SECTION 400
WATER LINES

PART 1 GENERAL

401 PVC PIPE INSTALLATION:

401.01 DESCRIPTION: This Work shall consist of furnishing, hauling, placing, and jointing the pipe as shown on the Plans or directed by the Contract Administrator.

401.02 MATERIALS:

a. **Pipe Materials:** Section 620 Water Line - PVC Pipe, Fittings, and Joints.
b. **Bedding and Backfill Material Requirements for PCV Pipe:** See Standard Drawing W01 and Section 602.

401.03 CONSTRUCTION METHODS:

a. **Protection of Work:** During the progress of the Work, the Contractor shall provide suitable barricades, fencing, signs, lighting, platforms, and/or scaffolding to protect the Work during construction, to prevent damage to such Work, and to protect the public from the Work. At the close of each day's Work, the open end of the pipelines shall be closed by suitable cover or plug and shall not be reopened until the Work recommences. Any obstructions which may occur in the line after being laid shall be removed by the Contractor at their own expense to the satisfaction of the Contract Administrator. The pipeline must be delivered free from dirt or other foreign matter.
b. **Laying of Pipe:** Pipe shall be laid true to the lines and grades shown on the Plans and given in the field. Procedures for laying and joining the pipe will be in accordance with the manufacturer's recommendations. Each pipe shall be carefully laid to the line and grade given in the field with bells upstream, and the ends of adjoining pipes shall butt against each other in such manner that there will be no shoulder or unevenness of any kind. Special care shall be taken that the invert of the pipe shall be a smooth continuous surface. At each bell, a hole shall be excavated of a size to give ample working room for proper make-up of the joint. Unless expressly ordered by the Contract Administrator, each pipe shall be brought to the required grade as established from grade lines. The Contractor shall, at their own expense, furnish all tools, materials, and labor, and shall construct cross-frames or horses at such intervals as the Contract Administrator may order in the field. The Contractor shall furnish all other implements necessary to determine the proper setting of the pipes.
c. **Establishing Grade:** The grade line shown on the Plans is the elevation of the invert or flow line of the pipeline. This section shall not apply when the Plans only require a minimum of 3 feet of cover and do not set an exact grade for the water line. The Contractor shall verify the requirement for exact grade with the Design Engineer prior to starting construction. The grade line shall be established in the trench by one of the following methods:
    1. Use of level and philly rod with grade stakes not farther than 300 feet apart. When this method is used the invert elevation of each section shall be verified before the next section is placed.
    2. Use of level and philly rod with grade stakes not farther than 300 feet apart to set a laser for establishing the grade line in the trench. When this method is used, the invert elevation shall be verified every 100 feet or when the laser is moved.

d. **Jointing the Pipe:** Pipe shall assemble with bell and spigot joints having rubber gaskets which compress to form a water-tight seal. Joints shall be assembled by bar and block, coupling pulleys or by backhoe. If the backhoe bucket is used to assembly the joint, a block of wood shall be placed between the end of the pipe and the bucket and care shall be taken to prevent damage to the pipe.

e. **Service Lines:** House services or road crossings shall be installed, in accordance with the appropriate sections of these Specifications before the pipeline is pressure tested and chlorinated.

f. **Interferences:** All known underground lines are shown on the Plans. This does not necessarily mean that all such lines that may be encountered are shown. Such obstructions are shown for the purpose of advising the Contractor that they may interfere with the Work to be done hereunder but not for the purpose of indicating that the Work can be performed without such interference. Elevations of underground obstructions and lines are shown as accurately as known on the profile sheets. The Contractor shall assume responsibility of all subsurface utilities. OKIE 811 shall be contacted for location service prior to excavation.

g. **Backfilling:** Backfilling of the trench shall be accomplished in accordance with Section 312 and Standard Drawing W01.

h. **Flushing:** The flushing velocity shall be at least 2.5 feet per second for small mains.

i. **Disinfection:** Refer to the latest version of the ANSI/AWWA C651 standard for disinfecting water mains as required by Oklahoma Department of Environmental Quality 252:626-19-2 or latest version.

j. **Testing:** Testing shall be accomplished in accordance with Section 107. Tests shall be taken at locations specified by the City.

k. **Connection to the System:** Connection to the system will not be made until after testing, flushing, and disinfection of the line, unless otherwise approved by the Director of Engineering and Construction.

401.04 SPECIAL REQUIREMENTS:

a. **Restrained Joints:** When a water line is placed in conduit or in a creek without concrete encasement, the pipe will be installed with restrained joints to prevent separation of the pipe in these structures.

b. **Bridging of Trench:** When ordered by the City, the Contractor shall, at their own expense, construct suitable platforms to bridge the trench at street intersections, at driveways to properties abutting the line of the Work and at such points as may be required to permit vehicle and/or pedestrian travel.

c. **Shop Tests:** The Contractor shall be responsible for obtaining tests of all materials as required by these Specifications. The Contractor shall furnish to the City, in the required number of copies, a certificate of shop tests on all pipe. These tests shall be witnessed by a reputable and established testing laboratory or firm, previously approved by the City.

d. **Locator Wire and Locator Tape:** All main water lines constructed of polyvinyl chloride, shall have a No. 12 solid copper wire with blue insulation jacket 30 mil polyethylene taped to the top surface of the pipe and connected at each end to the fire hydrant by attachment to an above ground bolt on the fire hydrant. Wire connectors shall be suitable for direct bury low voltage wire and have a waterproof design. Dig through locator tape as specified in Section 627 shall be buried 2 feet above the pipe.

e. **Testing:** Locator Wire shall be continuity tested by the Contractor in the presence of the Public Infrastructure Representative. Contractor shall replace the failed segment of wire should the wire not be continuous.

f. **Aerial Crossings and Crossings with Less than 4 feet of Cover:** See Standard Drawing STD W19 for aerial crossing requirements unless otherwise directed by an authorized City representative.

g. **On Site Materials Storage:** On-site pipe shall be stored according to the pipe manufacturer's specification.

h. **Arterial Roadway and Creek Crossings:** Pipe shall be encased in conduit 5 feet beyond back of curb for roadways unless otherwise directed by an authorized City representative and 15 feet beyond the top of bank on creeks. All joints shall be restrained.

401.05 METHOD OF MEASUREMENT: When this item is included as a pay item in the Contract it will be measured by the linear foot, through all fittings and specials.

401.06 BASIS OF PAYMENT: PVC pipe, measured as provided above, will be paid for by the linear foot and such payment shall be full compensation for all equipment, materials, tools, labor, and incidentals necessary to complete the Work as specified. The price bid shall include all cost and expense of furnishing, hauling, laying, and jointing the pipe, installing the protective materials, testing, flushing, sterilization and repairing of leaks. Excavation is paid under Section 311. Backfill and compaction are paid under either Section 312 or Section 313. This item will be paid as a separate bid item and payment will be made upon installation of the pipe. When this item is included in a Contract it will be listed as follows:

BA 401 PVC PIPE INSTALLATION (WATER) LINEAR FOOT

401.07 STANDARD DRAWINGS: W01, W06, and W07.

402 DUCTILE IRON PIPE INSTALLATION:

402.01 DESCRIPTION: This Work shall consist of furnishing, hauling, placing, and jointing the pipe as shown on the Plans or directed by the Contract Administrator. Ductile iron pipe shall not be considered for new construction without approval from the Director of Engineering and Construction. This section is only to be referenced for modifications to existing ductile iron pipe systems.

