



Specifications

TABLE OF CONTENTS

Specifications

Contents

| | |
|--|----|
| SECTION 1 | 3 |
| GRADING, EXCAVATION, BACKFILL, EMBANKMENTS | 3 |
| 1-01 GENERAL: | 3 |
| 1-02 STRUCTURAL EXCAVATION AND TRENCHING: | 3 |
| 1-03 BACKFILLING TRENCHES: | 3 |
| 1-04 GRADING:..... | 4 |
| 1-05 PROTECTION OF EXISTING UTILITIES: | 4 |
| 1-06 PAYMENT: | 4 |
| SECTION 2 | 5 |
| WATER SUPPLY LINES AND PIPING | 5 |
| 2-01 GENERAL: | 5 |
| 2-02 STANDARDS: | 5 |
| 2-03 PIPE ORIGIN: | 6 |
| 2-04 DUCTILE IRON PIPE: | 6 |
| 2-05 PVC PLASTIC PIPE: | 7 |
| 2-06 INSTALLATION-PIPE:..... | 7 |
| 2-07 TIE- INS AND BRANCH CONNECTIONS:..... | 8 |
| 2-08 MAIN LINE FITTINGS WITH NO ATTACHED VAVLES OR FITTINGS: | 8 |
| 2-09 CUL-DE-SACS: | 9 |
| 2-11 FIRE HYDRANTS:..... | 9 |
| 2-12 COMMERCIAL FIRE PROTECTION LINES: | 9 |
| 2-13 GATE VALVES: | 9 |
| 2-14 MISCELLANEOUS VALVES: | 10 |
| 2-15 AUTOMATIC FLUSHING DEVICES: | 11 |
| 2-16 VALVE BOXES: | 11 |
| 2-17 WATER SERVICE CONNECTIONS: | 11 |
| 2-18 WATERLINE SEPARATION: | 12 |
| 2-19 HIGHWAY and RAILWAY CROSSING PIPE BORES:..... | 12 |
| 2-20 DRIVEWAY CROSSING PIPE BORES: | 13 |
| 2-21 SERVICE LINE ROAD BORES and CROSSINGS: | 14 |
| 2-22 OPEN CUTS ACROSS ALL PAVED ROADS/DRIVEWAYS:..... | 15 |
| 2-23 GAS LINE CROSSINGS:..... | 15 |
| 2-24 TAPS FOR DISINFECTION:..... | 15 |
| 2-25 CLEAN UP & SIGN OFF: | 15 |
| 2-26 TRENCH SAFETY: | 15 |
| 2-27 MEASUREMENT AND PAYMENT:..... | 15 |
| SECTION 3 | 16 |
| STERILIZATION..... | 16 |
| 3-01 GENERAL: | 16 |
| 3-02 CHLORINATION: | 16 |
| 3-03 TESTING: | 16 |

| | |
|---------------------------------|----|
| 3-04 PAYMENT: | 16 |
| SECTION 4 | 17 |
| PRESSURE TESTING OF LINES | 17 |
| 4-01 GENERAL: | 17 |
| 4-02 INSPECTION: | 17 |
| 4-03 LEAKAGE LIMIT: | 17 |
| 4-04 PAYMENT: | 17 |
| SECTION 5 | 17 |
| PORTLAND CEMENT CONCRETE | 17 |
| 5-01 GENERAL: | 17 |
| 5-02 MATERIALS:..... | 18 |
| 5-03 REINFORCING STEEL: | 18 |
| 5-04 CLASS OF CONCRETE:..... | 18 |
| 5-05 PAYMENT: | 18 |

SECTION 1

GRADING, EXCAVATION, BACKFILL, EMBANKMENTS

1-01 GENERAL:

The Contractor shall perform all work classified as grading, excavation, backfill and embankments as required in the plans to the lines, grades, contours, dimensions and elevations as shown on the plans. This includes all work as follows:

- (a) Site grading
- (b) Preparation of sub-grade
- (c) Preparations of foundations
- (d) Structural excavation
- (e) Removal and disposal of brush, trees, rocks and other debris
- (f) All necessary shoring and sheeting to protect Personnel, and excavations
- (g) De-watering as necessary or required
- (h) Stabilization as necessary or required including the placing of select materials
- (i) The tamping and compacting as necessary or required

1-02 STRUCTURAL EXCAVATION AND TRENCHING:

All excavation of every description and of whatever substance may be encountered shall be performed to the lines and grades as called for on the plans and standard details. The Contractor shall accomplish such work in accordance with the standard practices pertinent to the work being performed. Excavation shall be held to the minimum required for proper performance of the work. Additional excavation may be required if, in the opinion of the Engineer, it is necessary to properly perform the work.

Where excavation requires "blasting" or any other hazardous operation the Contractor shall use due care to protect adjacent property and shall protect the Owner from any and all claims arising from such operations. Prior approval of the Engineer will be required.

All suitable material removed from the excavations shall be used in the formations of fills, embankments and backfilling. Materials deemed unsuitable for these purposes shall be disposed of by the contractor. Excess materials will be disposed of by the contractor.

