and do not lay pipe with greater than 48 inches of cover unless specifically approved by the City Engineer.

C. Install pipe such that valves and hydrants will be vertical.

D. Maintain pipe curvatures with the horizontal or vertical permissible deflection at joints, as specified by the manufacturer or AWWA specification C600.

e) 3.5 Installing Pipe

Install pipe and appurtenances only when trench conditions are suitable. Trenches must not contain water that can enter open end of pipe. Proper implements, tools, and facilities shall be provided by the Contractor for the safe and convenient performance of the Work.

A. Lower all pipe, fittings, valves, and hydrants carefully into the trench piece by piece by means of a derrick, ropes, or other suitable tools or equipment. Prevent damage to water main materials and protective coatings and linings. Do not drop or dump water line materials into the trench.

B. Carefully examine all pipe and fittings for cracks and other defects while suspended above the trench immediately before installation in final position. Defective pipe or fittings shall be clearly marked and shall be removed from the site.

C. Clean the interior and bell and spigot ends of each piece of pipe thoroughly before the pipe is laid.

- D. Prevent foreign material from entering the pipe while it is being placed in the line. If necessary, provide protective covering for the ends of the pipe until the connection is to be made to the adjacent pipe. During laying operations, no debris, tools, clothing, or other materials shall be placed in the pipe.
- E. As each length of pipe is placed in the trench, center the spigot end in the bell, force the pipe home and bring to correct line and grade. Secure the pipe in place with approved backfill material tamped around it. Take precautions to prevent dirt from entering the joint space.
- F. At times when pipe laying is not in progress, close the open ends of pipe with a watertight plug. Buckets, tape, etc. are not acceptable. Maintain plug in place until the trench is pumped completely dry.
- G. Lay pipe with bell ends facing in the direction of laying, unless directed otherwise by the Engineer. Where pipe is laid on a grade of 10 percent or greater, start the laying at the bottom and shall proceed upward with the bell ends of the pipe upgrade.

f) 3.6 Cutting Pipe

Use pipe-cutter for inserting valves, fittings, or closure pieces in a neat and workmanlike manner without damage to the pipe or lining. Cut at right angles to the axis of the pipe.

g) 3.7 Tracing Wire and Warning Tape Installation

- A. Install one continuous strand of tracer wire and one continuous strand of approved warning tape over all water mains (of all pipe materials). The detection tape shall be located approximately 18 inches above the pipe.
- B. Place the tracing wire directly on the pipe and secure it to the pipe with tape every 8-10 feet to insure that the wire remains adjacent to the pipe. The tracer wire shall be securely bonded together at all wire joints with approved watertight connectors to provide electrical continuity.
- C. The wire shall be #12 AWG Copper Clad Steel (.0808" diameter) high strength tracer wire, and insulated with a 30 mil high density polyethylene blue jacket complying with ASTM-D-1248 (Copperhead Reinforced Tracer Wire or approved equal).
- D. Proper connectors, which protect from moisture and corrosion, are required. Wire splices shall be connected using Copperhead SnakeBite or 3M DBR connectors. Do not tape the wire together.
- E. Install test stations to access the trace wire at intervals of no more than five-hundred (500) feet. Each valve, with valve box, shall serve as a trace wire access point by pulling the wire up into valve box to within 2 inches of top of valve. Where valves are not available for use as an access point, an access point station shall be created by coiling 3 feet of wire into a standard plastic meter box. Trace wire access points shall be within public right-of-way or public utility easements.



- F. For boring installations, tracing wire shall be installed inside the casing, with the pipe, and connected at both ends of the bore with an approved watertight connector. An access point station shall be installed within 50 feet of both ends of a bored roadway or railway crossing.
- G. The Contractor shall perform a continuity test on all trace wire in the presence of the Engineer or the Engineers' representative. Introducing a small electrical charge to the tracing system during testing will enhance the test results. If the trace wire is found to be not continuous after testing, the Contractor shall repair or replace the failed segment of the wire.

h) 3.8 Jointing

Provide jointing of all pipe, fittings, valves, and hydrants in strict compliance with manufacturer's instructions.