402.02 MATERIALS:

a. **Pipe Materials:** Section 621 Water Line - Ductile Iron Pipe, Fittings, and Joints and Section 605 Polyethylene Wrap.

b. **Bedding and Backfill Material Requirements for Ductile Iron Pipe:** See Standard Drawing W01 and Section 602.

402.03 CONSTRUCTION METHODS:

a. **Protection of Work:** During the progress of the Work, the Contractor shall provide suitable barricades, fencing, signs, lighting, platforms, and/or scaffolding to protect the Work during construction, to prevent damage to such Work, and to protect the public from the Work. At the close of each day's Work, the open end of the pipelines shall be closed by suitable cover or plug and shall not be reopened until the Work recommences. Any obstructions which may occur in the line after being laid shall be removed by the Contractor at their own expense to the satisfaction of the Contract Administrator. The pipeline must be delivered free from dirt or other foreign matter.

b. **Laying of Pipe:** Pipe shall be laid true to the lines and grades shown on the Plans and given in the field. Each pipe shall be carefully laid to the line and grade given in the field with bells

upstream, and the ends of adjoining pipes shall butt against each other in such manner that there will be no shoulder or unevenness of any kind. Procedures for laying and joining the pipe will be in accordance with the manufacturer's recommendations. Special care shall be taken that the invert of the pipe shall be a smooth continuous surface. Unless expressly ordered by the Contract Administrator, each pipe shall be brought to the required grade as established from grade lines. At each bell, a hole shall be excavated of a size to give ample working room for proper make-up of the joint. The Contractor shall, at their own expense, furnish all tools, materials, and labor, and shall construct cross-frames or horses at such intervals as the Contract Administrator may order in the field. The Contractor shall furnish all other implements necessary to determine the proper setting of the pipes. Ductile iron pipe shall be installed with polywrap. The polywrap shall be installed in accordance with the manufacturer's recommendations, with particular attention to joint overlap (minimum of 1 foot), joint tape, and protection of polywrap to prevent tears or penetrations.

c. **Establishing Grade:** The grade line shown on the Plans is the elevation of the invert or flow line of the pipeline. This section shall not apply when the Plans only require a minimum of 3 feet of cover and do not set an exact grade for the water line. The Contractor shall verify the requirement for exact grade with the Design Engineer prior to starting construction. The grade line shall be established in the trench by one of the following methods:
    1. Available use of GPS survey laths. Use of level and philly rod with grade stakes not farther than 300 feet apart. When this method is used the invert elevation of each section shall be verified before the next section is placed.
    2. Use of level and philly rod with grade stakes not farther than 300 feet apart to set a laser for establishing the grade line in the trench. When this method is used, the invert elevation shall be verified every 100 feet or when the laser is moved.
d. **Jointing the Pipe:** Pipe shall assemble with bell and spigot joints having rubber gaskets which compress to form a water-tight seal. Joints shall be assembled by bar and block, coupling pulleys or by backhoe. If the backhoe bucket is used to assembly the joint, a block of wood shall be placed between the end of the pipe and the bucket and care shall be taken to prevent damage to the pipe.
e. **Service Lines:** House services or road crossings shall be installed, in accordance with the appropriate sections of these Specifications before the pipeline is pressure tested and chlorinated.
f. **Interferences:** All known underground lines are shown on the Plans. This does not necessarily mean that all such lines that may be encountered are shown. Where existing utility lines or other subsurface obstructions are shown on the Drawings, they have been located as accurately as practicable by the City. Such obstructions are shown for the purpose of advising the Contractor that they may interfere with the Work to be done hereunder but not for the purpose of indicating that the Work can be performed without such interference. Elevations of underground obstructions and lines are shown as accurately as known on the profile sheets.
g. **Backfilling:** Backfilling of the trench shall be accomplished in accordance with Section 312 and Standard Drawing W01.
h. **Flushing:** The flushing velocity shall be at least 2.5 feet per second for small mains.
i. **Disinfection:** Refer to the latest version of the ANSI/AWWA C651 standard for disinfecting water mains as required by Oklahoma Department of Environmental Quality 252:626-19-2 or latest version.
j. **Testing:** Testing shall be accomplished in accordance with Section 107. Testing shall be at the Contractor's expense by a testing laboratory approved by the City, except for bacterial analysis which will be at the City's expense. Tests shall be taken at locations specified by the City.

k. **Connection to the System:** Connection to the system will not be made until after testing, flushing, and sterilization of the line, unless otherwise approved by the Director of Engineering and Construction.

402.04 SPECIAL REQUIREMENTS:

a. **Restrained Joints:** When a water line is placed in conduit or in a creek without concrete encasement, the pipe will be installed with restrained joints to prevent separation of the pipe in these structures.
b. **Bridging of Trench:** When ordered by the City, the Contractor shall, at their own expense, construct suitable platforms to bridge the trench at street intersections, at driveways to properties abutting the line of the Work and at such points as may be required to permit vehicle and/or pedestrian travel.
c. **Shop Tests:** The Contractor shall be responsible for obtaining tests of all materials as required by these Specifications. The Contractor shall furnish to the City, in the required number of copies, a certificate of shop tests on all pipe. These tests shall be witnessed by a reputable and established testing laboratory or firm, previously approved by the City.
d. **Dig through Locator Tape:** Dig through locator tape as specified in Section 627 will be buried 2 feet above the pipe.
e. **Aerial Crossings and Crossings with Less than 4 feet of Cover:** These crossings shall consist of 3/16ths of an inch thick smooth wall steel casing, welded to form a one-piece crossing, on concrete piers with bolted steel straps. The crossing shall be conducted in accordance with Standard Drawing W19. The crossing will be included in the price per foot for pipe installation unless otherwise stated.

402.05 METHOD OF MEASUREMENT: When this item is included as a pay item in the Contract it will be measured by the linear foot, through all fittings and specials.

402.06 BASIS OF PAYMENT: Ductile iron pipe, measured as provided above, will be paid for by the linear foot and such payment shall be full compensation for all equipment, materials, tools, labor, and incidentals necessary to complete the Work as specified. The price bid shall include all cost and expense of furnishing, hauling, laying and jointing the pipe, installing the protective materials, testing, flushing, sterilization and repairing of leaks. Excavation is paid under Section 311. Backfill and compaction are paid under either Section 312 or Section 313. This item will be paid as a separate bid item and payment will be made upon installation of the pipe. When this item is included in a Contract it will be listed as follows:

BA 402 DUCTILE IRON PIPE INSTALLATION (WATER) LINEAR FOOT

402.07 STANDARD DRAWINGS: W01, W06, and W07.

403 PRESTRESSED CONCRETE PIPE INSTALLATION:

403.01 DESCRIPTION: This Work shall consist of furnishing, hauling, placing, and joining the pipe as shown on the Plans or directed by the Contract Administrator**.** Prestressed concrete pipe shall not be considered for new construction without approval from the Director of Engineering and Construction. This section is only to be referenced for modifications to existing prestressed concrete systems.

