CITY OF BILOXI

**SPECIAL PROVISION NO. 907-644-1**

**DATE: 12/10/2024**

**SECTION 644 - WATER MAINS AND APPURTENANCES**

**644.01 - Description.** The work covered by this section consists of furnishing all labor, equipment and materials and performing all operations in connection with the installation of potable water lines, as indicated on the drawings and as specified herein. The work includes clearing, grubbing, trenching, bedding, pipe laying, backfilling, pipe fittings, valves, hydrants, and all incidental items including testing and disinfection of the completed water lines, which are necessary for installation of the mains and connections to hydrants and existing mains and meters.

**644.02 - Materials.**

**644.02.1 - Bedding Material.** Aggregate bedding material shall meet the requirements of “Size II Stabilizer Aggregate” of Section 907-304-1 or “Borrow Excavation” of Section 907-203-1. Bedding material is required where directed by the City engineer or his authorized representative.

**644.02.2 - Concrete.** Concrete for use in thrust blocks and valve box slabs shall be non-reinforced and shall have a minimum 28 days compressive strength of 3000 psi.

**644.02.3 - Polyvinyl Chloride (PVC) Pipe.** PVC water lines 4 inches through 12 inches shall be "Blue Brute" (blue in color), or an approved equal, Class 235, DR 18 polyvinyl chloride pipe manufactured in accordance with AWWA C-900 (latest edition) and shall be U.L. listed. PVC water lines 14 inches through 48 inches shall be “Big Blue” (blue in color), or approved equal, Class 235, DR 18 polyvinyl chloride pipe manufactured in accordance with AWWA C-905 (latest edition) and shall be U.L. listed. Pipe shall be furnished in standard lengths (minimum 20 feet) with integrally cast bells or couplings using elastomeric gaskets that meet the requirements of ASTM D 3139 and F-477. All necessary adapters for connection to fittings shall be provided.

**644.02.4 - Ductile Iron Pipe.** Ductile iron pipe shall be designed in accordance with AWWA Specification C150 and manufactured in accordance with AWWA Specification C151. Joints shall conform with AWWA Specification C111 or C115 as applicable and shall be of the push on or mechanical type except where flanged joints are indicated on the plans. Ductile iron pipe 4" and less in diameter shall be of thickness Class 51 and pipe 6" and greater in diameter shall be of thickness Class 50 except pipe with threaded flanges shall be Class 53.

**644.02.4.1 – Polyethylene Encasement.** Provide 8 mil minimum thickness polyethylene encasement (wrap) on all buried ductile iron pipe, fittings, and accessories in accordance with AWWA C105 (ANSI A21.5). Polyethylene encasement material shall consist of three layers of co-extruded linear low-density polyethylene (LLDPE), fused into a single layer. The inside surface of the polyethylene wrap shall be infused with an anti-microbial biocide to mitigate microbiologically influenced corrosion and a volatile corrosion inhibitor to control galvanic corrosion. The color shall be white. Product and manufacturer shall be V-Bio® Enhanced Polyethylene Encasement, or approved equal.Polyethylene encasement wrap shall be included in the cost of the installation of the ductile iron water pipe.

**644.02.5 - Fire Hydrants.** Hydrants shall be three-way Clow Medallion, Meuller Super Centurion 250, or approved equal with five and one-quarter inch (5 1/4") valve opening. The length of the lower barrel on each hydrant shall be appropriate for the depth of the water main. The color shall be safety yellow 10-56 Rus-Kil or approved equal.

Hydrants that are installed or have been taken out of service shall be completely covered and identified as being “NOT IN SERVICE” until approved for use or removed from the site. “NOT IN SERVICE” bags shall be N.I.S. bags as manufactured by Assured Flow Sales, Inc. or approved equal. N.I.S. bags shall be 27” x 42” and made of 4 mil polypropylene material orange in color and in bold print clearly state in contrasting color “NOT IN SERVICE”. “NOT IN SERVICE” labeling shall be visible from all sides. Ties straps shall be provided to firmly secure bags to hydrant and approved prior to use.

**644.02.6 - Water Valves.** Water valves shall be resilient seat gate valves complying with the requirements of AWWA C509 "Standard Specifications for Gate Valves for Ordinary Water Service" or AWWA C515 “Standard for Reduced Wall, Resilient Seated Gate Valves for Water Supply Service”. Valves shall be Mueller or approved equal. Valves shall be furnished with a non-rising stem and shall open by turning the operating nut counterclockwise. Valve ends shall be flanged or mechanical joint, as appropriate for the connection. Mechanical joints shall be recommended by the manufacturer for use with AWWA C-900 PVC or ductile iron pipe and shall be furnished with MJ retainer glands.

All buried valves with a depth of greater than 36” from finish grade to top of 2” nut shall be fitted with a telescopic extension stem, as manufactured by Trumbell Industries, Inc. or approved equal. The insert shall be one complete assembled unit composed of a ductile iron square nut, a self-adjusting extension arm, stop collar, anti-friction disk, housing adapter, a valve box centering ring, position indicator, debris shield, and a wrench nut coupler welded to the telescoping stem (bottom piece). The telescopic extension stem material shall be carbon steel with black enamel coating. The valve box top section shall be sized to fit inside of the upper section of a standard valve box, allowing clearance for a 5 ¼ inch drop lid.

The position indicator of the valve, from fully open to fully closed, shall be placed no more than 6” below final grade. A debris shield shall be installed over the position indicator to keep the indicating window visible and clear of dirt and other foreign material. The debris shield shall be of non-corrosive material and designed to fit tightly inside the cast iron adapter, to prevent dirt from passing onto the position indicator or into the valve box. Position indicator shall be secured in a way to prevent rotation of the indicator during operation.

