

SPECIFICATIONS AND GUIDELINES
FOR CONSTRUCTION OF
WATER LINES AND
APPURTENANT STRUCTURES

This document outlines construction requirements for buried water distribution pressure piping and appurtenances as shown on the drawings or as described in this document. The following construction practices are covered in this booklet:

- Installation of all buried pipe, fittings, joint restraints, valves, fire hydrant assemblies and service connection assemblies
- Installing connections to all existing and/or new facilities and provide temporary services as required
- Pressure testing of new pipelines and appurtenances
- Disinfecting new pipelines and appurtenances and dechlorination and flushing for a complete and operable system

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NOTICE

These guidelines and standards are written for use by persons engaged in construction and installation of water lines and infrastructure to be owned and operated by the Tri-County Water Conservancy District. It is the users' responsibility to ensure that guidelines and standards used for construction are the most current available as they may be amended from time to time.

MATERIALS AND SPECIFICATIONS

BENDS, TEES & FITTINGS

All bends, tees, and fittings shall have concrete thrust blocks and/or restraints attached as required by the District. All metal components shall be wrapped with 2 layers of 4 mil plastic sheeting attached or sealed to the pipe on all sides.

CONCRETE

Concrete for thrust blocks shall be Portland Cement concrete with minimum compressive strength at 28 days of 3000 psi.

FIRE HYDRANTS

Fire hydrants shall be attached underground with Core Blue or stainless steel bolts. Fire hydrants shall be installed and thrust blocks provided as shown in drawing.

All fire hydrants shall be improved, dry barrel type and shall conform to requirements of AWWA C-502. The standard hydrant shall have a 6" connection, a 5-1/4" main valve opening, two (2) 2-1/2" hose ports and one (1) 4-1/2" pumper port. The hydrant barrel shall be marked with a circumferential rib to denote the intended ground line. The centers of the hose nozzles and pumper nozzle shall be at least 14" above the ground grade line. The operating nut and port cap wrench nuts shall be 1-3/8" pentagon, measured from point to opposite flat side at the base. The height of the nut shall not be less than 1".

The nozzle caps shall be removed and the operating nut opened by turning to the left or counter clockwise. Nozzle caps shall be securely chained to the upper barrel section. Hydrants in the Montrose Fire Protection District shall be equipped with a "Stortz" connection on the pumper port.

MAIN WATER LINES

Main water lines and water line road crossings shall be constructed as required by the District. When an encasement pipe is required, crossings shall typically be constructed using a locking coupling (Yelomine) pipe with appropriate spacers. Road crossings shall be encased in SDR 35 PVC or heavier pipe, which shall typically extend to the edge of the compacted road profile on both sides. Service line road crossings in county subdivisions shall be a minimum of 1-1/2", Schedule 40 encased in 4", SDR 35 PVC or heavier pipe or 3/4" copper which do not require encasement as determined by the District. These service crossings shall be connected to the main line through a brass ball valve of same size. Any canal, lateral, ditch, or other miscellaneous crossing requiring encasing shall be constructed in the same manner as required by the District.

TAPPING PVC LINES

The following procedures are required when tapping PVC water lines:

- Taps shall be located at least 18" from any joint and there shall be a minimum of 36" between saddles if they are on the same plane.
- Tapping procedures shall be performed in accordance with the manufacturer's recommendations.
- Tapping sleeves and valves shall be used on 4" or larger taps.
- The pipe shall be tapped only when the ambient temperatures fall within the following range limits:
 - Dry Taps 0° F -100° F
 - Wet Taps 32° F - 90° F
- No taps shall be made where the pipe is discolored.

NOTE: Pipe saddles shall be used on ALL taps.

PIPE

Pipe buried underground, unless otherwise specified or shown, shall be bell and spigot with rubber gasket (push-on) type joints in straight runs and mechanical joints each way from bends. The spigot end of each pipe shall be marked to indicate when the pipe is properly inserted in the bell.

Pipe materials shall meet or exceed AWWA standards and class and type of pipe shall be specified by the District.

Pipe shall be PVC 1120 conforming to ASTM 2241. Sizes 3/4" through 1-1/2" shall be a minimum of Schedule 40. Schedule pipe shall be solvent welded. All Class pipe shall have gasketed joints. Pipe class and type will be determined by the District.

TONING WIRE

A continuous, insulated, minimum 14 gauge, solid copper toning wire shall be installed with all non-metallic pipe. Insulation shall be direct burial type. Additional continuous wire shall be installed as necessary to allow the toning wire to be looped up at all valve boxes and hydrants on all lines.

INSTALLATION OF TONING WIRE

Toning wire shall be placed on and duct taped to the top of the pipe at minimum 5 foot intervals.