The Contractor should familiarize himself with the types of excavation to be performed and the type of material to be handled. No consideration of claims for extra compensation due to the type of material in the excavation will be made.

1-03 BACKFILLING TRENCHES:

Trenches shall be carefully backfilled first to a horizontal plane six inches above the top of the pipe and pipe bells with sand consisting of clean durable uncoated grains free from lumps and organic material. Native material from trench excavation may then be used with no rocks larger than 3 inches in diameter or clay lumps larger than 6 inches in diameter allowed. Topsoil that was removed in the top 6 inches of the pipe trench will be stored separately and placed in the top 6 inches of the trench. The backfill will be mounded slightly above the natural ground. Backfilling, above the sand enveloped around the pipe, in

areas that lie within a public right-of-way will be backfilled in accordance with the permit conditions if a permit is issued by the appropriate political jurisdiction. If no backfill conditions are included in the permit then the backfill requirements utilized by the political subdivision will be used.

1-04 GRADING:

After construction is completed and all backfilling has settled, all areas within the work site shall be graded as directed by the Engineer. All debris shall be cleaned up and the site left in a neat and orderly appearance. At the time of final inspection, the contractor will provide a signed statement from the property owners stating the site cleanup is satisfactory. The Contractor will be responsible for all trench settlement during the warranty period.

1-05 PROTECTION OF EXISTING UTILITIES:

The Contractor shall protect existing utilities from damage during excavation and backfilling of trenches. If damage to existing utilities occurs, the Contractor will be responsible for repair or payment for repair of the damage at no expense to the Owner for such damages. It is the Contractor's responsibility to verify the location of all existing utilities in the field whether located on the maps or plans or not.

1-06 PAYMENT:

No separate payment will be made for trenching; disposal of unsuitable or excess materials and backfilling and all costs in connection therewith shall be included in the contract price for the items to which the work pertains.

SECTION 2
WATER SUPPLY LINES AND PIPING

2-01 GENERAL:

Water mains shall be a minimum diameter of 8 inches. A variance can be given to allow a 6" line extension for subdivision development in pressure planes 3,5,9,10,18,19, or those that have only ground pumping facilities, and the development is not subject to jurisdictional requirement to make fire flow available for some amount greater than what a 6" line extension can provide. The water mains shall be of the type of materials as specified herein and in the plans. All pipe and fittings shall be new and unused unless otherwise approved by JCSUD. Any pipe found to be defective before or after installation shall be removed from the system and replaced with sound pipe at no additional cost to the Owner. All fittings shall be wedged against the vertical face of the trench by means of concrete thrust blocks. All end of lines shall have a 2-inch flush valve installed unless otherwise directed by JCSUD.

2-02 STANDARDS:

The latest edition of the following standards and specifications form a part of this Specification to the extent indicated by any reference thereto:

(a) AMERICAN SOCIETY FOR TESTING MATERIALS

- ASTM D-2241 Standard specification for Polyvinyl chloride (PVC) plastic pipe (SDR-PR)
- ASTM F-477 Standard Specification for Elastomeric Seals for joining plastic pipe.
- ASTM D-3139 Standard specification for Plastic Pressure Pipe Using Flexible Elastomeric Seals.
- ASTM D-1784 Standard Specification for Rigid Polyvinyl Chloride (PVC) for Chlorinated Polyvinyl Chloride (PVC) Compounds.

(b) AMERICAN NATIONAL STANDARDS INSTITUTE (AMERICAN WATER WORKS ASSOCIATION)

- ANSI/AWWA C 104 American National Standard for Cement-Mortar Lining for Cast-Iron and Ductile Iron Pipe and Fittings for water.
- ANSI/AWWA C 105 American National Standard for Polyethylene Encasement for Ductile Iron Piping for Water and Other Liquids
- ANSI/AWWA C 106 American National Standard for Cast Iron pipes centrifugal cast in metal molds, for water or other liquids.
- ANSI/AWWA C 111 American National Standard for Rubber Gasket Joints for Cast-Iron and Ductile Iron pressure pipe and fittings.
- ANSI/AWWA C 110 American National Standard for Ductile-Iron and Gray Iron Ductile Iron fittings, 3 inch Through 48 inch for water for water or other liquids.
- ANSI/AWWA C 153 American National Standard for Ductile-Iron pipe, centrifugal cast in metal molds or sand-lined molds, for water or other liquids

(c) AMERICAN WATER WORKS ASSOCIATION

- ANSI/AWWA C 500 AWWA Standard for Gate Valves for Water and Sewerage Systems.
- ANSI/AWWA C 502 AWWA Standard for Dry-Barrel Fire Hydrants
- ANSI/AWWA C 509 AWWA Standard for Resilient Seated Gate Valves for Water and Sewerage Systems.
- ANSI/AWWA C 600 AWWA Standard for Installation of Ductile-Iron Watermains and their Appurtenances for Water and Sewerage Systems.
- ANSI/AWWA C 605 AWWA Standard Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water Mains
- ANSI/AWWA C 651 AWWA Standard for Disinfecting Water Mains
- ANSI/AWWA C 900 AWWA Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated fittings, 4 inch through 12 inches for water distribution and for sizes equal to or smaller than 16 inches for transmission mains.
- ANSI/AWWA C 909 AWWA Standard for Molecularly Oriented Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated fittings, 4 inch through 12 inches for water distribution.