Position indicator shall be sealed with two (2) neoprene o-rings and shall not admit more than 0.5 ounces of water after 7 days of submergence. Position indicator shall be cycle tested by manufacturer to ensure successful operation of 1 million revolutions. Drop testing shall be performed by dropping an 18-pound weight from 4 feet to ensure accidental impact will not crack or damage the position indicator. The extension stem shall be capable of surviving a torque test to 300 ft-lb without failure. Manufacturer shall supply test results from an independent testing laboratory.

All telescopic extension stem assemblies shall be included with the unit price of each buried valve (with a depth between 3 feet and 10 ½ feet from finished grade to the top of the 2-inch square) wrench nut installed and accepted by the Owner.

**644.02.6.1 – Insertion Valve.** Insertion valve (12 inches or less) shall be fully functioning, resilient wedge gate valve capable of installation under pressure complying with the requirements of AWWA C515. Insertion valves shall be Hydra-Stop, “Insta-Valve 250”, or approved equal. Insertion valves shall be furnished with a non-rising stem operating counterclockwise. The body, bonnet, and valve stem shall be 304 stainless steel. Wedges shall be resilient seat complying with AWWA C506 and be fully encapsulated with EPDM rubber. Rated working pressure shall be 250 psig. End connections for buried valves shall be permanently restrained to the pipe. Tapping machine shall be capable of removing the complete coupon from the host pipe. Upon installation of the insertion valve body on to the existing pipe, a pressure test of 1.1 times that of the contents shall be sustained for 15 minutes. Once the pressure test is affectively achieved, the insertion valve body must not be moved in accordance with AWWA Standards. If the insertion valve is moved, the pressure test must be completed again. The insertion valve must not be moved or repositioned once the pressure test is achieved.

Insertion valve (16 inches and larger) shall be fully functioning, resilient wedge gate valve capable of installation under pressure complying with the requirements of AWWA C515. Insertion valves shall be Team Industrial Services, “Insert Valve”, or approved equal. Insertion valves shall be furnished with a non-rising stem operating counterclockwise. The body and bonnet stem shall be ductile iron with NSF 61 Epoxy. Wedges shall be resilient seat (shall seat on valve when closed, not on host pipe). Rated working pressure shall be 250 psig. End connections for buried valves shall be mechanical joint permanently restrained to the pipe. Tapping machine shall be capable of removing the complete section of pipe.

**644.02.7 - Valve Boxes.** Except where concrete valve boxes are indicated on the plans, valve boxes shall be of cast or ductile iron as manufactured by Mueller, Kennedy, M & H or approved equal. Covers shall be cast or ductile iron with a designation of "WATER" embossed on the topside and shall be of the screw down type. Valve boxes shall be the two-piece type, adjustable in length and suitable for installation in roadway surfaces. Stack pipe for valve box adjustment shall be Class 150 DR 18 manufactured in accordance with AWWA C-900 PVC or ductile iron pipe. Adjustment risers shall be cast iron and approved prior to use by the City Engineer or his authorized representative.

**644.02.8 - Fittings.** Fittings for water mains of six inch (6") diameter and larger shall be seal coated cast iron or ductile iron with flanged or mechanical joint ends, as appropriate for each connection. Mechanical joints shall be recommended by the manufacturer for use with AWWA C-900/C-905 PVC or ductile iron pipe and shall be furnished with MJ retainer glands. Standard fittings shall be manufactured in accordance with AWWA C110 and compact fittings in accordance with AWWA C153. Fittings for use with ductile iron pipe may be of the push-on type. Fittings for connections between new main and existing mains and pipes shall be specifically designed for interconnection of the lines being joined and will be subject to the approval of the City engineer or his authorized representative.

The Contractor shall make every effort to limit the number of fittings installed along the mainline as well as at lateral connections. The excessive use of bends to route water main connections up, over and around obstructions will not be allowed. The Contractor shall immediately correct any sections of main or connections the City Engineer or his Authorized representative deems unacceptable.

If an unavoidable situation occurs where the Contractor must install an excessive number of fittings, in the opinion of the City Engineer or his Authorized Representative, the Contractor shall immediately alert the City Engineer or his Authorized representative via a Request for Information (RFI) with complete details (i.e. plans, pictures, elevations, distances, dimensions, etc.) of the issue at hand. The City Engineer and his Authorized representative will work with the Design Engineer and Contractor to provide a resolution.

**644.02.9 - Corporation and Curb Stops.** Corporation stops at the main and curb stops at the meter shall be Ford or approved equal of the type and size to fit the particular water service. All new corporation and curb stops shall be low lead brass.

**644.02.10 - Water Service Tubing.** Water service tubing shall be polyethylene "PE" tubing having copper tube O.D. sizes and complying with ASTM D2737, SDR 9, 200 psi as manufactured by Driscopipe or approved equal. The use of metal inserts in the tubing will not be permitted. Splicing of water service tubing shall NOT be allowed.

**644.02.11 - Water Meters.** New water meters will not be furnished and installed as part of this Contract. The existing water meters will be removed and reinstalled in new water meter boxes at the right-of-way line. The Contractor shall coordinate with the City to confirm that all existing meters, including radio transceivers, are operational after they have been reinstalled. Any existing water meter assemblies (i.e. the meter, sensor, transceiver, connections, etc.) damaged during construction shall be replaced by the Contractor in kind at no additional cost in accordance with the City’s Standards. The Contractor is responsible for ensuring that all meters reinstalled are operational. There is no separate payment for this work.