When splicing the toning wire, it shall be tied together in an overhand knot with the end of the insulation stripped off to expose at least 3/4" of bare wire, then wire twisted together. A silicone filled wire nut shall be screwed over the end to completely cover and seal the exposed wire. Black electrical tape is allowed on splices. Wire shall be looped up into at least one valve box at all valve clusters and at all fire hydrants.

The contractor shall be responsible for testing the toning wire to insure that there is complete continuity of signal. Each valve box shall be visually inspected to verify that the toning wire has been properly placed. The continuity of the toning wire shall be tested in each direction from a valve box or fire hydrant with an electronic locator.

UTILITY CONFLICTS

The Contractor shall be responsible for exposing potential utility conflicts far enough ahead of pipeline construction to make necessary adjustments in grade and alignment of the new pipeline within the recommended limits of pipe and fitting deflection and/or the lines and grades stated in the utility and road specifications. The Contractor shall be responsible for design of any grade and/or alignment adjustment. The Contractor shall not deviate from the approved design without the approval of Tri-County Water (TCW)

VALVES

Valves shall meet AWWA specifications with a non-rising stem and 2" square wrench nut. Stem shall have an "O" ring seal and have a resilient wedge. All valves shall be epoxy coated inside and out. All valves and metal fittings shall be wrapped in plastic to adequately protect the valve from the soil. All bolts on valves and fittings shall be stainless steel or Core Blue. Valve boxes shall be cast iron extension type of proper length to meet surrounding surface condition (flush with pavement, 1" above grade in dirt, etc).

INSTALLATION

All lines and appurtenances to be owned and operated by the TCW shall be installed to the District's specifications and requirements. All pipeline construction within the subdivision shall be solely at the developer's expense. The District shall connect all new water lines to the District's existing system at the Developer's expense. This normally requires three valves and a tee. TCW will approve all water system plans prior to installation. Utility Plans shall be furnished to the District and shall show all utilities proposed for construction. All contracts, plans, and specifications prepared by the Developer shall be reviewed and approved by TCW prior to the preconstruction conference. Every phase of development shall require a preconstruction conference at least one week prior to start of water system construction. All work shall be done in accordance with industry accepted construction practices and these specifications and guidelines. Water system installation shall comply with all applicable local, state and federal regulations. All pipes and fittings shall be handled with care to prevent damage to the materials. Materials can NOT be purchased from TCW. In new subdivisions or along new roadways the road subgrade in the road right-of-way (ROW) shall be completed and approved by the appropriate County prior to any water line construction. Property corners and boundaries shall be located prior to the installation of TCW water lines and other system infrastructure. The Developer shall take all risk associated with the location of these boundaries and corners.

If an irrigation or drainage ditch is located within 5' of the meter location, then the ditch shall be piped for 5' on each side of the meter.

All District facility construction is subject to District's approval prior to the transfer of the system to the District. The District reserves the right to reject any or all of the work performed. The Developer shall warranty and repair all defects in the pipeline for a period of 1 year after formal acceptance by the District. Formal acceptance shall be granted after all infrastructure has been completely installed and tested and the line has passed the specified pressure test. Formal acceptance begins the day that service is instigated to any customer on the constructed waterline.

QUALITY CONTROL

If the Developer and/or Contractor do not abide by all TCW specifications and requirements or fails at any time to provide a quality product as determined by TCW, the District shall refuse to accept any and all work and will delay service indefinitely until all deficiencies are corrected.

All construction shall conform to plans (construction drawings) submitted to and approved by the District. Water lines and related infrastructure shall be located and placed as designated on District approved design drawings or as staked and approved by the District. The contractor shall do all the clearing and grading necessary to provide for staking and construction. If the access and utility easements or rights-of-way are less than 60', sufficient easement shall be provided for the District's line. All District infrastructure shall have a minimum 4' separation from any other utility or service. If the pipeline parallels a sewer line, there shall be a minimum of 10' separation. The sewer line shall be encased whenever minimum requirements are not met on crossings.

PRODUCT HANDLING

Care shall be taken in handling and transporting to prevent damage to pipe and appurtenances. Loading and unloading shall be accomplished with material(s) under control at all times. Under **NO** circumstances shall the material be used if it has been dropped. Material shall be securely wedged and restrained during transport and supported on blocks when stored in the shop or field. Manufacturer's recommendations shall be carefully followed during material storage, handling, and installation.

Pipe shall be stored on a flat surface so that blocking can support the barrel evenly. It is not recommended that pipe be stacked higher than 4'. Plastic pipe, if stored outside for long periods of time shall be covered with an opaque material to protect it from sunlight and weather. All pipe and fittings shall be carefully lowered into trench in a manner to prevent damage to pipe or fittings.

