

WATER SPECIFICATIONS**PART 1 - GENERAL****1.1 DESCRIPTION**

- A. This section specifies materials and procedures for construction of underground water distribution systems. This includes piping, structures, appurtenances and all other incidentals.

1.2 COORDINATION

- A. Coordinate connection to water mains with Town of Altavista Utility Department. Provide schedule at least 1 week in advance of any connections or requested water disruptions/outages.
- B. Physically locate existing utilities prior to connections and construction. Contractor is responsible for contacting VA-811 (Miss Utility).
- C. Coordinate all construction activities with appropriate departments/agencies/utilities regard to public safety. Coordination will include but may not be limited to:
1. Town of Altavista Utility Department (water/sewer)
 2. Town of Altavista Public Works and/or VDOT (traffic)
 3. Utility companies (crossing of existing utilities, temporary pole shoring, etc.)
 4. Federal and State agencies such as DEQ, COE, VMRC, etc. (stream crossing and environmental issues).
- D. Owner will provide a water model for all new extensions of water mains which will install a new fire hydrant. Town of Altavista approval will be required of the construction plans and water model.
- E. The developer/owner shall include the following master notes on the site plan submitted to the Town for review.
1. The Town of Altavista administers business license and zoning ordinance programs (434-369-5001). Campbell County administers Land disturbances (erosion and sediment control) and building code programs (434-332-9506). Permits for work in the public street right of way are administered by Town of Altavista or VDOT (434-946-7631).
 2. All water and sewer improvements projects, whether in connection with a subdivision, a commercial development (i.e., site plans) or Town of Altavista funded maintenance work and capital projects, shall be constructed according to Town of Altavista specifications.
 3. All materials shall be approved by the Town of Altavista Utility Department or authorized Town representative before installation.
 4. The town shall provide and set water meters. Developer shall furnish and install all other materials, including meter boxes, meter yokes, fire hydrants, valves, valve boxes, manholes, and clean-outs according to Town of Altavista specifications.
 5. The contractor shall maintain a set of approved plans on the job site at all times during the construction.
 6. Call VA-811 (Miss Utility) before digging to have underground utilities marked.
- F. All approved plans shall be signed by developer/owner and Town manager prior to approval and construction.

- G. All testing shall be paid for by the developer, witnessed by the Town of Altavista at its discretion and certified by a licensed professional engineer.
- H. The contractor shall restore the disturbed areas (i.e., backfill, compact, fertilize/seed/straw and patch pavement) to original condition or better.
- I. As-built drawings certified by a licensed professional engineer shall be provided to the town prior to release of any surety bond.

1.3 SUBMITTALS:

- A. Shop drawings will be reviewed and signed by the contractor and owner's engineer prior to submission to the Town. Provide four (4) copies of shop drawings for all of the following listed items:
 - 1. Pipe, pipe restraint devices and fittings
 - 2. Valves and valve boxes (including air release valves)
 - 3. Casings and casing spacers
 - 4. Fire hydrants
 - 5. Backflow Prevention assemblies
 - 6. Double check detector check assemblies
 - 7. Meter settings including all service elements from the water main to the private property owner side of the meter service stub-out
 - 8. Vaults and manholes including hatches, frames, covers, steps, bollards, pipe boots, and any other item associated with such appurtenances
- B. Construction materials are not approved until the Town has returned a signed copy of submittals to the contractor or owner.

1.4 QUALITY ASSURANCE:

- A. All materials shall be new, best quality and in accordance with appropriate AWWA specifications.
- B. Comply with all manufacturer recommendations regarding delivery, storage, and handling of materials.
- C. Products Criteria:
 - 1. When two or more units of the same type or class of materials or equipment are required, these units shall be products of one manufacturer.
 - 2. A nameplate bearing manufacturer's name or trademark, including model number, shall be securely affixed in a conspicuous place on equipment. In addition, the model number shall be either cast integrally with equipment, stamped, or otherwise permanently marked on each item of equipment.
- D. Materials and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of the products for at least three years. Digital electronic devices, software and systems such as controls, instruments or computer work stations shall be the current generation of technology and basic design that has a proven satisfactory service record of at least three years.
- E. Regulatory requirements:
 - 1. Comply with the rules and regulations of the Virginia Department of Health and Town of Altavista having jurisdiction for potable water-service and fire-suppression water-service piping.
 - 2. Comply with standards of authorities having jurisdiction for potable water-service piping including materials, installation, testing, and disinfection.
 - 3. Comply with NSF 61, "Drinking Water System Components--Health Effects," for materials for potable water.

F. Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the Town of Altavista prior to installation.