A standard residential water service shall have a 5/8inch x 3/4inch Sensus SRII Low Lead Water Meter (PD 320). Water meters 1½ inch – 2 inch in size shall be Sensus Omni-R2 (SP-W-OMR-00-0611-01-A) and water meters over 2 inches shall be Sensus Omni C2 (DS-W-OMR-02-0611-01-A). The size of the meter shall be determined by the size of each individual service as determined in the field. Each meter is equipped with a Sensus FlexNet SmartPoint M2 Model #520M – Pit Set (AMR-337) radio transceiver (attached to the meter lid) that interacts with one or more Tower Gateway Base Stations.

**644.02.12 - Water Meter Boxes.** When the contract calls for replacement of water meter boxes or if contract call for replacement of existing water meters, the Contractor shall also replace existing meter boxes. Meter boxes located outside of pavement shall be replaced with a standard high-density polyethylene (HDPE) meter box as manufactured by DFW (Model DFW.1200.12) or approved equal. The meter box shall have minimum dimensions of 21 5/8” L x 16 3/8” W (at bottom) with a height of 12”. Meters boxes located in driveways, parking lots, sidewalks, etc., shall be a heavy walled box as manufactured by DFW (Model No. DFW37C-12 heavy duty body) or approved equal. Minimum dimensions shall be 21” L X 12 ½” W (at bottom) with a height of 12 ½”.

All meter boxes shall have blue lids. The lid/cover for a standard box located outside of pavement shall be as manufactured by DFW (Model DFW1200.3TDEEP.LID), or approved equal. AMR lid minimum dimensions shall be 15 9/16” L x 10 3/16” W with a 4 5/8” x ¼” deep recess for AMR pad with 1.88” x 2.5” slot hold for stem. Lids for meter boxes located in driveways, parking lots, sidewalks, etc. shall be a heavy walled as manufactured by DFW (Model DFW 37C-AF3MT-DEEP-LID) or approved equal. AMR heavy duty lid minimum dimensions shall be 17 ¾” L Xx11” W with a 4 5/8” x ½” deep recess for AMR pad with a 1 7/8” x 2.5” slot hole for stem.

**644.02.13 – Filter Fabric.** Geotextile fabric shall be non-woven, needle punched, and weigh a minimum of eight ounces (8 oz.) per square yard, as manufactured by Terratex Construction Fabrics, “NO8”, or approved equal.

**644.02.14 – Line Stop.** The line stop pay item shall include all components required to plug an existing water main so that a newly installed and tested water main can be connected to the existing main currently under pressure. The line stop will allow this connection to occur without the disruption of pressure or service to the existing main upstream of the line stop. Each line stop shall include the following components: Linestop nozzle with closure plug, gate valve (which is paid for separately under Pay Item 907-644-E), housing unit, high-pressure jackscrew actuator with folding line stop head and miscellaneous gaskets, seals, etc. required to accommodate the line stop operation as shown on the plans.

**644.02.15 – Temporary Bypass.** If required, the temporary bypass shall include constructing a temporary water line within the area where the existing water main is to be adjusted. Each temporary bypass shall include the following components: (1) two tees, (2) temporary water main (3) ductile iron fittings required for the temporary water main and (4) restraints, thrust blocks, etc. required to accommodate the bypass operation. If required, the temporary bypass operation shall work in conjunction with the line stopping operation.

**644.02.16 – Automatic Flusher.** If required, automatic flushers shall be installed and, if needed, relocated as directed by City of Biloxi Public Works to prevent stagnation of potable water in newly constructed water mains. Automatic flushers shall be Eclipse #9700 by Kupferle, or approved equal. Contractor shall provide Flusher with Sampling on a fire hydrant.

A 2-1/2” NST Swivel connection shall lead into a 2” automatic flushing valve. The flushing valve shall control the flow of water through the hydrant and its diaphragm with the extension and retraction of a DC latching solenoid and have a 220 PSI rating. Each unit shall be furnished with a stand-alone valve controller. The valve controller will not require a second hand-held device for programming. Controller must have a minimum of 12 possible flushing cycles per day. Controller shall be submersible to 12 feet, and operate with a 9-volt battery, and have resin-sealed electrical components. The solenoid shall have no loose parts when removed from the valve.

All components shall be housed in a lockable powder coated (red or yellow) aluminum enclosure, with ¾” perforations in the floor to diffuse flushing water. A removable floor plate shall allow access to a 2” FIP outlet if needed. Contractor to provide and install a collar lock to cover the 2-1/2” swivel for prevention of tampering with the device. A diffuser shall be provided and installed thru the removable access plate to allow directional flow of flushed water.

**644.03 - Construction Requirements.**

**644.03.1 - Trenching.** Trenches shall be dug so that the pipe can be placed at the alignment and depth required. The trench shall be so braced and drained that workmen may enter and work safely and efficiently. Discharge from dewatering pumps shall be conducted to natural drainage channels, drains or storm drainage system. No water shall be discharged into the sanitary sewer system.

The Contractor shall confine his excavation to the least width that will allow the easy installation of the water main and fittings. An open trench in advance of pipe laying operations at the close of the workday will not be permitted.

Where elevations or profiles are shown on the plans, pipes shall be laid to the depth so indicated. When elevations or profiles are not shown, and unless otherwise indicated on the drawings, pipes shall be laid to such depths as will provide for a minimum cover of two foot six inches (2'-6").

**644.03.1.01 – As-Built Water Main Location and Elevation.** The Contractor is required to survey the horizontal and vertical location of the new water main as the new main is installed. Locations and elevations shall be provided along the main line (at appropriate intervals to clearly define the alignment of the new main), as well as, at all bends, tees, valves, etc. This information shall be included on the monthly redlines submitted with pay requests as well as incorporated into the Contractor’s Final As-built Drawings.

