

**5.10.2 Overcoats:** Two (2) additional coats of paint are required over the base coat. The colors shall conform as follows:

**Main Size Color** 6" Aluminum - Top & Bottom 8" Blue Top - Aluminum Bottom 10" or larger Yellow Top - Aluminum Bottom

**Section 6 Services and Meters**

**6.1 General:** All water service fittings shall be fabricated in accordance with AWWA C800 and shall be pressure rated for 200psi or greater. Manufacturers and models shall be in accordance with the **City of Mesquite Approved Water Materials List**.

**6.2 Service Taps:** Domestic water service taps shall be off a looped main. Domestic water service taps shall not be shared, split or bullheaded with an irrigation tap and shall not tap to a fire hydrant lead. Irrigation meters may tap a fire hydrant lead. A submittal for all taps on Asbestos Cement (AC) pipe shall be provided to the City Engineer for approval. Utility contractor shall make the tap and install the service.

**6.3 Meter and Service Location:** Meters and services must be located within R.O.W. or easements in accordance with City approved plans and details. In residential developments, residential water meters and services are generally placed at the center of the lot in the grassed parkway. Water meters shall not be located in proposed driveways, sidewalks, parking lots or other paved areas. For narrow lots or front entry lots, the designer must design the location of the meters to make sure they are placed in an unpaved area. Meters in conflict with this requirement will be relocated by the developer/builder at their expense. In non-residential developments, water meters shall be located in unpaved islands. Meters should be set so that the meter face is 6-inches to 10-inches below finished grade.

**6.4 Meter Size:** Bullheaded, "split" ganged, or manifold meters are not allowed in lieu of a larger meter. The City Engineer may require meter sizing calculations in accordance with the **International Plumbing Code or AWWA Manual of Water Supply Practices M22 "Sizing Water Service Lines and Meters"**. All residential water services shall be ½ inch unless otherwise specified.

**6.5 Water Service Line:** All water service lines 2-inch or smaller shall be Type K copper in accordance with AWWA C800. All water services shall be continuous from the corporation valve at the water main to the angle meter valve in the meter box (No Couplings). Service line shall be "goose necked". Crimping or excessive bending of the service line shall not be allowed. Service lines shall be continuous and shall have no fittings under any paving, unless approved by the City Engineer. Long copper service lines that exceed the length of standard rolls of copper may be spliced in unpaved areas with a silver solder coupling. When installing a water main the Contractor shall furnish and install new meter boxes. Service lines shall be poly-wrapped for the first 5-feet of copper service from the main. Water service mains shall have a minimum depth under paving of 36-inches (measured from surface of paving).

**6.6 Service Saddles:** All service connections to the main for services 2-inch or smaller shall be made with service saddles. Service saddles shall meet requirements of AWWA C800 and be equipped with AWWA laper threads outlet. For ductile iron, cast iron and PVC water mains shall have a brass or bronze body with two bronze or 304L stainless steel straps. **Epoxy coated ductile iron service saddles will not be allowed.** Service saddles for AC water mains shall be a full body tapped stainless steel repair clamp. Service connections to the main for services larger than 2-inches shall use factory tee fittings.

**6.7 Corporation Valves:** All corporations shall meet requirements of AWWA C800 and be equipped with ball valve, AWWA laper threads inlet and a stainless steel grip ring compression outlet and be rated for 200 p.s.i. service pressure. For ductile iron pipe, use threaded corporation with Teflon tape wrap. Factory tees shall be installed for all services larger than 2-inches.

**6.8 Angle Meter Valve (Angle Curb Stop):** All angle meter valves shall meet requirements of AWWA C800 and be equipped with a ball valve with lock wing, rated for 200 p.s.i. service pressure. Angle meter valves of ¾-inch and 1-inch size shall be equipped with a stainless steel grip ring compression inlet connection x meter saddle-swivel nut outlet connection. Angle meter valves of 1-1/2-inch and 2-inch size shall be equipped with a stainless steel grip ring compression inlet connection and meter flange outlet connection.

