

250 WATER MAINS

ITEM 251 WATER MAINS - GENERAL

- 251.01 Description**
- 251.02 Responsibilities of Work**
- 251.03 Excavation**
- 251.04 Boring for Water Services**
- 251.05 Surface Restoration**
- 251.06 Materials**
- 251.07 Handling of Materials**
- 251.08 Cleanliness of Pipe**
- 251.09 Cutting Pipes**
- 251.10 Anchorages**
- 251.11 Manholes**
- 251.12 Valves**
- 251.13 Special Castings**
- 251.14 Air Release Assemblies**
- 251.15 Polyethylene Encasement**
- 251.16 Fire Hydrants**
- 251.17 Tie-ins**
- 251.18 Abandoning Mains**
- 251.19 Sterilization**
- 251.20 Testing**
- 251.21 Piling and Cradling**
- 251.22 Steel Casing Pipe**
- 251.23 Access Hatches**
- 251.24 Field Location of Existing Mains and Utilities**

251.01 Description. Water mains and appurtenant structures shall be constructed as shown on the plans, in accordance with the specifications for the various items which constitute the completed water main, and in reasonably close conformity with the lines, grades, and dimensions shown on the plans or established by the Engineer.

251.02 Responsibilities of Work. The Contractor shall furnish labor and approved materials required to install water mains and appurtenances, install new copper water services from the new mains to the property line, to excavate and assist City forces transferring existing water services from the mains to be abandoned to the new mains and, if needed, replace substandard service material, and to adjust existing mains where such mains interfere with construction of the new mains. If so noted on the plans, the Contractor shall furnish labor to set in existing mains all valves and special castings required for connection with the new mains, with materials furnished by the City. The Contractor shall furnish labor for such tie-ins, as specified in 251.17. When a tie-in is to be made with a tapping sleeve and valve,

the tap will be made by the City. All excavation, backfilling, and surface restoration required for the above work shall be performed by the Contractor and shall be considered included in the various bid items which necessitate the work.

The City will perform all necessary opening and closing of valves for all purposes related to the construction of water mains.

All survey work required for the layout and installation of the water mains shall be performed by the Contractor, unless noted otherwise on the plans.

251.03 Excavation. When the bid schedule contains Item 503 Excavation, the bid price shall be full compensation for excavating and backfilling the trenches in which the new mains, valves, special castings, hydrants and hydrant runs will be installed. The price shall also be full compensation for excavating and backfilling trenches required for tying into existing mains and adjusting existing mains. Granular backfill shall conform to the specifications of either 604.02 Bank Run Gravel, 304.02 Aggregate, or 310.02 (Grading A) material. When limestone or crushed concrete is required for bedding the pipe as hereinafter determined, the cost of furnishing this material shall be paid for at the price bid for 603 Limestone. Backfill or bedding containing slag or cinders will not be permitted. The cost of placing granular backfill or limestone shall be considered included in the price bid for the item which necessitated the work.

When the bid schedule does not include Item 503 Excavation, the cost of this work shall be considered included in the price bid for the item which necessitated the work.

The cost of excavating and backfilling for the construction of structures, such as manholes, anchorages, and piling and cradling, shall be included in the price bid for 503 Excavation For Structures, when such item is included in the bid schedule. When this item is not included in the bid schedule, the cost of the excavating and backfilling shall be considered included in the price bid for the various items covering such construction. Excavation and backfilling of trenches for new copper water services, and excavations and backfilling of holes for water service transfers will be as directed by the Engineer and shall be performed in accordance with the provisions and included for payment under Item 252 Trenches for Copper Water Services or Item 253 Boring for Water Services.

Removal of pavement, curb, gutter, sidewalk and other structures encountered within the excavation limits shall be included for payment under the appropriate Items of 202 Removal of Structures and Obstructions, if such items are included in the bid schedule. Structures not covered by 202 items in the bid schedule shall be removed in accordance with the provisions of 202, and payment for the work shall be considered included in the various bid items which necessitate the work.

When the bid schedule does not contain Item 201 Clearing and Grubbing, this work shall be performed in accordance with the provisions of 201, and payment for this work shall be considered included in the various bid items which necessitate the work.

251.03

All excavation and backfilling shall be performed in accordance with the provisions of 503 and/or 551 as applicable, and as hereinafter specified.

Trenches for water mains shall be excavated to a width of two feet greater than the internal diameter of the pipe to be laid, and to the depth required to lay the pipe at the grade shown on the plans or established by the Engineer. Pipes shall be laid directly on the trench bottom after it has been graded and tamped to support the pipe along its entire length, with holes for pipe bells recessed into the trench bottom, unless otherwise shown on the plans.

When excavating trenches for water mains in rock, as defined in 203.02, the Contractor shall excavate the trench to an additional depth of six inches below the proposed grade of the bottom of the pipe, and shall bring the trench depth to the grade of the bottom of the pipe with limestone bedding material meeting the requirements for Class B Bedding specified in 551.05, with holes recessed in the bedding material for the pipe bell. Slag will not be permitted for use as bedding material. The bedding material shall be compacted as specified in 203.09(e) and 203.12.

Unstable or unsuitable material encountered at the water main trench bottom, as determined by the Engineer, shall be removed to a depth specified by the Engineer, and the trench refilled to the proposed grade of the bottom of the pipe with limestone bedding material and compacted as specified above. Should it be necessary to excavate more than 3 feet below the original trench bottom, the Contractor shall receive additional compensation for the excavation below the 3-foot depth as specified in 503.08.

Excavation for appurtenant structures, such as manholes and anchorages, shall be excavated to a width sufficient to properly construct and inspect the structures, and to allow thorough compaction of backfill adjacent to the structures. Unsuitable materials at the bottom of the excavations shall be removed as specified above.

The backfill material shall be placed under and around the pipes and structures and to the top of the excavations in layers not to exceed 24 inches in thickness with mechanical tampers. Compaction of backfill shall be as specified in 551.09.

Special care shall be taken in placing and tamping backfill material under, around, and to a depth of twelve inches over top of the pipe. No boulders or rock shall be used for backfill below this level. No boulder or rock having six inches for its greatest dimension shall be used for backfilling the trench above this level. Earth shall be mixed with rock backfill to eliminate voids which could result in settlement.

All surplus or unsuitable excavated material shall be disposed of in accordance with 203.05 and the cost of such disposal shall be considered included in the price bid for the item which necessitated the work.

When excavation is to be paid for under Item 503, the cubic yards will be measured by the Engineer within the limits specified in the preceding paragraphs, after the requirements of 201 (if applicable) and 202 have been met. No allowance will be made for holes required to accommodate pipe bells or for tees or crosses set in the line for future uses. Whenever payment lines for Item 503 overlap for parallel

or intersecting trenches, the excavation within the overlapping portion will be measured once to cover the excavation for both trenches.

251.04 Boring for Water Services. The Contractor shall perform boring operations for copper water services when directed to do so by the Engineer. Borings shall be performed in accordance with the provisions of, and paid for under, Item 253 - Boring for Water Services.

251.05 Surface Restoration. All street pavement or surfaces, curb and gutter, sidewalks, and driveways necessarily removed during excavation operations shall be replaced in kind by the Contractor. The surfaces shall be replaced as specified in 104.07, and in accordance with the applicable provisions of Sections 300 Bases, 400 Flexible Pavement, 450 Rigid Pavements, 456 Sidewalks, Driveways and Steps, 455 Curbing, 453 Approach Slabs, and Standard Construction Drawings, unless otherwise shown on the plans. Restoration of the surfaces shall be paid for under the applicable items of the above sections, if such items are included in the bid schedule. Restoration of surfaces not covered by separate bid items shall be restored as specified above, and payment for the work shall be considered included in the various bid items which necessitate the work.