- A. Mechanical Joints: Tighten all nuts with torque limiting wrench. Nuts space 180 degrees apart shall be tightened alternately in order to produce equal pressure.
- B. Push-on Joints: Furnish and install adaptor as required to join bells and spigots of different sizes. Complete joint by forcing the plain end to the bottom of the socket with a forked tool or jack-type tool.
- C. Restrained Joints: Follow same procedure as for push-on joints and manufacturer's procedure for type of restrained joint installed.

i) 3.9 Setting of Valves--and Fittings:

- A. Set valves plumb. Tamp backfill around valves carefully in 6 inch layers for the full depth of trench with valve box in place. All pipe nipples between valves and fittings shall be Ductile Iron.
- B. Provide a valve box and C.I. lid for every valve. For valves in areas that will not be paved, use 6" PVC pipe riser in lieu of C.I. box. The valve box or riser shall not transmit shock or stress to the valve, with the box cover flush with the surface of the finished pavement or such other level as may be directed. Provide an extension stem on any operating nut that is greater than 5 feet below the valve box lid. Provide a precast (circular) concrete collar for all valves.
- C. Provide a concrete valve marker to locate valve only if directed by the City's Representative. This is not required within the development.

j) 3.10 Setting of Hydrants

Set all hydrants plumb with small nozzles parallel with the street and pumper nozzle facing the street, unless otherwise specified. Provide anchoring fittings, valve, and coupling pipe. All materials from the tee to the fire hydrant shall be ductile iron. Rotate coupling pipe for proper bury of hydrant. If additional adjustment is required to match the "bury line" with finished grade after backfill, use vertical fire hydrant extension.