**6.9 Water Meter Box or Vault:** A water meter box with locking lid shall be furnished and installed the Contractor after paving and fine grading is complete. When installing a water main, new meter boxes shall be furnished, installed and connected to the main. Meters larger than 2-inches in size shall be furnished and installed by the Contractor in concrete vaults in accordance with City details.

**6.10 Meter Fees:** For meters 2-inches in size and smaller, the City will furnish the meter upon payment of applicable fees to the Engineering Division. Owner's utility contractor shall install and set the meter. The contractor must directly purchase meters larger than 2-inches in size from a list approved by the City. Contact the City Meter Shop Supervisor for the list of approved meters and vendors for meters larger than 2-inches.

**6.11 Meter and Service Location Marking:** Each individual service location shall be marked on the face of the curb with a 4-inch high and 1/8-inch deep scribe mark "I" cut in the curb using an approved motor driven concrete saw. The scribe mark "I" shall receive a coating of blue paint, which shall coat the interior and exterior of the cut to a width of 1-inch.

**6.12 Blow-Off Valves:** For 2-inch blow-off valves, use fittings for a standard 2-inch service configuration.

**Section 7 Boring of Water Mains**

Refer to General Design Standards Details B-1 through B-5.

**Section 8 Backflow Prevention**

Refer to Mesquite City Code Sections 5-281 to 5-290.1 for specific information.

**Section 9 Fire Sprinkler Systems**

**9.1 General:** All underground and exterior fire system piping must be reviewed, permitted and inspected through the Engineering Division. The civil plans must show fire lines up to a flange 1-foot above the building floor in the fire room. Any required backflow prevention devices shall be located on the riser in the fire room and not in an exterior vault. Refer to General Design Standard drawings W-14 through W-16 for typical applications. Design of the overall fire protection system shall be permitted through the City of Mesquite Fire Department and meet requirements of National Fire Protection Association (NFPA) standard 13. Maintenance of the fire line from the City main to the building is the responsibility of the property owner and shall not be in a public easement.

The chlorinated water shall be retained in the conduit for at least 24 hours, during which time all valves and hydrants in the section treated shall be operated in order to disinfect the appurtenances. Every effort shall be made to prevent the flow of chlorinated water into conduits in active service. At the end of the 24-hour period, the treated water in all portions of the conduit shall have a residual of at least 10-mg/L (ppm) free chlorine. **Chlorine for Disinfection:**

Calcium Hypochlorite in granular form conforming to ANSI/AWWA B300 must be used and must contain approximately 65 percent available chlorine by weight. The material should be stored in a cool, dry, and dark environment to minimize deterioration.

The heavily chlorinated water shall then be flushed from the conduit and disposed in a manner meeting the requirements set out below.

The chlorine residual shall be tested prior to flushing operations.

**11.3.6 Disposal of Hyper-Chlorinated Water:**

If the chlorine residual exceeds 4-mg/L (ppm) the water shall remain in the new water conduit until the chlorine residual is less than 4-mg/L (ppm). As an alternate, the Contractor may choose to evacuate the water into water trucks, or discharge into an existing sanitary sewer system, or an approved storage facility (such as a detention pond until the chlorine residual is 4-mg/L (ppm) or less), or treat the water with Sodium Bisulfite or another dechlorination chemical (Sulfur Dioxide, Sodium Sulfite, Sodium Thiosulfate, or Ascorbic Acid) or method appropriate for potable water and approved by the Owner until the chlorine residual is reduced to 4-mg/L (ppm) or less. **The heavily chlorinated water shall not be disposed of into the storm sewer system.** After the specified chlorine residual is obtained, less than 4-mg/L (ppm), the water may then be discharged into the storm sewer system or utilized by the Contractor.

The requirement for discharge of heavily chlorinated water is found in the TPDES General Permit to Authorize the Discharge of Storm Water and Certain Non-Storm Water Discharges from Regulated Construction Activities Within the State of Texas.

The Contractor shall prepare the conduit for disinfection activities and secure same after chlorination is complete.

This shall consist of furnishing all equipment, material and labor to satisfactorily prepare the conduit for disinfection. The Contractor shall also be required to provide adequate provisions for sampling.