403.02 MATERIALS:

a. **Pipe Materials:** Section 622 Water Line - Prestressed Concrete Pipe, Fittings, and Joints.
b. **Bedding and Backfill Material Requirements for Prestressed Concrete Pipe:** See Standard Drawing W01 and Section 602.

403.03 CONSTRUCTION METHODS:

a. **Protection of Work:** During the progress of the Work, the Contractor shall provide suitable barricades, fencing, signs, lighting, platforms, and/or scaffolding to protect the Work during construction, to prevent damage to such Work, and to protect the public from the Work. At the close of each day's Work, the open end of the pipelines shall be closed by suitable cover or plug and shall not be reopened until the Work recommences. Any obstructions which may occur in the line after being laid shall be removed by the Contractor at their own expense to the satisfaction of the Contract Administrator. The pipeline must be delivered free from dirt or other foreign matter.
b. **Laying of Pipe:** Pipe shall be laid true to the lines and grades shown on the Plans and given in the field. Procedures for laying and joining the pipe will be in accordance with the manufacturer's recommendations. It is important that a uniform bedding be prepared for the pipe immediately before laying. The Contractor shall use a laying-square or some other satisfactory tool to check the bedding before the pipe is laid. A small ditch may be dug across the trench below the grade at the mid-point of the pipe to be laid, to facilitate the removal of the cable sling used in handling the pipe. After the trench is prepared to receive the pipe, the pipe shall be lowered into the trench with machines of adequate capacity to safely handle the loads. Each pipe shall be carefully laid to the line and grade given in the field with bells upstream, and the ends of adjoining pipes shall butt against each other in such manner that there will be no shoulder or unevenness of any kind. Special care shall be taken that the invert of the pipe shall be a smooth continuous surface. Unless expressly ordered by the Contract Administrator, each pipe shall be brought to the required grade as established from grade lines. The Contractor shall, at their own expense, furnish all tools, materials, and labor, and shall construct cross-frames or horses at such intervals as the Contract Administrator may order in the field. The Contractor shall furnish all other implements necessary to determine the proper setting of the pipes.
c. **Establishing Grade:** The grade line shown on the Plans is the elevation of the invert or flow line of the pipeline. This section shall not apply when the Plans only require a minimum of 3 feet of cover and do not set an exact grade for the water line. The Contractor shall verify the requirement for exact grade with the Design Engineer prior to starting construction. The grade line shall be established in the trench by one of the following methods:
    1. Use of level and philly rod with grade stakes not farther than 300 feet apart. When this method is used the invert elevation of each section shall be verified before the next section is placed.
    2. Use of level and philly rod with grade stakes not farther than 300 feet apart to set a laser for establishing the grade line in the trench. When this method is used, the invert elevation of shall be verified every 100 feet or when the laser is moved.
d. **Jointing the Pipe:** Pipe shall assemble with bell and spigot joints having rubber gaskets which compress to form a watertight seal. Joints shall be assembled by bar and block, coupling pulleys, or by backhoe. If the backhoe bucket is used to assembly the joint, a block of wood shall be placed between the end of the pipe and the bucket and care shall be taken to prevent damage to the pipe. Laying and joining pipe shall conform to the Specifications for laying and joining concrete pipe in the "General Specifications for Prestressed Concrete Cylinder Pipe". The bell of the pipe already laid and the spigot of the pipe to be laid shall be

cleaned just prior to joining the pipes and the rubber gasket shall be stretched over the spigot and placed in the annular spigot groove. The rubber gasket shall be thoroughly lubricated with a coating of vegetable soap before the gasket is placed in the spigot groove. Extreme care shall be taken in pushing or pulling the spigot of the pipe into the bell of the pipe already laid to prevent damaging the gasket. Concrete pipe joints for water shall be protected by filling both interior and exterior joints with mortar or by a method approved by the manufacturer and the City.

e. **Service Lines:** House services or road crossings shall be installed, in accordance with the appropriate sections of these Specifications before the pipeline is pressure tested and chlorinated.

f. **Interferences:** All known underground lines are shown on the Plans. This does not necessarily mean that all such lines that may be encountered are shown. Where existing utility lines or other subsurface obstructions are shown on the Drawings, they have been located as accurately as practicable by the City. Such obstructions are shown for the purpose of advising the Contractor that they may interfere with the Work to be done hereunder but not for the purpose of indicating that the Work can be performed without such interference. Elevations of underground obstructions and lines are shown as accurately as known on the profile sheets.

g. **Backfilling:** Backfilling of the trench shall be accomplished in accordance with Section 312 and Standard Drawing W01.

h. **Flushing:** The flushing velocity shall be at least 2.5 feet per second for small mains.

i. **Disinfection:** Refer to the latest version of the ANSI/AWWA C651 standard for disinfecting water mains as required by Oklahoma Department of Environmental Quality 252:626-19-2 or latest version.

j. **Testing:** Testing shall be accomplished in accordance with Section 107. Testing shall be at the Contractor's expense by a testing laboratory approved by the City, except for bacterial analysis which will be at the City's expense. Tests shall be taken at locations specified by the City.

k. **Connection to the System:** Connection to the system will not be made until after testing, flushing, and sterilization of the line, unless otherwise approved by the Engineer.

403.04 SPECIAL REQUIREMENTS:

a. **Restrained Joints:** When a water line is placed in conduit or in a creek without concrete encasement, the pipe will be installed with restrained joints to prevent separation of the pipe in these structures.

b. **Bridging of Trench:** When ordered by the City, the Contractor shall, at their own expense, construct suitable platforms to bridge the trench at street intersections, at driveways to properties abutting the line of the Work and at such points as may be required to permit vehicle and/or pedestrian travel.

c. **Shop Tests:** The Contractor shall be responsible for obtaining tests of all materials as required by these Specifications. The Contractor shall furnish to the City, in the required number of copies, a certificate of shop tests on all pipe. These tests shall be witnessed by a reputable and established testing laboratory or firm, previously approved by the City.

d. **Dig through Locator Tape:** Dig through locator tape as specified in Section 627 will be buried 2 feet above the pipe.

403.05 METHOD OF MEASUREMENT: When this item is included as a pay item in the Contract it will be measured by the linear foot, through all fittings and specials.

403.06 BASIS OF PAYMENT: Prestressed concrete pipe, measured as provided above, will be paid for by the linear foot and such payment shall be full compensation for all equipment, materials, tools, labor, and incidentals necessary to complete the Work as specified. The price bid shall include all cost and expense of furnishing, hauling, laying and jointing the pipe, installing the protective materials, testing, flushing, sterilization and repairing of leaks. Excavation is paid under Section 311. Backfill and compaction are paid under either Section 312 or Section 313. This item will be paid as a separate bid item and payment will be made upon installation of the pipe. When this item is included in a Contract it will be listed as follows:

BA 403 PRESTRESSED CONCRETE PIPE INSTALLATION (WATER)	**LINEAR FOOT**

403.07 STANDARD DRAWINGS: W01, W06, and W07.

410 FITTINGS:

410.01 DESCRIPTION: The term fittings is understood to mean bends, tees, crosses, sleeves, plugs, restrained joints, and other specified fittings. This Work shall consist of furnishing, hauling, placing, and joining the fittings as shown on the Plans or directed by the Contract Administrator.