**644.03.2 - Pipe Bedding.** Where trench conditions are such that adequate support for the pipe cannot be obtained on the native material, aggregate bedding material shall be used with the approval of the City engineer or his authorized representative.

**644.03.3 - Sheathing and Shoring.** The Contractor shall place such sheathing and shoring in the trenches as may be necessary to support properly the trench walls and any adjacent structures. The type and amount of sheathing and shoring shall be such as the nature of the ground and attendant condition may require. It shall be the sole responsibility of the Contractor to provide such sheathing, shoring and bracing as may be required for the safe conduct of the work. The City engineer or his authorized representative may, however, order the placement of sheathing, shoring or bracing if, in his opinion, it is required to properly execute the work in accordance with these specifications. No additional compensation will be allowed for this operation.

No actions or instructions by the City engineer or his authorized representative shall be regarded as his responsibility for the security of the trench or protection of workmen. The full responsibility shall remain with the Contractor.

**644.03.4 - Dewatering.** The Contractor shall keep all excavations free from water at his own expense while pipe laying is in progress and to such extent as may be necessary while excavation work alone is being carried on. He shall provide for the disposal of the water removed from excavations in such a manner as not to cause injury to the public health, to public or private property, or to any portion of the work completed or in progress, or any impediment to the use of the streets by the public. No water shall be discharged into the sanitary sewer system.

**644.03.5 - Pipe Laying.** Proper implements, tools and facilities shall be provided and used by the Contractor for the safe and convenient prosecution of the work. All pipe, fittings, valves and appurtenances shall be carefully lowered into the trench, piece by piece by means of ropes or other suitable tools or equipment in such a manner as to prevent damage to materials and protective coatings and linings. Under no circumstances shall materials be dropped or dumped into the trenches.

All pipe, fittings, and appurtenances shall be inspected for defects and cracks prior to being lowered into the trench.

The outside of the spigot, the inside of the bell and any couplings used shall be brushed and wiped clean and dry and free from all foreign matter before pipe is joined.

Every precaution shall be taken to prevent foreign material from entering the pipe while it is being installed. If the pipe laying crew cannot put the pipe into the trench and in place without getting earth into it, a heavy, tightly woven canvas bag of suitable size shall be placed over each end and left there until the connection is to be made to the adjacent pipe. During the laying operations, no debris, tools, clothing or other material shall be placed in the pipe.

After placing a length of pipe in the trench, the spigot end shall be centered in the bell and the pipe forced home and brought to correct line and grade. The pipe shall be secured in place with approved backfill material tamped under it as herein specified. Precautions shall be taken to prevent dirt from entering the joint space.

At times when pipe laying is not in progress, the open ends of pipe shall be closed by watertight plug or other means approved by the City engineer or his authorized representative. This provision shall apply during the noon hour as well as overnight. If water is in the trench, the seal shall remain in place until the trench is pumped completely dry.

Cutting of pipes for inserting fittings or closure pieces and to bring fittings, valves and hydrants to designated locations shall be done in a neat and workmanlike manner in accordance with instructions of the pipe manufacturer and without damage to the pipe.

All pipe and fittings shall be installed in accordance with the manufacturer's recommendations. PVC pipe shall be installed in accordance with applicable AWWA Specifications and the pipe manufacturer's installation manual. Ductile iron pipe shall be installed in accordance with AWWA C600. The Contractor shall have copies of this AWWA Specifications and the installation manual available on the project at all times.

**644.03.6 - Water Service Connections.** At all locations within the right-of-way limits of the project where existing water services are in place, the Contractor shall provide new corporation stops and polyethylene service lines between the new main and the water meters to replace the existing service lines. New service lines shall be of equal size as the existing service lines, but no less than one-inch (1”), unless otherwise specified on the plans or as directed by the City engineer or his authorized representative. Additional lines shall be installed for future use as directed by the City engineer or his authorized representative or as indicated on the plans. A residential single service line shall be a minimum of one-inch (1”). A residential double service line shall be either one and one-half inch (1 ½”) or two-inch (2”), as appropriate, or as directed by the City engineer or his authorized representative.

Water services shall be installed in accordance with the recommendations of both the pipe main manufacturer and the service line manufacturer.

All new and replacement service lines shall extend from the water main to the meters in the meter boxes which are generally located near the back of the sidewalk. The existing meter box shall be replaced with a new box at the right-of-way line and the existing meter reinstalled in the new box. All new and replacement service lines shall be one continuous piece of tubing without any couplings from the main to the meter. All service lines shall be installed directly from the main to the meter and shall cross the street at right angles to the main. Where required by note or as directed in the field, water meter boxes shall be relocated to the street right-of-way line.

There may be instances where the existing meter/meter box is located outside of the right-of-way near a house, building, etc. In this instance, the water service shall be replaced and reconnected from the new main to the back of the existing meter. The old meter and box is to be removed. A new meter box shall be installed at the right-of-way line and the existing meter reinstalled in the new box.

A minimum of three (3) City working days notice shall be given to the City so a press release can be given to notify water system customers of a cut off and an approximate time that will be required for connection of the new water service.

The time required for change out of an existing water service to the new water system shall be kept at minimum. No service shall be left off overnight.

Service lines shall have at least twenty-four inches (24") cover as measured from the completed roadway and sidewalk surfaces. Service lines may be installed in narrow trenches at the required depth.

New service lines which are not tied into a meter during construction shall terminate at a meter box at the right-of-way line. The proper stop valves will be installed on the line as necessary to protect the system. This work shall be coordinated with the City Engineer or his authorized representative.