1.5 WARRANTY

A. The Contractor shall remedy any defect due to faulty material or workmanship and pay for any damage to other work resulting therefrom within a period of one year from final acceptance. Further, the Contractor will furnish all manufacturers' and supplier's written guarantees and warranties covering materials and equipment furnished as part of the Town of Altavista water system. Performance bonds may be held by the Town of Altavista for the year following final acceptance.

PART 2 - PRODUCTS

2.1 DUCTILE IRON PIPE AND FITTINGS

A. Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell and plain spigot or push-on-joint bell and plain spigot. Pipe shall be Pressure Class 350 and rated for a minimum working pressure of 350 psi.

1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.

2. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

B. Flanged Ductile Iron Pipe: AWWA C115/A21.11, with factory applied screwed long hub flanges.

1. Flanges: 125 pound fittings meeting ANSI/ASME B 16.42, or meeting ANSI/ASME B 16.1 for fittings not available in ductile iron. Verify pressure rating with Town of Altavista prior to submission of plans.

2. Pipe and fittings above grade or within vaults/manholes are to be painted. Pipe shall be shop primed with one coat of rust inhibitive primer. Final paint color shall be coordinated with Town of Altavista.

C. Cement Mortar Internal Lining: Cement mortar lining and bituminous seal coat as per AWWA C104.

D. Exterior Pipe Coating: The exterior of pipe shall have the standard asphaltic coating.

2.2 POLYVINYL CHLORIDE PIPE AND FITTINGS

A. PVC, AWWA Pipe: ASTM D2241 for smaller than 4-inch and AWWA C900 (or AWWA C909 for PVC0) for 4-inch and larger diameter. Joints should be push-on type with rubber rings conforming to ASTM D3139 and ASTM F477. Pipe shall be minimum DR 14 and rated for a minimum working pressure of 250 psi.

1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.

a. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

2.3 PE PIPE AND FITTINGS

A. PE, AWWA Pipe: AWWA C901, minimum SODR No. 9; CTS Sizing, with PE compound number required to give pressure rating not less than 200 psi.

B. PE Fittings: Stainless steel stiffeners required for all fittings, connections, and couplers with PE tubing.

2.4 COPPER TUBE AND FITTINGS

- A. Copper Tubing (buried): ASTM B88, Type K water tube, annealed temper, rated for minimum working pressure of 250 psi.
- B. Copper Tubing (within structures and vaults): ASTM B88, Type L water tube, hard drawn.
- C. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper alloy, solder joint pressure fittings or compression type conforming to ANSI B16.26 for copper tubing rated for a minimum 250 psi working pressure.
- D. Brazing Alloy: AWS A5.8/A5.8M, Classification BCuP.
- E. Copper Unions: ANSI MSS SP-123, cast copper alloy, hexagonal-stock body with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.

2.5 CASING PIPE AND APPURTENANCES

- A. Steel Casing pipe: ASTM B88, minimum 0.25-inch thick or per regulatory authority which the casing pipe crosses. No coating for casing pipe. Full circle butt weld joints.
- B. PVC, Schedule 40 Pipe: ASTM D1785.
 - 1. PVC, Schedule 40 Socket Fittings: ASTM D2466.
- C. PE Casing Pipe: PE casing pipe shall conform to ASTM D 3035, minimum DR 17 or thickness as required to protect the carrier pipe at A16 loading at the installed depth of the casing, whichever is thicker.
- D. Casing spacers and spider: Shall be required for carrier pipe 6-inch and larger and shall be painted metal or plastic. Spacers will not contain any wood materials.
- E. Seals: Seals for carrier pipe 6-inch and larger shall be neoprene specifically constructed for casing seals. Brick and mortar will be permitted as well.

2.6 VALVES**A. Gate Valves:**

- 1. Non-rising Stem, Resilient-Seated Gate Valves: AWWA C515, ductile-iron body and bonnet; with bronze or ductile-iron gate, resilient seats, bronze non-rising stem, and stem nut. Valve shall have O-ring seals and open counter-clockwise, ends shall be compatible with piping systems in which valves are installed. Valves shall be rated for at least 250 psi working pressure. Include interior coating according to AWWA C550, and mechanical-joint ends for buried installations and flanged in vaults and interior applications. Gate valves will be American Flow Control, Mueller, Kennedy or approved equal gate valve with stainless steel stem.
- 2. Non-rising Stem, Resilient-Seated Gate Valves smaller than 4" diameter: Lead free brass and bonnet; resilient seats, bronze non-rising stem, and stem nut. Valve shall open counter-clockwise, ends shall be compatible with piping systems in which valves are installed. Valves shall be rated for at least 200 psi working pressure.
- 3. Underground valve nut: Furnish valves with 2 inch (50 mm) nut for socket wrench operation.
- 4. Aboveground and pit operation: Furnish valves with hand wheels.