(d) NATIONAL SANITATION FOUNDATION:

- NSF No. 14 National Sanitation Foundation Standard No, 14 for Thermoplastic materials, Pipe, Fittings, Valves, Traps, and Joining
- NSF No. 61 Drinking Water System Components-Health Effects

(e) TEXAS NATURAL RESOURCES CONSERVATION

- Chapter 290 Rules – Water Hygiene

2-03 PIPE ORIGIN:

Any and all pipe is subject to rejection if, in the opinion of the inspector or JCSUD representative, the pipe is in any way damaged, defective, or abnormally worn due to excessive sun exposure prior to installation. All pipe shall be of a domestic origin unless otherwise approved by the Engineer. Each section of pipe shall be in accordance with latest AWWA Standard for the material. No used pipe can be used. Any and all pipe not so stamped and certified shall be rejected.

2-04 DUCTILE IRON PIPE:

MATERIALS: All Ductile-Iron pipe shall conform to ANSI/AWWA C 151, IRON GRADE 60-42-10, wall thickness class 50. Distribution lines equal to or greater than 16 inches in diameter will be ductile iron pipe. Transmission mains equal to or greater than 20 inches in diameter will be ductile iron pipe. All Ductile-Iron fittings shall conform to ANSI/AWWA C 153 iron grade 70-50-05, 350 psi rated for all pipe sizes. Cement mortar lining for Ductile-Iron pipe and fittings shall conform to ANSI/AWWA C 104, except the lining shall be 1/16 inches thick. Exterior coating for Ductile-IRON pipe and fittings shall be bituminous. Each length of pipe and each coupling shall be subjected to a hydrostatic test (at factory) of not less than 500 psi with at least 10 seconds.

2-05 PVC PLASTIC PIPE:

MATERIAL: Distribution lines 4 inches in diameter up to 12 inches in diameter will be AWWA C-900 DR-18. Transmission mains equal to or smaller than 16 inches in diameter will be AWWA C-900 DR-18. All pipe will meet the requirements of ANSI/NSF 61. If pipe material other than C-900 is used then it will be identified on the plans.

STORAGE: All plastic pipe shall be laid out on a flat surface to prevent disfiguring the pipe. Any pipe stored outdoors for a prolonged period of time should be covered with some type of protective material.

DAMAGED PIPE: No damaged pipe should be used in the system, except that localized damage may be cut out of the pipe and the balanced used. Gouges and scratches, which penetrate more than 10% of the wall thickness, shall be cause for the rejection of the pipe.

CUTTING: All pipe cuts should be square, and burrs should be removed before installation of pipe.

2-06 INSTALLATION-PIPE:

The trench should be straight with a minimum trench width as specified in the following table. The trench width for pipe not included in the table will be specified on the plans. A sand bed of 6-inch minimum thickness under the pipe and pipe bell shall be prepared prior to placing the pipe in the trench. A minimum of 6 inches of sand is required around the pipe and pipe bell. If the pipe trench has ground water or is being laid across a drainage channel then 3/4" washed rock shall be laid to encompass the pipe to a depth of 6 inches below, above and on the sides of the pipe. Any substitution material must be approved by the Engineer. All pipe shall have at least a 5-foot setback onto private property from ROW line when pipe is being installed on easement. The minimum depth of cover is 42 inches from the finished ground surface grade to the top of the pipe. All water lines shall not be laid any deeper than 7' from final grade to the top of the pipe unless otherwise approved by JCSUD. In questions of interpretation of conflicts for installation procedures, JCSUD Specifications take precedence over AWWA Standards which take precedence over manufacturers recommendations. All pipes laid will have tracer wire. The wire shall be solid copper at least #12 AWG or larger and insulated. All splices shall be watertight and underground type. The tracing wire shall be taped to the top of the pipe using PSPWT210 2"x100' (10 mils thick) Poly Tape (ASTM D-1000), at intervals of every 36 inches to prevent dislocation of the wire during backfilling. The wire shall be extended to ground surface at all valves, fire hydrants, and other locations shown on drawings using the Copperhead brand Snakepit product # **CD14*TP** test station or JCSUD approved equal. The tracer wire should have continuity by utilizing the intended terminal on the top of the test station. The tracer wire shall be brought up on the outside of the valve box and go through the inside of the test station as shown on **page 13** of the standard details.

Fittings, valves and ductile iron pipe will be wrapped in plastic wrap to protect fittings and bolts from corrosion and contact with concrete. Tie-ins to existing lines will not be allowed without the permission of JCSUD. No tie in will be done on Mondays, Fridays or days before Holidays.

The interior of all pipes shall be cleaned thoroughly and kept clean during the progress of construction. When any line is not being worked on, it shall be plugged with a water-tight plug to prevent the entry of any foreign matter. All pipes shall be laid in such a manner as to allow the full length of the section to rest solidly on the pipe bed. When installing bends and fittings, a full joint of pipe is to be installed

into and out of all bends and fittings. Pipe shall not be laid in water or in any trench when the trench or weather conditions are unfavorable for work, unless authorized by JCSUD.

