ITEM 906

FURNISHING AND INSTALLING WATER LINES

906.1 Description

This section shall govern the provisions for furnishing of all plant, equipment, superintendence, labor, materials and performance of all operations in connection with installation of water lines, fittings, including certain appurtenance thereto as specified herein, or as indicated on the drawings.

906.2 Scheduling of Construction

At start of Project, Contractor shall inform City Engineer of two streets that he intends to start on first. After installation of water lines, Contractor shall complete service connections, all testing and placing of sod. After approval from City Engineer that work performed on first street is complete, Contractor may proceed to another street while the second street is being completed. This process will continue throughout the Project.

906.3 Materials

Polyvinyl Chloride (PVC) Pressure Pipe:

All pipe to be provided shall be new and shall conform to the size as shown on the plans. All pipe shall conform to the AWWA Specification C-900-97, or C-905-97, or latest revision. Pipe shall be made from Class 12454-A or Class 12454-B material providing a hydrostatic design basis (HDB) of 4,000 psi and conforming with the outside diameter (OD) dimensions of steel pipe (IPS) or cast-iron pipe (CI) and with the wall thickness of DR series 14, 18, and 25.

The manufacturer or supplier shall furnish the Owner an affidavit that all delivered materials comply with the requirements of ANSI/AWWA Standard C-900-97, or latest revision, and with the requirements of AWWA C-905-97.

Gaskets and lubricants intended for use with PVC pipe and couplings shall be made from materials that are compatible with the plastic material and with each other when used together, but that will not support the growth of bacteria and will not adversely affect the potable qualities of the water that is to be transported.

Ductile Iron Pipe:

General: Ductile iron pipe shall be in accordance with ANSI/AWWA Standard Specifications C-151/A-21.51.81, latest revision. Ductile iron pipe shall be thickness Class 50, pressure rated for 200 psi unless otherwise indicated on the plans and complying with the requirements of ANSI/AWWA Standard C-150/A-21.50-81.

Fittings for ductile iron pipe or PVC pipe shall be either cast iron or ductile iron and shall conform to the body thickness and radii of curvature of ANSI Standard A-21.16.03 (AWWA C-153) or of the latest revision. Exterior and interior of fittings shall have a protective fusion-bonded Epoxy Coating in accordance with ANSI/AWWA C116/A21.16.03 or of the latest revision

Exterior coating of the ductile iron pipe shall be a standard bituminous coating of either coal-tar or asphalt base, approximately 1 mil thick. The coating shall be continuous, smooth, neither brittle when cold nor sticky when exposed to the sun, and shall be strongly adherent to the pipe.

Interior coating of the ductile iron pipe shall be in accordance with the latest revision of ANSI/AWWA Standard C-104/A-21.4.

Marking Pipe: The weight, class, or nominal thickness and casting period shall be shown on each pipe. The manufacturer's mark, the year in which the pipe as produced, and the letters "DI" or "Ductile" shall be cast or stamped on the pipe. All required markings shall be clear and legible and all cast marks shall be on or near the joint.

The type of joint for ductile iron pipe and fittings shall either be mechanical or flanged unless otherwise indicated on the plans.

Push-on joints will not be allowed unless specifically approved for use by the City Engineer or his representative. If approved by Engineer, push-on joints shall conform to ANSI/AWWA Standard Specification C-111/A21.11 1980 or the latest revision thereof.

Mechanical joints shall conform to ANSI/AWWA Standard Specification C-110/A21.10 or the latest revision thereof. Bolts on all mechanical joint pipe and fittings shall be manufacturer's standard special alloy corrosion resistant bolt suitable for buried installation.

Flanged joints shall conform to ANSI/AWWA Standard Specification C-115/A21.15 1975 or the latest revision thereof. Bolts shall conform to ANSI Standard B-18.2.1 and nuts shall conform to ANSI Standard B-18.2.2.

The manufacturer or supplier shall furnish the Owner a Certificate of Compliance and mill tests for all ductile iron pipe.