The Contractor shall mark the face of the curb with a "W" stamped into the wet concrete where the curb is finished over the water service and shall keep construction records showing all lines, fittings, valves, taps, etc., with sufficient data to accurately locate these items after the trench has been backfilled. In the event of a failure, by the Contractor, to accurately locate all items listed herein, the Contractor will be held responsible in relocating these items at his own expense.

**644.03.7 - Backfilling Trenches.** Backfilling shall be made with the material removed from the trench or excavation, provided that the excavated material is suitable for backfilling. Suitable material shall be construed as material that will compact readily when the usual methods of mechanical tamping are used. All backfill material shall be free from cinders, ashes, roots, refuse, vegetable matter, excess organic material, rocks, stones, or other unsuitable materials.

Existing/native material shall be utilized as backfill wherever possible. In the event that existing material is unsuitable for backfill, borrow material may be used. This borrow material must be from a pre-approved source. The placement of borrow material must be approved by the City Engineer or his authorized representative. The excavation and disposal of unsuitable material shall be measured and paid for as Excess Excavation.

All trenches shall be backfilled by hand or by approved mechanical methods from the bottom of the trench to a depth of one foot (1'-0”) above the top of the pipe with fill placed in layers of six (6") inches and compacted by tamping to 95% density in accordance with ASTM D 1557, so as to insure that the backfill is well placed and compacted beneath the haunches of the pipe. Backfill material shall be deposited in the trench for its full width of each side of the pipe, fittings and appurtenances simultaneously. Care shall be exercised to prevent distortion or damage to the pipe. The Contractor shall use special care in placing this portion of the backfill so as to avoid injuring or moving pipe.

From one foot (1'-0”) above the pipe to the grade shown on the drawings or specified herein, the trench shall be backfilled by hand or by approved mechanical methods and compacted in layers which do not exceed eight inches (8") to 95% density in accordance with ASTM D 1557, unless approved otherwise by the City Engineer or his authorized representative in non-paved areas.

The City engineer or his authorized representative shall have the right to forbid the use of any compacting tools or machines that he considers dangerous to the pipe or incapable of compacting the backfill properly.

The Contractor shall take random density tests in the trench lines to assure that proper compaction has been achieved.

Where any sheathing or bracing is withdrawn as the backfilling progresses, all voids or spaces left thereby shall be carefully and thoroughly filled and compacted with properly shaped tools.

After completion of backfilling, all materials not used therein, including such earth that cannot be properly rounded up over the refilled excavation, shall be removed and disposed of and all roads, shoulders, and other places in the line of the work shall be left free, clean and in good order.

**644.03.8 - Thrust Blocks.** Thrust blocks shall be installed at each change of direction of twenty two and one-half (22 1/2) degrees or more, at tees and at dead ends. Thrust blocks shall be made with non-reinforced concrete and shall have dimensions not less than those shown on the drawings. The thrust blocks shall be of sufficient size to resist the force resulting from the flow of water through the type of fitting to be blocked.

**644.03.9 - Restraints.** Each fitting, valve, hydrant, etc. shall be restrained with the appropriate size "Megalug" retainer gland.

Where indicated of the drawings, metal harnesses or metal tie rods shall be used in addition to retainer glands and thrust blocks. The harness assembly shall be of adequate strength to prevent movement of the fittings being restrained.

All harness assemblies and the tie rods installed shall be hot dip galvanized in accordance with ASTM A123.

**644.03.10 - Connections to Existing Mains.** Connections to existing mains shall be made at the locations shown on the plans. These connections shall be made without interrupting service in the existing lines unless circumstances make this type of connection impractical. Where it is necessary to interrupt the water service, these connections shall be made under the direct supervision of a representative of the City. The City shall determine the time at which these connections shall be made, and shall approve the operation of all valves on the existing system, and any operations, which might affect the potability of the water.

The Contractor shall at no time operate any valve on the existing system except with the direct authorization of the City.

Where a tie-in is to be made to an existing pipe or fitting, the Contractor shall excavate and expose the existing fitting or main, in order to ascertain its correct location and elevation. This excavation can then be backfilled until the tie-in is made. No additional compensation will be allowed for this operation.

**644.03.11 - Setting Hydrants.** Hydrants shall be located as shown on the plans or as directed by the City engineer or his authorized representative in a manner that will provide complete accessibility and prevent the possibility of damage from vehicles or injury to pedestrians. All hydrants shall be set plumb. Each hydrant shall be connected to the main with a six-inch (6") branch line. All hydrant caps shall be removed and greased with AWWA approved grease. After installation, all hydrants shall be tested for satisfactory operation.

Minimum height of hose nozzles shall be eighteen inches (18”) above ground surface (or anticipated future ground surface) as shown on the plans. Hydrant shall be installed with the pumper nozzle facing the street.

Before ordering new hydrants, the Contractor shall determine the barrel length required for all hydrants on the project, both new and relocated. New hydrants shall be ordered in barrel lengths as needed to place a hydrant at each designated location on the project.

Hydrants that are installed or have been taken out of service, shall be completely covered and identified as being “NOT IN SERVICE” until approved for use or removed from the site.

**644.03.12 - Relocating Hydrants.** Existing fire hydrants designated for relocation shall be carefully disconnected from the existing water main and shall be installed at the locations and in conformance with the details for new hydrants that are shown on the plans.

A new gasket and restraint clamp shall be provided for connection of the hydrant to the main. Existing mechanical joint or flange bolts may be reused if they are in satisfactory condition.

