SECTION 5 – INSTALLATION OF DUCTILE IRON PIPE, VALVES, FITTINGS, FIRE HYDRANTS, AND APPURTENANCES

5-01 GENERAL

Unless specified differently on the plans or as supplemented herein, installations of ductile iron pipe, valves, fittings, fire hydrants, and appurtenances shall conform to the applicable requirements of AWWA C600, "Installation of Ductile-iron Water Mains and Their Appurtenances", and the applicable provisions of the Ductile Iron Pipe Research Association (DIPRA) "Guide for the Installation of Ductile Iron Pipe".

The Contractor shall furnish all labor, equipment, and materials required to construct, install, and complete the ductile iron pipelines, connections, valves, fittings, fire hydrants, thrust restraints, and all other appurtenances as shown on the plans and specified herein.

The interior of all pipe, valves, fittings, and fire hydrants shall be kept free from dirt and foreign materials at all times during the progress of the work and left clean at the completion of installation.

5-02 CONSTRUCTION MATERIALS

Contractor shall furnish only approved materials per Section 4, "Materials", and Section 8, "Referenced City of Fullerton Standard Drawings", of these Specifications. All materials shall be new and of the best quality for their intended use. All like materials shall be of one manufacture for any particular project.

5-03 INSTALLING DUCTILE IRON PIPE

The pipe and fittings shall be inspected for defects prior to lowering in trench. All lumps, blisters, and excess coating shall be removed from the bell and spigot ends of each pipe and the outside of the spigot and the inside of the bell shall be wiped clean and dry and free from oil and grease before the pipe is laid.

Pipe shall be lowered into the trench with fabric or other approved slings. Under no circumstances shall pipe be dropped, pushed off the bank, or allowed to fall into the trench.

5-03.01 Laying Pipe

Whenever it is necessary to deflect pipe from a straight line either in the vertical or horizontal plane to avoid obstructions or where long radius curves are required, the amount of deflection allowed shall not exceed that required by DIPRA for a satisfactory joint and shall be approved by the Engineer. Short lengths of pipe may be used only in situations where adequate total horizontal and/or vertical joint deflection may not be obtained by using a standard length of pipe, and also in locations where fittings are to be installed.

Except where necessary in making connections with other water pipelines, or where otherwise authorized by the Engineer, pipe shall be laid with the bells facing in the direction of installation. For lines on appreciable slopes, bells shall face upgrade unless directed otherwise by the Engineer.

During laying operations, no debris, tools, clothing or other materials shall be placed in the pipe. At all times when pipe laying is not in progress, the open ends of pipe shall be kept tightly closed by watertight expandable plugs or other means approved by the Engineer.

No pipe or appurtenances shall be laid in water or when, in the opinion of the Engineer, trench or weather conditions are unsuitable for such work.

After pipe has been set in trench, exterior of spigot and interior of bell shall be thoroughly cleaned. A water soluble, nontoxic, lubricant as approved by pipe manufacturer shall be applied to rubber gasket. Pipe ends shall be aligned, and spigot shall be pulled into bell with come-along devices, or hoists with chains and slings, unless permitted otherwise by Engineer. If a pry bar is used, a timber header shall be placed between the pipe and the pry bar before the spigot is pushed into bell. A feeler gage shall be used to determine if each joint has been properly assembled.

5-03.02 Cutting Pipe

The cutting of ductile-iron pipe for inserting tees, fittings, or for other reasons shall be done in a neat manner without damage to the pipe or cement lining so as to leave a smooth end at right angles to the axis of the pipe. Unless otherwise authorized by the Engineer, all such cutting of pipe shall be done with a special cutting tool specifically made for cutting and machining ductile iron pipe. Cut ends and rough edges shall be ground smooth and beveled for push-on joints.

5-03.03 Polyethylene Protective Wrapping

Unless otherwise shown on the plans, polyethylene protective wrapping (Polywrap) for ductile iron pipe shall be furnished and installed on all buried water lines, except where water lines are within steel casing pipe, in accordance with the requirements of AWWA Standard C105, "Polyethylene Encasement for Ductile-Iron Pipe Systems", Section 4 of these Specifications, and as supplemented herein. Polywrap shall be installed so as to prevent any section of the pipe, fittings, valves, services, or appurtenances from contacting the soil. The polywrap shall be taped to provide a snug fit along the pipe.