FIELD INSPECTION

All construction performed shall have full time inspection by TCW. The developer shall pay a deposit for this inspection prior to the commencement of work. The District shall be given a minimum of 48 hours notice prior to any construction activities. Any work done without an inspector shall be redone. No work shall be performed on the District's system until the alignment has been staked and approved by TCW and the District inspector is on site. If a Contractor does not have sufficient equipment, labor, and materials to accomplish the work, the job shall be discontinued until remedies are made for all deficiencies.

EXCAVATION, BACKFILL AND BEDDING

Trench excavations shall provide for the following cover over the pipe:

- Delta County – 48"
- Montrose County – 54"
- Ouray County – 60"

Marking tape shall be placed in backfill 18" to 24" below the finished grade and directly over the pipeline and a minimum 14-gauge blue tracer wire shall be glued or taped, at minimum 5' intervals, to the top of the pipe. The pipe bed shall be a minimum 6" of approved bedding material. The pipeline shall then be filled to a minimum 12" above the pipe with approved bedding material, at specified compaction, prior to mechanical backfilling and compaction of the trench. Fill requirements above the pipeline may be increased depending on backfill material and the District shall outline requirements prior to construction. Contractor shall meet or exceed all city/county requirements for compaction in road ROW. Backfill material will contain no material greater than 12" in diameter. **No more than 100' of open trench will be permitted at any time.**

SUBMITTALS

All materials used by the developer shall have prior approval by TCW. Materials cannot be purchased from TCW. The District will approve a water system plan after all the other utilities service plans are submitted to the District. All plans and specifications generated by the developer shall be reviewed and approved by the District prior to the preconstruction conference. Every phase of the development shall have a preconstruction conference at least one week prior to start of water system construction.

Submittals shall include but are not limited to the following:

- *Material and pressure class schedule of all pipe, pipe fittings, and other appurtenances*
- *Special joint details and any special provisions required for assembly*
- *Utility Plan*
- *Other submittals as required by District*

TESTING

Inspection shall begin at the beginning of construction and continue through the testing, disinfection and flushing operations. Any defective work discovered after installation shall be removed and correctly replaced by the contractor in a manner satisfactory to the District.

PRESSURE AND LEAK TESTS FOR PRESSURE PIPE

The Contractor shall furnish the pump, pipe connections, taps, gauges, auxiliary water container, bulkheads, plugs and other necessary equipment and perform pressure and leakage tests on all lines unless otherwise directed by TCW. All equipment and material that will come in contact with water entering the distribution system shall be clean and disinfected prior to use. Water shall be potable water that has only been stored in clean and disinfected containers.

Tests shall be conducted on all pipelines or sections of pipeline thereof. Tests on lines anchored or blocked by concrete shall NOT be conducted until the concrete has taken permanent set.

Hydrostatic testing for leaks shall be performed in conformance to the applicable sections of AWWA or local jurisdiction requirements; whichever is more stringent, except as modified below. All testing shall be inspected unless otherwise authorized by the District.

The minimum test pressure shall be 150 psi or 50% above the normal operating pressure not to exceed the maximum pressure rating of the pipe, whichever is greater. Hydrostatic pressure shall be applied by pumping water from an auxiliary supply. The Contractor shall accurately determine the volumes of water required to reach the initial test pressure and water required to re-pressurize the pipe structure at the completion of the test period.

A pressure test shall have a maximum differential pressure after 24 hours of 2% before acceptance by TCW. The test pressure shall be maintained for a minimum of 4 hours and additional time as required for thorough inspection to find any leaks or defects in the water main and appurtenances. Should the pipe section fail to pass the tests, the Contractor shall find and correct failures and repeat the tests until satisfactory results are obtained.

Air Removal - Before applying the specified test pressure, air shall be expelled completely from the pipe, valves, and hydrants. If permanent air vents are not located at all high points, the Contractor shall install acceptable devices at such points so that the air can be expelled as the line is filled with water.

DISINFECTION

The pipeline shall be disinfected with a chlorine solution which has a residual of 50 PPM for 24 hours prior to flushing and being put into service.

Precautions shall be taken to protect pipe interior, fittings and valves against contamination. All openings in the pipeline shall be closed with watertight plugs when not under construction. If water accumulates in the trench, plugs shall remain in place until the trench is dry. All pipe and fittings shall be kept free of dirt or any foreign material likely to cause contamination.

Mains shall be disinfected by the continuous feed method or the tablet method in accordance with AWWA C-651-92 or current revision, except as specified otherwise or Approved in writing by the District.

Table 1

Number of chlorine tablets per 20' pipe section.

Pipe size	2"	4"	6"	8"	10"
Tablets	1	1	2	3	5