B. Gate Valve Accessories and Specialties

- 1. Tapping-Sleeve Assembly: ANSI MSS SP-60; sleeve and valve to be compatible with the drilling matching.
 - a. Tapping Sleeve: Stainless-Steel, two-piece bolted sleeve. Sleeve to match the size and type of pipe material being tapped.

- b. Valve shall include one raised face flange mating tapping-sleeve flange.
 - c. Tapping Sleeve shall be Romac SST or approved equal.
2. Valve Box: Adjustable Cast-iron box of two piece type, consisting of lid, sliding extension and base. Lettering "WATER" shall be embossed on the valve box lid in letters not less than 1 inch high. Base shall be proper type and size for the valve with which it was used. Barrel approximately 5 inches (125 mm) in diameter or larger as required to properly access valve stem, and adjustable cast-iron extension of length required for depth of bury of valve.
 3. Valve box concrete donut: Precast concrete donut with interior minimum 1/2" clearance from valve box and will be tapered at the top to minimize catching on lawn or roadway maintenance equipment.
 4. Valve box adapter: Rubber compound sized for the diameter of the valve. Adapter will protect valve box base from resting on the valve body
- C. Service Saddles, Corporation Valves, and Curb Valves
1. Service-Saddle Assemblies: Saddles will be ductile iron with epoxy coated stainless band, Ford FC202 or approved equal.
 2. Corporation Valve: AWWA C800, bronze body and ground-key plug, with threaded inlet and outlet matching service piping material.
 3. Curb Valves: AWWA C800, bronze body, ground-key plug or ball, wide tee head, with inlet and outlet matching service piping material, minimum pressure of 200 psi (1375 kPa).
- D. Pressure Reducing Valves for Water Mains
1. Pressure reducing valve: ASSE 1003 with pressure of 150 psi (1035 kPa). Coordinate model, manufacturer, size, etc. with Town of Altavista prior to submitting design plans.
 2. Install pressure gauge on each side of PRV. Pressure gauge will include ball valve or corp stop upstream of pressure gauge.
- E. Air Relief Valves
1. Combination Air Valve: AWWA C512, Float-operated, hydromechanical device to automatically release accumulated air or to admit air during filling of piping.
 2. Pressure Rating: 300 psi (2070 kPa)
 3. Body components: Cast or ductile iron body, bonnet, and frame, bronze plug, Buna-n needle and seat, stainless steel float
 4. Water inlet size: 2-inch NPS
 5. Orifice sizes: sized per manufacturer recommendation based on pressure
 6. Air Release Valve will be Cla-Val Model 34AR or approved equal.
- F. Backflow Preventer
1. Backflow Preventer shall not be located in any area containing fumes that are toxic, poisonous or corrosive.
 2. Direct connections between potable water piping and sewer connected wastes shall not exist under any condition with or without backflow protection.
 3. Backflow Preventer shall be accessed and have clearances for the required testing, maintenance and repair. Access and clearances shall maintain a minimum of 1 foot (305 mm) between the lowest portion of the assembly and grace, floor or platform. Installations elevated more than 5 feet (1524 mm) above the floor or grade shall be provided with a permanent platform capable of supporting a tester or maintenance person.

G. Double-Check, Backflow-Prevention Assemblies: AWWA C510 for continuous-pressure applications, unless otherwise indicated. Comply with VDH requirements and coordinate design with Town of Altavista prior to submission for approval.

1. Double check Detector Assembly will be Wilkins Model 350DA or approved equal
2. Water Meter: AWWA C700, disc type, at least one-fourth size of detector check valve. Include meter, bypass piping, gate valves, check valve, and connections to detector check assembly.
3. Vault: Precast concrete vault will be sized for diameter of through water piping. Vault shall all minimum 48" clearance from the bottom of the vault lid to the top of the through piping. Vault shall be minimum 48" clear width and with minimum interior dimensions to allow for at least 12" clearance between all pipes and pipe flanges to the interior walls.
 - a. Access: A 300 lb or H-20 rated hatch will be required for 4" and larger assemblies. Hatch will be sized to allow removal and replacement of the assembly within the vault.
 - b. Vault shall drain be positively graded to daylight.
4. Valves:
 - a. Ball type with threaded ends on inlet and outlet of NPS 2 (DN 50) and smaller.
 - b. OS&Y gate type with flanged ends on inlet and outlet of NPS 2-1/2 (DN 65) and larger.