410.02 MATERIALS: Section 620 Water Line - PVC Pipe, Fittings, and Joints; Section 621 Water Line - Ductile Iron Pipe, Fittings, and Joints; Section 622 Water Line - Prestressed Concrete Cylinder Pipe, Fittings, and Joints; and Section 605 Polyethylene Wrap.

410.03 CONSTRUCTION METHODS: Fittings shall be installed in accordance with the manufacturer's recommended procedures. Construction methods for fittings shall be the same as for the type of pipe corresponding to the fittings.

410.04 SPECIAL REQUIREMENTS:

a. **Polywrapping of Fittings:** All cast or ductile iron fittings shall be polywrapped in accordance with Section 402.03b.
b. **Thrust Blocks:** All bends, tees, crosses, and plugs shall be blocked with concrete under Section 439, except when the fittings have flanged, welded, or restrained joints, the Contract Administrator may, under certain conditions, delete the blocking. Blocking shall be placed so that joints are accessible for repair.

410.05 METHOD OF MEASUREMENT: When this item is included as a pay item in the Contract it will be measured by each type of fitting.

410.06 BASIS OF PAYMENT: Fittings, measured as provided above, will be paid for by the individual fitting and such payment shall be full compensation for all equipment, materials, tools, labor, and incidentals necessary to complete the Work as specified. The price bid shall include all cost and expense of furnishing, hauling, laying, jointing, installing the protective materials, testing, flushing, sterilization and repairing of leaks. Excavation is paid under Section 311. Backfill and compaction are paid under either Section 312 or Section 313. This item will be paid as a separate bid item and

payment will be made upon installation of the fitting. When this item is included in a Contract it will be listed as follows:

BA 410A1* BEND (Enter bend deflection, pipe size, and type material)	**EACH**
*(Each different bend deflection, size, and type will have a separate listing. Numbers run from BA 410A1 to BA 410A99)	
BA 410B1* TEE (Enter pipe sizes, and type material)	**EACH**
*(Each tee size and type will have a separate listing. Numbers run from BA 410B1 to BA 410B99)	
BA 410C1* CROSS (Enter pipe size, and type material)	**EACH**
*(Each cross size and type will have a separate listing. Numbers run from BA 410C1 to BA 410C99)	
BA 410D1* SLEEVES (Enter pipe size, and type material)	**EACH**
*(Each sleeve size, and type will have a separate listing. Numbers run from BA 410D1 to BA 410D99)	
BA 410E1* PLUGS (Enter pipe size, and type material)	**EACH**
*(Each plug size, and type will have a separate listing. Numbers run from BA 410E1 to BA 410E99)	
BA 410F1* RESTRAINED JOINT (Enter pipe size, and type material)	**EACH**
*(Each restrained joint size and type will have a separate listing. Numbers run from BA 410F1 to BA 410F99)	
BA 410G1* SPECIAL FITTING (Enter description)	**EACH**
*(Each special fitting will have a separate listing. Numbers run from BA 410G1 to BA 410G99)	

410.07 STANDARD DRAWINGS: W06.

411 CONNECTIONS:

411.01 DESCRIPTION: This Work shall consist of furnishing, hauling, placing, and joining the fittings and valves as shown on the Plans for connection to the existing water distribution system or directed by the Contract Administrator.

411.02 MATERIALS: Section 620 Water Line - PVC Pipe, Fittings, and Joints; Section 621 Water Line - Ductile Iron Pipe, Fittings, and Joints; Section 622 Water Line - Prestressed Concrete Cylinder Pipe, Fittings, and Joints; Section 625 Water Line - Valves; and Section 605 Polyethylene Wrap.

411.03 CONSTRUCTION METHODS: Fittings shall be installed in accordance with the manufactures recommended procedures. Construction methods for connections shall be the same as for the type of fittings involved in the connection. The Contractor shall furnish and install connecting pipes, valve boxes, and fittings, including blind flanges or plugs, at the locations shown on the Plans.

411.04 SPECIAL REQUIREMENTS:

a. **City Installed Taps:** Due to State Regulations, the City will always make the taps on active lines in the water distribution system. These taps will be made at the Contractor's expense. The City will furnish and install tapping saddle and tapping valves. The Contractor shall escrow funds for the taps according to the City of Broken Arrow Manual of Fees.

b. **Coordination of Connections:** The Contractor shall have all material assembled and shall coordinate their Work with the City in order to interrupt service for as short a time as possible. The Contractor shall, under no circumstances, operate any of the City's valves.

411.05 METHOD OF MEASUREMENT: When this item is included as a pay item in the Contract it will be measured by each type of connection.

411.06 BASIS OF PAYMENT: Connections, measured as provided above, will be paid for by the individual connection and such payment shall be full compensation for all equipment, materials, tools, labor, and incidentals necessary to complete the Work as specified. The price bid shall include all cost and expense of furnishing, hauling, installing the tapping saddle, installing the tapping valve, and tapping the line. Jointing the fittings, installing the protective materials, testing, flushing, sterilization, and repairing of leaks shall be paid under Section 410. Excavation is paid under Section 311. Backfill and compaction are paid under either Section 312 or Section 313. This item will be paid as a separate bid item and payment will be made upon installation of the connection. When this item is included in a Contract it will be listed as follows:

BA 411A1* CONNECTION (Enter pipe size and type material) **EACH**
*(Each type connection will have a separate listing. Numbers run from BA 411A1 to BA 411A9999.)

411.07 STANDARD DRAWINGS: W06.

412 WATER SERVICE LINES:

412.01 DESCRIPTION: This Work shall consist of furnishing and installation of water services, copper meter setters, corporation cocks, angle cocks and all fittings necessary to complete the water service at the locations shown on the Plans, and in accordance with Standard Drawing W08 or W08A or as directed by the Contract Administrator.

412.02 MATERIALS: Section 623 Water Line - Service Line and Fittings.

412.03 CONSTRUCTION METHODS: Construction shall be in accordance with Standard Drawings W08, W08A, W11, W11A, W12, and W12A and Sections 311, 312, 313, 314, and 315. Individual service lines shall not be less than 3/4 inch in diameter. Water meters will be installed under Section 431 and meter boxes will be installed under Section 432. Service line trenches shall be backfilled with fill sand to the level indicated and thoroughly compacted to 95 percent Standard Density within 2 percent of optimum moisture.

412.04 SPECIAL REQUIREMENTS: All service lines shall be installed prior to testing. However, service lines will not be connected to meters until the line has passed the test requirements.

412.05 METHOD OF MEASUREMENT: When this item is included as a pay item in the Contract it will be measured by each type of service line.