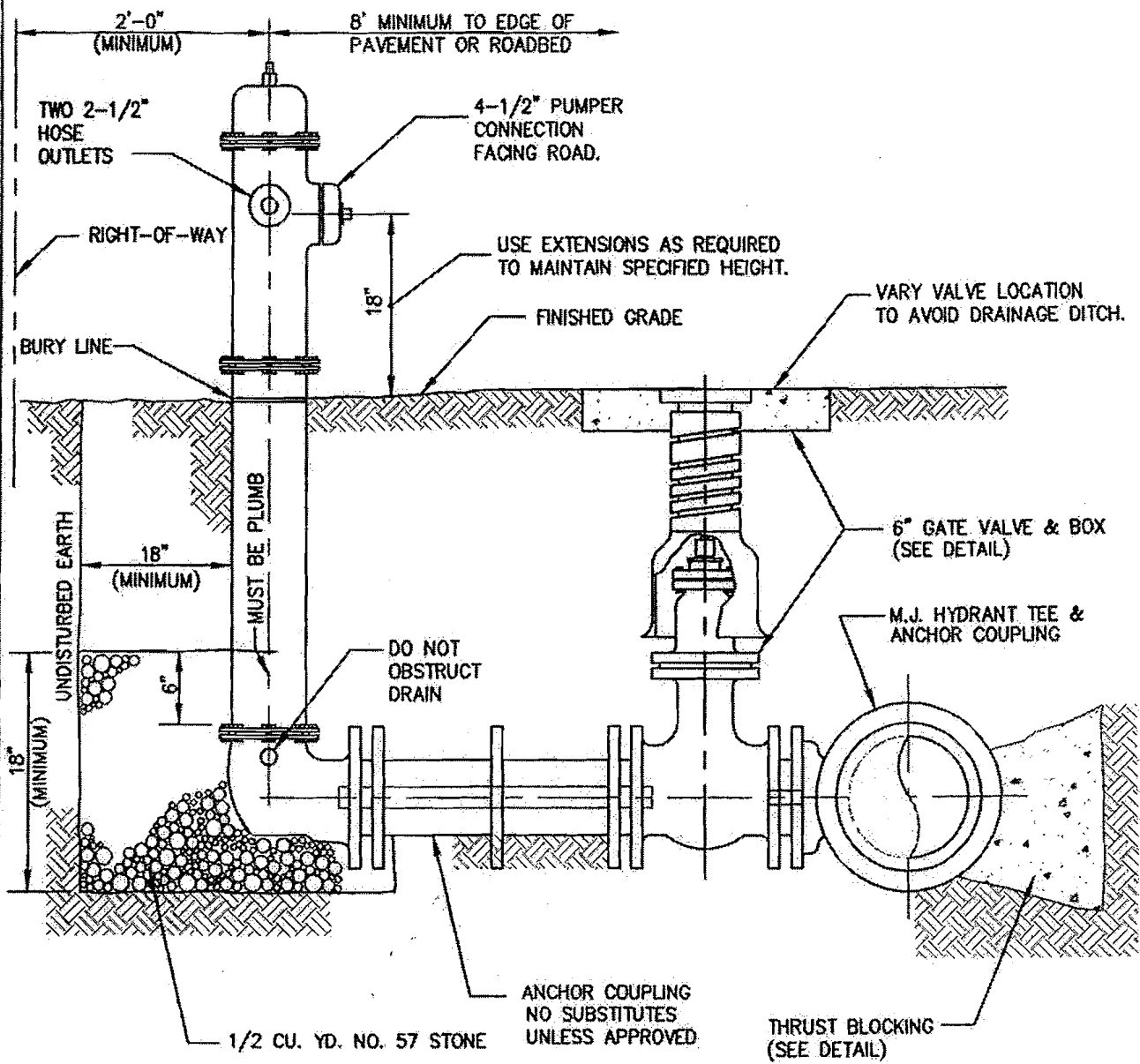
k) 3.11 Thrust (Reaction) Blocking

Provide blocking for all plugs, caps, tees, bends, hydrants, etc. unless otherwise specified.

- A. Blocking shall be purchased Ready-Mix concrete having a compressive strength of not less than 3,000 psi at 28 days. Place blocking between solid, unexcavated earth and the fitting to be anchored. The area of bearing on the pipe and on the ground in each instance shall withstand thrust forces created by the specified test pressure. In no instance shall the bearing area be smaller than shown on the Drawings for firm, dry clay (3000 lb. per sq. ft.). Where soils of lesser bearing capacity are encountered, increase bearing area dimensions as necessary. All blocking shall be placed such that the joints will be accessible for repair, unless otherwise shown or directed
- B. Metal harnesses, tie rods, or clamps may not be used except in special situations specifically approved by the Engineer.

l) 3.12 Connection to Existing Mains:

- A. Coordinate connections to existing water facilities with the City of Calhoun Water Construction Department and do not make connections to existing mains without specific approval of time of day and allowable duration of service disruption.
- B. All connections to existing main will be done by City of Calhoun unless otherwise approved.



NOTE:  
SEE SPECIFICATIONS FOR ACCEPTABLE MATERIALS AND MANUFACTURERS.

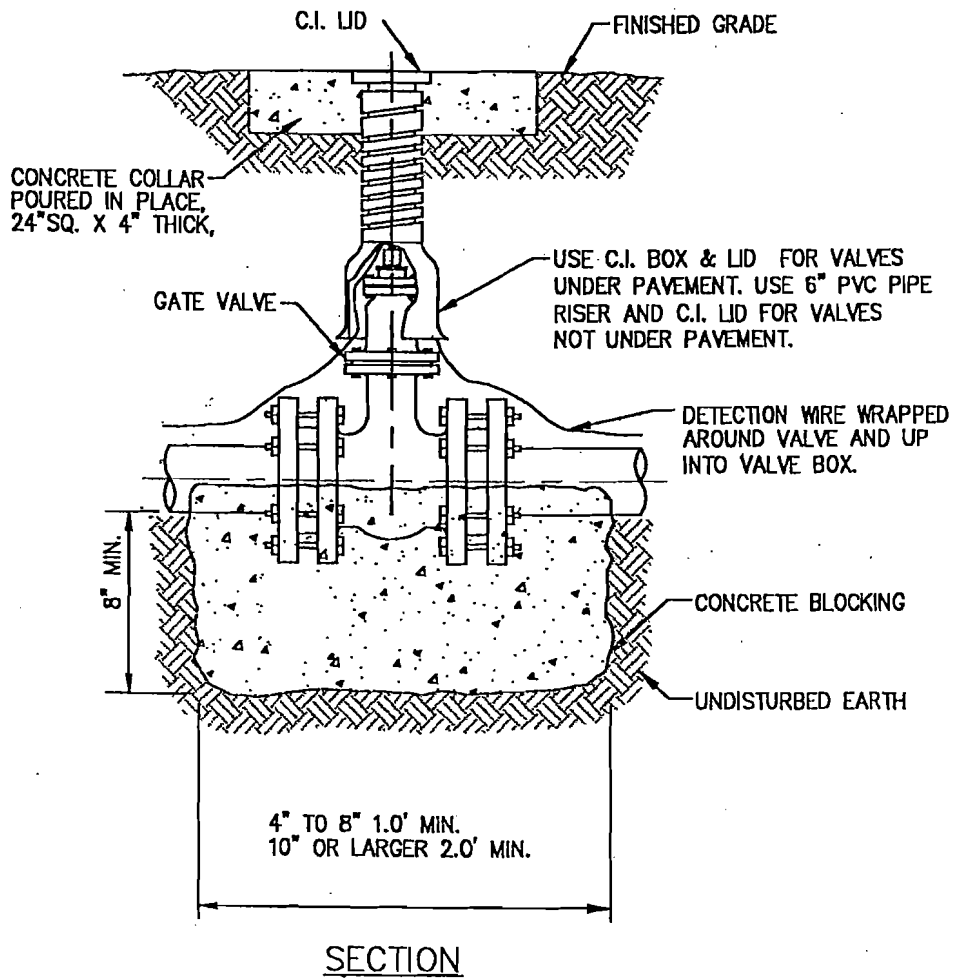
WATER SYSTEM DETAILS  
FIRE HYDRANT ASSEMBLY

CITY OF CALHOUN  
ENGINEERING DEPARTMENT  
P.O. BOX 248  
CALHOUN, GEORGIA 30701  
TELEPHONE (706) 629-4701

DRAWN BY: JWC	SCALE: NTS	DATE: SEPT. 21, 1998	DWG. NO.: WATER-07
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**NOTES**

1. USE READY-MIX CONCRETE WITH 3,000 PSI STRENGTH @ 28 DAYS.
2. PLACE CONCRETE BEARING SURFACES AGAINST UNDISTURBED EARTH.
3. PLACE CONCRETE CLEAR OF JOINT AND JOINT ACCESSORIES.



**WATER SYSTEM DETAILS  
GATE VALVE & BOX**

**CITY OF CALHOUN**  
 WATER AND SEWER CONSTRUCTION  
 P.O. BOX 248  
 CALHOUN, GEORGIA 30701  
 TELEPHONE (706) 629-4750

DRAWN BY: JWC

SCALE: NTS

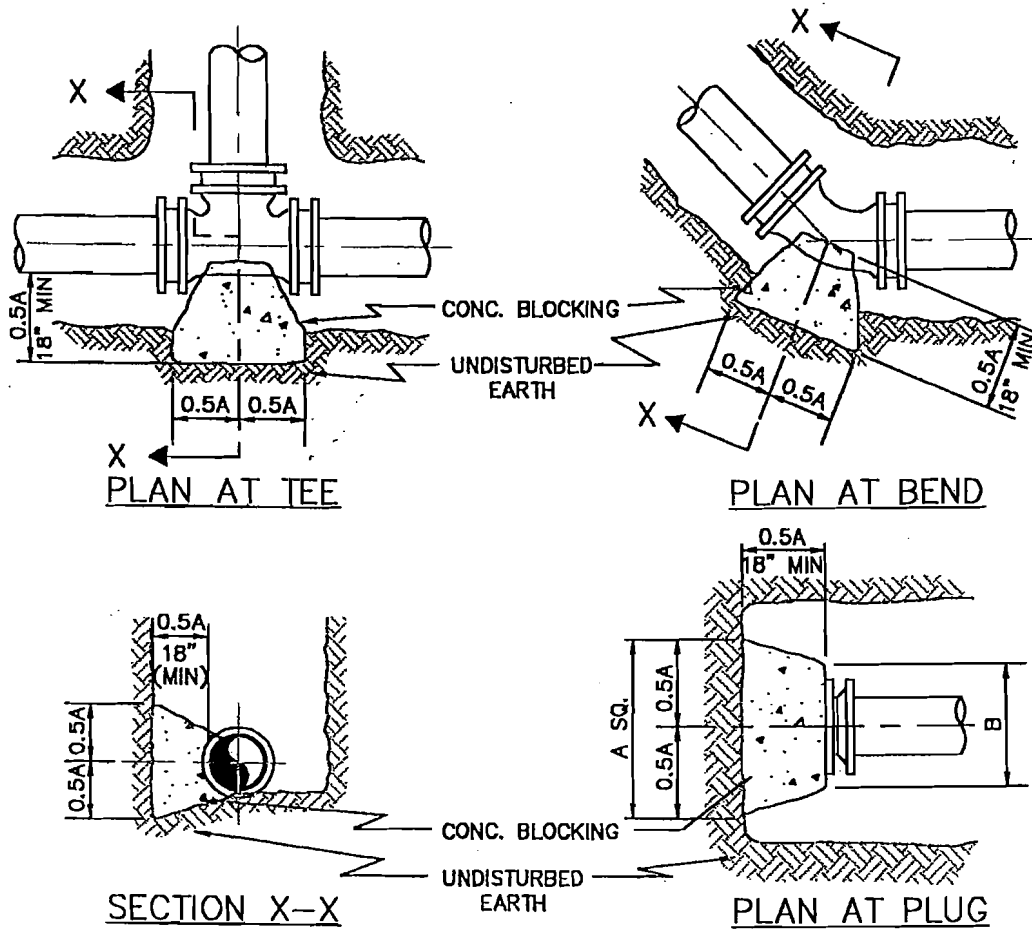
DATE: SEPT. 21, 1998

DWG. NO.: WATER-02

**NOTES**

1. USE READY-MIX CONCRETE WITH 3,000 PSI STRENGTH @ 28 DAYS.
2. PLACE CONCRETE BEARING SURFACES AGAINST UNDISTURBED EARTH.
3. PLACE CONCRETE CLEAR OF JOINT AND JOINT ACCESSORIES.
3. DIMENSIONS BASED ON SOIL BEARING OF 4000 P.S.I.

PIPE SIZE	90° BEND	45° BEND	22.5° BEND	11.25° BEND	TEES	PLUGS	
	A	A	A	A		A	B
4"	15"	12"	12"	12"	12"	12"	10"
6"	20"	16"	12"	12"	18"	18"	12"
8"	30"	20"	15"	12"	24"	24"	12"
10"	36"	26"	18"	14"	30"	30"	14"
12"	40"	32"	20"	16"	36"	36"	16"
14"	48"	36"	26"	18"	40"	40"	18"
16"	64"	42"	32"	20"	48"	48"	20"



**WATER SYSTEM DETAILS  
THRUST BLOCKING**

**CITY OF CALHOUN**  
 WATER AND SEWER CONSTRUCTION  
 P.O. BOX 248  
 CALHOUN, GEORGIA 30701  
 TELEPHONE (706) 629-4750

DRAWN BY: JWC

SCALE: NTS

DATE: SEPT. 21, 1998

DWG. NO.: WATER-04