Any punctures, tears or other damage shall be patched with polyethylene wrap and tape. Openings for service taps, blowoffs, or similar appurtenances shall be cut in

the polywrap during backfilling of the trench. Rock or other material that could damage the wrapping shall not be allowed in the backfill.

5-03.04 Protection of Metal Surfaces

All exposed surfaces of the valves, flanges, bolts, nuts, tie-rods, turn buckles, etc., in contact with the earth and backfill materials shall be coated with a minimum of 30 mils of bitumastic coating prior to backfilling. In addition to this coating, the main and fittings shall be encased in polyethylene wrapping as described elsewhere in this Section.

5-03.05 Thrust Restraints

Unless shown differently on the plans or as directed by the Engineer, concrete thrust blocks shall be required behind all bends, tees, pipe ends, and fire hydrants against undisturbed earth. All thrust shall have the minimum bearing areas per City of Fullerton Standard Drawing 640, or as shown on plans.

Concrete thrust blocks shall be cured for a minimum of three working days before the pipeline can be pressurized unless other methods of pipe restraint are approved by the Engineer.

Unless otherwise directed by the Engineer, the concrete thrust block shall be placed so that the pipe and fitting joints are accessible for repair.

5-03.06 Flushing

After the pipeline has been completely installed, flushing of the pipeline shall be done per the requirements of Section 6 of these Specifications.

5-04 VALVE BOX ASSEMBLY

Unless specified differently on the plans or as supplemented herein, installation of a valve box assembly shall conform to the requirements of City of Fullerton Standard Drawing 650. All buried gate and butterfly valves shall be boxed with the valve cover flush with the finish street pavement grade. The valve box riser shall rest on the bonnet of the gate valve and shall be cut to the required length to assure a level and/or flush fit to finish grade. The valve box shall be installed so as not to transmit shock loads or stress to the valve. All valve boxing shall be installed straight and plumb and centered over the valve operating nut. All active valves shall be accessible at all times during construction operations.

A valve stem extension is required when the depth from finished grade to the operating nut is greater than 48 inches. The valve stem extension shall be per City of Fullerton Standard Drawing 651.

Excavation and backfill for a valve box assembly shall be per Section 2 of these Specifications.

5-05 FIRE HYDRANT ASSEMBLY

Unless otherwise directed by Engineer, the installation of a fire hydrant assembly shall conform to City of Fullerton Standard Drawing 610. Hydrants shall be set plumb and at such elevation that the lateral and main shall have approximately the same depth of cover.

Fire hydrants shall be placed where shown on the plans, unless otherwise directed by the Engineer. Locations shall provide complete accessibility and adequate pedestrian clearance in accordance with the Americans With Disabilities Act requirements and minimize the possibility of damage from vehicles.

Where required by the plans or as directed by the Engineer, fire hydrant guard posts and/or a check valve shall be installed per City of Fullerton Standard Drawings 610 and 615.

All hydrants not in service shall be bagged or otherwise identified as directed by Engineer

Contractor shall field paint the fire hydrant barrel and guard posts in accordance with the applicable field painting requirements addressed later in this Section.

5-06 LARGE SERVICE LATERALS, BACKFLOW ASSEMBLIES, AND FIRELINES

Unless specified differently on the plans or as supplemented herein, installation of large service laterals (3 and 4 inch) shall conform to City of Fullerton Standard Drawings 603 and 701. Six inch and larger service laterals shall be designed to meet individual development requirements.

The Owner/Developer or Contractor shall be responsible for preparation of the necessary design plan showing the proposed large service installation together with meter and appurtenances, backflow assemblies, and firelines. The plan shall be submitted to the Engineer for review and must be approved prior to beginning construction. All licenses and permits, and other requirements shall be in accordance with the requirements of Section 1 of these Specifications.

The horizontal runs of all above ground large services, backflow assemblies, and firelines shall be installed in a level position.