906.4 Construction Methods

General:

Handling of Materials: All material furnished by the contractor shall be delivered and distributed at the job site opposite or near the place where it is to be laid in the trench. Pipe, fittings, valves, and accessories shall be loaded and unloaded by hoists or skidding so as to avoid shock or damage. Under no circumstance shall such material be dropped. The materials shall be so handled that the coating and lining will not be damaged. If, however, any

part of the coating or lining is damaged, the repair shall be made at the contractor's expense in a manner satisfactory to the Engineer.

Alignment: Horizontal alignment of the pipe line shall be as shown on the drawings. Except where fittings are specifically required, contractor may, at his option, use fittings, pipe joints, deflections, or a combination thereof to obtain the indicated alignment if approved by the Engineer.

Pipe Covers: The water line shall be installed with a minimum cover of 4 feet below natural ground in open areas or below top of existing or future curb, unless otherwise indicated on the drawings.

Trench Conditions: Where side of trenches are unstable or of soft material, 5 feet or more in depth, the trench shall be shored, sheeted, braced, sloped, or otherwise supported by means of sufficient strength to protect the employee working within them. Minimum requirements for trench timbering shall be in accordance with the Trench Safety System Specification.

Pipe shall not be laid in water or when trench or weather conditions are unsuitable for such work. It shall be the contractor's full responsibility for the diversion of drainage and dewatering of trenches during construction operations of this project.

In any case where the trench has been inadvertently over-excavated more than 6" below bottom of the pipe or were the subgrade is soft and in the opinion of the Engineer will not adequately support the pipe, the trench bottom shall be corrected with thoroughly compacted aggregate bedding material, such as iron ore or washed rock, to the required pipe foundation grade at the contractor's expense.

Inspection Before Installation: All pipe and fittings shall be carefully examined for defects while suspended above the trench immediately before installation in final position. Any defective, unsound or damaged material shall not be installed. All foreign material or dirt shall be removed from the pipe and fittings and it shall be kept clean during and after laying. At times when pipe installation is not in progress, and at the end of a day's work, open ends of the installed pipe shall be securely closed.

Lowering of Water Line Material into Trench: Proper implements, tools and facilities satisfactory to the Engineer shall be provided and used by the contractor for the safe and efficient execution of the work. All pipe, fittings and appurtenances shall be carefully lowered into the trench by means of derrick ropes, wide nylon slings, or other approved methods in such a manner as to avoid damage to the materials and protective coatings and linings. Under no circumstances shall the material be dropped.

Trench Backfill Material: Backfill material shall consist of suitable materials from trench excavation, or new materials, as approved by the Engineer. Backfill material shall be free from large clods of earth, stones, or debris,

which might result in improper backfilling of the pipe. If excavating material is found to be unsuitable, it will be at the contractor's expense to purchase new material, approved by the Engineer, for the backfilling of trench.

Backfill material shall be placed equally on both sides of the pipe in 6-inch layers and each layer shall be thoroughly and carefully tamped by mechanical means until the pipe has a cover of one foot. Compacted material shall be equal to density of the adjacent soil or better.

The trench shall then be filled to a point approximately six (6) inches above the surface of the ground. As soon as practicable the trench shall then be water tamped by inserting a pipe down to the bottom of the trench, then flooded with water until the water rises to the surface. After the trench has settled, following the water treatment, the trench shall then be filled with dry material and well tamped.

All trenches shall be promptly backfilled and the backfill water tamped and completely finished, including replacement of street surfacing, as the work progresses. Where this method, will not provide satisfactory results, the Engineer may allow the backfilling to be done otherwise.

Specified Backfill: Where earth in the trench bottom is soft and not capable in supporting weight of the pipe or fittings, the bottom shall be excavated deeper, two (2) foot or so, and backfilled with aggregate bedding material, to the pipe grade at the contractor's expense. Material used shall be approved by the Engineer.

Thrust Restraint; All pipe fittings and fire hydrants shall be restrained in accordance with Section 3.8 of the AWWA C-600 Standard and in accordance with details in the plan drawings.