2.7 WATER METERS

A. Residential Water Meters

1. Meters through 2" meter will be Badger Recordall Disc Series or approved equal.
2. Coordinate with Town of Altavista for water meters, piping and vaults for water meters larger than 2".
3. Meters will be 5/8" x 3/4" unless otherwise noted on the plans.
4. All meters larger than 5/8" x 3/4" will be equipped with a bypass, either in the setter or hard piped around the meter.

B. Meter yoke and box will be Ford model LYLBB-144-233-P4-NL.

C. Tandem meter setter will be Ford TVBHC72-12W-44-33NL setter. Tandem setters will be installed within a meter box.

1. Pressure reducing valves for individual meter services will be will be diaphragm type with adjustable outlet pressure from 25 to 75 psig. Valve will be Wilkins LU70, Watts or approved equal.
2. Meter box will be 18" diameter circular meter box for tandem setter and in-line PRV. Box will be 24" deep and supported by minimum 8 bricks. HDPE boxes will be ribbed for strength
3. Frame and cover-Cast iron frame and cover (Ford C32 or equal) with adaptor ring for larger meter box.

2.8 WATER SERVICE BACKFLOW PREVENTER

A. Comply with VDH requirements and coordinate design with Town of Altavista prior to submission for approval.

B. Backflow preventer for residential connections and irrigation systems will be Watts reduced pressure zone assembly series 009 or approved equal and will include integrated valves on both sides. Assembly will be lead-free for all installations associated with potable water. Assembly will include minimum 1" air gap.

- C. Install backflow preventer assembly within minimum 18" diameter circular HDPE meter box with matching frame and 11½" cover. Frame and cover will be cast iron. Coordinate size of meter box for services larger than ¾".

2.9 CONCRETE VAULTS

- A. Precast, reinforced-concrete vault: ASTM C858, designed for AASHTO H20-44 load designation.
1. Vault dimensions: Per standard details or minimum 12" clearance from all pipe bolts and pipe joints.
 2. Ladder: Aluminum ladder.
 3. All hardware within vaults shall be stainless steel including screws, nuts, bolts, washers, rods, etc. If stainless steel is unavailable for specific hardware components, coordinate use of other material with Town of Altavista prior to installation.
 4. Drain: ASME A112.6.3, cast iron floor drain with outlet. Include body anchor flange, light-duty cast iron grate, bottom outlet, and integral or field-installed bronze ball or clapper-type backwater valve.
 5. Hatch: H20 Loading, aluminum diamond plates with Type 316 stainless steel hardware. Doors will include hold open arm with aluminum latch. Sized per standard details or as coordinated with Town of Altavista Utility Department.
 - a. 300 lb rated hatch in non-traffic areas may be allowed with prior approval from Town of Altavista.
 6. Resilient Pipe Connectors: ASTM C923, flexible boot watertight connection with stainless steel band pipe connector and stainless steel internal expansion clamp.
 7. Bollards: Concrete filled 6" diameter steel or cast iron bollards at each corner of the vault to prevent vehicles on the vault top. Round concrete tops and paint bollards safety yellow. Bollards will extend at least 48" above adjacent grade. Coordinate bollard locations with Town of Altavista.

2.10 FLUSHING HYDRANTS

- A. Ground-Type Flushing Hydrants: Non-freeze and drainable, of length required for shutoff valve installation below frost line.
1. Pressure Rating: 150 psi (1035 kPa) minimum
 2. Outlet: One, with angled discharge
 3. Hose Thread: NPS 2-1/2 (DN 65), with NFPA 1963 external hose thread, and with cast iron cap with brass chain
 4. Barrel: Cast iron
 5. Valve: Bronze body with plunger closure, and automatic draining
 6. Inlet: NPS 2 (DN 50) minimum
 7. Hydrant Box: Cast iron with cover, for ground mounting
 8. Operating Wrench: One for each unit
- B. Hydrant shall be Kupferle Mainguard #78 hydrant or approved equal.
- C. Automatic Flushing system will be Hydro-Guard and will require Town of Altavista approval for specifications.

2.11 FIRE HYDRANTS

- A. All hydrants shall have removable interiors capable of replacement without digging up the hydrant and be packable under pressure. Threaded joints or spindles shall be bronze and upper and lower barrels shall be of equal

diameter. Upper barrel shall be of sufficient length to permit setting hydrant with barrel flange not more than 4 inches (100 mm) above finished grade. All fire hydrants shall have 6 inch (150 mm) bottom connection. Pressure Rating: 250 psi (1725 kPa). Hydrant valve shall open by turning operating nut to left or counterclockwise. Coordinate exterior finish shall with Town of Altavista Utility Department. Default exterior finish color shall be red alkyd-gloss enamel paint. Outlet threads shall meet NFPA 1963, with external hose thread used by local fire department. Include cast iron caps with steel chains and Pentagon, 1-1/2 inch (38 mm) point to flat operating and cap nuts.