The Contractor shall repair or replace all house drains that were damaged during the excavation operations in the manner shown on the plans or directed by the Engineer, and in accordance with the provisions of 556. When the bid schedule does not contain an item for 556 House Drain Pipe, payment for the restoration of drains shall be considered included in the bid items which necessitate the work.

The Contractor shall restore all grassy areas and replace and replant all shrubs and trees damaged during the construction of water mains and appurtenant structures, and all incidental work thereto. These surfaces shall be restored in the manner shown on the plans, or as directed by the Engineer, in accordance with the applicable provisions of 653 Topsoil Furnished and Placed, 659 Seeding and Mulching, 660 Sodding, 662 Planting Shrubs, and 663 Planting Trees. When the bid schedule does not contain the above items, the cost of the work shall be considered included in the prices bid for the various items which necessitated the work.

Unless specified otherwise, the Engineer shall determine the limits of all surface restoration.

251.06 Materials. Unless otherwise noted in the Contract or in these specifications, the Contractor shall furnish all materials required for the complete installation of the water mains, appurtenant structures, and incidentals as shown on the plans. All materials furnished by the Contractor shall be approved by the Engineer prior to construction.

All materials required for the installation of water mains and appurtenant structures shall meet the requirements of the appropriate sections of 715.

251.07 Handling of Materials. The Contractor shall carefully handle and lay all pipe, special castings, valves, and hydrants to prevent damage, and special care

251.08

shall be taken to prevent the pipe coating from being damaged, particularly on the inside of the pipe.

All pieces shall be carefully examined for defects, and no piece shall be laid which is known to be defective. If any defective piece is discovered after being laid, it shall be removed and replaced in a satisfactory manner by the Contractor at his own expense.

The Contractor shall protect all material from loss or damage from any cause at all times. He shall be responsible for any hydrant, valve, or other material found broken on the work site, and all parts lost or damaged shall be repaired or replaced at his expense.

251.08 Cleanliness of Pipe. The pipe shall be thoroughly cleaned before lowered into the trench, and shall be kept clean until accepted in the completed work. The exposed ends of all uncompleted lines shall be closed with wooden or other acceptable bulkheads such as caps or plugs at all times when pipe laying is not actually in progress.

251.09 Cutting Pipes. Whenever ductile iron or steel pipes require cutting to fit in the line, the work shall be done at the Contractor's expense. Cuts shall be made at right angles to the pipe axis. When cutting pipe ends that will be inserted in push on joints, the circumference of the pipe shall be beveled in the manner directed by the Engineer to prevent cutting of the rubber gasket.

251.10 Anchorages. The pipes shall be anchored against movement at all locations where unbalanced pressures occur, such as at elbows, tees, and bulkheads.

For all ductile iron or steel pipes 12 inches in diameter and larger, and for all diameters of ductile iron or steel pipes in which the internal pressure equals or exceeds 100 psi, all horizontal thrust blocks shall be constructed of concrete and shall be of the design shown on the plans. Horizontal thrust blocks and thrust blocks for bottom vertical bends for ductile iron or steel pipes less than 12 inches in diameter and with less than 100 psi internal pressure shall be hard wood blocking. Anchors for top vertical bends for ductile iron or steel pipes shall be constructed of concrete and reinforcing steel and shall be of the design shown on the plans. Top and bottom vertical bends may be restrained using ductile iron lugs and threaded bar stock in lieu of concrete thrust blocking. When the plans do not specify dimensions and/or reinforcing steel sizes for thrust block and anchorages, the dimensions and/or bar sizes shall be as determined by the Engineer.

All thrust blocks and anchorages for prestressed concrete cylinder pipe shall conform to the design and size shown on the plans.

Wood blocking shall be included for payment under the item governing the installation of the pipe being anchored. Concrete anchorages shall be constructed in accordance with the provisions of 509 Reinforcing Steel and 511 Concrete for Structures.

251.11 Manholes. Access manholes, air release manholes, and blowoff manholes shall be of the size, type, and design as shown on the plans. Manholes shall be constructed and paid for in accordance with the provisions of Item 562.

251.12 Valves. Gate valves, butterfly valves, check valves, and accompanying valve boxes, Victaulic couplings, and valve stem extensions shall be installed as specified in 258. For purposes of payment, the prices bid for items listed under 258 shall include the cost of furnishing materials only. The cost of installing valves, valve boxes, Victaulic couplings, and valve stem extensions shall be included in the price bid for the item governing the installation of the pipe in which the valve will be installed.

251.13 Special Castings. The cost of furnishing cast or ductile iron special castings for ductile iron water mains shall be paid for at the prices bid for Item 259. The cost of installing special castings shall be included in the price bid for the item governing the installation of the pipe in which the special casting will be installed.

251.14 Air Release Assemblies. Air release assemblies shall be of the size and type shown on the plans, and shall be installed at the locations shown. Air release assemblies shall be installed and paid for in accordance with the provisions of Item 262.

251.15 Polyethylene Encasement. The Contractor shall furnish and install polyethylene encasement for all ductile iron, prestressed concrete cylinder and steel pipe, special castings, valves, and couplings unless determined otherwise by the Engineer. When the bid schedule does not contain an item for 261 Polyethylene Encasement, the cost of this work shall be included for payment in the item governing the installation of the material to be encased.

251.16 Fire Hydrants. Hydrants, hydrant valves, and hydrant run piping shall be furnished and installed as specified in Item 260. The installation of the hydrant and the laying of the hydrant run pipe and valve shall be paid for under the appropriate items governing the installation of the pipe and valve.

251.17 Tie-Ins. When the Contractor is responsible for tying a new main into an existing main, the tie-in shall be made at the location and in the manner shown on the plans. Cutting of an existing main for a tie-in shall be performed and paid for in accordance with 263 Tying Into Existing Mains. Furnishing and installing pipe, special castings, and sleeves required for constructing the branch to the existing main shall be performed and paid for in accordance with 254 and 259. When the plans call for tie-in to be made using a tapping sleeve and valve, the City will install the sleeve and valve as specified in 251.02.

251.18 Abandoning Mains. The Contractor shall bulkhead exposed ends of existing mains to be abandoned at locations and in the manner specified on the plans or determined by the Engineer. The cost of the work shall be considered included in the various laying pipe items which necessitate the work.

251.19 Sterilization. During the laying of the main the Contractor, at his own expense, shall place a sterilizing powder meeting the requirement of 715.19 into the main at intervals so that the quantity per 100 feet of main shall be not less than the following amount:

251.20

<u>Pipe Diameter (in.)</u>	<u>Ounces/100 Ft.</u>
4	2
6	4
8	6
10	10
12	14
16	24
20	38
24	54
30	84
36	120
42	162
48	200
54	254

If an alternate type of sterilizing material is furnished, as provided for in 715.19, the material shall be introduced in the main in such a quantity that will produce a chlorine concentration of 50 ppm. All sterilizing shall be performed in accordance with the latest revision of AWWA C 651.

When pipe laying is completed, the City will fill the line for sterilizing the pipe and appurtenances, and will obtain and test a sample for bacteria. Should additional sterilization be required due to poor test results, the Contractor shall furnish additional labor to assist in the additional sterilization work but the sterilizing equipment and material will be furnished by the City. The cost of materials and labor required for the Contractor's work in sterilizing the mains shall be included in the corresponding item governing the main being sterilized.

251.20 Testing. After the mains have been laid, and backfilled, the mains will be filled with water by the City for a leakage test.

The leakage test shall be in accordance with the latest revision of section 4, pressure and leakage test, in ANSI/AWWA C600, standard for installation of ductile-iron water mains. The mains shall be tested in lengths of less than 2,000 feet when possible. The duration of the test at full pressure shall be a minimum of two (2) hours, unless otherwise directed by the Engineer. The leakage during the test shall not exceed 11.65 gallons per day per inch diameter per mile of pipe. When testing against a closed metal-seated valve, an additional leakage allowance of 0.19 gallons per day per inch diameter per valve will be allowed.

The test shall be made by connection of a pump to a fire hydrant or a corporation stop in the main, pumping the main to the test pressure, and measuring the quantity of water required to pump the main back up to the test pressure at the end of the test period.

The mains shall be tested under a minimum pressure that is 1.5 times the static pressure at the point of testing or 50 psi higher than the maximum static pressure that the mains will experience in service, as determined by the Engineer. The minimum pressure at the highest point along the test section shall be 1.25 times the working

static pressure at that point. The duration of the test shall be two hours unless directed otherwise by the Engineer.

The Contractor shall furnish the necessary pumps, pipe, and connections for making the test, install all taps in the pipe, and shall install and remove the temporary bulkheads furnished by the City. The City will furnish gauges and measuring devices for the test, but the Contractor shall furnish all assistance necessary for conducting the test.

In the event that the main fails to meet the test requirements, the Engineer may order the Contractor to expose the joints or any section in question, repair the defective joint or replace the defective pipe, repeat the test, backfill, and restore the surface. Such additional work shall be at the Contractor's expense.

The Contractor shall be responsible for any damage to the trench, piping or appurtenances which may arise from, or in connection with, the tests and all damaged pipe or appurtenances shall be replaced by the Contractor immediately.

The cost of all material and labor performed by the Contractor in conjunction with the pressure testing shall be included for payment under the item governing the installation of the main being tested.

251.21 Piling and Cradling. Piling required for supporting the water main shall be of a size and type shown on the plans, and shall be driven at the locations and to the evaluations shown, or as directed by the Engineer. Piling shall be driven and paid for in accordance with the provisions of Item 507.

Reinforced concrete pile caps and cradling for the water main shall be constructed in accordance with the details shown on the plans, and paid for under Items 509 and 511. Excavation for the pile caps and cradling shall be included for payment under Item 503 Excavation For Structures.

251.22 Steel Casing Pipe. The Contractor shall furnish and install steel casing pipe for water mains at the locations shown on the plans, or as determined by the Engineer. Steel casing pipe shall be installed and paid for in accordance with the provisions of under Item 264.

251.23 Access Hatches. Access hatches shall be provided in all water mains that are 30 inches and larger in diameter. The locations and number of access hatches shall be as shown on the plans. The cost of furnishing special pipe sections with access hatches shall be included in the price bid for the item governing the installation of the pipe for the main in which the special pipe section will be installed.

251.24 Field Location of Existing Mains and Utilities. The Contractor shall be responsible for determining the elevations and alignment of existing water mains, especially at points of connection and of all other utilities in the vicinity of the work. The Contractor will receive no extra payment for additional work required if the alignment and/or elevations of existing mains or other utilities are not as shown on the plans.

ITEM 252 TRENCHES FOR COPPER WATER SERVICES

- 252.01 Description**
- 252.02 Requirements**
- 252.03 Classification**
- 252.04 Method of Measurement**
- 252.05 Basis of Payment**

252.01 Description. This work shall consist of the excavating and backfilling of trenches for copper water services.

252.02 Requirements. Trenches for copper water services shall be excavated and backfilled in accordance with the provisions of 503 and as hereinafter specified.

The trenches shall have a width of thirty inches, and shall be excavated to the depth required for the installation of the service as determined by the Engineer.

Granular material shall be used for backfilling all copper water service trenches. The granular material shall meet the requirements of 604.02, Bank Run Gravel, 304.02 Aggregate, or 310.02 (Grading A) material. Backfill containing slag or cinders will not be permitted. The backfill shall be placed under and around the copper service and to the top of the trench in layers not to exceed 24 inches in thickness with mechanical tampers. Compaction shall be as specified in 551.09. Special care shall be taken in placing and tamping backfill material under, around, and to a depth of twelve inches over top of the pipe.

The cost of placing and compacting granular backfill material shall be included in the price bid for 252.

Removal of pavement, curb and gutter, sidewalks, and other structures encountered within the excavation limits, and the restoration of surfaces necessitated by the excavation of the trenches shall be included in the various bid items covering such work, as specified in 251.03 and 251.05. Work not covered by specific bid items shall be considered included in the prices bid for Item 252.

252.03 Classification. For purposes of payment, excavation for water service trenches shall be classified as (a) earth, or (b) rock. Earth excavation shall include all excavation not classified as rock. Rock excavation shall include excavation defined as rock in 203.02.

252.04 Method of Measurement. After the requirements of 201 (if applicable) and 202 have been met, the linear feet of excavated trench will be measured in place by the Engineer within the limits specified above.

252.05 Basis of Payment. Payment will be made at the contract price for:

<u>Item</u>	<u>Unit</u>	<u>Description</u>
252	Linear Foot	Trenches For Water Services In Earth
252	Linear Foot	Trenches For Water Services In Rock

The above prices shall include the cost of furnishing all labor and equipment necessary for the excavating and backfilling of trenches for copper water services, except for work designated to be included for payment under other Contract items, as specified herein.

ITEM 253 BORING FOR WATER SERVICES

253.01 Description

253.02 Requirements

253.03 Method of Measurement

253.04 Basis for Payment

253.01 Description. This work shall consist of boring holes through earth for the purpose of installing or transferring copper water services. Boring will not be done in rock as defined in 203.02.

253.02 Requirements. Holes will be bored underneath the roadway for water services at locations specified by the Engineer.

The bore holes shall be left in such condition that the City may readily install the service in the bore hole or pull the service through by means of rods.

Boring length will be determined by the Engineer. Additional excavation required for the installation of a new service beyond the boring limits will be paid for at the price bid for 252 Trenches For Water Services.

The bore hole shall be at a depth specified by the Engineer.

253.03 Method of Measurement. Boring for water services will be paid for by the actual number of linear feet bored as measured by the Engineer.

253.04 Basis for Payment. Payment for boring for water services will be made at the contract price for:

<u>Item</u>	<u>Unit</u>	<u>Description</u>
253	Linear Foot	Boring for water services

The above price shall include the cost of furnishing all labor, materials, and equipment necessary for boring for water services as specified herein.

ITEM 254 DUCTILE IRON PIPE

- 254.01 Description**
- 254.02 Materials**
- 254.03 Installation**
- 254.04 Joints**
- 254.05 Method of Measurement**
- 254.06 Basis of Payment**

254.01 Description. This work shall consist of the furnishing, hauling, handling, and laying of ductile iron pipe for water main construction. Included in this Item are: Connecting the new pipes with the branches set in the existing mains, cutting the pipes to fit in the line where required, installing restrained hydrant runs, making all restrained joints for special castings and valves, placing wood and concrete thrust blocks, bulkheading water mains to be abandoned, sterilization of the new mains, pressure testing the new mains, and all incidental work not specifically covered by another Contract Item.

254.02 Materials. Materials to be furnished for this work shall meet the requirements of the following sections:

Materials - General.....	715.01
Ductile Iron Pipe	715.02
Polyethylene Encasement.....	715.15
Restrained joints.....	715.16
Wood Blocking	715.17
Gasket Lubricant	715.18
Sterilizing Powder.....	715.19
Anchoring Pipe	715.27

254.03 Installation. The mains shall be installed in accordance with 251 Water Mains-General, and as hereinafter specified. Hydrant runs shall be constructed using ductile iron pipe meeting 715.02 or anchoring pipe meeting 715.27.

254.04 Joints. Push on joints with rubber gaskets for ductile iron pipe shall be made with gasket lubricant, in accordance with the pipe manufacturer's instructions. The spigot end of the pipe to be inserted in the bell shall be beveled as specified in 251.09. Ductile iron pipe used as a carrier pipe within a casing pipe shall have restrained joints as specified in 715.16.

All pipe joints at special castings, valves, sleeves, and anchoring pipe shall be made with a restraining gland as specified in 715.16. Straight pipe joints adjacent to special castings, valves, and sleeves will be made with a restraining gasket at the discretion of the Engineer.

The spigots shall be adjusted in the bells to no more than one-half of the manufacturer's maximum allowable joint deflection. The inside of the bell and the outside of the spigot must be thoroughly cleaned and all dirt, mud or grease, and all lumps, blisters or bubbles of coating removed before making the joints.

In areas where pressure is 100 psi or less, restrained joints for pipe diameters 12 inches and smaller shall be installed for a length of 15 feet on each side of the valve, bend, or offset using restraining gaskets or mechanical joint restraining glands. In areas where pressure exceeds 100 psi, restrained joints for diameters 12 inches and smaller shall be installed for a length of 30 feet on each side of the valve, bend, or offset using restraining gaskets or mechanical joint restraining glands. Restrained joints for diameters 16 inches and larger shall be installed for a length of 30 feet on each side of a valve, bend, or offset using restraining gaskets or mechanical joint restraining glands.

Butterfly valves shall be connected to ductile iron mains using either mechanical joint restraining glands or mechanical joint to Victaulic adapters and Victaulic couplings. Mechanical joint restraining glands shall be furnished under Item 254.04. Mechanical joint to Victaulic adapters shall be furnished under Item 259.

254.05 Method of Measurement. The length of pipe to be paid for shall be the length of pipe line in place and accepted, measured along the axis of the pipe, with no deductions made for valves or special castings. In case of branch pipes, the length shall be measured from the axis of the main line to the end of the branch. Lengths of branch runs for tees and crosses set in the pipe for future use shall not be considered as length of pipe for measurements and payment.

254.06 Basis of Payment. Payment for laying Ductile Iron Water Pipe will be made at the contract price for:

<u>Item</u>	<u>Unit</u>	<u>Description</u>
254	Linear Foot	_____ inch Ductile Iron Pipe

The above price shall include the cost of furnishing labor, materials, and equipment necessary to complete the work specified in 254.01 for the installation of ductile iron water mains, in the manner specified herein and in accordance with 251 - Water Mains, General. The price shall also include the cost of other related work not specifically itemized in the bid schedule, as provided for in 251 - Water Mains, General.

ITEM 255 PRESTRESSED CONCRETE CYLINDER PIPE

255.01 Description

255.02 Materials

255.01

255.03 Laying Schedule

255.04 Installation

255.05 Joints

255.06 Extra Bends

255.07 Method of Measurement

255.08 Basis of Payment

255.01 Description. This work shall consist of the laying of prestressed concrete cylinder pipe, and the setting of valves and valve boxes, for water main construction. Included in this item are: Installation of all special pipe sections and fittings, closure pieces, adapters, couplings, and other appurtenances as may be required for completion of the concrete water main. Also included are connecting the new pipes with the branches set in the present mains, making all restrained joints at special pipe sections designed for thrust restraint, sterilization of the new mains, pressure testing the new mains, and all incidental work not specifically covered by another Contract Item. The Contractor shall furnish the material required for the above work, with the exception of valves, valve boxes, and Victaulic couplings paid for under other Contract items as specified in 251.

The furnishing and laying of ductile iron hydrant runs, the furnishing and setting fire hydrants, the construction of anchorages and manholes, the furnishing and installing of air release assemblies, and tying into existing mains shall be paid for under other Contract items as specified in 251. Excavation, backfilling, and surface restoration shall be paid for as specified in 251.03.

255.02 Materials. Materials to be furnished for this work shall meet the requirements of the following sections:

Materials - General.....	715.01
Prestressed Concrete Cylinder Pipe.....	715.04
Gasket Lubricant	715.18
Sterilizing Powder.....	715.19
Polyethylene Encasement.....	715.15

Prestressed concrete cylinder pipe and fittings shall be prefabricated so that, when installed according to the laying schedule, the pipe will conform to the lines and grades shown on the plans.

255.03 Laying Schedule. The Contractor shall submit a laying schedule for approval by the Engineer prior to any construction. The schedule shall show all pertinent information required for the laying of the prefabricated concrete pipe and fittings, including but not necessarily limited to stationing, elevations, grades, laying lengths, locations of all special pipe sections and fittings, deflections, and rotations of pipe sections.

255.04 Installation. The pipe, fittings adapters, closure pieces, and couplings shall be installed in accordance with the manufacturer's instructions, and in accordance with 251 Water Mains-General.

255.05 Joints. Non-restrained push-on joints shall be made with gasket lubricant. The joints shall be sealed with grout in accordance with the pipe manufacturer's specifications and instructions.

After pushing the pipes together using gasket lubricant, restrained joints shall be made with the harness clamp assembly furnished with the pipe, and shall be sealed with grout. All materials used, and the methods employed in making the joints, shall be in strict conformity with the manufacturer's specifications and instructions.

The inside of the bell and the outside of the spigot of the pipes must be thoroughly cleaned of all dirt, mud or grease and all lumps, excess metal, blisters or bubbles of coating removed before making the joint.

As soon as the joints are grouted and inspected, the pipe shall be covered with at least six inches of earth, unless ordered completely backfilled by the Engineer.

255.06 Extra Bends. The Contractor shall have at least two 2° and two 4° bevel adapters for use as required for unforeseen field adjustments. Such materials shall be furnished by the Contractor at his expense.

255.07 Method of Measurement. The length of pipe to be paid for shall be the length of pipe in place and accepted, measured along the axis of the pipe, with no deduction made for valves, special pipe sections, fittings, and closure pieces. In case of branch pipes, the length shall be measured from the axis of the main line to the end of the branch. Lengths for tees, Y-branches, or crosses set in the line for future use shall not be considered as length of pipe for measurement and payment.

255.08 Basis of Payment. Payment for laying prestressed concrete cylinder pipe will be made at the contract price for:

<u>Item</u>	<u>Unit</u>	<u>Description</u>
255	Linear Foot	_____ inch Prestressed concrete cylinder pipe

The above price shall include the cost of furnishing all labor, materials and equipment necessary to complete the work specified in 255.01 for the installation of prestressed concrete cylinder pipe, in the manner specified herein and in accordance with 251. The price shall also include the cost of other related work not specifically itemized in the bid schedule, as provided for in 251.

ITEM 256 BURIED STEEL WATER PIPE

- 256.01 Description**
- 256.02 Materials**
- 256.03 Laying Schedule**
- 256.04 Installation**
- 256.05 Method of Measurement**
- 256.06 Basis of Payment**

256.01 Description. This work shall consist of laying buried steel pipe and fittings, and the setting of valves and valve boxes, for water main construction. Included in this Item are: Installation of all special pipe sections and fittings, closure pieces, adapters, couplings, and other appurtenances as may be required for the completion of the steel water main, connecting the steel pipes with branches set in the present mains, making all types of joints required for the completion of the steel main, placing thrust blocks, sterilization of the steel mains, pressure testing the steel mains, and all incidental work not specifically covered by another Contract Item. The Contractor shall furnish the material required for the above work, with the exception of valves, valve boxes, and Victaulic couplings, which shall be paid for under other Contract Items as specified in 251.

The construction of anchorages and manholes, the furnishing and installing of air release assemblies, and tying into existing mains shall be paid for under other Contract Items, as specified in 251. Excavation, backfilling, and surface restoration shall be paid for as specified in 251.03. Installation of steel water pipe on bridges will be paid for under Item 251.

256.02 Materials. Materials to be furnished for this work shall meet the requirements of the following sections:

Materials-General	715.01
Steel Pipe.....	715.05
Couplings	715.09
Polyethylene Encasement	715.15
Sterilizing Powder.....	715.19

Steel Pipe and fittings shall be prefabricated so that, when installed according to the laying schedule, the pipe will conform to the lines and grades shown on the plans.

256.03 Laying Schedule. The Contractor shall submit a laying schedule for approval by the Engineer prior to any construction. The laying schedule shall show where each numbered pipe section or fitting belongs in the line, and the numbers on the schedule shall correspond with those painted on the pipe sections and fittings. In addition, the laying schedule shall show other information required for the laying of the steel pipe and fittings, to the lines and grades shown on the plans, including but

not necessarily limited to stationing, elevations, grades, laying lengths, and deflections.

256.04 Installation. The pipe, fittings, adapters, closure pieces, couplings, and appurtenances shall be installed in accordance with 251 Water Mains-General, and as herein specified. All joints shall be of the type shown on the plans. Victaulic couplings shall be installed in accordance with the coupling manufacturer's instructions.

Where welded butt joints are permitted, the field material and the welding procedure shall conform to the latest revision of AWWA C206 - Standard Specifications for Welding of Field Water Pipe Joints. After the completion of the welding, the pipe shall be wire-brushed, cleaned and coated both on the inside as well as the outside, and wrapped on the outside in accordance with the coating requirements of 715.05.

When closure pieces are required in the field for steel pipe, the Contractor will be required to make all necessary measurements, and he shall be responsible for the correctness of the pieces.

Where plates are cut off with an acetylene torch or similar method, the burned edges shall be ground or chipped smooth before making the joints.

All pipe coating and wrapping damaged in cutting off the ends of closure pieces or other work shall be repaired as set forth in applicable sections of the American Water Works Association Specification C203.

256.05 Method of Measurement. The length of pipe to be paid for shall be the length of pipe line in place and accepted, measured along the axis of the pipe, with no deductions for valves, special pipe sections, fittings, and closure pieces. in case of branch pipes, the length shall be measured from the axis of the main line to the end of the branch. Lengths for tees, Y-branches, or crosses set in the line for future use shall not be considered as length of pipe for measurement and payment.

256.06 Basis of Payment. Payment for laying buried steel water pipe and fittings will be made at the contract price for:

<u>Item</u>	<u>Unit</u>	<u>Description</u>
256	Linear Foot	_____ inch Buried steel water pipe

The above price shall include the cost of furnishing all labor, materials and equipment necessary to complete the work specified in 256.01 for the installation of buried steel water pipe and fittings, in the manner specified herein. The price shall also include the cost of other related work not specifically itemized in the bid schedule, as provided for in 251.

ITEM 257 EXPOSED STEEL WATER PIPE

- 257.01 Description**
- 257.02 Materials**
- 257.03 Installation**
- 257.04 Method of Measurement**
- 257.05 Basis of Payment**

257.01 Description. This work shall consist of installing exposed steel water pipe on bridge structures, including all special sections, couplings, hangers, supports, insulation, and other necessary appurtenances. Included in this Item are: Connecting the steel pipes to the ductile iron or concrete water pipes at either end of the bridge structures, cutting the steel pipes to fit in the line where required, sterilization of the steel pipe, pressure testing of the steel pipe, coating of all couplings and other uncoated portions of steel pipe, installing insulation for all pipe and couplings, and all incidental work not specifically designated for payment under another Item. The Contractor shall furnish all materials required for the above work.

257.02 Materials. Materials required for this work shall meet the requirements of the following sections:

Materials-General.....	715.01
Steel Pipe.....	715.05
Couplings	715.09
Sterilizing Powder.....	715.19
Insulation.....	715.20

Hangers and/or supports shall be of the design, type, and size specified on the plans. Shop drawings shall be submitted to the Engineer for approval prior to construction.

257.03 Installation. Steel water pipe shall be installed in accordance with the applicable sections of 251 Water Mains-General, and as hereinafter specified.

Hangers and/or supports for steel water pipe shall be installed at the locations and in the manner shown on the plans.

The steel pipe shall be joined with the couplings at the locations shown in accordance with the coupling manufacturer's instructions. Expansion couplings shall be provided at the locations shown.

After installation, all couplings and other uncoated sections of the steel pipe shall be coated with the same type of material used by the pipe manufacturer for the pipe coating. The pipe and couplings shall be wrapped with a tight canvas, and the coating material poured into the space between the canvas and the pipe or coupling.

After coating, the entire length of pipe and couplings shall be covered with insulation and protective jacket. Insulation and jacket shall be installed in accordance with the manufacturer's instructions.

257.04 Method of Measurement. The length of pipe to be paid for shall be the total length of pipe installed and accepted, measured along the axis of the pipe. No deductions will be made for couplings or special sections.

257.05 Basis of Payment. Payment for installation of exposed steel water pipe will be made at the contract price for:

<u>Item</u>	<u>Unit</u>	<u>Description</u>
257	Linear Foot	____ inch Exposed steel water pipe

The above price shall include the cost of furnishing all labor, materials, and equipment to complete the work as herein specified.

ITEM 258 VALVES

- 258.01 Description**
- 258.02 Materials**
- 258.03 Installation**
- 258.04 Method of Measurement**
- 258.05 Basis of Payment**

258.01 Description. This work shall consist of the furnishing of gate valves, butterfly valves, check valve, valve boxes, polyethylene encasement, Victaulic couplings and cast or ductile iron mechanical joint bell to shouldered Victaulic adapters for use with butterfly valves.

258.02 Materials. Materials to be furnished under this Item shall meet the requirements of the following sections:

Materials-General	715.01
Mechanical Joint Bell to Victaulic Adapters	715.03
Gate Valves	715.06
Butterfly Valves	715.07
Check Valves	715.08
Valve Boxes	715.10
Victaulic Couplings.....	715.09
Polyethylene Encasement.....	715.15
Tapping Sleeve and Valve.....	715.21
Valve Stem Extensions.....	715.26

258.03 Installation. Valve stems and valve boxes shall be set plumb, and the valve boxes set to grade. Valves shall be installed with polyethylene encasement.

258.04

Valves with flanged ends shall be installed in accordance with the valve manufacturer's instructions.

When the finished operating nut depth is more than six feet below grade, valve shall be furnished with a valve stem extension to raise the operating nut to a depth of four feet.

Butterfly valves with shouldered ends shall be joined to the pipe ends using either mechanical joint restraining glands or Victaulic couplings. Special pipe sections with shouldered Victaulic ends will be provided in the mains for this purpose, as specified in 715.03, 715.04, 715.05, and 715.09. Victaulic couplings shall be installed according to the manufacturer's instructions.

258.04 Method of Measurement. The number of valves be paid for shall be the number of valves actually furnished and accepted in the completed water main.

258.05 Basis of Payment. Payment for furnishing valves will be made at the contract price for:

<u>Item</u>	<u>Unit</u>	<u>Description</u>
258	Each	____ inch Gate valve
258	Each	____ inch Butterfly valve
258	Each	____ inch Check valve

The prices bid for furnishing gate valves and butterfly valves shall include the cost of furnishing a valve box to be installed with each valve. The price bid for furnishing butterfly valves shall also include the cost of furnishing two Victaulic couplings for installing each valve, including gaskets and bolts. The cost of installing the above materials shall be included in the price bid for the item governing the pipe in which the valve will be installed.

ITEM 259 SPECIAL CASTINGS

259.01 Description

259.02 Materials

259.03 Method of Measurement

259.04 Basis of Payment

259.01 Description. This work shall consist of furnishing cast or ductile iron special castings, and cast or ductile iron flange and bell pipe, for installation in ductile iron water mains. Cast or ductile iron special castings include items such as tees, bends, crosses, sleeves, adapters, reducers, and plugs. Special castings furnished shall be of the sizes and types shown on the plans.

Restrained joints for mechanical or push-on bells shall be made in accordance with 254.04.

259.02 Materials. Materials to be furnished under this item shall meet the requirements of the following sections:

Materials-General.....	715.01
Special Castings	715.03
Restrained Joints	715.16

259.03 Method of Measurement. The number of special castings of a given size and type to be paid for shall be the actual number of such castings installed in the completed water main.

259.04 Basis of Payment. Payment for furnishing special castings will be made at the contract price for:

<u>Item</u>	<u>Unit</u>	<u>Description</u>
259	Each	____ inch Casting, special

ITEM 260 FIRE HYDRANTS

- 260.01 Description**
- 260.02 Materials**
- 260.03 Installation**
- 260.04 Method of Measurement**
- 260.05 Basis for Payment**

260.01 Description. This work shall consist of the furnishing and setting of fire hydrants for water mains.

260.02 Materials. Materials required for this work shall meet the requirements of the following sections:

Materials-General.....	715.01
Fire Hydrants.....	715.11
Restrained Joints	715.16
Wood Blocking	715.17
Anchoring Pipe.....	715.27

260.03 Installation. Excavation, backfilling, and surface restoration required for the setting of fire hydrants shall be performed and paid for in accordance with 251.03 and 251.05. Hydrants shall be handled in accordance with 251.07.

260.04

Excavation for hydrants shall be made to a depth of six inches below the bottom of the hydrant and the hydrant set firmly on a suitable stone or concrete block not less than one-foot square. The lower two and one-half feet of the excavation shall be refilled with #57 washed gravel meeting the material requirements for coarse aggregate specified in Table 703-1 of 703.01. Gravel containing slag or cinders will not be permitted.

Hydrants shall be set on the end of the hydrant run pipe, carefully to grade as designated by the bury line on the hydrant barrel, plumb, and square to the street line. Hydrants shall be blocked against thrust as specified in 251.10. The hydrant drain holes shall be kept free of all blocking so as to provide drainage during shutdown.

All joints between the hydrant inlet bell and the branch of the hydrant tee shall be restrained in accordance with 254.04.

Following the successful completion of the water main pressure test, the Contractor shall be responsible for rotating the steamer nozzle perpendicular to the street from which the hydrant is connected.

260.04 Method of Measurement. The number of fire hydrants to be paid for shall be the number of hydrants furnished, installed and accepted on the completed water main.

260.05 Basis of Payment. Payment for fire hydrants will be made at the contract price for:

<u>Item</u>	<u>Unit</u>	<u>Description</u>
260	Each	Fire Hydrants

The above price shall include the cost of furnishing all labor, materials, and equipment necessary for furnishing and installing the hydrant as herein specified, including furnishing and placing a stone or concrete foundation block, a wood thrust block if required, and the gravel drain for the hydrant. The price shall also include the cost of other related work necessitated by the installation of the hydrant when such work is not specifically itemized in the bid schedule, as provided for in 251.

ITEM 261 POLYETHYLENE ENCASEMENT

- 261.01 Description**
- 261.02 Method of Measurement**
- 261.03 Basis of Payment**

261.01 Description. This work shall consist of furnishing and installing polyethylene encasement for all ductile iron, prestressed concrete, or steel pipe,

special castings, valves, and couplings at all locations shown on the plans or as otherwise directed by the Engineer. Polyethylene encasement shall be installed according to and meet the material requirements of 715.15.

261.02 Method of Measurement. Installation of polyethylene encasement will be paid for by the linear foot. Measurement for payment will be on the actual number of linear feet of water main, fittings, valves, and couplings that are encased, for each size of water main.

261.03 Basis of Payment. Payment will be made at the contract price for:

<u>Item</u>	<u>Unit</u>	<u>Description</u>
261	Linear Foot	Polyethylene encasement ____inch pipe

The above price shall include the cost of furnishing all labor and materials necessary to complete the work herein specified.

ITEM 262 AIR RELEASE ASSEMBLIES

- 262.01 Description**
- 262.02 Materials**
- 262.03 Installation**
- 262.04 Method of Measurement**
- 262.05 Basis of Payment**

262.01 Description. This work shall consist of furnishing and installing manual and automatic air release assemblies for water mains.

262.02 Materials. Materials required for this work shall meet the requirements of the following sections:

Materials-General.....	715.01
Air Release Assemblies.....	715.12
Valve Boxes	715.10

262.03 Installation. Manual air release assemblies shall be installed with the materials, and in the configuration shown on the plans. A valve box shall be used to enclose the manual air release assembly on underground water mains.

The automatic air release valve and brass gate valve shall be installed as shown on the plans. The automatic air release assembly on underground water mains shall be installed in a manhole structure. The manhole shall be as shown on the plans or as directed by the Engineer.

262.04

The City shall make all taps in ductile iron pipes for the installation of air release assemblies. For concrete and steel pipe, air release assemblies shall be installed in the taps provided by the pipe manufacturer.

262.04 Method of Measurement. The quantity of air release assemblies to be paid for shall be the actual number of such assemblies furnished, installed and accepted on the completed water main.

262.05 Basis of Payment. Payment for air release assemblies shall be made at the contract unit price for:

<u>Item</u>	<u>Unit</u>	<u>Description</u>
262	Each	___ inch Automatic air release - tap required
262	Each	___ inch Automatic air release - no tap required
262	Each	___ inch Manual air release - tap required
262	Each	___ inch Manual air release - no tap required

The unit price shall include the cost of furnishing all labor, materials, and equipment necessary to install the air release assemblies as herein specified.

ITEM 263 TYING INTO EXISTING MAINS

- 263.01 Description**
- 263.02 Location of Existing Main**
- 263.03 Existing Main Shut Off**
- 263.04 Excavation**
- 263.05 Cutting Pipes**
- 263.06 Method of Measurement**
- 263.07 Basis of Payment**

263.01 Description. This work shall consist of cutting into existing ductile or cast iron water mains for the purpose of connecting new water mains to the existing water system. The work does not include the installation of the pipe and special castings required to construct the branch for connection to the new main, which shall be performed in accordance with, and paid for under, Item 254.

263.02 Location of Existing Main. The Contractor shall be responsible for determining the elevation and alignment of the water main to be tied into, as specified in 251.24. The Contractor will receive no additional payment for re-excavation of the new main previously installed if alignments and elevations are not as shown on the plans.

263.03 Existing Main Shut Off. The existing main to be cut will be shut off by the City at a time established by the City. The Contractor will not be compensated

for down time should the shut down take longer than anticipated. The City does not guarantee that a water tight shut down will be obtained, and the Contractor may have to work with some water in the pipe. The Contractor shall pump all water out of the existing main, if so directed by the Engineer.

263.04 Excavation. Excavation, backfilling, and surface restoration required for exposing the existing main for the tie-in shall be performed and paid for in accordance with 251.03 and 251.05.

263.05 Cutting Pipes. The existing main shall be cut to permit the installation of the pipe and special castings for the branch as shown on the plans. The pipe shall be cut so as to leave a smooth end at right angles to the axis of the pipe. The cut ends of the existing main shall be cleaned and beveled as directed by the Engineer before installation of the pipe and special castings.

263.06 Method of Measurement. The quantity of tie-ins to be paid for shall be the number of tie-ins completed and accepted on an existing main.

263.07 Basis of Payment. Payment for tie-ins will be made at the contract unit price for:

<u>Item</u>	<u>Unit</u>	<u>Description</u>
263	Each	Tying into ____ inch main

The unit price shall include the cost of furnishing all labor and equipment necessary to cut and clean the existing main for the connection of special castings or pipe, including pumping of water out of the existing main when required, as herein specified.

ITEM 264 - STEEL CASING PIPE

264.01 Description

264.02 Materials

264.03 General

264.04 Installation Procedures

264.05 Method of Measurement

264.06 Basis of Payment

264.01 Description. This item shall consist of furnishing all necessary labor, materials and equipment to furnish and install, at the location shown on the project plans, the steel casing pipe as shown on the plans, or as directed by the Engineer. This work shall include the excavation, boring and jacking, dewatering, sheeting, working shafts, steel casing, stainless steel casing spacers, granular material,

264.02

grouting and all appurtenances which are required for the proper completion of the work.

In all cases the Contractor shall be responsible for meeting the requirements of all applicable building and safety codes; and it shall be the Contractor's responsibility to use methods and materials which will adequately protect the work and the people employed thereon.

264.02 Materials. Materials to be furnished for this work shall meet the requirements of the following sections:

Materials-General	715.01
Steel Casing Pipe.....	715.14

264.03 General. Horizontal boring and jacking is specialized construction, and the Contractor must demonstrate to the Engineer that he is fully qualified and experienced in this work, otherwise he will be required to sublet this work to a firm with ability and experience acceptable to the Engineer in this specialized field.

The Contractor shall submit to the Engineer complete detail drawings describing all materials he proposes to use and method of construction intended in his performance of this work. These drawings must receive the Engineer's approval prior to commencement of work.

264.04 Installation Procedures. Jacking equipment shall be set up in a trench or shaft with a backstop erected to counterbalance the thrust developed by jacking the casing pipe. Working shafts required for the construction shall be located at the ends of the casing. Sizes of the shafts and the type of sheeting to be used shall be approved by the Engineer. The backstop shall be constructed of heavy timbers, rails or structural shapes as approved by the Engineer and shall be securely anchored to prevent any lateral displacement which would cause misalignment of the pipe during the jacking operation. The guide timbers and other members supporting the casing pipe shall be accurately placed in line and set to grade.

Pressure shall be applied by the jacks to produce a thrust coaxial with the casing pipe. Pressure on the casing pipe shall be maintained at all times, except when another section is added. The following section shall be placed on the guides, and connected with a full penetration weld.

All materials encountered shall be excavated, regardless of the nature thereof, by approved boring methods and all excavated material must be removed and disposed of in accordance with 105.17. Excavation shall be confined within the limits of the casing and executed in such a manner as to eliminate any settlement in the ground over or near the casing.

Alignment and grade shall be checked at regular intervals as directed by the Engineer, and if any deviation is found, corrections shall immediately be made in a

manner satisfactory to the Engineer to return the casing to the proper alignment and grade. If significant deviations in the alignment or grade of the casing pipe render it unacceptable for the installation of the carrier pipe, then the Engineer will direct the Contractor to remove or abandon the casing pipe installed and proceed with an alternate installation. No payment will be made for casing pipe that is installed and subsequently removed or abandoned.

In lieu of the casing pipe installation shown on the plan, the Contractor may elect to install a tunnel liner. The tunnel liner may be used subject to the approval of the Engineer and will be paid at the unit price bid for the casing pipe.

The Contractor shall furnish and maintain the necessary electric lighting and ventilating installations which are required by the State and City codes. He shall also provide such barricades, lights, flagmen, and watchmen above ground as may be necessary or as ordered by the Engineer, for the proper protection of persons and property. No extra payment will be allowed for lights, barricades, watchmen, flagmen, etc., associated with this work.

Carrier pipe shall be furnished and placed in accordance with the appropriate item indicated on the plans. The carrier pipe shall be installed and fixed in correct alignment using casing spacers as described in 715.22.

The casing pipe shall be thoroughly lubricated to facilitate sliding the carrier pipe into place. The carrier pipe installation sealing the end of the casing pipe and filling the annular space between the casing and carrier pipes with blown sand or other material shall be in accordance with the plans.

Voids around the outside of the casing shall be grouted with a mixture consisting of one part Portland cement and one part mortar sand, thoroughly mixed with sufficient water to permit a steady flow under pressure through the grout pipes. Proportions of the grout may be varied when field conditions so require and the Engineer so directs. Should it be necessary to decrease the setting time of the grout, quick setting cement or an approved admixture shall be used as directed by the Engineer.

The grouting equipment shall have adequate capacity and design to properly and expeditiously handle the required volume of grout at the pressures necessary to completely fill all voids outside the casing. Arrangements shall be made before starting the work for an ample supply of grouting materials to avoid interruptions once underway. Upon the completion of satisfactory grouting operations at a particular location, the grout pipe shall be removed from the grout hole after the grout has taken its initial set. The space occupied by the grout pipe shall be completely filled with a stiff cement mortar and troweled smooth.

264.05 Method of Measurement. The quantity to be paid under this item shall be the actual number of linear feet of steel casing pipe complete in place,

264.06

measured horizontally along the centerline of the casing pipe actually in place and accepted.

264.06 Basis of Payment. Payment for accepted quantities complete in place will be made at the contract price for:

<u>Item</u>	<u>Unit</u>	<u>Description</u>
264	Linear Foot	___" Steel Casing Pipe (___" Min. Wall)

ITEM 265 WATER MAIN VALVE BOXES ADJUSTED

- 265.01 Description**
- 265.02 Material**
- 265.03 Construction Methods**
- 265.04 Method of Measurement**
- 265.05 Basis of Payment**

265.01 Description. This item shall consist of raising or lowering water main valve boxes to conform to the grade of the pavement, sidewalk or other improvements.

265.02 Material. If any new valve box castings are needed, except as provided under Section 107.13, they will be furnished by the City of Akron, Division of Water Distribution.

265.03 Construction Methods. The Contractor shall excavate, by hand, around all water main valve boxes sufficient to permit their adjustment after which he shall raise or lower the box as necessary to conform to the grade of the new pavement, sidewalk or other improvement and maintain the box in its proper position until the improvement is completed.