The Contractor shall make all necessary taps into the pipe to accomplish chlorination of a new line.

After satisfactory completion of the disinfection operation, the Contractor shall remove surplus pipe at the chlorination and sampling points, plug the remaining pipe, backfill, and complete all appurtenant work necessary to secure the conduit.

**10.1 Excavation:** Excavation in general, shall be made in open cut from the surface of the ground and shall be no greater in width and depth than is necessary to permit the proper construction of the work. When the trench depth exceeds five (5) feet, see Standard Procedures Section 12.2 regarding "Trench Safety" requirements. The amount of trench excavation to grade shall not exceed 100 (one hundred) feet from the end of the pipe laying operations and no excavation shall be 300 (three hundred) feet in advance of the completed pipe operations (includes backfilling). At the end of the workday, all trench excavation shall be backfilled. Any landscaping and irrigation system within the City medians and right-of-ways that are disturbed, removed, or damaged during construction shall be replaced to original condition or better by a licensed irrigator.

**10.2 Minimum bury depth:** Minimum bury depth shall be forty-two (42) inches from finished grade to the top of the pipe, unless otherwise directed by the City Engineer.

**10.3 Sanitation:** The inside of all pipe and fittings shall be kept clean during installation. The City Engineer may require swabbing or pigging of all new pipe if the pipe is installed in an unsanitary manor. See Section 11 TESTING PROCEDURES for more information.

**10.4 Lifting Straps:** All water pipe, valves, fire hydrants, and fittings shall be installed by the use of lifting straps. The use of chains is prohibited.

**10.5 Backfill and Compaction:** For trenches not under paving, final backfill material shall be from the trench excavation placed in a maximum of 12 inch loose lifts and compacted to 95% of Standard Proctor Density (ASTM D698) at a moisture range of 0% to plus 6% of optimum moisture. Under existing or proposed paving, backfill shall be crushed concrete flexible base (TxDOT, Item 247, Grade 1, Type D) compacted to 95% of Standard Proctor Density (ASTM D698) at a moisture range of 0% to plus 6% of optimum moisture unless alternate material is approved by the City Engineer. The contractor shall take new proctors at each change in soil type. Water jetting will not be allowed for any trench.

**Section 11 Testing Procedures**

**11.1 Notification of Testing:** The Contractor shall hire an independent testing lab, subject to the approval of the City Engineer, for all material and acceptance testing at Contractors Expense. The Contractor shall notify the assigned City Public Works Construction Inspector of all density testing 24 hours prior to the scheduled test. Copies of all test reports shall be sent to the Public Works Inspector for review and acceptance and inclusion in the City project file. Projects will not receive City acceptance until all test results are complete and satisfactory.

**11.2 Compaction of Trenches and Excavations:** Density tests shall be performed at a frequency of one test per lift, per 300 linear feet of trench (including services) at locations specified by the City Public Works Construction Inspector. All nuclear gauge density tests shall be performed per ASTM D2922.

**11.3 Pressure Testing and Disinfecting Water Mains:**

The purpose of this specification is to define the minimum requirements for the pressure testing and disinfection of water mains, including the preparation of water mains, hydrostatic tests, flushing, application of chlorine, and sampling for the presence of coliform bacteria. Water mains, services and fire sprinkler systems shall be flushed and disinfected per the following requirements and in accordance with AWWA C651 "Disinfecting Water Mains".

Unless otherwise specified, the Contractor shall inject chlorine disinfectant into the conduit and monitor the solution.

The City Public Works Construction Inspector shall supervise the taking of water samples from a suitable tap (not through a fire hydrant) for analysis by the North Texas Municipal Water District laboratory. The sample(s) shall be transported by City staff to the laboratory at 9:00 AM on Tuesdays and Thursdays. Samples may not be taken earlier than 3:00 PM on the day prior to delivery. The City Public Works Construction Inspector shall notify the Contractor of the results.