After installation is complete and before acceptance of the project, all relocated fire hydrants shall be cleaned and given one coat of suitable paint, safety yellow 10-56 Rus-Kil or approved equal, as directed by the City engineer or his authorized representative.

Prior to disconnection of existing hydrants, the Contractor shall notify the City Fire Chief's office and give pertinent information as to when and where the hydrant will be relocated.

**644.03.13 - Setting Valves and Valve Boxes.** Valves shall be installed with stems vertical. All valves not shown on the plans to be located in a concrete vault shall be provided with cast iron valve boxes as a means of protecting and permanently locating the operating nut on the valve. The top of the valve box shall be installed flush with the ground or roadway surface and shall be supported by a suitable foundation. Valve boxes shall be installed where a valve wrench can fit straight over the operating nut. If stack pipe is used, joints formed between the stack pipe and the valve and the stack pipe and the bottom of the valve box, shall be rapped with geotextile fabric in accordance with the details. Geotextile fabric shall be held in place by a suitable means as approved by the City Engineer or his authorized representative until backfill is complete. Width of the fabric shall be a minimum of two feet (2’) centered over the joint, unless directed otherwise by the City Engineer or his authorized representative and length shall be suitable to wrap around the joint and overlap one-third the circumference of the joint.

If new water valve boxes need to be adjusted after installation one of the following methods shall be used for the adjustment:

1. If threaded adjustment is available, the threaded pieces of the valve box shall be adjusted to the proper grade.
2. If the valve box is to be raised less than three inches (3”) and no threaded adjustment is available, risers shall be added to the valve box.
3. If the valve box is to be raised more than three inches (3”) and no threaded adjustment is available, the stack pipe shall be removed and replaced with the proper length pipe for the new grade.
4. If the valve box is to be lowered and no threaded adjustment is available, the stack pipe shall be cut to proper length for the new grade.

### The adjustment of casting for new water valves shall include the plumbing and centering of the valve box, riser and stack pipe on the valve nut. A valve wrench shall be used prior to acceptance of adjustment of casting to verify compliance with requirements stated in this section of the specification. There shall be no separate payment for adjustment of new water valve boxes.

All valves located outside walk and pavement areas shall be provided with concrete slabs. The concrete slab shall be two feet (2') square by four inches (4") thick.

The Contractor shall mark the face of the curb with a "V" stamped into the wet concrete where the curb is adjacent to water valves. If the valve is located within the limits of the street, each adjacent curb shall be marked with a “V” at the location of the valve. If the valve is located outside of the street, the adjacent curb shall be mark with a “V” at the location of the valve. The contractor shall keep construction records showing location of valves with sufficient data to accurately locate the valve after construction.

**644.03.14 - Pressure Tests.** The sections and complete pipe line shall be subjected to pressure tests conforming with AWWA Standard C-600-87, Section 4 and shall successfully pass the leakage test as determined by the following formula:

L = SD(12.25)

133,200

Where:

L = allowable leakage, in gallons per hour

S = length of pipe tested, in feet

D = nominal diameter of the pipe, in inches

The test pressure shall be one hundred fifty pounds per square inch (150 psi). The duration of the test shall be at least four (4) hours.

**644.03.15 - Testing Hydrants.** After the pressure and leakage tests have satisfactorily completed, the Contractor shall remove all hydrant caps (hose nozzle caps and pumper nozzle caps) and grease the nozzle threads. The hydrant caps shall be replaced and the main hydrant valves shall be fully opened. All hydrants shall be required to withstand the same pressure test as described in Subsection 644.03.14 without leakage.

**644.03.16 - Sterilization.** After the water main has been completed and a satisfactory hydrostatic test has been made, the Contractor shall sterilize the water mains. The Contractor shall submit the method and/or individual who will provide the chlorination service for prior approval by the City engineer or his authorized representative. Mains shall be thoroughly flushed before introduction of the chlorinating materials. All new mains and repaired portions of or extensions to, existing mains shall be chlorinated so that a chlorine residual of not less than twenty-five (25) PPM (Parts Per Million) remains in the water after twenty-four (24) hours standing in the pipe. Granular chlorine shall not be applied in the new main, fittings, services, etc. All chlorinating materials shall be in a liquid or gas form.

**644.03.16.1 - Rate of Application.** Water from the existing distribution system or other source of supply shall be controlled so as to flow slowly into the newly laid pipeline during the application of chlorine. The rate of chlorine mixture flow shall be in such proportion to the rate of water entering the pipe that the chlorine dose applied to the water entering the newly laid pipe shall produce a residual of at least twenty-five (25) PPM after twenty-four (24) hours standing. This may be expected with an application of fifty (50) PPM, although some conditions may require more.

**644.03.16.2 - Prevention of Reverse Flow.** Valves shall be manipulated so that the strong chlorine solution in the line being treated will not flow back into the line supply water. Check valves may be used if desired.

**644.03.16.3 - Retention Period.** Treated water shall be retained in the pipe long enough to destroy all non-spore-forming bacteria. This period shall be at least twenty-four (24) hours and should produce a residual not less than twenty-five (25) PPM at the extreme end of the retention period.

If the circumstances are such that a shorter retention period must be used, the chlorine concentration shall be increased accordingly. For instance, for a contact period of one (1) hour, a one hundred (100) PPM chlorine concentration is required. Under these conditions special care shall be taken to avoid attack in pipe, valves, hydrants and other appurtenances.

**644.03.16.4 - Chlorinating Valves and Hydrants.** In the process of chlorinating newly laid pipe, all valves or other appurtenances shall be operated while the pipeline is filled with the chlorinating agent.

**644.03.16.5 - Final Flushing and Testing.** Following chlorination, all treated water shall be thoroughly flushed from the newly laid pipeline and its extremities until the replacement water throughout its length shall, upon test, be proved comparable in quality to the water served the public from the existing water supply system and approved by the public health authority having jurisdiction. This satisfactory quality of water delivered by the new main should continue for a period of at least two (2) full days as demonstrated by laboratory examination of samples taken from a tap located and installed in such a way as to prevent outside contamination.

**644.03.16.6 - Repetition of Procedure.** Should the initial treatment fail to result in the condition specified, the original chlorination procedure shall be repeated until satisfactory results

are obtained. All testing shall be at no additional cost to the City.

**644.03.16.7 - Bacteriological Sampling:**

**New Water Mains.** After completion of the construction and disinfection of water distribution, the Contractor shall arrange for at least one sample to be collected, on two (2) consecutive days, in accordance with the latest Mississippi State Department of Health guidelines from every dead end line and every major looped line for bacteriological examination. A representative of the Department shall be present when the samples are collected. The samples shall be collected by the registered engineer in charge of the project, the water supply system’s certified operator, or a representative of the Mississippi State Department of Health. Water being collected for testing shall not have a chlorine residual higher than is normally maintained in other parts of the distribution system. No chlorine shall be present which is a result of line disinfection. Less than one (1) coliform bacteria per one hundred (100) milliliters (ml) and no confluent growth indication shall constitute a satisfactory sample when analyzed by the Mississippi Department of Public Health Laboratory or a laboratory certified by the Mississippi State Department of Health.

**Boil Water Notices.**  The Contractor must follow the *Mississippi Department of Health Guidelines for Issuing a Boil Water Notice*. The Health Department Standards define the number of samples required per day for the impacted area based on the number of service connections affected. In order for a boil water notice to be lifted, the minimum number of samples per day must pass all testing for two (2) consecutive days. The required sampling shall begin as soon as possible and continue as long as required. Samples may have to be taken for several days in a row before two (2) consecutive days of samples test clear. Do not take samples for two days and wait to see if the results are clear. The Contractor shall keep sampling every day while the testing takes place. The boil water notice cannot be lifted until these tests have passed. The Contractor shall coordinate with the testing laboratory to collect the samples and run the tests as soon as possible (and test continuously) to ensure that boil water notices can be lifted as soon as possible. This is particularly important when a boil water notice impacts a large area, business, casino, etc.

**644.03.17 - Marking Tape & Locator Wire.** All water lines and service lines must be installed with a non-corrosive metallic tape with aluminum core placed directly over and on the center of the facility at a depth of one foot (1’) over the line for its entire length. Tape shall have a 2mil clear film laminated to ½ mil aluminum foil center coil. Tape must be connected to all facilities or appurtenances. The 5-mil tape shall have a three-inch (3") width and the words "Buried Waterline" should be printed on it along its entire length in accordance with American Public Works Association colors.

All water mains and services shall be installed with a fourteen (14) gauge solid copper insulated locator wire placed directly on the center of the main for its entire length. Wire shall be tied to an appurtenance at the start of the new main and shall be a continuous piece of wire for its entire length. The Contractor shall supply the splice kits and other accessories necessary for one continuous locator wire.

Installation of locator tape and wire shall be an absorbed cost and no additional compensation will be given for this work.

**644.03.18 - Parallel Installation.** Water mains and services shall be laid at least ten feet (10') horizontally and eighteen inches (18”) vertically from any existing or proposed sewer main or service. The water main shall be installed above the sanitary sewer. The distances shall be measured edge to edge. Any deviations must be approved by the City on a case-by-case basis, if supported by field data.

**644.03.19 - Crossings.** Water mains and services crossing sewers shall be laid to provide a minimum vertical distance of eighteen inches (18") between the outside of the water main and the outside of the sewer. The water main shall be installed above the sewer main. At crossings, one full length of water pipe shall be located so both joints will be as far from the sewer as possible. Special structural support for the water and sewer pipes may be required. Any deviation must be approved by the City on a case-by-case basis, if supported by field data.

**644.03.20 – Line Stop Procedure.** The line stop procedure is a general approach only. Actual implementation means and methods are the responsibility of the Contractor and shall be submitted to the Engineer and/or his authorized representative prior to commencement of the work.

The Contractor shall clean the exterior of the main to remove debris, corrosion deposits and other

surface irregularities that might interfere with proper seating and sealing of the line stop fitting against the main.

The line stop fitting shall be a split mechanical bolt-on type, fabricated from ASTM A-36 carbon

steel, epoxy coated, with 18-8 type 304 stainless steel nuts, bolts, and washers, and be complete with equalization fittings, blind flange with gaskets, nuts and bolts. Flanges are to be AWWA 207 Class D, ANSI 150# drilling. Gaskets are to be compounded for use with water, salt solutions, and mild acids.

Line stop fittings installed on slip joints or mechanical joint pipe shall require that at least three standard lengths of pipe remain buried from the point of the line stop to where the line will be cut open. An alternative method is to anchor the line stop fitting with concrete. Line stop fittings shall be installed and pressure tested at 150 psi for 15minutes prior to tapping the main.

Concrete support/anchor shall be installed after pressure test. Concrete support should extend to the “BEAM POINT or CENTER LINE” of the pipe main. This method should prevent movement laterally where the line is isolated and cut open.

Temporary line stop valve is installed into the line stop fittings (flanged tee may be mounted to the valve for temporary bypass). Drilling machine is mounted to line stop valve, and the wet tap is performed.

Coupon from the tap is retracted into the machine, stop valve is closed, drilling machine is depressurized and removed. Coupon is measured to verify pipe I.D. for sizing adjustments of the folding head stop sealing element.

Line stop machine is mounted on stopping valve, and line stop assembly, valve is opened, and assembly enters the pipe and the line stop is performed.

Pipe main is de-pressurized and alterations/reconnections can now begin.

After alterations/reconnections are completed, and the new line has been sanitized, the line stop is repressurized, and the stopper head is removed from the line stop and the valve is closed.

Drilling machine with closure plug is mounted to stop valve. Valve is opened and the assembly is

installed and locked into position inside the neck of the stop fitting.

The drilling machine is then removed, and blind flange is installed to the line stop fitting for completion of the job.

**644.04 - Method of Measurement.** Water lines of the size specified will be measured in place, by length in linear feet along centerline to each line from center to center of intersecting lines or to the farthest extent of terminal fittings with no deductions for valves, fittings, etc.

The Contractor will NOT be compensated for any water main piping until the new water line has been installed, pressure tested, chlorinated, bacteriologically tested and placed into service.

Fire hydrants will be measured and paid for per fire hydrant assembly. The fire hydrant assembly shall consist of the hydrant, , M.J. gate valve (6” minimum), retainer glands (as required), C-900 pipe (6” as required). Fire hydrant assembly shall be all components from the vertical axis of the MJ gate valve to the vertical axis of the hydrant. The water line from the main to the 6” M.J. gate valve will be measured for separate payment and shall be paid for under 6” water main. The anchoring tee on the water main shall be paid for under ductile iron fittings. Excavation, dewatering, marking tape, locator wire, blocking, thrust blocks, backfilling and tie-ins for water lines will not be measured for separate payment but shall be absorbed costs in other items of work.

The labor and materials necessary to paint relocated hydrants and new hydrants will not be measured for separate payment but shall be included in the unit price bid for the new hydrant or the relocation of the existing hydrant.

No payment for water service lines shall be made until City of Biloxi has inspected and accepted the completed Work. Payment for water service tubing shall be measures as a straight, horizontal line from the water main to the point of connection to the water meter connection. Service will NOT be paid for until the mainline has been placed into operation and services are activated.

Meter relocation, meter boxes, reinstallation of the existing meter in the new meter box and any other fittings required will not be measured for separate payment but shall be included in the cost-of-service lines. The Contractor shall take care to ensure that the existing meters are reinstalled correctly and are operational. The Contractor shall immediately correct any issues with meters being installed backwards, wires disconnected, damaged, etc.

Aggregate bedding, if ordered by the City engineer or his authorized representative, will be measured by volume in cubic yards in accordance with 907-304-1 or 907-203-1.

If existing/native material is used as backfill, there shall be no additional payment for excavation and backfill. If existing material is unsuitable for backfill, borrow material may be used. This borrow material must be from a pre-approved source. Approved placement of borrow will be measured by volume in cubic yards in accordance with 907-203-EX. The excavation and disposal of the unsuitable material shall be paid for as Excess Excavation and measured by volume in cubic yards in accordance with 907-203-G.

Stamping service line and valve locations in the curb will not be measured for separate payment. The stamping shall take place while the curbs are being installed.

All pressure testing, flushing and sterilization of new water lines shall be done by the Contractor and will not be measured for separate payment. These costs shall be included in the contract unit bid prices for water line items.

Water valves will be measured by the number and size of units as specified.

“Megalug” retainer glands shall be measured by the pound from the dimensions and shipping weights shown on the submittals and paid as ductile iron fittings. Fittings will not be paid for until the water main has been placed into service.

Tapping materials, corporation stops, curb stops, reducers, and other fittings used on service lines will not be measured separate payment but shall be included in the unit price bid for service lines.

Hot-tap and valve connected thereto shall be measured by the specified size of the hot-tap and valve. Both tapping sleeve and valve along with labor and other incidentals required to make the hot-tap shall be included in the bid price of the item.

Valve boxes shall be measured by the pound from the dimensions and weight shown on the submittals and paid as castings in accordance with Special Provision 907-604-1. Filter fabric shall not be measured for separate payment.

Line stops shall be measured per each, and shall include all items (with the exception of gate valves) described in Subsection 644.02.14. If required, bypass procedure shall include all items described in Subsection 644.02.15. Separate payment will not be made for temporary water main, fittings, etc.

There shall not be separate payment for adjustment of new water valve boxes, the cost therefore shall be absorbed in other pay items. For adjustment of existing water valve boxes, see Section 613-1, “Adjustment of Castings, Gratings, and Utility Appurtenances” of this specification.

**644.05 - Basis of Payment.** The prices thus bid shall be full compensation for completing the work specified. Materials or work for which a pay item is not included and are necessary to complete the work under this section shall be furnished or performed and shall be considered incidental to the completed construction.

Payment will be made under:

907-644-A: \_\_\_" C-900 PVC Water Main -per linear foot

907-644-B: \_\_\_” C-905 PVC Water Main -per linear foot

907-644-C: \_\_\_" Ductile Iron Water Main -per linear foot

907-644-D: \_\_\_" Diameter Water Service -per linear foot

907-644-E: \_\_\_" Water Valve -per each

907-644-F: \_\_\_" X \_\_\_” Hot Tapping Sleeve & \_\_\_" Valve -per each

907-644-G: Fire Hydrant -per each

907-644-J: Relocate Fire Hydrant -per each

907-644-K: \_\_\_\_” Line Stop -per each

907-644-L: \_\_\_\_” Insertion Valve -per each

907-644-M: \_\_\_\_” Water Meter and Box (all sizes, depths, and types) - per each

907-644-N: \_\_\_\_\_Ductile Iron Fittings -per pound