265.04 Method of Measurement. The quantity to be paid for shall be the number of valve boxes actually adjusted to grade. The number of boxes shall be determined by counting them complete in place.

265.05 Basis of Payment. Payment for accepted quantities shall be made at the contract price for:

<u>Item</u>	<u>Unit</u>	<u>Description</u>
265	Each	Water Main Valve Boxes Adjusted

The above price shall constitute full compensation for furnishing all labor, materials, equipment tools and incidentals necessary to complete the item as specified.

ITEM 266 TAPPING WATER MAINS AND INSTALLING SERVICES

266.01	Description
266.02	General
266.03	Materials
266.04	Other Work
266.05	Installation Procedures
266.06	Inspection and Testing
266.07	Method of Measurement
266.08	Basis of Payment

266.01 Description. Water mains shall be tapped and service lines installed of the size and at the location specified by the Engineer in accordance with these specifications, materials, and methods or as established by the Engineer.

266.02 General. The Contractor shall demonstrate to the Engineer that he is fully qualified in this field and has satisfactorily completed work of this type. If the Engineer determines that the Contractor has not demonstrated that he is fully qualified in this type of work, he shall sublet this work to those with ability and experience acceptable to the Engineer in this type of work.

266.03 Materials. The Contractor shall furnish all water service materials, including piping, fittings and valves. Contractor shall use proper and suitable tools and appliances for the safe and convenient handling and pipelaying.

Materials to be used in this work shall meet the requirements of the following sections.

Polyethylene Encasement.....	715.15
Brass Service Fittings.....	715.13
Copper Tubing.....	715.23
Curb Boxes.....	715.24
Tapping Saddles.....	715.25

266.04 Other Work. Other work to be furnished in conjunction with the installation of water main service taps shall meet the requirements of the following sections.

- Item 252 - Trenches for Copper Water Services
- Item 253 - Boring for Water Services

The Engineer shall determine which of the above methods of work will be used to install the service.

266.05 Installation Procedures. Taps for corporation stops will be installed in place on active or inactive polyethylene-encased water mains. Corporation taps will be installed at either a ten o'clock or two o'clock position on the circumference

266.05

of the pipe, screwed directly into a tapped and threaded hole in the main. Taps 1 inch in diameter shall be installed in water mains without any additional appurtenances. Taps 1½ inches and larger in diameter in water mains less than 12 inches in diameter shall be installed with a saddle.

The Contractor shall be prepared and shall have on the site all equipment, materials, and personnel needed to install the tap in an expeditious manner. After the size and location of the tap are identified, the site over the main shall be excavated and necessary procedures followed to ensure safety to the workers and to not cause an inconvenience to the public.

After the entire circumference of the pipe has been carefully exposed, its exterior and wrapping shall be cleaned of soil, standing water, and debris to a minimum of six inches below the water main. All taps shall be made on active mains under pressure or taps made for pipe sterilization using a tapping machine which clamps onto the pipe barrel.

Corporation taps shall have tapered AWWA threads on the inlet side and flared copper on the outlet side. Bits shall be clean and sharp and properly lubricated according to the manufacturer's instructions. The tapping machine shall bore and thread the hole into the main before the closed corporation stop is inserted to a depth where one to three threads are exposed and the machine removed.

The corporation stop shall be installed by tapping directly through the polyethylene encasement after applying two or three wraps of polyethylene tape to cover the area where the tap is to be made. After the tap has been completed, the work will be inspected by the Engineer and cuts in the polyethylene and any other damage to the film shall be repaired with polyethylene adhesive tape as described in the latest revision of AWWA Specification C105.

After the tap has been made and the corporation stop installed, a length of copper tubing shall be attached between the outlet and the curb stop at the location determined by the Engineer. The copper tubing shall be given shallow bends, if necessary, to maintain its proper depth and supported with permanent wooden blocking within two feet of the corporation stop to prevent any undue stress loading on the tap threads. Another length of copper tubing shall be connected between the outlet of the curb stop to the property line or other location designated by the Engineer where the service line shall terminate. A curb box and rod shall be installed over the curb stop. (Copper service lines shall be wrapped with polyethylene encasement or a suitable dielectric tape for a minimum clear distance of three (3) feet away from the water main.)

The Contractor shall install at the end of the service line a flared copper to copper union to which the houseline shall be attached. If no houseline exists, a short piece of copper tubing no less than six inches long shall be connected to the union and the end crimped.

The minimum depth of the service line at any point shall be no less than 4½ feet and shall maintain the minimum horizontal and vertical clearance distances from sewers and other utilities and structures as required by the Engineer.

266.06 Inspection and Testing. After the work has been completed, the tap, service line and fittings will be tested to line pressure and inspected for leakage by the Engineer. If any leaks are present, the Contractor shall replace any or all of the components of the tap, service line, and fittings to the satisfaction of the Engineer to stop any leakage noted. After the service has been tested, inspected, and approved, the Contractor shall submit the following information regarding the work to the Engineer:

- Name of Contractor
- Date and time of installation
- Lot number and address
- Fittings used
- Primary and secondary locations of curb or meter box referenced from property line and other aboveground water appurtenances
- Length of service from tap to curb box
- Service line material used
- Depth of service
- Tap size
- Main size
- Box number

266.07 Method of Measurement. After the work has been inspected and approved by the Engineer, the diameter of the service line and the linear feet of service line installed from the corporation stop to the copper-to-copper union fitting will be measured in place by the Engineer.

266.08 Basis of Payment. Payment for the above work shall include the cost of furnishing all material, equipment, and labor necessary for the proper tapping and installation of water service lines as specified herein. Compensation for excavating trenches, boring, installing meter pits, and restoration of pavement and other areas will be paid for under their respective items as described in other work.

ITEM 267 FIRE HYDRANT RELOCATION

- 267.01 Description**
- 267.02 Materials**
- 267.03 Contractor Qualification**
- 267.04 Installation**
- 267.05 Method of Measurement**
- 267.06 Basis for Payment**

267.01

267.01 Description. This work shall consist of furnishing materials, and removing and relocating existing fire hydrants and fire hydrant runs which conflict with other planned work.

267.02 Materials. Materials required for this work shall meet the requirements of the following sections:

Materials – General	715.01
Ductile Iron Pipe	715.02
Couplings	715.09
Fire Hydrants.....	715.11
Restrained Joints	715.16
Wood Blocking	715.17
Gasket Lubricant	715.18
Sterilizing Powder	715.19
Anchoring Pipe.....	715.27

267.03 Contractor Qualification. Fire hydrants and hydrant run relocations may be scheduled to be performed by the Akron Public Utilities Bureau forces or, if conditions predicate, by a qualified Contractor. A Contractor will be deemed qualified after showing competence and previous experience of performing similar water main work. The choice of installer will be at the discretion of the Akron Public Utilities Bureau.

267.04 Installation. Installation shall be performed and paid for in accordance with Items 251.03, 251.05, 254, and 260.

267.05 Method of Measurement. The length of hydrant run to be paid for shall be the length of pipe in place and accepted, measured along the axis of the pipe; and the number of hydrants to be paid for shall be the number of hydrants furnished, installed, and accepted.

267.06 Basis of Payment. Payment for fire hydrants and hydrant runs will be made at the contract price for:

<u>Item</u>	<u>Unit</u>	<u>Description</u>
254	Linear Foot	Water Main
260	Each	Fire Hydrants

The above prices shall include the cost of furnishing all labor, equipment, and materials, and the removal of scrap materials for the excavation, restoration, and installation of fire hydrants and hydrant runs as specified herein.