Microbiological sampling shall be done prior to connecting the new conduit into the existing distribution system in accordance with AWWA C651 Disinfecting Water Mains. Samples shall be tested in accordance with **Standard Methods for the Examination of Water and Wastewater**. Samples for bacteriological analysis shall be collected in sterile bottles treated with sodium thiosulfate. At least one sample shall be collected from every 1,000-linear-feet of new water conduit, plus one set from the end of the line and at least one set from each branch. If trench water has entered the new conduit during construction or, if in the opinion of the City inspector, excessive quantities of dirt or debris have entered the new conduit, samples shall be taken at intervals of approximately 200-linear-feet. Samples shall be taken of water that has been in the new conduit for at least 16-hours.

Unsatisfactory test results shall require a repeat of the disinfection process and resampling as required above until a satisfactory sample is obtained.

**In the event there are three unsatisfactory test results from the same sampling point, the Contractor must "poly-pig" the new water main and samples taken again until a satisfactory sample is obtained.**

**11.4 Tapping Sleeve and Valve Air Test:** Prior to tapping, all tapping sleeves and valves shall be air tested at 120 psi for three (3) minutes, with no pressure loss.

**Section 12 Safety**

**12.1 General:** All contractors and developers, with their employees and agents, shall comply with all applicable Federal, State and Local safety laws and regulations, including but not limited to the Occupational Safety and Health act of 1970, and ordinances rules, regulations and orders of any public authority having jurisdiction for the safety of persons or property to protect them from death, injury, damage or loss.

**11.3.1 Connection to Existing Water System:**

Water required to fill the new main for hydrostatic pressure testing, disinfection, and flushing shall be supplied through a temporary connection between the distribution system and the new main. The temporary connection shall include an appropriate cross-connection control device and shall be disconnected during the hydrostatic pressure test. As an alternate, a connection to the existing distribution system is permitted provided a new valve is placed at the connection point. **Do not test against an existing valve in the existing system.**

**11.3.2 General Procedures and Precautions Taken During Construction:**

- Inspect materials prior to installation to ensure their cleanliness and integrity.
- Keep interior of pipe dry and clean during storage and installation. Prevent contaminates from entering the water main during storage and construction.
- If dirt enters the pipe during storage or installation, it shall be removed and the interior surface swabbed with a 1 to 5 percent hypochlorite disinfecting solution.
- During construction openings in the pipe shall be closed with a watertight plug when pipe laying is stopped at the close of each day's work or for other reasons such as rest breaks and meals to prevent contaminants and animals from entering pipe
- Remove, by flushing or other means, those materials that may have entered the water main.
- Chlorinating any residual contamination that may remain, and flushing the chlorinated water from the main.
- Protecting the existing distribution system from backflow caused by hydrostatic test and disinfection procedure.
- Documenting that an adequate level of chlorine contacted each pipe to provide disinfection.
- Once the contractor has been notified by the City Public Works Construction Inspector of a successfully (negative result) laboratory bacteriological testing result, the contractor can make connection of the approved new water main to the active distribution system.

**11.3.3 Hydrostatic (Pressure) Test:**

All water mains, fittings and services shall be tested with a hydraulic test pressure of not less than 200 psi over a period of not less than 2 hours. The rate of leakage of all pipe tested shall not exceed 11.65-gallons-per-inch of nominal diameter of the pipe per mile. If the tests indicate a leakage in excess of the acceptable rate, the Contractor shall be required to find and repair the leak. Even if the test requirements are met, all apparent leaks shall be repaired and stopped.

The hydrostatic pump shall be connected to a system where the amount of leakage can be determined by measurement or gauge. The 200-psi pressure shall be maintained at the highest point of the main being tested over the entire 2-hour test period. The leakage shall be determined by comparing the quantity of water in the measuring system at the beginning of the test and quantity of water at the end of the test. The difference in these quantities shall be the leakage. An alternate method is to add water to the measuring system during the test. At the end of the 2-hour test, the quantity of water added shall be the leakage.