Laying Polyvinyl Chloride (PVC) Pressure Pipe:

Joining Pipe: The pipe ends (bell and spigot rings) surface shall be thoroughly cleaned with a rag and wiped dry. When a pipe section is already in the trench, place a rubber gasket into the bell groove and work with the fingers until it seats evenly 360 degrees. The gasket shall be thoroughly lubricated with approved lubricate. The entire surface of the spigot end shall be lubricated up to the full insertion mark. Align the pipe section and insert the spigot straight into the bell. Do not swing or stab the joint. The spigot end of the pipe has a mark to indicate the proper depth of insertion. Always make certain that this full insertion mark is within 3/8-inch of the end of the bell after assembly.

On 10-inch and larger PVC pipe, mechanical assistance may be necessary in addition to the bar and block to push the pipe home. Do not use purely mechanical means, like a backhoe bucket, for pushing the pipe home. Without the "feel" of the bar and block, the joint can be damaged by forcing it past the built-in-stop. Use a short cable with moderate tension to avoid

"telescoping" the pipe, and be sure the man with the bar and block is out of reach of a possible broken cable.

Prior to backfilling, all water lines, valves, and fittings shall be partially covered between joints, pressure tested, and chlorinated in accordance with the sub-section specified hereinafter. Shoring, sheeting, and bracing, if used, shall be removed before commencing backfilling.

Laying of Ductile Iron Pipe:

The laying and jointing of the ductile iron pipe shall be in accordance with the applicable requirements of Section 3 of AWWA C-600-05, or the latest revision, Installation of Ductile-Iron Water Mains and Their Appurtenances.

906.5 Chlorination of Lines

Chlorination of completed water lines shall be in accordance with Specification Item 940 – DISINFECTION OF WATER MAINS.

906.6 Bacteriological Tests

Bacteriological test of completed water lines shall be in accordance with Specification Item 940 - DISINFECTION OF WATER MAINS.

906.7 Hydrostatic Testing

Hydrostatic Testing shall be in accordance with Specification Item 939 - HYDROSTATIC TEST FOR PRESSURE LINES.

906.8 Cleanup and Grading

As the work progresses and upon completion of this project, all debris and surplus materials resulting from the work shall be removed from the job site.

All areas shall be uniformly and smoothly graded to finish or existing grade elevation as shown on the plans. The finish grading shall be reasonably smooth and free from irregular surface changes. The degree of finish grading shall be that ordinarily obtainable from either blade grades or scraper operators. All drainage swales shall be finished so as to drain readily. Upon completion of the blading, the site shall have a clean and neat appearance satisfactory to the Engineer.

906.9 Measurement

(OPEN CUT) Measurement for water main installed in the trench will be made by the linear foot along the horizontal alignment of the pipe measured along the horizontal centerline of the trench. Measurement shall be made through and include all fittings, and through all casing.

(Augering & Jacking) or (Boring & Jacking) Measurement for water main installed by augering or boring will be made by the linear foot along the horizontal alignment of the pipe above the bore hole, and through all casing.

Ductile Iron or Cast Iron Fittings will not be measured separately and shall be a subsidiary item to the installation of water mains.

906.10 Payment

Payment for water main installed by open-cut will be made at the contract unit price per linear foot as indicated on the proposal and as specified under paragraph 906.9, “Measurement”.

Payment for water main installed by augering & jacking or boring & jacking will be made at the contract price per linear foot as indicated on the proposal, and as specified under paragraph 906.9, “Measurement”.

The above payment will constitute full compensation for furnishing all plant, equipment, labor, material superintendence, and performing all operations required for cleaning, trench excavation, dewatering, installing pipe, bends and fittings, thrust blocking, hydrostatic testing, sterilization, backfill, clean-up operations, and all incidental operations required for complete water main installation in accordance with the drawings and installation.

Ductile Iron or Cast Iron Fittings will not be paid for separately and shall be considered incidental to the item for which they are components.

END OF ITEM 906