B. Dry-Barrel Fire Hydrants:

1. AWWA C502, freestanding, one NPS 4-1/2 (DN 115) and two NPS 2-1/2 (DN 65) outlets, 5-1/4 inch (133 mm) main valve, drain valve, and NPS 6 (DN 150) mechanical-joint inlet; nipples will be bronze or non-corrosive metals with "National Standard" threads; interior coating according to AWWA C550; cast iron body, compression-type valve opening against pressure and closing.
2. Hydrant will be safety flange, breakaway type so designed that if broken off, the hydrant will remain closed.
3. Hydrants shall be Mueller Super Centurion 240-A423 or approved equal.

2.12 WARNING TAPE AND DETECTION WIRE

- A. Warning tape shall be standard, 4 mil. Polyethylene, 3 inch minimum (76 mm) wide tape, detectable type, blue with black letters and imprinted with "CAUTION BURIED WATER LINE BELOW".
- B. Detection wire will be insulated 12 gauge copper wire.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

- A. Use pipe, fittings, and joining methods for piping systems according to the following applications:
 1. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.
 2. Do not use flanges for underground piping.
 3. Flanges, unions, grooved-end-pipe couplings, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.
 4. Install Copper Tracer Wire, No. 12 AWG solid, single conductor, insulated. Install in the trench with piping to allow location of the pipe with electronic detectors. The wire shall not be spiraled around the pipe nor taped to the pipe. Wire connections are to be made by stripping the insulation from the wire and soldering with rosin core solder per ASTM 828. Solder joints shall be wrapped with rubber tape and electrical tape. At least every 1000 feet (300 m) provide a 5 pound (2.3 kg) magnesium anode attached to the main tracer wire by solder. The solder joint shall be wrapped with rubber tape and with electrical tape. An anode shall also be attached at the end of each line.
 - a. Install tracer wire will with all pipes regardless of material type.
- B. Pipe materials and joint systems
 1. General:
 - a. Below grade water pipe will be ductile iron piping with push-on joints.
 - b. Below grade fittings will be ductile iron mechanical joint fittings.
 - c. Above grade and piping within vaults will be flanged joint ductile iron pipe.

2. Additional installation conditions
 - a. Water mains crossing streams will be encased within concrete to extend longitudinally from top of bank to top of bank.
 - b. Water mains crossing public asphalt topped roadways will be encased within steel casings.
 - 1) Water service lines under public asphalt and gravel roadways will be encased in schedule 40 PVC or min DR 17 HDPE casings.
 - c. Water mains under structures will be encased within steel casings.
3. Restrained joint ductile iron pipe will be installed in the following conditions:
 - a. Within steel casings
 - b. Within concrete encasements for stream crossings
 - c. Under Structures
4. PVC pipe with push-on joints may be installed for overland applications with minimal potential for additional utility disturbances with written approval of the Town of Altavista Utility Department.
5. Aboveground and within vault water-Service piping ¾-inch to 3-inch shall be hard copper tube with bronze threaded or compression fittings.
6. Size:
 - a. All water mains to be operated and maintained by the Town of Altavista will be a minimum of 2-inch diameter.
 - b. All water mains to be operated and maintained by the Town of Altavista with more than one residential water service connection will be a minimum of 4-inch diameter.
 - c. All water mains to be operated and maintained by the Town of Altavista with a fire hydrant will be a minimum of 6-inch diameter.
 - d. All water mains to be operated and maintained by the Town of Altavista shall be sufficiently sized per a Town of Altavista approved water model.
7. Water service mains serving one or two residential service connections shall be:
 - a. Soft copper tube with wrought-copper, solder-joint fittings or couplers for copper tube joints.
 - b. PE, AWWA pipe; PE, AWWA fittings; and heat-fusion joints or compression joints.

3.2 VALVE APPLICATIONS

- A. Use mechanical-joint-end valves for 3-inch and larger underground installation. Use threaded- or flanged-end valves for installation in vaults. Use corporation valves, curb valves or ball valves with ends compatible with piping, for 2-inch and smaller installation.
 1. Additional installation conditions
 - a. Underground Valves, 3-inch and Larger: AWWA, cast iron, non-rising-stem, resilient-seated gate valves with valve box.
 - b. Underground Valves, 4-inch and Larger, for Indicator Posts: UL/FMG, cast iron, non-rising-stem gate valves with indicator post.
 - c. Use the following for valves in vaults and aboveground:
 - 1) Curb stop, Corp valve or Ball Valves, 2-inch and Smaller: Bronze, non-rising stem.
 - 2) Gate Valves, 3-inch and Larger: AWWA, cast iron, OS&Y rising stem, resilient seated.