**11.3.4 Flushing and Pigging the Main Prior to Disinfection / Chlorination**

**Flushing Method:**

Before the main is chlorinated, it shall be filled to eliminate air pockets and flushed to remove particulates. The flushing velocity in the main shall not be less than 2.5 ft/sec. Below is the required flow and openings needed to flush pipelines with a pressure of 40 psi

Pipe Inch	Flow gpm	1" Tap	1-1/2" Tap	2" Tap	2-1/2" Hydrant Outlets
4	100	1			1
6	200		1		1
8	400		2	1	1
10	600		3	2	1
12	900			2	2
16	1600			4	2

**Pigging Method:**

Pigging is accomplished by passing an appropriate sized pig through the pipe. A pig is a bullet-shaped, flexible sponge available in different sizes, densities, and degrees of roughness. **All mains 12-inch and larger must be pigged prior to flushing and disinfection with chlorine.**

The pig shall be inserted in the new conduit at the location where the new conduit is connected to the active distribution system.

Where expulsion of the pig is required through a dead-ended conduit, the Contractor shall make every effort to prevent back flow of the purged water into the conduit after passage of the pig. Backwater re-entry into the pipe can be prevented by the temporary installation of mechanical joint bends and pipe joints to provide a riser out of the trench.

After passage of the pig, flushing of all backwater from the pipe, and satisfactory test results, the Contractor shall secure the test location openings and then proceed with disinfection.

**11.3.5 Disinfection (Chlorination):**

The Continuous-feed method must be used unless it is stated otherwise in the Contract Specifications.

The Contractor shall install and remove all pump-in, blow-off and sampling points.

Water from the existing system or other approved source shall be made to flow at a constant rate in the new main.

At a point no more than 10-ft downstream of the beginning of the new conduit, water entering the new conduit shall receive a dose of chlorine such that the water shall have not less than 100-mg/L (ppm) free chlorine. Chlorine application shall not cease until the entire conduit is filled with heavily chlorinated water. 125 lbs of Calcium Hypochlorite (65% available chlorine) is required in 100,000 gal of water to produce 100 mg/L (ppm) Chlorine concentration.

**12.2 Trench Safety:** All excavation and trench operations shall be conducted in accordance with **29 Code of Federal regulations (CFR), Part 1926, Subpart P** and all other applicable State and City regulations. Prior to commencing any excavation or trenching operation, the Contractor shall submit to the City Engineer a plan sealed by a Texas Licensed Professional Engineer indicating the intended procedures to be used by the Contractor to comply with OSHA requirements. Such plan shall further identify the "Competent Person" as required by paragraph 1926.651(k)(1) that will work with each crew. An affidavit from the Contractor indicating the competent person must be submitted with the trench safety plan to the City Engineer. A copy of the trench safety plan must be on the job at all times. The City reserves the right to deny payment for any construction activities in excavations or trenches that are not in accordance with the submitted plan. The City does not approve or disapprove Trench Safety Plans, but will retain a file copy.

**12.3 Confined Space Entry:** All entry into confined spaces conducted in accordance with **29 Code of Federal regulations (CFR), Part 1910.147 P** and all other applicable State and City regulations. Prior to commencing any confined space entry, the Contractor shall submit to the City Engineer a copy of the confined space entry plan with a completed permit.

**Work Zone Traffic Control:** Where work is to be carried out in or adjacent to any street, alley or public place, the Contractor shall design, furnish, erect and maintain such barricading, signage, barriers, markers, stripping or other traffic control devices as are necessary to alert, direct and protect the traveling public. These traffic control devices shall be designed, installed and maintained in accordance with the **City of Mesquite Work Zone Traffic Control Guidelines** and the most current edition of the **Texas Manual of Uniform Traffic Control Devices**. In addition, the Contractor shall provide and maintain such other barricades and signs as deemed necessary by the City Engineer. The Contractor's responsibility for the furnishing and maintenance of these traffic control devices shall not cease until the project is **accepted by the City Engineer**.

REVISION TABLE			WATER SHEET FIVE		
NO.	REVISION	DATE	ENGINEERING DIVISION		
			GENERAL DESIGN STANDARDS		
			City of Mesquite, Texas		
			APPROVAL DATE	SCALE	DRAWN BY
			02/01/10-L	N.T.S.	NCJ