2-07 TIE- INS AND BRANCH CONNECTIONS:

All main line tie-ins will have a flanged tee with (3) flg x MJ valves. If allowed by JCSUD, a stainless steel tapping band with flange and flange x MJ valve can be installed to facilitate a wet tap. A tapping sleeve cannot be used when the tap is the same size as the main that it is connecting to. A flanged tee with flange x MJ valves on all sides must be cut in to properly make a connection. When the tie-in calls for an immediate step down for a road crossing, there will be an anchor coupling used in between the valve and 45 bend. The Contractor will be responsible for notifying the affected customers 48 hours in advance that will be out of water. The contractor will have the proper fittings, blocking, equipment, and labor to install the fitting and to minimize the time the water will be off. The Contractor will verify the size, type and depth of the pipe being tied into. If the new line is to be tied into the end of an existing line, a valve will first be installed to facilitate isolation for testing of the new water line as shown on the plans.

2-08 MAIN LINE FITTINGS WITH NO ATTACHED VALVES OR FITTINGS:

All tees, wyes, plugs, caps, reducers, crosses, and bends will be ductile iron with mechanical connections on lines 3 inches or larger. Unless otherwise approved by JCSUD, a full joint of pipe will be laid into and out of all bends. MEGA-LUG or STARGRIP restrained glands will be used on all fittings, plugs and flush valves in addition to concrete blocking. All concrete thrust blocks are required to extend from the fitting to unexcavated native soil. All concrete thrust blocks will be inspected before and after concrete is poured by JCSUD or their designated representative. Blocking that is found to be inadequate shall be removed and re-blocking shall be accomplished.

2-09 CUL-DE-SACS:

When cul-de-sacs are designed within a subdivision the water line size shall be reduced to 4" once the radius begins, unless deflection of the originally designed pipe size can be properly achieved without exceeding the pipe manufacturer's recommendations on deflections. A 45 bend will be attached to the reducer using a foster adapter to help achieve the radius that is needed. The JCSUD Standard Detail Draw should be referenced for cul-de-sacs. Any changes to this standard must be approved by JCSUD.

2-10 LINE FITTINGS WITH ATTACHED VAVLES OR FITTINGS:

All tees, wyes, plugs, caps, reducers, crosses, and bends will be ductile or cast iron. These fittings will be flanged on all faces unless shown on the drawings. Connections between valves and other fittings will be flange by flange. Any MJ fittings that are to be installed together will be done so using a Foster Adaptor. Connections between flanged fittings and pipe will be made with a flanged by mechanical joint adaptor. A full joint of pipe will be laid into and out of all bends. MEGA-LUG or STARGRIP restrained glands will be used on all pipe connections to the mechanical joint adapters. A 20' piece of pipe will be used out of all fittings, unless otherwise approved by JCSUD. When there is more than 20' but less than 80' in between two fittings, the pipe will be restrained with locktite pipe. When a vertical transition utilizing 45-degree bends is required, ductile iron pipe and all thread will be used in between the two 45 vertical bends. All fittings will have concrete thrust blocks that are required to extend from the fitting to unexcavated native soil. All concrete thrust blocks will be inspected before and after concrete is poured by the Engineer or his designated representative. Blocking which is found to be inadequate shall be removed and re-blocking shall be accomplished.

2-11 FIRE HYDRANTS:

Fire hydrants shall not be installed on main lines less than 6 inches in size. Distances between fire hydrants shall not be more than 1000 feet. When being set within a city's jurisdiction the length of line between each hydrant shall be governed by their standards only when it is less than 1000 feet. Hydrants will be either a Mueller Super Centurion 250, Clow Medallion, American Darling HB-84-B or M&H Style 129. All fire hydrants shall conform to ANSI/AWWA C 502 compression type, 150 working pressure, traffic model, and dry top unless otherwise specified. All fire hydrants will be painted red at the factory and set level and plumb. The 5-1/4 inch cap shall be a minimum of 18 inches from finished grade with a maximum of 24 inches. The Tee for installation of the hydrant shall be MJ x flange with a flange x MJ valve. An 18 inch anchor coupling shall be used to connect the hydrant to the valve. If a lead is needed and it's use approved by JCSUD, the lead must be C-900 PVC and be one solid piece from the valve to the fire hydrant. A suitable support and thrust block will be installed to support the hydrant. The drainage holes will not be blocked by the thrust block or the support.

2-12 COMMERCIAL FIRE PROTECTION LINES:

All fire protection lines shall be separated from the distribution system by means of an approved double check detector assembly which shall be installed inside a precast concrete vault. The approved Park double check vault is referenced in the standard details on page 20. The double check detector assembly shall have a JCSUD approved 5/8" x 3/4" low flow detector check meter installed.