3.3 DUCTILE IRON PIPE

- A. Install Ductile Iron, water-service piping according to AWWA C600 and AWWA M41-3rd Edition.
 - 1. Install PE corrosion-protection encasement according to ASTM A674 or AWWA C105/A21.5.
- B. Pipe shall be sound and clean before laying. When laying is not in progress, the open ends of the pipe shall be closed by watertight plug or other approved means.
- C. When cutting pipe is required, the cutting shall be done by machine, leaving a smooth cut at right angles to the axis of the pipe. Bevel cut ends of pipe to be used with push-on bell to conform to the manufactured spigot end. Cement lining shall be undamaged.
- D. Push on joints shall be made in strict accordance with the manufacturer's instruction. Pipe shall be laid with bell ends looking ahead.

3.4 PVC PIPE

- A. PVC piping shall be installed in strict accordance with the manufacturer's instructions and AWWA C605. Place selected material and thoroughly compacted to one foot above the top of the pipe.

3.5 COPPER PIPE

- A. Copper piping shall be installed in accordance with the Copper Development Association's Copper Tube Handbook and manufacturer's recommendations.

3.6 ANCHORAGE INSTALLATION

- A. Install water-distribution piping with restrained joints. Anchorages and restrained-joint types that may be used include: concrete thrust blocks, locking mechanical joints, set-screw mechanical retainer glands, bolted flanged joints, heat-fused joints, pipe clamps and tie rods.
- B. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:
 - 1. Gasketed-Joint, Ductile Iron, Water-Service Piping: According to AWWA C600.
 - 2. Gasketed-Joint, PVC Water-Service Piping: According to AWWA M23.
- C. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.
- D. Contractor may utilize restrained joint pipe in lieu of or to supplement other anchorage systems. Contractor will provide documentation from manufacturer of adequacy of restrained joint pipe or alternative anchorages.
- E. Restrained joint pipe, restrained joints, grip rings, mega-lugs, etc. will utilize a **250 psig** pressure (unless otherwise approved by the Town of Altavista Utility Department in reduced pressure areas) with a **factor of safety of 2.0 to 1** for design of joint restraints. Main-line valves will be treated as dead-ends regarding restraint design.
 - 1. Joint restraint lengths may be reduced due to reduced static and pump pressures in limited locations as coordinated with the Town of Altavista Utility Department.

3.7 VALVE INSTALLATION

- A. Gate Valves: Install each underground valve with stem pointing up and with valve box. Install valves in accordance with manufacturer's recommendations, AWWA C600, or applicable standards. Use mechanical-joint-end valves for 3-inch and larger for underground installations.

- B. Install concrete donuts for all valves located within gravel or vegetated areas.
- C. Install valve box adaptor between valve body and valve box base.
- D. Install in-line valves and fire hydrant shutoff valves within the right-of-way behind the ditchline, behind the guardrail, or beyond the top of slope and/or outside of the clear zone per Town of Altavista or VDOT requirements when possible. Contractor will coordinate all valve locations with the Town of Altavista Utility Department and VDOT prior to installation.
- E. Contractor will be permitted to roll the alignment in order to install valves in locations suitable to the Town of Altavista and/or VDOT. Contractor will coordinate all alignment shifts with the Town of Altavista Utility Department prior to installing pipe and valves.

3.8 DETECTOR-CHECK VALVE INSTALLATION

- A. Install in vault or aboveground and for proper direction of flow. Install bypass with water meter, gate valves on each side of meter, and check valve downstream from meter.
- B. Support detector check valves, meters, shutoff valves, and piping on brick or concrete piers.

3.9 WATER METER INSTALLATION

- A. General: Install all meter components excluding the meter. Meter will be provided and installed by the Town of Altavista.
- B. Contractor will be responsible for coordination of the location and grade for water services with the Town of Altavista Utility Department. Contractor will determine required connection point and elevation to verify that service can be installed. Contractor will notify Town of Altavista prior to laying water main if there is a conflict regarding service layout or location.
- C. Install pressure reducing valves on all residential meters unless noted or otherwise instructed by Town of Altavista Utility Department.
- D. Install stainless steel inserts within all fittings, couplings, and connections to main line and meters for PE tubing.
- E. Extend service pigtail at least 36" outside of meter box on downstream side and cap. Do not crimp end of service pigtail.

3.10 BACKFLOW PREVENTER INSTALLATION

- A. Install backflow Preventers of type, size, and capacity indicated. Include valves and test cocks. Install according to requirements of plumbing and health department and authorities having jurisdiction.
- B. Do not install backflow Preventers that have relief drain in vault or in other spaces subject to flooding.
- C. Do not install bypass piping around backflow Preventers.
- D. Support 2-1/2-inch and larger backflow Preventers, valves, and piping near floor and on brick or concrete piers.

3.11 CONCRETE VAULT INSTALLATION

- A. Install precast concrete vaults according to ASTM C891.

3.12 FLUSHING HYDRANT INSTALLATION

- A. Install post-type flushing hydrants with valve below frost line and provide for drainage. Support in upright position. Include separate gate valve or curb valve and restrained joints in supply piping.

- B. Install ground-type flushing hydrants with valve below frost line and provide for drainage. Install hydrant box flush with grade. Include separate gate valve or curb valve and restrained joints in supply piping.
- C. Install sampling stations with valve below frost line and provide for drainage. Attach weather-resistant housing and support in upright position. Include separate curb valve in supply piping.

3.13 FIRE HYDRANT INSTALLATION

- A. General: install each fire hydrant with a separate gate valve in the supply pipe, anchor with restrained joints, mega-lugs, rodding back to mainline tee and/or thrust blocks, and support in upright, vertical position. Contractor will provide manufacturer's documentation regarding acceptability of restrained joints, mega-lugs, and/or rodding if used in lieu of concrete thrust blocks. Fire hydrants shall be installed on 6 inches or larger lines only.
- B. Install fire hydrants within the right-of-way behind the ditchline, behind the guardrail, or beyond the top of slope and/or outside of the clear zone per Town of Altavista and VDOT requirements. Contractor will coordinate all hydrant locations with the Town of Altavista (and VDOT if outside of Town limits) prior to installation.
- C. All fire hydrant leads will be ductile iron pipe from the mainline tee to the hydrant base.
- D. AWWA-Type Fire Hydrants: Comply with AWWA M17.
- E. High Ground Water Location: Relocate fire hydrants when excavation reveals high ground water or plug the hydrant drain hole if unable to relocate. Notify the Town of Altavista Utility Department in writing when hydrant drain holes are plugged.
- F. Coordination with local fire department: Notify local fire departments of work area, approximate work schedule, and all water mains & fire hydrants which may be impacted by utility work.
- G. Provide signage and/or provide cover to denote fire hydrants which are not usable by fire department. Coordinate signage and/or cover with local fire department.

3.14 FIELD QUALITY CONTROL

- A. Notify Town of Altavista Utility Department at least 48 hours in advance of the test date, and perform tests in presence of the Engineer.
- B. Contractor is prohibited from making service taps prior to pressurized testing of the water main.
- C. Town of Altavista will supply potable water for pipeline testing at no cost (to the Owner/Contractor) equal to two times the pipe volume. Master meters are to be installed and in service prior to filling and flushing the lines. Contractor will provide an estimated volume of water required for flushing, testing, and disinfection. All water in excess of this volume will be purchased by the Contractor/Owner from the Town of Altavista.
- D. After the line has been back-filled and at least seven days after the last concrete reaction anchor has been poured, subject the line or any valved section of the line to a hydrostatic pressure test in accordance with AWWA C600, except as modified herein. Fill the system with water at a velocity of approximately 1 ft. per second while necessary measures are taken to eliminate all air. After the system has been filled, raise the pressure by pump to 1.5 times the working pressure or up to the rated pressure of the pipe, whichever is less. Test pressures shall be:
 - 1. Not be less than 1.25 times the working pressure at the highest point along the test section
 - 2. Not exceed thrust restraint pressure

3. Not vary by more than +/- 5 psi
 4. Not exceed the rated pressure of the valves or hydrants when test includes closed gate valves
 5. Shall be at least **200 psig** as measured at the high point on the section of line under tests. Town of Altavista Utility Department may elect to reduce the pressure of the test dependent upon location within the water system.
 6. Measure pressure at the low point on the system compensating for gage elevation. Maintain this pressure for two hours. If pressure cannot be maintained, determine cause, repair, and repeat the test until successful.
- E. A leakage test shall be conducted concurrently with the pressure test in accordance with AWWA C600, except as modified herein. Leakage shall be determined with a calibrated test meter, furnished by the Contractor. Leakage is defined as the quantity of water required to maintain a pressure within 5 psi of the specified test pressure, after air has been expelled and the pipe filled with water. Leakage shall not exceed the volumes listed in AWWA C600. If leakage exceeds that specified, find and repair the leaks and repeat the test until successful.
- F. All visible leaks shall be repaired regardless of the amount of leakage.
- G. Prepare reports for testing activities.