412.06 BASIS OF PAYMENT: Water service lines, measured as provided above, will be paid for by the individual service line and such payment shall be full compensation for all equipment, materials, tools, labor, and incidentals necessary to complete the Work as specified. The price bid shall include all cost and expense of furnishing and installing service lines, corporation cocks, curb stops, angle cocks, copper meter setters, any other fittings required to complete the installation, installing the protective materials, testing, flushing, sterilization and repairing of leaks. Excavation is paid under

Section 311. Backfill and compaction are paid under either Section 312 or Section 313. This item will be paid as a separate bid item and payment will be made upon installation of the service line. When this item is included in a Contract it will be listed as follows:

BA 412A SERVICE LINE 3/4 INCH	**EACH**
BA 412B SERVICE LINE 1 INCH	**EACH**
BA 412C SERVICE LINE 1 1/2 INCH	**EACH**
BA 412D SERVICE LINE 2 INCH	**EACH**

412.07 STANDARD DRAWINGS: W08, W08A.

413 SERVICE LINE TAPS:

413.01 DESCRIPTION: This Work shall consist of furnishing and installing service line taps and all other items necessary to complete the tap at the locations shown on the Plans or as directed by the Contract Administrator.

413.02 MATERIALS: Section 624 Water Line - Taps and Section 605 Polyethylene Wrap.

413.03 CONSTRUCTION METHODS: Taps shall be installed in accordance with the manufacture's recommended procedures. Construction methods for taps shall be the same as for the type of pipe being tapped.

413.04 SPECIAL REQUIREMENTS:

a. **Tapping Saddles:** Tapping saddles shall be used for all taps unless otherwise specified.
b. **Contractor Taps:** The Contractor shall tap only new lines not yet in service. Tapping lines in service shall be accomplished only by City personnel. However, licensed plumbing contractors may install 3/4-inch and 1-inch service taps on water mains 12 inches and smaller as specified by the City of Broken Arrow Utilities Department and subject to inspection by the Building Inspector.
c. **Tap Protection:** All taps shall be polywrapped in accordance with Section 402.03b.
d. **Pressure Testing:** All taps and service lines shall be in place prior to final pressure testing of the new line. The new line may be tested without taps if the Contractor desires to do so.

413.05 METHOD OF MEASUREMENT: When this item is included as a pay item in the Contract it will be measured by each service line tap, by type.

413.06 BASIS OF PAYMENT: Service line taps, measured as provided above, will be paid for by the individual tap and such payment shall be full compensation for all equipment, materials, tools, labor, and incidentals necessary to complete the Work as specified. The price bid shall include all cost and expense of furnishing, hauling, installing, installing the protective materials, testing, flushing, sterilization and repairing of leaks. Excavation is paid under Section 311. Backfill and compaction are paid under either Section 312 or Section 313. This item will be paid as a separate bid item and payment will be made upon installation of the tap. When this item is included in a Contract it will be listed as follows:

BA 413A1* SERVICE LINE TAPS (Enter description of tap) *(Each different tap will have a separate listing. Numbers run from BA 413A1 to BA 413A99)	**EACH**

413.07 STANDARD DRAWINGS: W08, W08a, W10, W11, W11A, W12, W12A, W13, W14, W15, W16.

420 VALVES:

420.01 DESCRIPTION: This Work shall consist of furnishing and installing valves and all other items necessary to complete the valve installation at the locations shown on the Plans or as directed by the Contract Administrator.

420.02 MATERIALS: Section 625 Water Line – Valves and Section 605 Polyethylene Wrap.

420.03 CONSTRUCTION METHODS:

a. **Installation Requirements:** The AWWA Standard for the Installation of Cast Iron Water Main, AWWA C600 shall govern the installation, as applicable. If the paint is damaged the valve shall be cleaned by wire-brushing and given two coats of product equivalent to the existing coating.
b. **Stem Orientation:** Gate valves shall be set with the stems plumb. Ball valves shall be set with the handwheels horizontal. Air relief valves shall be set so that the square operating nut on the 2-inch valve can be operated from the top. Check valves shall be horizontal. All others shall be coordinated with the Contract Administrator.
c. **Excavation and Backfill:** Shall be as set forth for the type of pipe being used on the project.

420.04 SPECIAL REQUIREMENTS:

a. **Valve Protection:** All buried valves shall be polywrapped in accordance with Section 402.03b.
b. **Valve Boxes:** All valves shall have valve boxes installed in accordance with Section 430.

420.05 METHOD OF MEASUREMENT: When this item is included as a pay item in the Contract it will be measured by each valve, by type.

420.06 BASIS OF PAYMENT: Valves, measured as provided above, will be paid for by the individual valve and such payment shall be full compensation for all equipment, materials, tools, labor, and incidentals necessary to complete the Work as specified. The price bid shall include all cost and expense of furnishing, hauling, installing, installing the protective materials, testing, flushing, sterilization and repairing of leaks. Excavation is paid under Section 311. Backfill and compaction are paid under either Section 312 or Section 313. Valve box is paid under Section 430. This item will be paid as a separate bid item and payment will be made upon installation of the valve. When this item is included in a Contract it will be listed as follows:

BA 420A1* VALVE (Enter description of the valve) **EACH**
*(Each different valve will have a separate listing. Numbers run from BA 420A1 to BA 420A99)

420.07 STANDARD DRAWINGS: N/A

421 OUTLET ASSEMBLIES:

421.01 DESCRIPTION: The term outlet assembly is understood to mean a stub line for future service from a 12-inch or larger distribution main. The outlet assembly shall consist of a flanged stub constructed into a prestressed concrete line or a MJ X MJ X flanged tee in a ductile iron or PVC

line, a flanged by MJ valve, and an MJ plug bolted to the valve. A valve box will be supplied under Section 430. This Work shall consist of furnishing and installing outlet assemblies and all other items necessary to complete the outlet assembly installation at the locations shown on the Plans or as directed by the Contract Administrator.

421.02 MATERIALS: Section 605 Polyethylene Wrap; Section 620 Water Line – PVC Pipe, Fittings, and Joints; Section 621 Water Line – Ductile Iron Pipe, Fittings, and Joints; Section 622 Water Line – Prestressed Concrete Cylinder Pipe, Fittings, and Joints; Section 623 Water Line – Service Line and Fittings; and Section 625 Water Line – Valves.

421.03 CONSTRUCTION METHODS: Construction methods for outlet assemblies shall be the same as specified for the type of pipe, fittings, and valves included in the assembly.

421.04 SPECIAL REQUIREMENTS:

a. **Outlet Assembly Protection:** All outlet assemblies shall be polywrapped in accordance with Section 402.03b.
b. **Valve Position:** Outlet assemblies shall be tested with the valves in the open position. Upon completion of the testing, all outlet assembly valves shall be closed.

421.05 METHOD OF MEASUREMENT: When this item is included as a pay item in the Contract it will be measured by each outlet assembly, by type.

421.06 BASIS OF PAYMENT: Outlet assemblies, measured as provided above, will be paid for by the individual assembly and such payment shall be full compensation for all equipment, materials, tools, labor, and incidentals necessary to complete the Work as specified. The price bid shall include all cost and expense of furnishing, hauling, installing, installing the protective materials, testing, flushing, sterilization and repairing of leaks. Excavation is paid under Section 311. Backfill and compaction are paid under either Section 312 or Section 313. This item will be paid as a separate bid item and payment will be made upon installation of the outlet assembly. When this item is included in a Contract it will be listed as follows:

BA 421A1* OUTLET ASSEMBLY (Enter description) **EACH**
*(Each different outlet assembly will have a separate listing. Numbers run from BA 421A1 to BA 421A99)

421.07 STANDARD DRAWINGS: N/A.

422 AIR AND/OR VACUUM VALVE ASSEMBLIES:

422.01 DESCRIPTION: It is understood that an air and/or vacuum valve assembly shall consist of the vault with lid, tap or outlet assembly, piping and bends, gate valve, air and/or vacuum valve, and all associated items required to complete the installation. This Work shall consist of furnishing and installing air and/or vacuum valve assemblies, as shown on Standard Drawing W02, and all other items necessary to complete the air and/or vacuum valve assembly installation at the locations shown on the Plans or as directed by the Contract Administrator.