2-13 GATE VALVES:

Gate valves shall be designed for a minimum water working pressure of not less than 200 psi. Valves shall have a clear waterway equal to the full normal diameter of the valve and shall be opened by

turning counter-clockwise. The operating nut shall have an arrow, cast in the metal, indicating the direction of opening. Each valve shall have the manufacturers' initials, pressure rating, and year of manufacture cast on the body. Prior to shipment from the factory, each valve shall be tested by hydraulic pressure equal to twice the specified water working pressure. Valves will be M&H Style 4067, Clow Resilient Wedge, Mueller A-2360 series, American Flow Control Series 2500 or Kennedy KenSeal II. Valves 2-inches through 16-inches shall be resilient-seated gate valves conforming to ANSI/AWWA C 509. All valves shall be supported by use of non-twist concrete support blocks as shown on the standard details or plans. Two (2)-inch valves shall be threaded bodied and mounted by means of using brass nipples. Valves installed deeper than 3-½ ft. to the top of the operating nut, will have a valve extension made and installed to facilitate operation of the valve with a standard valve wrench. All intersecting lines will have a cluster of appropriate valves, unless otherwise specified. Main line valves attached only to pipe will have mechanical joints. Valves attached to fittings on two ends will be flanged. Valves attached to fittings and pipe will be flanged by mechanical joint. All valves installed shall have an approved concrete support resting underneath it. The AWWA C 509 specification is modified with all exposed nuts and bolts on the valves other than the operating nut will be ASTM-304 Stainless Steel.

2-14 MISCELLANEOUS VALVES:

All air relief valves shall be A.R.I. D-040-C 1" and be set at the places designated by JCSUD. All blow off, pressure regulator, and flush valves shall be of the types and sizes and at the locations shown on the plans. Dead end lines will have a flush valve at the end of the line. They will be connected by a 2-inch MJ tapped cap or an MJ tap plug, depending on whether the connecting pipe ends in a fitting or just pipe, with retainer glands and properly blocked, set level and plumb. The flush valve will stand 18-24" inches from finished grade to Center Line of upper 90 and plugged with a galvanized plug with the outlet turned toward the drainage ditch.

2-15 AUTOMATIC FLUSHING DEVICES:

An automatic flushing device will be installed at the end of all dead-end lines, unless otherwise approved by JCSUD. All automatic flushing devices will be Kupferle brand 1" Z9400-A-BLUETOOTH. A 1" meter will be installed with all automatic flushing devices. The standard detail on page 21 should be referenced for the installation of all flushing devices.

2-16 VALVE BOXES:

Valve boxes shall be cast iron with cast iron lids and installed so as to be centered over the valve and be set plumb, with the soil around the box tamped equal to the distance of the disturbed area. If the valve box needs an extension to reach the surface then a piece of ductile iron pipe will be used, PVC pipe is not allowed. If an extension is needed for the valve box then a piece of ductile will be used to make up the difference, PVC is not allowed. All valve locations shall be marked with a commercially manufactured steel post and valve marker as shown on page 7 of the standard details. A 24" x 24" x 6" concrete pad poured around all valve boxes will also be required, completed before final inspection. In areas of multiple valves, one larger concrete pad that encompasses all of the valves will be poured per JCSUD direction.

2-17 WATER SERVICE CONNECTIONS:

All taps must be made with an approved tapping machine. All water service connections will be tapped into the water line using a tapping saddle. Tap saddles will be brass or other approved material with CC threads for brass corporation stops. Tapping saddles will be located perpendicular at the property lines between lots and perpendicular to the water line unless shown at other locations on the plans. Taps for near side connections will be made on top of the pipe when on private property and at 90 degrees when in ROW. Taps for far side connections will be made on the side of the pipe at 90 degrees from the top of the pipe. All taps made must be 1". All tap saddles must be a 1" Smith-Blair Style 317. If the meter is to be a single 5/8" x 3/4", the service must be reduced to 3/4" at the saddle using a 1" x 3/4" brass bushing. All tapping sleeves must be Smith-Blair model 663. Tapping sleeves will only be used when specified on the plans.

A compression corporation stop will be attached to the tapping saddle. A 1-inch corp stop will be used for all dual connections and all long connections. A 3/4-inch stop will be used for 3/4" single short connections ONLY. Corporation stops for 1-inch "long side" services will be either Ford Model F1000-4-G-NL or Mueller B-25008N. For 3/4-inch "short side" single service connections either Ford F-1000-3-G-NL or Mueller B-25008N. For 1- inch and 3/4 - inch "short side" dual services the corporation used shall be Ford Model F1600-4-NL. For 1- inch "short side" single service connections either F1000-4-G-NL or Mueller B-25008N. Copper will be used on all "short" side services. Copper tubing shall conform to seamless copper water tube, ASTM Designation B 88, Type K Class 1, annealed (soft) copper tubing for use with compression-type or flared fittings. "Long" side connections crossing County Roads will be SDR-9 250-psi poly (1" min.) encased with 1 1/2 inch Schedule 40 Glued PVC laid Flowline to Flowline or from the Back of Curb to Back of Curb. State Road crossing encasement will conform to the TxDOT Permit requirements. The road crossing will connect to a brass tee for duals or a single connection just outside the ROW line. Copper tubing (as above) will be used to the curb stop a maximum of 3 ft. inside of the property line, where it is clearly marked. Where duals are to be set, the boxes will be set on the property on which it will service, 5 to 7 feet from the property line. **The tees** for "long side" services will be either FORD model T444-334-G-NL or Mueller 15381N series. Tees for 3/4 - inch and 1- inch "short side" dual services will be FORD model T448-334-G-NL, this male iron pipe by CTS tee will screw directly into the female iron pipe by CC thread corporation. **Compression Coupling** will be either Ford C

44-33G-NL or C44-44G-NL or Mueller 15403N or 15404N, these compression couplings are not allowed to be in between the corporation and the curb stop on short taps.

Angle type brass curb stops with Wing Locks, 360 degree turns, i.e.; Ford BA43-444WR-G-NL will be used for 1 inch. A Ford BA43-232-WR-G-NL for 5/8 inch x 3/4 inch x 3/4 inch, this will be used on all standard 3/4-inch service connections, and Ford BA43-342-WR-G-NL for 1 inch CTS X 3/4 inch meter swivel or Mueller B24258-3 will be used. Curb stops will be set level and plumb, approximately 1" from the rear of the box, aligned with the pre-fab hole in the meter box to allow for easy installation of the meter and plumbing. One curb stop allowed per box, plugged with a 1" PVC plug and locked with an AMERICAN LOCK 23762 A40KA- Series (all keyed alike). The lock needs to have electrical tape wrapped three (3) times end over end covering the key hole. Meter boxes for standard meters will be NDS D1200-OLCIR series with a metal reading flap. Meter boxes for 1" meters will be NDS D1500-DUDICIR. Service lines 1.5" & larger will have a 2" RS valve with valve box installed at the tap of the existing line. The meter box used for 2" meters will be an NDS 17" X 30" X 18" Model #126BCDMCIFB. No meter box or tap will be allowed within any trafficked area, including but not limited to, streets, sidewalks, driveways, or parking lots. All meter boxes will be a minimum of 2' away from any paved or trafficked area. When service lines are laid in a development that has curb and gutters, a "W" will be required to be etched in to the curb marking where the meter box is or where the road crossing is.

2-18 WATERLINE SEPARATION:

Water line and sanitary sewer line crossings shall meet the requirements of Texas Commission on Environmental Quality (TCEQ) Chapter 217.53. In addition, water lines and sanitary sewers shall be installed no closer to each other than 9 feet and where this cannot be achieved, the sanitary sewer shall be constructed of SDR 26 (ASTM D2241) 160 psi pressure pipe with water tight joints used in water main construction for the 9 foot clearance. No physical connection shall be made between a drinking water or any appearance thereof shall be constructed so as to prevent any possibility of sewerage enter. No sewer lines carrying domestic or industrial wastes shall cross suction mains to pumping equipment. Water lines shall not be installed closer than 10 feet to a septic tank drainfield, it must be encased for the line length that is less than 10 feet from the drainfield.

2-19 HIGHWAY and RAILWAY CROSSING PIPE BORES:

All bores will conform to the requirements of the entity that controls the roadway where the work is taking place (TXDOT, County). All crossings of public and private roads and railways will be bored unless noted on the plans. All pipe bores for State Road Crossings and Railroad crossings shall conform to the following criteria: All bore encasement pipe sizes will be determined in **Table 2-18**. The encasement pipe will be a minimum pipe thickness of three-eighths (3/8) inch and shall have a minimum yield strength of 35,000 psi. The exterior of the pipe will be coated in accordance with the latest revision to AWWA Standard C203 or AWWA Standard C214.

TABLE 2-18: ENCASEMENT PIPE SIZE REFERENCE:

| Material | Nominal Pipe Diameter (inches) | Minimum Trench Width (inches) | 3/8"(.357") Thick Steel Encasement size (inches) | PVC Encasement size (inches) |
|----------|--------------------------------|-------------------------------|--|------------------------------|
| PVC | 4 | 21 | 10 | 10" SDR 35 |
| PVC | 6 | 24 | 12 | 12" SDR 35 |
| PVC | 8 | 27 | 14 | 15" SDR 35 |
| PVC | 10 | 30 | 16 | 18" PS 46 |
| PVC | 12 | 33 | 20 | 21" PS 46 |
| PVC | 16 | 36 | 24 | 24" PS 46 |
| D.I. | 8 | 27 | 14 | 12" SDR 35 |
| D.I. | 10 | 30 | 16 | 18" PS 46 |
| D.I. | 12 | 33 | 20 | 21" PS 46 |
| D.I. | 14 | 33 | 22 | 21" PS 46 |
| D.I. | 16 | 36 | 24 | 24" PS 46 |
| D.I. | 18 | 35 | 26 | 27" PS 46 |
| D.I. | 20 | 37 | 28 | 27" PS 46 |
| D.I. | 24 | 42 | 32 | 30" PS 46 |
| D.I. | 30 | 48 | 34 | 36" PS 46 |

Other pipe bores shall conform to the following criteria. All bore encasement pipes will be a minimum internal diameter four (4) inches in diameter greater than the nominal outside diameter of the pipe. The encasement pipe will be SDR-35 PVC pipe. All gaskets will be installed.

All pipe bores shall also meet the following criteria: The top of the casing will be a minimum of 60 inches below the lowest surface elevation. The pipe will be separated from the casing by CCI Model CSS12 Stainless Steel spacers installed in accordance with the recommendations of the manufacture. The ends of the casing will be sealed with Espansit end seals installed in accordance with the manufacturer's recommendations. The encasing pipe will not be sloped more than one-eighth (1/8) inch per foot of casing. No open cuts will be made on State Roads within 12 feet of paved surfaces unless written authorization is received from the Texas Department of Transportation. Open cuts for railroads will be shown on the plans.

2-20 DRIVEWAY CROSSING PIPE BORES:

All paved driveways will be bored unless noted on the plans. All bore encasement pipes will be sized according to Table 2-18. The encasement pipe will be SDR-35 PVC pipe. All gaskets will be installed.

All pipe bores shall also meet the following criteria: The top of the casing will be a minimum of 42 inches below the lowest surface elevation. The maximum depth below the lowest point will be 60 inches unless shown on the plans. All pipes bored under a driveway will not be permitted to have a bell inside the casing. No spacers will be used on the outside of the pipe. If a bore is longer than one pipe joint, then the pipe will be separated from the casing by CCI Model CSS12 Stainless Steel spacers installed in accordance with the recommendations of the manufacturer. The ends of the casing will be sealed with plastic used for wrapping ductile iron fittings and approved by JCSUD. The encasing pipe will not be sloped more than one-eighth (1/8) inch per foot of casing. For driveways, no open cuts will

be made within 5 feet of paved surfaces unless written authorization is received from the property owner.

2-21 SERVICE LINE ROAD BORES and CROSSINGS:

All pipe bores or road crossings for service lines 1 inch or smaller in diameter shall conform to the following criteria: All piping for service line road bores and road crossings for single or dual meter sets will be 1 inch SDR 9 Poly with 1-1/2 inch schedule 40 glued PVC pipe as encasement, using a long slip coupling to piece together. All other encasement pipes will be a maximum internal diameter one (1) inch greater than the outside diameter of the service pipe diameter. The top of the casing will be a minimum of 42 inches below the lowest elevation unless specified on plans. The maximum depth below the lowest point will be 54 inches unless shown on the plans. The encasing pipe will not be sloped more than one-eighth (1/8) inch per foot of casing. All service line road bores for service lines greater than 2 inches in diameter shall conform to the criteria for Highway and Railway crossing bores. No open cuts will be allowed with 5 feet of a county or city maintained road unless written authorization is received from the county or city that has the jurisdiction.

2-22 OPEN CUTS ACROSS ALL PAVED ROADS/DRIVEWAYS:

No open cuts will be allowed across any paved surface without written permission from the person or entity with jurisdiction over the road or driveway. If an open cut is allowed by the governing entity or property owner, an agreement between JCSUD and the state/city/county/property owner who has jurisdiction over the paved road or driveway is required. This agreement shall relinquish JCSUD of any liability over unsatisfactory conditions that may arise due to the disturbance of the road and/or the drainage ditch.

2-23 GAS LINE CROSSINGS:

When crossing a gas line or gas easement the rules and specifications of the gas company who owns the easement will be followed. If an encroachment agreement is needed then the engineer shall acquire such agreement and furnish a copy to JCSUD. A minimum 2' vertical separation is required in between the crossing water line and gas line. All water lines that cross a gas line and their respective easements will have SDR-35 PVC encasement laid from easement ROW line to ROW line. Typical JCSUD encasement specifications and procedures will be followed. Ductile iron or steel encasement is not permitted when crossing a gas line or gas easement unless JCSUD has written direction from the governing gas company stating otherwise.

2-24 TAPS FOR DISINFECTION:

If a water service tap is not installed within 1000 feet of line length, a tap will be installed so that no length of pipe run will be greater than 1000 feet without a tap.

2-25 CLEAN UP & SIGN OFF:

The Contractor shall, as the project progresses, restore the site to its original condition or better, including the smoothing out of all excavation. The Contractor upon completion of the project shall provide a signed letter from each property owner affected by the construction, a letter or statement indicating that the property owner is satisfied with the restoration.

2-26 TRENCH SAFETY:

In accordance with various State and US Government laws and regulations, whenever trench excavations exceed a depth of five (5) feet, a trench safety system will be installed. The trench safety system must be developed and installed to meet the requirements of both State and US government laws and regulations.

2-27 MEASUREMENT AND PAYMENT:

Measurement and payment will be based on completed work performed in strict compliance with the plans and specifications. Measurements of the pipe shall be along the centerline and will include all valves, fittings and service line to a point five (5) feet from the meter. Limits of construction are shown on the plans. All trenching, backfill, concrete thrust blocks, sewer line crossings and fittings shall be included in the bid price per linear foot of pipe. Drilled crossings or encased crossings open cut will be paid for separately in addition to the payment for the pipe. Meters, fire hydrants and valves along with gravel and asphalt replacement will be paid for separately. Monthly interim payments will be made at 95% of the completed work as agreed upon between the Contractor and the Owner. Payments for materials on hand and delivered to the project site can be made from the manufacturer's invoice up to 50% of the unit item bid price. Final payment will be made after acceptance of the work by the Owner and sign off by the property owners.

SECTION 3

STERILIZATION

3-01 GENERAL:

Each unit of the water distribution system shall be sterilized with chlorine before acceptance for domestic operation. The chlorinating material shall conform to the requirements of AWWA B 300-10.

3-02 CHLORINATION:

The amount and method of chlorination shall be in accordance with current TCEQ requirements and AWWA C651 using the continuous-feed method. In case of conflicting requirements, TCEQ Chapter 290 shall govern. The initial free residual must be equal to or above 25mg/L and after a 24 hour hold time have a free residual equal to or above 10mg/L. A JCSUD representative must be present to perform the residual test.

3-03 TESTING:

Bacterial Samples will be collected and tested for every 1000 feet of line installation according to TCEQ Chapter 290 Rules. The Contractor is responsible for collecting the samples, and a JCSUD representative must be on-site during the sample collection.

After the applicable contact period, the system shall be flushed with clean water until the residual chlorine content is not greater than the residual chlorine content of the water supplied. The effectiveness of the disinfection procedure shall be established by bacteriological sampling and analysis. If results are not satisfactory, procedure shall be repeated until satisfactory results are obtained. Before being placed into service, the entire system shall be disinfected until a sample of chlorine free water from each line is found to be free of organisms of the Coli-Aerogenes groups. The disinfection and submission of samples shall be in accordance with the requirements of TCEQ - i.e. one sample per 1000' of pipe.

3-04 PAYMENT:

Separate payment will be made for this item and the cost thereof should be separate from the unit price for the distribution line in the proposal.

SECTION 4

PRESSURE TESTING OF LINES

4-01 GENERAL:

Unless otherwise specified by the Engineer, hydrostatic pressure tests will be made as directed by the Engineer and under his supervision. Pressure during the testing of the lines shall be raised to the rated working pressure at the lowest elevation of the pipe and that pressure maintained for a period not less than four (4) hours. The test will be managed such that no more than 50 feet elevation difference occurs on the segment tested.

4-02 INSPECTION:

During the testing period, critical pressure points shall be inspected for leaks. Pressure tests shall be conducted as follows:

1. Fill pipe with water until all air is exhausted.
2. Bring pressure to rated pipe pressure by pumping from a container.
3. Refill container and maintain pressure for four (4) hours.
4. Measure water required to refill container to pre-test level.

Defective pipe or fittings, etc. disclosed by the test shall be replaced by the Contractor with sound material, and the testing continued or repeated until the test results are satisfactory.

4-03 LEAKAGE LIMIT:

No piping installation will be accepted until, or unless, the leakage is less than ten (10) gallons per inch of pipe diameter per mile of pipe per 24 hours.

Should any test of combined sections of line disclose leakage per mile greater than that specified above, or if individual sections show leakage greater than the specified limit, the Contractor shall locate and repair or replace defective joints or segments of line until leakage is within the acceptable limits. Leakage losses shall be within the allowances specified before acceptance of the project. No leakage shall be permitted in solvent cement joints.

4-04 PAYMENT:

A separate payment will be made on this item and the cost involved thereof should be separate from the unit price for the distribution line in the proposal.

SECTION 5

PORTLAND CEMENT CONCRETE

5-01 GENERAL:

The works covered by this section consists of furnishing all labor, materials, and equipment necessary,

and performing all operations in connection with the installation of concrete work in accordance with these specifications and the applicable drawings.

5-02 MATERIALS:

(a) Aggregate: Both coarse and fine aggregate shall conform to Federal Specifications SS-A-281. Coarse aggregate shall be well grades from fine to coarse, within prescribed limits. The maximum size shall be 1-1/2 inches.

(b) Cement: Only one brand of each type of cement shall be used for exposed concrete in any individual structure. Cement reclaimed from cleaning bags or leaking containers will not be used. Cement shall be used in the sequence of receipt of shipment, unless otherwise directed by the Engineer.

All Portland cement will comply with Federal Specification SS-C-192, Type 1 or 1A.

5-03 REINFORCING STEEL:

All reinforcing steel will be fabricated to the dimensions and shapes as indicated by the plans. Prior to placement, all steel bars will be cleaned of rust, scale and any other foreign matter that could prevent a good bond with the concrete. Laps or splices shall be of adequate length to transmit stresses and all splices in adjacent bars shall be staggered. The steel, complete in place shall comply in all respects with the ACI and CRSI codes.

5-04 CLASS OF CONCRETE:

All concrete shall be 5 sack and shall have a compressive strength of 3000 psi at 28 days. No high early strength concrete will be accepted.

5-05 PAYMENT:

No separate payment will be made for the work covered by this section, and all costs in connection therewith shall be included in the bid price for the items of which they are a part.