3.15 IDENTIFICATION

- A. Install continuous underground warning tape 12 inches (300 mm) directly over piping.
- B. Install continuous 12 gauge coated copper wire adjacent to all water main and water service piping. Overlap at least 24" of wire and twist sufficiently that wire will not separate for breaks.
1. Expose at least 12" of copper wire within all meter boxes for service lines back to the main.
 2. Loop copper wire within valve boxes to within 6" of top of valve box cover of all in-line and hydrant valves. Loop copper wire within air release valves vaults/manholes such that it is accessible.

3.16 SEPARATION OF WATER AND SEWER LINES

- A. General: Comply with Virginia Department of Health latest standards for separations of water mains, sanitary sewers and sanitary septic systems.
- B. Waterlines shall normally be separated horizontally from sanitary sewer lines, manholes, and septic system drainfields by a distance of 10 feet measured edge-to edge.
- C. Under unusual conditions when local conditions prevent a horizontal separation of 10 feet from sewer lines and manholes, the water line may be laid closer provided the invert of the water main is 18 inches above the top of the sewer; the sewer constructed of AWWA approved and tested water pipe; and all manholes are of water tight construction tested in place. The sewer pipe shall be pressure tested in place without leakage prior to backfilling.
- D. Waterlines crossing sewers shall be laid to provide at least 18 inches vertical separation between that the invert of the water main and the top of the sewer pipe.
- E. Under unusual conditions when local conditions prevent an 18-inch vertical separation, the sewer line passing over or under water mains shall be constructed of AWWA approved water pipe. The sewer pipe shall be pressure tested in place without leakage prior to backfilling. Water lines passing under sewers shall in addition have an 18" vertical separation between the bottom of the sewer and the top of the water line; adequate structural support for the

sewer to protect both utilities; and the water pipe be centered on the crossing point so the joints are equidistant and as far away as possible from the sewer.

- F. The Town of Altavista Utility Department will review all unusual sewer and waterline crossing conditions. The crossing conditions will be constructed such that the Town of Altavista Utility Department can approve the condition.

3.17 CLEANING

- A. Disinfect and test water lines in accordance with AWWA Standard C651 and the following:
- B. All water lines shall be disinfected prior to being in operation.
- C. Prior to disinfection all water lines shall be flushed unless the tablet method of disinfection is used. All valves and hydrants shall be operated during this operation. Flushing velocities should not be less than 2.5 ft./sec.
- D. Methods of Chlorine Application
1. Continuous feed method - Potable water shall be introduced into the pipeline at a constant flow rate. Chlorine shall be added at a constant rate of this flow so that the chlorine concentration in the water in the pipe is at least 50 mg/L. The chlorinated water shall remain in the pipeline at least 24 hours, after which, the chlorine concentration in the water shall be at least 10 mg/L. All valves and appurtenances shall be operated while the chlorinated water remains in the pipeline.
 2. The velocity of the potable water in the pipeline shall be less than 1 ft./sec. The water shall then remain in contact with the pipe for 24 hours. All valves and appurtenances shall be operated while the chlorinated water is in the pipeline.
- E. Final Flushing- After the required retention period, the heavily chlorinated water shall be flushed from the lines using potable water.
- F. Testing - After the lines have been flushed at a velocity of no less than 3 fps (in accordance with AWWA 651-14), the water lines shall be tested. Samples shall be collected at 1200 feet intervals throughout the length of pipeline.
1. All chlorine residual determinations shall be made using only those methods approved by the Virginia Department of Health.
 2. Water samples for bacteriological analysis must be collected at 1200 feet intervals throughout the length of pipeline and analyzed by a certified laboratory using one of the two options below (in accordance with AWWA 651-14):
 - a. Option A: Two samples taken at least 16 hours apart. A minimum of two samples at least 16 hours apart shall be collected from each sampling location.
 - b. Option B: Two samples taken at least 15 minutes apart after the pipeline has been disinfected and allowed to sit for a 16 hour rest period.
 3. The results of these samples must indicate no coliform contamination before the pipeline can be utilized as part of the waterworks. If contamination is indicated, then the disinfection procedures must be repeated.
- G. Water samples will be collected from both connection points (or the connection point and termination point) of the main line. Water samples will be collected from each water main branch larger than 2" as well.
- H. Maintain a copy of AWWA Standard C-651 on Project site during all disinfecting operations. An additional copy will be available for review in the office of the Town of Altavista Utility Department.
- I. Prepare reports for purging and disinfecting activities.

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