422.02 MATERIALS: Section 601 – Concrete; Section 602 – Pipe Bedding; Section 603 – Select Backfill; Section 605 Polyethylene Wrap; Section 620 Water Line – PVC Pipe, Fittings, and Joints; Section 621 Water Line – Ductile Iron Pipe, Fittings, and Joints; Section 622 Water Line –

Prestressed Concrete Cylinder Pipe, Fittings, and Joints; Section 623 Water Line – Service Line and Fittings; Section 624 Water Line – Taps; and Section 625 – Water Line Valves.

422.03 CONSTRUCTION METHODS:

a. **Excavation:** Shall be accomplished in accordance with Section 311 Excavation.
b. **Backfill:** Shall be accomplished in accordance with Section 312 Common Backfill and Compaction and/or Section 313 Select Backfill and Compaction.
c. **Concrete Work:** Shall be accomplished in accordance with Section 330 Concrete Placement.
d. **Tap or Outlet:** Taps shall be accomplished in accordance with Section 413 Service Line Taps for 12-inch and smaller lines. For lines larger than 12 inches outlets shall be accomplished in accordance with Section 421 Outlet Assemblies.
e. **Assembly:** Shall be accomplished in accordance with the section that applies to the pipe being used and according to the manufacturer's recommendations.
f. **Vault Construction:** Shall be accomplished in accordance with Section 433 Meter or Valve Vaults.

422.04 SPECIAL REQUIREMENTS:

a. **Vertical Position:** The top of the vault shall be placed at ground level.
b. **Testing:** All air and/or vacuum valves shall be in place prior to testing. Valve operation shall be checked during filling and draining of the line.

422.05 METHOD OF MEASUREMENT: When this item is included as a pay item in the Contract it will be measured by each air and/or vacuum valve assembly, by type.

422.06 BASIS OF PAYMENT: Air and/or vacuum valve assemblies, measured as provided above, will be paid for by the individual assembly and such payment shall be full compensation for all equipment, materials, tools, labor, and incidentals necessary to complete the Work as specified. The price bid shall include all cost and expense of furnishing, hauling, installing, installing the protective materials, testing, flushing, sterilization and repairing of leaks. Excavation is paid under Section 311. Backfill and compaction are paid under either Section 312 or Section 313. This item will be paid as a separate bid item and payment will be made upon installation of the air and/or vacuum valve assembly. When this item is included in a Contract it will be listed as follows:

BA 422A1* AIR AND/OR VACUUM VALVE ASSEMBLY EACH
(Enter description)
*(Each different air and/or vacuum valve assembly will have a separate listing. Numbers run from BA 422A1 to BA 422A99)

422.07 STANDARD DRAWINGS: W02.

423 FIRE HYDRANT ASSEMBLY:

423.01 DESCRIPTION: It is understood that a fire hydrant assembly shall consist of the flanged tee, piping and bends, gate valve, valve box, fire hydrant, thrust block, and all associated items required to complete the installation. This Work shall consist of furnishing and installing fire hydrant assemblies, as shown on Standard Drawing W09, and all other items necessary to complete the fire hydrant assembly installation at the locations shown on the Plans or as directed by the Contract Administrator.

423.02 MATERIALS: Section 620 Water Line – PVC Pipe, Fittings, and Joints; Section 621 Water Line – Ductile Iron Pipe, Fittings, and Joints; Section 622 Water Line – Prestressed Concrete Cylinder Pipe, Fittings, and Joints; Section 625 – Water Line Valves; and Section 626 Fire Hydrants and Extensions.

423.03 CONSTRUCTION METHODS:

a. **Excavation:** Shall be accomplished in accordance with Section 311 Excavation.
b. **Backfill:** Shall be accomplished in accordance with Section 312 Common Backfill and Compaction and/or Section 313 Select Backfill and Compaction.
c. **Concrete Work:** Shall be accomplished in accordance with Section 330 Concrete Placement.
d. **Outlet Installation:** Shall be accomplished in accordance with Section 421 Outlet Assemblies.
e. **Assembly:** Shall be accomplished in accordance with the section that applies to the pipe being used and according to the manufacturer's recommendations.
f. **Valve Box Installation:** Shall be accomplished in accordance with Section 430 Valve Boxes.

423.04 SPECIAL REQUIREMENTS:

a. **Valve Protection:** All valves shall be polywrapped in accordance with Section 402.03b.
b. **Testing:** All fire hydrants shall be in place prior to testing. Valves shall be open during testing. Prior to acceptance all fire hydrants shall be flow tested.

423.05 METHOD OF MEASUREMENT: When this item is included as a pay item in the Contract it will be measured by the fire hydrant assembly.

423.06 BASIS OF PAYMENT: Fire Hydrant assemblies, measured as provided above, will be paid for by the individual assembly and such payment shall be full compensation for all equipment, materials, tools, labor, and incidentals necessary to complete the Work as specified. The price bid shall include all cost and expense of furnishing, hauling, installing, installing the protective materials, testing, flushing, sterilization and repairing of leaks. Excavation is paid under Section 311. Backfill and compaction are paid under either Section 312 or Section 313. This item will be paid as a separate bid item and payment will be made upon installation of the fire hydrant. When this item is included in a Contract it will be listed as follows:

BA 423A FIRE HYDRANT ASSEMBLY EACH

423.07 STANDARD DRAWINGS: W09.

430 VALVE BOXES:

430.01 DESCRIPTION: This Work shall consist of furnishing and installing valves boxes, as shown on Standard Drawing W04 and all other items necessary to complete the valve box installation at the locations shown on the Plans or as directed by the Contract Administrator.

430.02 MATERIALS: Section 606 Valve Boxes, Vaults, Pits, and Manholes

430.03 CONSTRUCTION METHODS:

a. **Excavation:** Shall be accomplished in accordance with Section 311 Excavation.

b. **Backfill:** Shall be accomplished in accordance with Section 312 Common Backfill and Compaction and/or Section 313 Select Backfill and Compaction.

c. **Assembly:** Shall be accomplished in accordance with the manufacturer's recommendations. Based on the depth of the line one of the following configurations shall be used for valve boxes:

1. Type 1 Valve Box: This type of valve box consisting of a top and bottom shall be used when the depth from top of valve to ground level is 26 inches or less. This will allow for 6 inches adjustment up or down.
2. Type 2 Valve Box: This type of valve box consisting of a top, bottom, and one 17-inch extension shall be used when the depth from top of valve to ground level is 43 inches or less. This will allow for 6 inches adjustment up or down.
3. Type 2 Valve Box with PVC Extension: This type of valve box consisting of a top, bottom, one 17-inch extension, and a 6-inch PVC pipe (C-900 DR18) extension of required length shall be used when the depth from top of valve to ground level is over 43 inches. The PVC extension will be cut to allow for 6 inches adjustment up or down.

d. **Alignment:** Valve boxes shall be set in such a manner to ensure that the box is vertical and the operating nut is fully accessible with a valve wrench.

e. **Elevation:** The top of the valve box shall be level with the finished elevation.

f. **Concrete Collar:** The Contractor shall place a 2-foot by 2-foot by 4-inch thick concrete collars around all valve boxes not in the street surface. The Contractor shall place a 2-foot by 2-foot by 6-inch-thick concrete collar around all valve boxes in residential asphalt streets. In other asphalt streets the thickness of the collar shall be equivalent to the street thickness. Collars shall be cast-in-place.