No sewer and water laterals shall be laid in the same trench.

Contractor shall field paint all aboveground, bare, or exposed piping and appurtenances of large services, backflow assemblies, and firelines in accordance with the applicable field painting requirements addressed later in this Section.

5-06.01 Meters

All large service installations shall include a meter and provisions for a temporary bypass line. Meters shall conform to size, type and manufacturer as shown on the plan or per City of Fullerton Standard Drawing 603. The Engineer reserves the right to specify the type of meter if, in Engineers sole opinion, a specific type of meter is best suited for the proposed application. Meters shall read in US gallons.

5-06.02 Backflow Assemblies

Unless specified differently on the plans, all large service installations shall include backflow assemblies per Section 3 of these Specifications.

5-06.03 Firelines

Unless specified differently on the plans or as supplemented herein, installation of firelines shall conform to City of Fullerton Standard Drawings 701 and 721.

5-07 SMALL SERVICE LATERALS

5-07.01 General

All material for one inch and two inch diameter service laterals shall be supplied and installed by the Contractor per Section 4 and City of Fullerton Standard Drawings 601 and 602, respectively. The service lateral shall consist of a double strap service saddle, corporation stop, copper tubing, angle meter stop, meter, customer valve, and meter box assembly.

Service laterals shall be installed perpendicular to the centerline of the street with a four inch "W" letter chiseled into the curb face opposite the location of the corporation stop.

Meter boxes shall be brought to grade upon construction of concrete sidewalks and grading of parkway. Meter boxes for 1 inch service laterals located in areas subject to traffic loading, or located behind rolled curbs shall be installed with traffic bearing covers. Regardless of location, all meter boxes for 1 $^1/_2$ inch and 2 inch meters shall be installed with traffic bearing covers.

No sewer and water laterals shall be laid in the same trench.

All new services shall be installed before new mains are pressure tested and chlorinated.

5-07.02 Backfill and Compaction

Backfill and compaction requirements in the area adjacent to the copper tubing service lateral shall conform to Section 2 of these Specifications. Compaction of

backfill material by mechanical means directly over the exposed service tubing shall not be allowed unless approved by Engineer.

5-07.03 Backflow Assemblies

Unless specified differently on the plans or as supplemented herein, installation of backflow assemblies when required for small service installations, shall conform to City of Fullerton Standard Drawing 604 and Section 3 of these Specifications.

5-08 CONNECTION TO THE EXISTING DISTRIBUTION SYSTEM

The Contractor shall make the connection to the existing distribution system as shown on plans or as directed by the Engineer. All connections must be made in the presence of the Engineer. Proper flushing, hydrostatic testing and disinfecting of new facilities must take place per Section 6 of these Specifications prior to permanent connections.

5-08.01 Pressure Tapping

The Contractor may tap cast iron, ductile iron, and plastic distribution mains under pressure. The exterior surface of the pipe shall be cleaned to provide a smooth surface for the tapping sleeve. The tapping sleeve shall be secured to the pipe to prevent movement during the tapping process.

Pressure tapping of concrete cylinder pipe requires prior written approval by the Engineer.

5-08.02 Shutdown of Main

All work necessary to shut down an existing distribution main for the benefit of the Contractor shall be by the Water Services Division. Under no circumstances shall the Contractor operate valves, hydrants, and other appurtenant equipment on the existing distribution system.

It shall be the Contractor's responsibility to coordinate the necessary shutdown schedules through the Engineer assigned to the project. Scheduled shutdowns shall require sufficient time to allow operations personnel to review, approve, and develop an appropriate program.

The City will make a concerted effort to isolate the system as planned with the Contractor. If a watertight shut down cannot be achieved, the Contractor shall be prepared to employ necessary pumping equipment to remove the water from the trench. City shall not be responsible for any delays due to system shutdown and isolation.

All emergency situations shall be reported immediately to the City at (714)738-6897. When an extensive and/or lengthy main shutdown is required, the Engineer

will determine what temporary service connections may be required. The Contractor shall furnish all necessary hose, piping, valves, tank trucks and associated labor required to provide such temporary service. All piping, hoses, and associated equipment used in temporary service connections shall be flushed and disinfected in accordance with Section 6 of these Specifications.

In making connections to existing mains, the Contractor shall perform the work in the shortest time possible and shall do the work in such a manner and as such times that will cause the least inconvenience to water users because of shutoff of water services. No valve or other control on the existing distribution system shall be operated for any purpose by the Contractor without the approval of the Engineer. All consumers affected by such operation shall be notified in writing by the Contractor at least two working days before the operation and advised of the probably time when the service will be restored. This notification shall be subject to prior approval of the Engineer. Notifications shall occur only after the hydrostatic testing and disinfecting requirements of these Specifications have been met and approved by the Engineer.

All tie-in locations shall be excavated a minimum of one working day in advance of final connection to expose the affected portions of existing pipelines and to allow time for the necessary measurements, assembling of materials and equipment, and assuring that all pre-assembled piping and fittings will be compatible with the existing main.

The Engineer may postpone or reschedule any shutdown operation if for any reason he feels that the Contractor is improperly prepared with competent personnel, equipment, or materials to proceed with the connection work. If it appears the connection to the existing distribution main cannot be made in the time specified, the City shall order necessary corrective measures at the Contractors expense.

5-08.03 Transfer of Jurisdiction of Completed Work

The Contractor shall be aware that once a physical connection is made to the City's system, the valves and appurtenances are under the City's jurisdiction and shall only be operated by authorized City personnel on a prearranged program schedule. The transfer of jurisdiction does not relieve the Contractor of any responsibility for the quality of work or materials.

5-09 ABANDONMENT OF EXISTING WATER MAIN, VALVES AND APPURTENANCES

Existing water mains, valves and appurtenances shall be abandoned at the locations as shown on the plans. Contractor shall abandon the existing water main facilities after transfer of jurisdiction of the new main to the City. Contractor shall install plug and concrete thrust blocks at the locations shown on the plans or as directed by Engineer.

5-10 FIELD PAINTING

The Contractor shall field paint all aboveground, bare, or exposed piping and appurtenances in accordance with the applicable specifications and plans. Unless specified differently on the plans or as supplemented herein, painting of water system installations as identified below, shall conform to the applicable requirements of Section 310 of the Standard Specifications and in accordance with manufacturer's recommendations. Contractor shall avoid paint spraying during windy conditions.

5-10.01 Surface Preparation

Remove all dirt, grease, oil, from surfaces to be painted by washing the surface with RUST-OLEUM® 3599 Industrial Pure Strength® Cleaner/Degreaser, commercial detergent or other approved cleaning method. Loose rust, scale and deteriorated coatings shall be removed by sandblasting, scraping and wire brushing, or power tool cleaning. Galvanized and non-ferrous surfaces shall be solvent cleaned.

Care should be taken to protect outside screw and yoke (OS&Y) gate valve stems, meter registry glass, brass test cocks, and other surfaces identified by Engineer, during surface preparation. These items should be masked off and not receive any primer or finished coat.

5-10.02 Primer and Finished Coat

All installation surfaces shall be primed with RUST-OLEUM® Hard Hat™ aerosol spray coating (2mil), V2182 Gray Primer. The first finished coat may be applied after primer has dried.

The following installations shall have two finished coats (2 mil each) of RUST-OLEUM® Hard Hat™ aerosol spray coating. The second finished coat shall be applied within 1 hour or after 48 hours. Listed below are installations and associated color and manufacturer's paint catalog numbers:

Fireline Assemblies Large Meter Assemblies Backflow Assemblies	V2137 Dark Green
Steel Plate Meter Box Covers Valve Stem Extensions	V2179 Black
Private Fire Hydrants Fire Department Connections	V2163 Safety Red

The following installations shall have two finished coats (2 mil each) of RUST-OLEUM® Low-VOC Industrial Enamel. The second finished coat shall be

applied after 24 hours. Listed below are installations and associated color and manufacturer's paint catalog numbers:

Fire Hydrants Air Release Assembly Covers Guard Posts	3444 Safety Yellow