430.04 SPECIAL REQUIREMENTS: The Public Infrastructure Representative shall verify alignment on each valve box.

430.05 METHOD OF MEASUREMENT: When this item is included as a pay item in the Contract it will be measured by each type valve box and the linear feet of 6 inch PVC extension.

430.06 BASIS OF PAYMENT: Valve boxes, measured as provided above, will be paid for by the individual valve box with and such payment shall be full compensation for all equipment, materials, tools, labor, and incidentals necessary to complete the Work as specified. The price bid shall include all cost and expense of furnishing, hauling, installing, installing the protective materials, testing and repairing of problems. Excavation is paid under Section 311. Backfill and compaction are paid under either Section 312 or Section 313. This item will be paid as a separate bid item and payment will be made upon installation of the valve box. When this item is included in a Contract it will be listed as follows:

BA 430A TYPE 1 VALVE BOX	**EACH**
BA 430B TYPE 2 VALVE BOX	**EACH**
BA 430C VALVE BOX EXTENSION 6 INCH PVC	**LINEAR FOOT**

430.07 STANDARD DRAWINGS: W04.

431 WATER METERS:

431.01 DESCRIPTION: This Work shall consist of furnishing and installing water meters and all other items necessary to complete the water meter installation, as shown on Standard Drawings W11 to W16, at the locations shown on the Plans or as directed by the Contract Administrator.

431.02 MATERIALS: Section 628 Water Meters.

431.03 CONSTRUCTION METHODS: Installation shall be in accordance with the manufacturer's recommended procedures and the appropriate Standard Drawing.

431.04 SPECIAL REQUIREMENTS:

a. **Installation:** Only City personnel may install required meters on new lines and lines that are in service.
b. **Testing:** All water meters shall be in place prior to testing. Valves shall be open during testing. Prior to acceptance all water meters shall be flow tested.

431.05 METHOD OF MEASUREMENT: When this item is included as a pay item in the Contract it will be measured by each water meter, by type.

431.06 BASIS OF PAYMENT: Water meters, measured as provided above, will be paid for by the individual water meter with and such payment shall be full compensation for all equipment, materials, tools, labor, and incidentals necessary to complete the Work as specified. The price bid shall include all cost and expense of furnishing, hauling, installing, installing the protective materials, testing, flushing, sterilization and repairing of leaks. This item will be paid as a separate bid item and payment will be made upon installation of the water meter. When this item is included in a Contract it will be listed as follows:

BA 431A1* WATER METER (Enter meter type) **EACH**
*(Each different meter will have a separate listing. Numbers run from BA 431A1 to BA 431A99)

431.07 STANDARD DRAWINGS: W11, W12, W13, W14, W15, and W16.

432 WATER METER BOXES:

432.01 DESCRIPTION: This Work shall consist of furnishing and installing meter boxes, as shown on Standard Drawing W11, and all other items necessary to complete the meter box installation at the locations shown on the Plans or as directed by the Contract Administrator.

432.02 MATERIALS: Section 629 Water Meter Boxes.

432.03 CONSTRUCTION METHODS:

a. **Excavation:** Shall be accomplished in accordance with Section 311 Excavation.
b. **Backfill:** Shall be accomplished in accordance with Section 312 Common Backfill and Compaction and/or Section 313 Select Backfill and Compaction.
c. **Installation:** Shall be in accordance with the manufacturer's recommended procedures and Standard Drawing W11.

432.04 SPECIAL REQUIREMENTS: Meter boxes shall be set with the top of the box level with the finished grade.

432.05 METHOD OF MEASUREMENT: When this item is included as a pay item in the Contract it will be measured by each meter box.

432.06 BASIS OF PAYMENT: Water meter boxes, measured as provided above, will be paid for by the individual water meter box with and such payment shall be full compensation for all equipment, materials, tools, labor, and incidentals necessary to complete the Work as specified. The price bid shall include all cost and expense of furnishing, hauling, installing, installing the protective materials, testing, flushing, sterilization and repairing of leaks. Excavation is paid under Section 311. Backfill and compaction are paid under either Section 312 or Section 313. This item will be paid as a separate bid item and payment will be made upon installation of the water meter box. When this item is included in a Contract it will be listed as follows:

BA 432 WATER METER BOX EACH

432.07 STANDARD DRAWINGS: W11.

433 METER OR VALVE VAULT:

433.01 DESCRIPTION: This Work shall consist of furnishing, hauling, placing and installing all materials and other items necessary for construction of meter or valve vaults, as shown on Standard Drawing W17, at the locations shown on the Plans or as directed by the Contract Administrator.

433.02 MATERIALS: Section 630 Metal Castings.

433.03 CONSTRUCTION METHODS:

a. **Excavation:** Shall be accomplished in accordance with Section 311 Excavation.
b. **Backfill:** Shall be accomplished in accordance with Section 312 Common Backfill and Compaction and/or Section 313 Select Backfill and Compaction.
c. **Concrete Work:** Shall be accomplished in accordance with Section 330 Concrete Placement.
d. **Precast Manhole Sections:** If used these items shall be set in accordance with Section 512.
e. **Culvert Pipe (Concrete, polypropylene, HDPE, CPP):** With prior approval these items, in appropriate diameters, may be used as meter vaults. When these materials are used, they will have a concrete bottom and top corresponding to Standard Drawing W17.
f. **Manhole Ring and Lid Installation:** Shall be in accordance with the manufacturer's recommended procedures.

433.04 SPECIAL REQUIREMENTS: Vault top shall be at the same elevation as the finish grade.

433.05 METHOD OF MEASUREMENT: When this item is included as a pay item in the Contract it will be measured by each type of meter or valve vault.

433.06 BASIS OF PAYMENT: Meter or valve vaults, measured as provided above, will be paid for by individual vault and such payment shall be full compensation for all equipment, materials, tools, labor, and incidentals necessary to complete the Work as specified. Price bid shall include all cost and expense of furnishing, hauling, installing, installing protective materials, testing, and repairing. Excavation is paid under Section 311. Backfill and compaction are paid under either Section 312 or Section 313. This item will be paid as a separate bid item and payment will be made upon installation of the meter or valve vault. When this item is included in a Contract it will be listed as follows:

BA 433A1* METER OR VALVE VAULT (Enter type) EACH
*(Each different vault will have a separate listing. Numbers run from BA 433A1 to BA 433A99)

433.07 STANDARD DRAWINGS: W17.

434 SAMPLE POINTS:

434.01 DESCRIPTION: It is understood that a sample point shall consist of a tap, copper tubing, approved PEX tubing, gate valves, fittings, and other items necessary to complete the sample point installation. This Work shall consist of furnishing, installing, and removing sample points at the locations shown on the Plans or as directed by the Contract Administrator.

434.02 MATERIALS: Section 623 Water Line – Service Line and Fittings; Section 624 Water Line – Taps; and Section 625 – Water Line Valves.

434.03 CONSTRUCTION METHODS:

a. **Excavation:** Shall be accomplished in accordance with Section 311 Excavation.
b. **Backfill:** Shall be accomplished in accordance with Section 312 Common Backfill and Compaction and/or Section 313 Select Backfill and Compaction.
c. **Installation:** Shall be in accordance with the manufacturer's recommended procedures. Sample points shall be a minimum of 3/4-inch size and shall be constructed of type K copper or approved PEX tube. They shall extend at minimum 2 feet above the ground and be equipped with two gate valves separated by a 3-inch-long nipple. The Contractor shall use crossings, where available, as sample points.
d. **Removal:** Shall be accomplished upon completion of testing. The Contractor shall remove the sample point back to the main line or to the end of the crossing if used. When the sample point is removed back to the main line, the tapping saddle and corp stop shall be fully enclosed in polywrap in accordance with Section 402.03b.

434.04 SPECIAL REQUIREMENTS: A minimum of two sample points shall be placed on any new line up to 1,200 feet in length. One additional sample point will be required for each additional 2,000 feet of water line or any part thereof.

434.05 METHOD OF MEASUREMENT: When this item is included as a pay item in the Contract it will be measured as a lump sum for all required sample points.

434.06 BASIS OF PAYMENT: Sample points, measured as provided above, will be paid for by the lump sum and such payment shall be full compensation for all equipment, materials, tools, labor, and incidentals necessary to complete the Work as specified. The price bid shall include all cost and expense of furnishing, hauling, installing, installing the protective materials, testing, and repairing. Excavation is paid under Section 311. Backfill and compaction are paid under either Section 312 or Section 313. This item will be paid as a separate bid item and payment will be made upon removal of the sample points. When this item is included in a Contract it will be listed as follows:

BA 434 SAMPLE POINTS LUMP SUM

434.07 STANDARD DRAWINGS: N/A.

435 BLOW OFF ASSEMBLY:

435.01 DESCRIPTION: It is understood that a blow off assembly shall consist of the outlet assembly, piping and bends, gate valve, valve box, thrust block, splash block, and all associated items required to complete the installation. This Work shall consist of furnishing and installing blow off assemblies, as shown on Standard Drawing W18, and all other items necessary to complete the

blow off assembly installation at the locations shown on the Plans or as directed by the Contract Administrator.

435.02 MATERIALS: Section 620 Water Line - PVC Pipe, Fittings, and Joints; Section 621 Water Line - Ductile Iron Pipe, Fittings, and Joints; Section 622 Water Line - Prestressed Concrete Cylinder Pipe, Fittings, and Joints; and Section 625 - Water Line Valves.

435.03 CONSTRUCTION METHODS:

a. **Excavation:** Shall be accomplished in accordance with Section 311 Excavation.
b. **Backfill:** Shall be accomplished in accordance with Section 312 Common Backfill and Compaction and/or Section 313 Select Backfill and Compaction.
c. **Concrete Work:** Shall be accomplished in accordance with Section 330 Concrete Placement.
d. **Outlet Installation:** Shall be accomplished in accordance with Section 421 Outlet Assemblies.
e. **Assembly:** Shall be accomplished in accordance with the section that applies to the pipe being used and according to the manufacturer's recommendations.
f. **Valve Box Installation:** Shall be accomplished in accordance with Section 430 Valve Boxes.

435.04 SPECIAL REQUIREMENTS:

a. **Valve Protection:** All valves shall be polywrapped in accordance with Section 402.03b.
b. **Testing:** All blow offs shall be in place prior to testing. Prior to acceptance all blow offs shall be flow tested.

435.05 METHOD OF MEASUREMENT: When this item is included as a pay item in the Contract it will be measured by the blow off assembly.

435.06 BASIS OF PAYMENT: Blow off assemblies, measured as provided above, will be paid for by the individual assembly and such payment shall be full compensation for all equipment, materials, tools, labor, and incidentals necessary to complete the Work as specified. The price bid shall include all cost and expense of furnishing, hauling, installing, installing the protective materials, testing, flushing, sterilization and repairing of leaks. Excavation is paid under Section 311. Backfill and compaction are paid under either Section 312 or Section 313. This item will be paid as a separate bid item and payment will be made upon installation of the blow off. When this item is included in a Contract it will be listed as follows:

BA 435 BLOW OFF ASSEMBLY EACH

435.07 STANDARD DRAWINGS: W18.

436 CONCRETE ENCASEMENT:

436.01 DESCRIPTION: See Section 330.

436.02 MATERIALS: See Section 330.

436.03 CONSTRUCTION METHODS: See Section 330.

436.04 SPECIAL REQUIREMENTS: See Section 330.

436.05 METHOD OF MEASUREMENT: See Section 330.

436.06 BASIS OF PAYMENT: See Section 330.

BA 436 CONCRETE ENCASEMENT CY

436.07 STANDARD DRAWINGS: W07.

437 CONCRETE SLAB PROTECTION FOR PIPELINES:

437.01 DESCRIPTION: See Section 330.

437.02 MATERIALS: See Section 330.

437.03 CONSTRUCTION METHODS: See Section 330.

437.04 SPECIAL REQUIREMENTS: See Section 330.

437.05 METHOD OF MEASUREMENT: See Section 330.

437.06 BASIS OF PAYMENT: See Section 330.

BA 437 CONCRETE SLAB PROTECTION FOR PIPELINES CY

437.07 STANDARD DRAWINGS: N/A.

438 CONCRETE CRADLE:

438.01 DESCRIPTION: See Section 330.

438.02 MATERIALS: See Section 330.

438.03 CONSTRUCTION METHODS: See Section 330.

438.04 SPECIAL REQUIREMENTS: See Section 330.

438.05 METHOD OF MEASUREMENT: See Section 330.

438.06 BASIS OF PAYMENT: See Section 330.

BA 438 CONCRETE CRADLE CY

438.07 STANDARD DRAWINGS: W07.

439 CONCRETE THRUST BLOCKS:

439.01 DESCRIPTION: See Section 330.

439.02 MATERIALS: See Section 330.

439.03 CONSTRUCTION METHODS: See Section 330.

439.04 SPECIAL REQUIREMENTS: See Section 330.

439.05 METHOD OF MEASUREMENT: See Section 330.

439.06 BASIS OF PAYMENT: See Section 330.

BA 439 CONCRETE THRUST BLOCKS CY

439.07 STANDARD DRAWINGS: W06.

440 REINFORCED CONCRETE PIERS:

440.01 DESCRIPTION: See Section 330.

440.02 MATERIALS: See Section 330.

440.03 CONSTRUCTION METHODS: See Section 330.

440.04 SPECIAL REQUIREMENTS: See Section 330.

440.05 METHOD OF MEASUREMENT: See Section 330.

440.06 BASIS OF PAYMENT: See Section 330.

BA 440 REINFORCED CONCRETE PIERS CY

440.07 STANDARD DRAWINGS: N/A.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION