



**SPECIAL PROVISIONS  
FOR  
WATER MAIN RELOCATON**

**Pottawattamie County  
STP-U-1642(690)--70-78**

**Effective Date  
March 18, 2025**

**THE STANDARD SPECIFICATIONS, SERIES 2023, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.**

1. GENERAL

- 1.1 The City of Council Bluffs Water Works, which is by reference made a part of this document and is hereinafter referred to as the "Water Works."
- 1.2 Furnish and install all pipe, fittings, structures, and accessories required for water main construction as shown on plans and/or specified herein.
  - 1.2.1 Shipment and Storage: Do not telescope small pipe inside larger pipe for shipment or storage. Handle by use of appropriate slings, hoists, skids or other approved means. Dropping or rolling is not permitted. Pipe with damage to cement mortar lining will be rejected; field patching not permitted.
- 1.3 Before installation of new facilities, verify sizes, measurements, type and location of existing public or private piping and appurtenances at points of connection to the new facilities. This work shall be considered incidental to the project.
- 1.4 Make necessary field measurements to determine piping laying lengths; work pipe into place without forcing or springing.
- 1.5 Do work in accordance with best present-day installation and construction practices and manufacturer's recommendations.
- 1.6 All water main work shall conform with the contract documents. If the Contractor wants to request changes to the water main plans or wants authorization for additional work, the Contractor shall notify the Engineer.
- 1.7 The Contractor shall do the necessary pavement removal, excavation, and trench shoring/bracing, to enable the Water Works to install the proposed valve(s), tapping valve(s), and sleeve(s) on the existing water mains.

- 1.7.1 The Contractor shall excavate all material to a depth of approximately 1 foot to 1 foot 6 inches below the bottom of the existing main; comply with safety rules of the State and Federal governments. This Special Provision shall not relieve the Contractor from complying with appropriate safety regulations.
- 1.7.2 When unstable material is encountered in the bottom of the excavation, the Engineer may authorize the Contractor to place 1 1/2 inch clean granular material. This material will be paid for separately at the contract unit price for Granular Bedding for Water Main, 1 1/2 inch Clean. The granular material shall not be used without authorization from the Engineer.
- 1.7.3 The pavement removal and replacement work shall be paid for at the contract unit prices. Thrust blocking shall be constructed by the Contractor. The excavation, backfilling, trench shoring/bracing, and thrust blocking shall be considered incidental to the project unless a contract item is provided.
- 1.7.4 The Water Works will provide and install the proposed tapping valves and sleeves noted on the plans as work by the Water Works.

- 1.8 The Contractor shall notify the Water Works at least 2 full working days, excluding Saturdays, Sundays, and Holidays before the Contractor needs the Water Works to tap existing mains, tap new mains for house services or purification. After receiving passing sampling and pressure test results, the Contractor shall coordinate tapping with Water Works. Refer to Article 1.16 for information regarding cut and connect operations.

If for one or more of the following reasons the Water Works cannot tap the main on the date as established above, the Contractor shall reschedule a new date when the Water Works personnel are available. A minimum of 2 full working days, excluding Saturdays, Sundays, and Holidays prior notice by the Contractor will be required by the Water Works for rescheduling taps. Refer to 1.16 for information regarding shut-off notice re-distribution costs.

- 1.8.1 If the Contractor does not have the tapping site ready or it is unsafe for the Water Works personnel.
- 1.8.2 Weather conditions will not permit work to be performed by the Contractor or Water Works.
- 1.8.3 The Water Works reserves the right to reschedule the work for emergencies as necessary, without notice or compensation to the Contractor.

- 1.9 The material required as noted on the plans as “temporary” shall be provided by the Contractor. The material shall include the required bolts and retainers. These items shall be installed by the Contractor at locations noted on the plans and as directed by the Engineer. The Contractor shall remove these materials as directed by the Engineer. This work including “temporary” material shall be considered incidental to the project.

- 1.10 After award of Contract, and before construction begins submit following information and drawings for Engineer's review. Resubmit for review as necessary.

- 1.10.1 Manufacturer's specifications and/or catalog data listing for the following:
  - 1.10.1.1 Ductile Iron Pipe
  - 1.10.1.2 Mechanical Joint Fittings Ductile Iron
  - 1.10.1.3 C-900 PVC Casing with Casing Chocks and End Seals
  - 1.10.1.4 Polyethylene Encasement
  - 1.10.1.5 Gate Valves with Stainless Steel Bolts

- 1.10.1.6 Valve Boxes – Heavy Duty
- 1.10.1.7 Pipe and Fitting Joint Gaskets
- 1.10.1.8 Oversized Solid Sleeves – Long Body
- 1.10.1.9 Fire Hydrants with Minimum Bury Depth Shown
- 1.10.1.10 Swivel Joint Offsets (6 inches by 24 inches)
- 1.10.1.11 Retainer Glands and Wedge Action Restrainers with Shear Set Screws for DI Pipe
- 1.10.1.12 Type K Copper for Water Services
- 1.10.1.13 Concrete Mix for Thrust Blocks (4000 psi)
- 1.10.1.14 Class “A” Crushed Stone

1.10.2 Such other information as Engineer may request.

- 1.11 Incorporate no materials in work until mill and/or factory test certifications, as requested by Engineer, have been furnished which show that materials comply with specifications.
- 1.12 Any delays in obtaining materials not shown on the plans that are necessary for the construction of the new water main improvements, any delays during revision of the water alignment or any delays caused by obstructions encountered during construction, shall not result in any additional costs to the Contracting Authority or any time extensions.
- 1.13 Contractor shall not backfill fittings and other appurtenances until the Engineer has seen the completed work and recorded the location. The Engineer may require the Contractor to expose the work at the Contractor’s expense, if backfilling proceeds prior to the work being recorded.
- 1.14 Contractor shall not deviate from the contract documents without prior approval from Engineer.
- 1.15 Water mains shall not be constructed without staking provided by the Engineer. Contractor shall not remove or disturb staking until authorized by the Engineer. Work done without staking or prior to replacement of staking removed by the Contractor may be subject to rejection and/or replacement at the Contractor’s expense. The cost of restaking may be deducted from the cost of work completed under the contract. Staking shall not begin before a Contract is approved and fully executed.
- 1.16 When the planned water main improvements require the shutdown of an existing in service main, the Contractor shall notify the Water Works at least 1 full working day (excluding Saturdays, Sundays and Holidays) in advance of wanting water shut-off notices delivered to affected residents and/or businesses. The distribution of shut-off notices will only be performed by Water Works personnel. A minimum advance notice of water service shut-off of 24 hours is required for residential users and 48 hours is required for commercial and industrial users. The hours of advance notice do not include Saturdays, Sundays or Holidays.

One distribution of shut-off notices will be provided by the Water Works for each planned service interruption. The Contractor shall complete all required work within the requested shut-off period and shall not request the distribution of shut-off notices until the Contractor’s work has progressed far enough to ensure the required work will be ready to be performed in the requested shut-off time frame.

Distribution of additional shut-off notices required due to failure by the Contractor to commence and/or complete all the required work within the requested shutoff period will be redistributed by the Water Works at a cost of \$500.00 for each redistribution. The \$500.00 charge per redistribution for that work will be deducted from the Contract payment for the water main construction. Standard notification requirements shall apply.

The redistribution fee may be waived at the Water Works' discretion if weather is the only reason the work was not completed during the requested shut-off period.

## 2. PIPE MATERIALS AND COVERINGS

- 2.1 Ductile Iron Pipe (DIP): Conforming to latest edition of ANSI/AWWA C150/A21.50 and manufactured in accordance with ANSI/AWWA C151/A21.51.
- 2.1.1 Minimum thickness - Class 52 for 6 inch to 12 inch pipe.
- 2.1.2 Mechanical, push-on and restrained joint pipe shall conform to the latest edition of ANSI/AWWA C111/A21.11.
- 2.1.3 Restrained joint pipe, when specified on the plans, shall be SNAP-LOK or BOLT-LOK as manufactured by Griffin Pipe Products Company or approved equal.
- 2.1.4 Joint gaskets – styrene butadiene rubber (SBR) gaskets shall be used per AWWA C111/A21.11 unless specified otherwise on the plans.
- 2.2 Pipe Lining: Cement line inside in accordance with ANSI/AWWA C104/A21.4.
- 2.3 Pipe Coating: Coat outside with asphaltic coating in accordance with ANSI/AWWA C151/A21.51. Coat inside with asphaltic coating in accordance with ANSI/AWWA C104/A21.4.
- 2.4 Polyethylene Encasement: All of the proposed water main, and all portions of the existing water main exposed due to the construction of the proposed water mains shall have 8 mil (nominal) polyethylene encasement (LLDPE). This work shall conform to the current American National Standard, ANSI/AWWA C105/A21.5 specification. The encasement shall be wrapped with a self adhesive tape suitable for direct burial at a minimum of 2 foot intervals and both sides of all joints.

Water main with aluminum jacket shall not require encasement. Water main installed in a steel casing shall not require encasement.

Any damaged polyethylene encasement around pipe or fittings shall be repaired by the Contractor, as directed by the Engineer, prior to placement in the water main trench at no additional cost. Any subsequent damage to polyethylene during construction (i.e., taps) shall be repaired by the Contractor and approved by the Engineer.

- 2.5 Insulation and Aluminum Jacket. All pipe insulation shall be 2 inch thick urethane or polyisocyanurate foam insulation. Insulation shall be provided in two half-shells and shall be STYROFOAM or TRYMER 2000 brand as manufactured by Dow Plastics or approved equal. R-value for installed insulation shall meet or exceed 7.50. R-value calculated as: Insulation thickness (t, inches) / manufacturer's stated K-factor (K, thermal conductivity at 180 days and 75°F mean temperature, BTU in/hr • ft<sup>2</sup> • °F) [R = t / K].

A factory fabricated 0.016 inch smooth aluminum alloy jacket as manufactured by Childers Products Company, Inc., or approved equal shall cover the insulation. All jacketing shall have a smooth pattern and an integrally bonded moisture barrier over the entire surface in contact with the insulation. The insulation and aluminum jacket for all bends and pipe joints shall also be factory fabricated. (Except as allowed by Engineer under special conditions.)

The aluminum jacket shall extend a minimum of 2 feet below the finish ground grade. The insulation below that elevation shall be encased in polyethylene meeting the requirements

of Section 2.4 of these provisions. Joints shall be secured with stainless steel screws.

### 3. VALVES, AND VALVE BOXES

- 3.1 Gate Valves: Resilient-seated or resilient wedge, manufactured in accordance with AWWA C509 or C515.
- 3.1.1 Nonrising stem; "O" ring stem seal; 2 inch square operating nut; ductile iron body and bonnet, (for AWWA C509 no cast iron) bronze mounted.
- 3.1.2 Open counter-clockwise (left).
- 3.1.3 Valve ends shall be mechanical joint unless otherwise specified.
- 3.1.4 Acceptable gate valves are the following:
- 1) Mueller A-2362-20 (valve sizes 2 inch through 12 inch: AWWA C509)
  - 2) Mueller A-2361-20 (valve sizes 2 inch through 48 inch: AWWA C515)
  - 3) Clow Model No. 2639; Figure F-6100
  - 4) American Flow Control Series 2500
  - 5) U.S. Pipe A-USPI-20 or A-USP2-20
  - 6) M & H Valve Company Style 7000 (valve sizes 4 inch through 12 inch: AWWA C-515); Style 4067 (valve sizes 14 inch and 16 inch)
  - 7) American AVK Series 45 (AWWA C515); Series 25 (AWWA C509)
  - 8) Or Equal pre-approved by the Engineer.
- 3.1.5 Valves shall have stainless steel bolts. Galvanized bolts shall not be used.
- 3.1.6 Coatings on all exposed internal or external surfaces will comply with AWWA C550 and NSF/ANSI Standard 61.
- 3.1.7 Contractor shall provide and install a 4 inch thick solid concrete block under all valves for support. Minimum block size shall be equal to valve diameter. Pressure treated or cedar wood wedges, 1 1/2 inch nominal width, shall be provided and installed by the Contractor between the valve and block as necessary.
- 3.1.8 Valves 16 inch and larger may be installed vertically or horizontally as indicated on the plans.
- 3.1.9 Joint gaskets - SBR gaskets shall be used per AWWA C111/A21.11 unless specified otherwise on the plans.
- 3.2 Tapping Valves and Sleeves
- 3.2.1 Tapping valves and tapping sleeves will be furnished and installed by the Water Works or their authorized representative unless shown otherwise on the plans.
- 3.2.2 Acceptable tapping valves and tapping sleeves are the following:
- 1) ROMAC SST stainless steel tapping sleeve with D.I. flange with gasket glued to flange or Mueller H-615 sleeve for mechanical joint. Mueller H-667 tapping valve.
  - 2) Clow F-5205 mechanical joint sleeve and F-5093 tapping valve.
  - 3) Power Seal type 3490 stainless steel tapping sleeve.
- 3.2.3 Concrete thrust blocks are required on all tapping valves. Thrust blocks shall be installed by the Contractor.

3.2.4 Contractor shall provide and install a 4 inch thick solid concrete block under all valves for support. Minimum block size shall be equal to valve diameter. Pressure treated or cedar wood wedges, 1 1/2 inch nominal width, shall be provided and installed by the Contractor between the valve and block as necessary.

3.2.5 Refer to Sections 1.7 and 1.8.

### 3.3 Valve Boxes

3.3.1 Use valve boxes for all valves unless shown otherwise on the plans.

- 1) Valve boxes shall be Tyler Series 6860, 29U-Domestic Heavy Duty or 30U-Non-Domestic Heavy Duty, Star Model VB-0006 (Heavy Duty) Valve Box, or equal approved by the Engineer.
- 2) Cast iron, screw type; with cast iron drop cover.
- 3) Inside diameter: 5 1/4 inch.
- 4) Lid shall be labeled "Water" with raised lettering.
- 5) A No. 6 (Standard) separate full pot base shall be used.
- 6) Bottom section shall be 24 inch or 18 inch; top section shall be 26 inch or 16 inch; middle section if required shall be 24 inch. 36 inch bottom sections shall never be used. Field cutting or modifications to the valve box sections shall not be permitted.

3.3.2 If valve boxes are required to extend beyond 74 inches (three pieces) and are not noted in the plans as "extra depth," the Water Works will provide the additional section(s). Contractor should anticipate up to 3 weeks for delivery upon approval of Water Works providing materials. No additional compensation will be provided for the Contractor's installation.

### 3.4 Polyethylene Encasement

3.4.1 All valves shall be wrapped with polyethylene. Polyethylene around MJ bolts shall be installed without piercing or damaging the polyethylene. Refer to Section 2.4.

3.5 Any product determined by the Contractor to be an "or equal" shall be submitted for approval prior to the Shop Drawing submittals. Contractor shall provide relevant product information for both the "equal" and specified product with all differences marked/noted on the "equal." By submitting an "equal" for review, the Contractor states the "equal" meets or exceeds all specified requirements and is of equal or greater quality and/or manufacturing workmanship and that it is the Contractor's opinion (not supplier's opinion) that the "equal" product is as good as or better than the specified product. The Engineer may require a product demonstration, at no cost, while considering an "equal." If an "equal" is accepted by the Engineer, the item shall be submitted as a Shop Drawing for review. "Equals" submitted as a Shop Drawing without prior acceptance will be rejected without consideration given to suitability as an "equal."

## 4. FITTINGS

4.1 Fittings for ductile iron pipe 3 inch through 64 inch in diameter shall comply with latest edition of ANSI/AWWA C110/A21.10 with a working pressure 250 psi. Ductile-iron compact fittings shall comply with latest edition of ANSI/AWWA C153/A21.53.

4.1.1 Mechanical, push-on, and restrained joint shall conform to the latest edition of ANSI/AWWA C111/A21.11.

4.1.2 Cement lining and asphaltic coating inside in accordance with ANSI/AWWA C104/A21.4. Coat outside with bituminous coating in accordance with ANSI/AWWA C153/A21.53.

- 4.1.3 All fittings shall have 8 mil (nominal) polyethylene encasement. This work shall conform to the current American National Standard, ANSI/AWWA C105/A21.5 specification. Encasement shall be taped on each side of a joint, including fittings.
- 4.1.4 Joint gaskets -- SBR gaskets shall be used per AWWA C111/A21.11 unless specified otherwise on the plans.
- 4.1.5 All hydrant branch tees shall be swivel joint tees unless shown otherwise on the plans.
- 4.1.6 A full pipe length shall be installed on each side of all elbows, bends, and offsets, unless shown or directed otherwise.
- 4.1.7 Sleeves required to connect the proposed water main to the existing water main and to cut and plug water mains that are to remain in service shall be provided and installed by the Contractor.
- 4.1.8 The sleeves for 4 inch through 20 inch pipe shall be Tyler/Union or Star Products Long Body Standard Solid Sleeve or approved equal for mechanical joint pipe, with current standard wall thickness. The sleeves for 4 inch through 16 inch pipe shall be Tyler/Union or Star Products Long Body Dual Purpose Solid Sleeve or approved equal for connecting mechanical joint pipe to pipe with nonstandard wall thickness and for 20 inch pipe shall be Smith-Blair 413 transition couplings or approved equal. The coupling for 4 inch through 12 inch connections to transite pipe shall be ROMAC XR501 extended range couplings, or Hymax Couplings manufactured by Total Piping Solutions, Inc., or approved equal. For connection to transite pipe larger than 12 inch, Large Diameter Hymax Couplings manufactured by Total Piping Solutions, Inc. shall be used, or approved equal.
- 4.1.9 Contractor shall provide and install a 4 inch thick solid concrete block under all fittings and sleeves for support. Minimum block size shall be equal to the outside diameter at the widest location. Pressure treated or cedar wood wedges, 1 1/2 inch nominal width, shall be provided and installed by the Contractor between the valve and block as necessary.
- 4.2 Polyethylene encasement shall be installed on all fittings. Polyethylene around MJ bolts shall be installed without piercing or damaging the polyethylene. Refer to Section 2.4.
- 4.3 Shop Drawings shall be submitted for all items in this Section. Refer to Section 1.10.

## 5. FIRE HYDRANTS

- 5.1 Fire hydrants shall comply with latest edition of ANSI/AWWA C502.
- 5.2 All fire hydrants shall have an auxiliary gate valve and valve box.
- 5.3 Fire hydrants shall comply with the following requirements:
  - 5.3.1 Two 2 1/2 inch nozzles and one 4 1/2 inch nozzle. The 2 1/2 inch nozzles to have 3 1/16 inch O.D. thread with eight threads per inch. The 4 1/2 inch nozzle threads to be National Standard. The 4 1/2 inch nozzle shall be directed toward the street or as directed by the Water Works. Any required rotation of upper barrel by the Contractor shall be considered incidental.
  - 5.3.2 Swivel offsets, swivel 90 degree bends, or hydrant extensions shall be used as directed by the Water Works to adjust fire hydrant location or elevation.

- 5.3.3 Inlet shall have a 5 1/4 inch minimum main valve opening. Mechanical joint connection.
  - 5.3.4 Hydrants shall be factory painted per the paint manufacturer's specifications. Paint shall be yellow primer. No finish coat.
  - 5.3.5 Operating nut to be a 1 1/2 inch pentagon, Council Bluffs Standard. Shall open counter-clockwise (left).
  - 5.3.6 Acceptable hydrants are:
    - 1) Mueller Centurion A-423
    - 2) Kennedy Guardian K81D
    - 3) Clow Medallion
    - 4) Waterous Pacer Model WB67-250
    - 5) American AVK Nostalgic (2780)
    - 6) Or Equal pre-approved by the Water Works
  - 5.3.7 Joint gaskets – styrene butadiene rubber (SBR) gaskets shall be used per AWWA C111/A21.11 unless specified otherwise on the plans.
  - 5.4 Contractor shall provide and install a 12 inch by 12 inch by 4 inch solid concrete block under all new hydrants for support (refer to plan detail). Pressure treated or cedar wood wedges, 1 1/2 inch nominal width, shall be provided and installed by the Contractor between the hydrant and block as necessary.
  - 5.5 Fire hydrant branches less than one pipe length from the water main shall be one continuous piece of pipe. Hydrant branches over one pipe length shall be mechanical joint pipe. The hydrant branch pipe shall be incidental to the fire hydrant assembly.
  - 5.6 Fire hydrants delivered to the project with chipped paint, scratches, rust and/or other defects shall not be installed. Contractor shall be responsible for verifying the hydrant condition upon taking delivery.
  - 5.7 Fire hydrants shall have polyethylene encasement to the ground line. The polyethylene encasement shall not block the drain holes for the hydrant. Polyethylene around MJ bolts shall be installed without piercing or damaging the polyethylene. Refer to Section 2.4.
  - 5.8 Shop Drawings shall be submitted for all items in this Section. Refer to Section 1.10.
6. BOLTS FOR WATER MAIN
- 6.1 Bolts required for connecting joints in piping, fittings, plugs, etc. shall be high strength, low alloy steel meeting the requirements of the current revision of ANSI C111/AWWA 21.11. Cast iron bolts shall not be used.
  - 6.2 All valves shall have stainless steel bolts. Galvanized bolts shall not be used.
7. JOINT RESTRAINT
- 7.1 Concrete Thrust Blocks
    - 7.1.1 Required where piping changes direction or deadends. Concrete thrust blocks are also required on all hydrant branch tees and tapping valves.
    - 7.1.2 Carry to undisturbed edge of trench for bearing.



- 7.1.3 No bolts, joints or drain holes shall come into contact with the concrete thrust block. If necessary, a sheet of 8 mil polyethylene shall be used to protect these areas before the concrete is placed. The polyethylene shall not block the drain holes.
  - 7.1.4 Size and location of thrust blocking to conform to detail as shown on plans.
  - 7.1.5 Thrust blocks shall be poured in place concrete having a minimum 28 day compressive strength of 4000 psi. Submit mix design that documents the required strength as a Shop Drawing submittal. Provide the Engineer a copy of the concrete ticket at the time of installation. Do not install thrust blocks without an approved Shop Drawing for the concrete mix. Thrust blocks shall have a minimum of 3 days cure before the main is filled and flushed (subjected to pressure), unless the appurtenance being blocked also has retainer rings and approved rodding. The sides of the thrust blocks shall be formed using wood or steel to conform to the Plan details. Pre-cast concrete thrust blocks may be permitted for "cut and connect," "cut and plug," and temporary installations when specifically authorized by individual location by the Engineer. Pre-cast concrete thrust blocks shall be encased in the approved concrete mix before backfilling.
- 7.2 Retained Fittings
- 7.2.1 Provide retained or securely jointed pipe joints to prevent joint separation at all mechanical joint fittings, including sleeves, and where piping changes direction or deadends in addition to concrete thrust blocks.
  - 7.2.2 Retained pipe joints for below ground installation shall include use of either retainer glands or wedge action restrainers. No additional payment shall be made for this work.
  - 7.2.3 Retainer glands or wedge action restrainers shall have set screws with shear heads to prevent damage to the pipe lining. Set screws shall be the Ford Meter Box Company, Inc. Auto-Tork screws, Star Pipe Products Stargrip Series 3000 Mechanical Joint Wedge Action Restraint with Break-off Torque Control Nuts, Sigma One-Lok Wedge-Action Restraining Gland or approval equal.
  - 7.2.4 Shop Drawings shall be submitted for all items in this Section. Refer to Section 1.10.
- 7.3 Tie Rods and Nuts
- 7.3.1 When noted on the plans and/or when the Water Works requests tie rods, the Water Works will provide the rodding material, and the Contractor shall cut and install the material as directed by the Engineer. The installation of this material shall be considered incidental to the project.
- 7.4 Restrained Fittings
- 7.4.1 Restrained pipe joints shall be locked mechanical joint. "American Ductile Iron Pipe Flex Ring" restrained joint fittings shall not be used.
  - 7.4.2 Restrained pipe at fittings, when specified on the plans, shall utilize BOLT-LOK Pipe spigots as manufactured by Griffin Pipe Products Company or approved equal. "American Ductile Iron Pipe MJ Couple Joint" restrained joint pipe may be used with prior authorization from the Engineer. "American Ductile Iron Pipe Flex Ring" restrained joint pipe and "Clow Water Systems Company Super-Lock"

restrained joint pipe shall not be used.

7.4.3 Shop Drawings shall be submitted for all items in this Section. Refer to Section 1.10.

7.5 Polyethylene Encasement

7.5.1 Encase all metallic restraint materials and devices. Refer to Section 2.4.

## 8. PIPE INSTALLATION

8.1 When lifting polyethylene encased pipe, use a fabric type sling or a suitably padded cable, padded chain or other means to prevent damage to the polyethylene. Any damaged polyethylene shall be repaired or replaced before backfilling.

8.2 Lay pipe in the dry trench (no standing water) and to minimum depths shown on plans. Polyethylene encasement shall be placed around pipe prior to lowering pipe into trench.

8.3 Clean pipe interior of foreign material before lowering into trench; keep clean at all times by securely closing open ends of pipe and fittings with watertight plug to prevent ingress of foreign material at all times when pipe jointing operation is not in progress. If water is in the trench, the seal shall remain in place until the trench is pumped dry.

8.4 Place pipe in trench in sound, undamaged condition; do not injure pipe coating or lining; do not use end hooks to install or move pipe.

8.5 Cut pipe in neat and workmanlike manner without damage to pipe; mechanical pipe cutters subject to approval of Engineer; bevel cut ends of push-on type pipe.

8.6 Before installation visually inspect for cracks, gouges, or other defects; damaged or unsound pipe shall not be used.

8.7 Deflect pipe joints, as shown on plans, in accordance with pipe manufacturer's recommendations.

8.8 Plug or cap and block all pipe ends or fittings left for future connections.

8.9 Uncover existing mains a sufficient time ahead of pipe laying operations to determine fittings required to make connections; make connections between existing and new water mains with sleeves and fittings as required.

8.10 Install pipe in accordance with best construction practices as specified in AWWA Standard C600 and manufacturer's recommendations.

8.11 Trenchless boring for the installation of water mains shall be allowed only where shown on the plans or as directed by the Engineer. Where trenchless boring is specified, the open excavation shall end and begin 3 feet from the nearest edge of the driveway, street, tree, etc. to be bored unless noted otherwise on the plans. Trenchless boring method shall be approved by the Water Works.

No tunneling or water jetting shall be allowed. If utilities and/or other conflicts are encountered during boring, surface removal and excavation shall be completed as directed by the Engineer. Any sleeves required due to the trenchless method being used shall be approved by the Water Works prior to use. All required sleeves shall be incidental, unless otherwise noted on the plans.

8.12 All newly constructed water main and appurtenance shall be backfilled prior to December

1<sup>st</sup>. All water main and appurtenances that are under construction on or after December 1<sup>st</sup> shall be protected from the elements throughout the workday and backfilled at the end of each workday. All water main construction that is left exposed to the elements on or after December 1<sup>st</sup> may be backfilled, insulated or otherwise protected by the Water Works at their discretion. The \$500.00 plus materials charge per location for that work will be deducted from the Contract payment for the water main construction. The Contractor shall not be paid any additional cost for subsequent excavation or removal of temporary materials to resume or complete the work.

- 8.13 In the event the project will not be completed by the Contract completion date, and work will be suspended for a winter shutdown, the Engineer may require the new partially completed water main be temporarily connected to the existing water main until work resumes in the spring. The temporary connection(s), and any other work required by the Engineer in preparation for the winter shutdown, shall be completed by the Contractor as directed by the Engineer. All labor, costs and temporary materials required to prepare the project for a winter shutdown and resume work in the spring shall be at the Contractor's expense and shall be considered incidental to the project.

## 9. FIRE HYDRANT AND WATER VALVE INSTALLATION

### 9.1 Water Valves

- 9.1.1 Install with stems vertical and centered in box.
- 9.1.2 Check all valve bolts when installed; tighten as necessary.
- 9.1.3 Tamp the area the box will be placed on. Thoroughly tamp earth backfill as it's placed around each valve box.
- 9.1.4 Contractor shall provide and install a 4 inch thick solid concrete block under each valve. Minimum block size shall be equal to valve diameter.
- 9.1.5 Encase in polyethylene per Section 3.4. Refer to Section 2.4.
- 9.1.6 All valve boxes shall be easily accessible for operation by the Water Works through the entire project, including the winter.
- 9.1.7 All valve boxes not set at finish grade prior to December 1<sup>st</sup> shall be adjusted as necessary by the Water Works. The \$500.00 charge for that work will be deducted from the Contract payment.

### 9.2 Fire Hydrants

- 9.2.1 The minimum depth of cover for hydrants and hydrant branches shall be 5 feet, unless otherwise noted on the plans. Restraining fittings and anchoring pipe shall be used in addition to the installation of thrust blocks. Hydrants shall be vertically plumb and set to finish grade per plan details. Subsequent adjustments of hydrant height will be considered incidental to the project.
- 9.2.2 Set at an elevation so that cover will not be less than the adjacent main.
- 9.2.3 Set at minimum bury depth as required by the manufacturer. Refer to barrel markings and/or Shop Drawings. The maximum allowed bury depth deviation, measured at the groundline below the steamer nozzle, shall be +1/2 inch.
- 9.2.4 Set on concrete pad per plan details and verify the barrel section of the hydrant

is vertically plumb.

- 9.2.5 Backfill bottom of hydrant with clean gravel to 18 inches above bottom of hydrant stand pipe and a minimum of 6 inches above the weep holes. This gravel shall be incidental to the work.
- 9.2.6 Encase hydrant in polyethylene per Section 5.7. Refer to Section 2.4.
- 9.2.7 Block hydrant in place per plan details after verifying the barrel section of the hydrant is still vertically plumb. Refer to Section 7.1.
- 9.2.8 Thoroughly tamp backfill around hydrant to undisturbed trench face while checking the barrel section of the hydrant remains vertically plumb.
- 9.2.9 Operate hydrant in open and closed position to assure all parts are in working condition.
- 9.2.10 When the depth of a new fire hydrant tee is dictated by a nearby connection to an existing water main, the Contractor shall evaluate the hydrant location and determine the depth of the tee relative to final grade. If the depth is less than 4 feet or greater than 6 feet the Contractor shall notify the Engineer to determine the appropriate installation of the non-standard depth fire hydrant. No additional payment will be made by the Contracting Authority for hydrants near existing mains that are within 2.0 feet of the elevation shown in the plans.

#### 10. TRENCH BACKFILL

Trench backfill shall be per the water main details as shown on the plans. This work shall be monitored, coordinated, and tested by the Engineer.

- 10.1 Backfill trench immediately after the Engineer has recorded location of connections and appurtenances, or at the Engineers direction.
- 10.2 Allow no more than 200 feet of trench to be open at one time. Install appurtenances and backfill as work progresses.
- 10.3 Backfill with material excavated from trench except where other backfill is specified by the Engineer.
  - 10.3.1 Backfill material shall be free of large stones, large clods, organic material, rubbish, frozen, or unsuitable materials.
  - 10.3.2 Consolidate backfill material by mechanical or hydraulic compaction equipment.
  - 10.3.3 Refer to the Water Main Details, as shown on the plans, for backfill density requirements.
- 10.4 If excavated material is excessively wet and/or density requirements cannot be obtained because of moisture content, Contractor shall cease operation until the Engineer determines whether corrective action is required.
  - 10.4.1 Refer to Sections 17 and 18 for information regarding measurement and payment for select backfill.
- 10.5 Contractor shall excavate the trench to the depth(s) directed by the Engineer for the testing lab to obtain the trench density test and replace and recompact the test area. This

work is incidental to the project.

10.6 The Contractor shall give the Engineer timely notice of readiness for density test. Testing labs employed by the Engineer typically require a minimum of 24 hours notice. Minimum testing frequency for density testing of trench backfill is as follows:

10.6.1 One test first 100 feet of water main trench backfilled by Contractor. The results from this test will determine if the material and the method of compaction being used by the Contractor is obtaining the required density.

10.6.2 Testing of trench backfill shall continue at 200 feet to 250 feet intervals to the end of the water main trench.

10.7 The Engineer shall order the density tests. Contractor ordered tests shall be paid for by the Contractor unless prior approval is obtained from the Engineer.

10.8 The Engineer reserves the right to charge the Contractor (or deduct from the project payment) for retesting for failed tests.

## 11. SEPARATION OF WATER MAINS AND SANITARY SEWERS

### 11.1 General

11.1.1 The following factors should be considered in providing adequate separation:

- 1) Materials and type of joints for water and sewer pipes.
- 2) Soil conditions.
- 3) Service and branch connections into the water main and sewer line.
- 4) Compensating variations in the horizontal and vertical separations.
- 5) Space for repair and alterations of water and sewer pipes.
- 6) Off-setting of pipes around manholes.

### 11.2 Horizontal Separation of Gravity Sewers from Water Mains

11.2.1 Separate gravity sewer mains from water mains by a horizontal distance of at least 10 feet unless:

- 1) The top of a sewer main is at least 18 inches below the bottom of the water main, and
- 2) The sewer is placed in a separate trench or in the same trench on a bench of undisturbed earth at a minimum horizontal separation of 3 feet from the water main.

11.2.2 When it is impossible to obtain the required horizontal clearance of 3 feet and a vertical clearance of 18 inches between sewers and water mains, the sewers must be constructed of water main materials meeting the requirements. However, provide a linear separation of at least 2 feet.

### 11.3 Separation of Sewer Force Mains from Water Mains

11.3.1 Separate sewer force mains and water mains by a horizontal distance of at least 10 feet unless:

- 1) The force main is constructed of water main materials meeting a minimum pressure rating of 150 psi and

- 2) The sewer force main is laid at least 4 linear feet from the water main.

#### 11.4 Separation of Sewer and Water Main Crossovers

11.4.1 Vertical separation of sanitary sewers crossing under any water main should be at least 18 inches when measured from the top of the sewer to the bottom of the water main. If physical conditions prohibit the separation, the sewer may be placed not closer than 6 inches below a water main or 18 inches above a water main. Maintain the maximum feasible separation distance in all cases.

11.4.2 Where the sewer crosses over or less than 18 inches below a water main, locate one full length of sewer pipe of water main material so both joints are as far as possible from the water main. The sewer and water pipes must be adequately supported and have watertight joints. Use a low permeability soil for backfill material within 10 feet of the point of crossing.

#### 11.5 Sewer manholes

11.5.1 No water pipe shall pass through or come in contact with any part of a sewer manhole. A minimum horizontal clearance of 10 feet shall be maintained.

### 12. WATER MAIN DISINFECTION

12.1 None of the work performed by the Contractor under this section shall be done unless the Engineer is present. Conduct water main disinfection per ANSI/AWWA C651-05. Contractor shall provide the calcium hypochlorite (conforming to ANSI/AWWA B300) required for disinfection.

12.1.1 After installation of all piping, all segments of the mains shall be flushed prior to chlorination. All valves and flushing or air release taps shall be operated and all hydrants flushed to be sure that all dirt and debris has been flushed from all of the piping, including dead end sections beyond mainline valves installed by the Contractor. All dead ends that cannot be flushed with a hydrant shall be flushed through a temporary flushing device. Refer to plan details.

12.1.1.1 The temporary flushing device for water mains with a diameter smaller than 12 inch shall be either a combination blowoff and sampling tap with a minimum pipe diameter of 2 inch, or a temporary fire hydrant.

12.1.1.2 The temporary flushing device for water mains with a diameter of 12 inch or greater shall be a temporary fire hydrant.

12.1.2 Contractor shall provide and install all necessary valves, adaptors, and pipe for the temporary flushing device. The temporary flushing device shall include an adaptor to accommodate a defuser or special equipment for neutralizing heavily chlorinated water. Contractor shall remove the materials after flushing and disinfection of the new water main is completed. This work shall be incidental to the project.

12.1.3 Contractor shall flush the new water main until the turbidity of the water is at or less than 5.0 NTU as measured by the Water Works. The Contractor shall take all steps necessary to reduce the turbidity in the new water main to this level.

12.1.4 Continuous-Feed Method: At a point not more than 10 feet downstream from connections to existing mains inject at a constant rate a solution of Calcium

Hypochlorite and water until the entire main has a chlorine residual of 50 ppm; allow system to stand full of solution for 24 hours. Minimum free chlorine residual at pipe extremities: 10 ppm at end of 24 hour test period; if requirement is not met, repeat disinfection procedure. The Contractor shall operate all valves and all hydrants in the new main to assure complete disinfection; repeat test procedure if necessary.

Slug Method (Contractor's Option): The Contractor is required to place calcium hypochlorite granules in the main during construction; completely filling the main to eliminate air pockets; flushing the main to remove particulates; and slowly flowing through the main a slug of water dosed with chlorine to a concentration of 100 mg/L. The slow rate of flow ensures that all parts of the main and its appurtenances will be exposed to the highly chlorinated water for a period of not less than 3 hours. At a point not more than 10 feet downstream from the beginning of the new main, water entering the new main shall receive a dose of chlorine fed at a constant rate such that the water will have not less than 100 mg/L free chlorine. To ensure that this concentration is achieved, the chlorine concentration should be measured at regular intervals. The chlorine shall be applied continuously and for a sufficient period to develop a solid column, or slug, of chlorinated water that will, as it moves through the main, expose all interior surfaces to a concentration of approximately 100 mg/L for at least 3 hours. The free chlorine residual shall be measured in the slug as it moves through the main. If at any time it drops below 50 mg/L, the flow shall be stopped; chlorination equipment shall be relocated at the head of the slug; and, as flow resumes, chlorine shall be applied to restore the free chlorine in the slug to not less than 100 mg/L. As the chlorinated water flows passed fittings and valves, related valves and hydrants shall be operated so as to disinfect appurtenances and pipe branches.

A minimum 3/4 inch purification tap(s) shall serve as the injection point(s). The purification taps will be installed in the main by the Water Works. The Contractor shall provide and install all remaining material, including copper piping, valves, and other fittings necessary for constructing a purification tap for an injection point for the calcium hypochlorite. At the direction of the Engineer, the Contractor shall perform the required excavation, install and subsequently disconnect copper piping and valve at these injection sites. The Contractor shall maintain access to injection sites until the new main tests pathogenic bacteria-free, then furnish and compact backfill at these sites. The copper and appurtenances shall become Contractor salvage when the removal is directed. This work will be incidental to the project unless a Contract item for Water Main Tap for Purification is provided. The tap and installation done by the Water Works shall be done at no charge unless the Contract item is provided.

- 12.2 The Contractor shall thoroughly flush main after the test until extremities indicate the same chlorine residual as the supply water. A diffuser shall be used for flushing and to aid in incorporating the neutralizing agents. All hydrants in the test section shall be flushed before pressure testing begins. The Contractor shall obtain permission from the City or County for the use of their sanitary sewer or storm sewer as necessary to transport the flushing water. The flushing shall be done in a manner such that the City or County sewer system is not surcharged.
- 12.3 Heavily chlorinated water will require that a neutralizing agent be added to prevent damage to the environment and/or City or County sewer systems. This work shall be done in accordance with AWWA C651-05 Sec 4.5.2 using special equipment and neutralizing agents provided by the Contractor. Sodium Thiosulfate as manufactured by Esseco General Chemical, Parsippany, New Jersey (973) 515-1840 or equal may be used as a

neutralizing agent. Use per manufacturer's recommendation to reduce the chlorine residual. Contractor shall immediately increase the amount of neutralizing agent if the flushing water chlorine residual is above acceptable levels.

- 12.4 After completion of disinfection and flushing of the chlorinated water, the Water Works will collect and deliver bacteriological samples for testing. A minimum of 24 hours must elapse between flushing and sampling. Samples must test pathogenic bacteria free, meaning but not limited to, total coliform, E. coli and pseudomonas. Samples will be delivered to the Water Works lab between 7:00 AM and 12:00 PM Monday through Friday. Samples must be tested by the lab within 30 hours of being drawn.

Results of the testing will be available to the Engineer the following day excluding Saturdays, Sundays and Holidays. The Contractor shall not call the lab for results. A minimum of 24 hours is required for lab testing.

Samples shall be taken at fire hydrants and at the end(s) of each main. Material for sampling sites other than hydrants shall be through a Temporary Combination Blowoff and Sampling Tap constructed of smooth material, copper, schedule 80 PVC and/or brass fittings as detailed on the plans. The outlet where the bacteria sample is taken shall not be threaded internally or externally. Materials used for sampling shall be sanitized before taking any samples. This work shall be incidental to the project. Additional working days shall not be provided for any retesting work.

A sample shall be taken at intervals not to exceed 1200 feet of pipe.

- 12.5 The Engineer shall require two consecutive sets of acceptable samples, taken at least 24 hours apart.
- 12.6 Hydrants shall be used as sampling points. If hydrants are not installed at the end of the main, samples may be taken from a Temporary Combination Blowoff and Sampling Tap. The Contractor shall provide and install all material necessary for constructing a sampling point for the Water Works. The Contractor shall perform the required excavation, install and subsequently disconnect piping and valve at these sample sites. The Contractor shall maintain access to sampling sites until the new main tests pathogenic bacteria free then furnish and compact backfill at these sites. The piping and appurtenances shall become Contractor salvage when the removal is directed.
- 12.7 Mains shall test bacteria free for both tests before the hydrostatic test is conducted.
- 12.8 A \$500 charge for each disinfection retest after two failed tests on each testing segment of main will be deducted from the Contract payment for the water main construction.
- 12.9 Mains that do not pass the hydrostatic test and require repairs to the new main shall be re-disinfected and test bacteria free prior to conducting the subsequent hydrostatic test. Additional working days shall not be provided for any testing work.

### 13. TESTING REQUIREMENTS

- 13.1 None of the work performed by the Contractor under this Section shall be done unless the Engineer is present. Test all pipe after installation in accordance with AWWA Standard C-600.

#### 13.1.1 Hydrostatic test:

- 1) The Contractor will flush out all of the new main to remove air before testing; the Water Works will insert taps to help release trapped air. The Contractor shall plug the taps after testing as directed by the Engineer.



- 2) Test at 150% of maximum operating pressure for 2 hours; allowable pressure change during test period shall be 5% of test pressure.
- 3) The Engineer will observe test to ensure compliance as required in 2) above.
- 4) Comply with current AWWA Standard C-600 unless noted otherwise.
- 5) Water used for pressure testing shall have a minimum chlorine residual content of 50 ppm.

13.2 The Contractor shall provide all test pumps, test plugs, pipe, and gages, and make all required piping connections to perform required testing.

13.3 Examine trench for leakage during test; replace all defective pipe or fittings disclosed during test and repeat test until requirements have been met.

13.4 A \$500 charge for each hydrostatic retest after two failed tests on each testing segment of main will be deducted from the Contract payment for the water main construction.

14. EXISTING FIRE HYDRANT AND OTHER APPURTENANCES

14.1 Remove and Salvage:

14.1.1 Contractor shall do the necessary excavation and subsequent backfilling to remove the fire hydrants and other appurtenances as noted on the plans. Contractor shall cut the water main and/or hydrant branch pipe beyond the hydrant connection as directed by the Water Works. Contractor shall place the salvaged hydrant and other appurtenances on a vehicle and transport them, along with the Water Works Observer/Field Representative, to the Water Works Distribution Office at 2000 North 25<sup>th</sup> Street and unload the salvaged items as directed by the Water Works Observer/Field Representative.

14.1.2 Contractor shall be responsible for replacing the existing fire hydrant and other appurtenances if they are damaged during the salvage work. The replacement fire hydrant and other appurtenances shall comply with this Special Provision. No additional compensation will be made to the Contractor for replacement of the damaged fire hydrant and other appurtenances.

14.1.3 This work shall not be paid for until the salvaged hydrant and other appurtenances are delivered. If a salvaged hydrant and other appurtenances are not delivered, the Water Works reserves the right to deduct the hydrant and other appurtenances value from the Contract payment.

14.1.4 Contractor shall furnish and install a concrete plug in the exposed pipe(s) prior to backfilling as a part of this work. Refer to Section 16.9. Appurtenances will not be salvaged to the Water Works unless noted otherwise on the plans.

14.2 Remove and Dispose:

14.2.1 Contractor shall do the necessary excavation and subsequent backfilling to remove the fire hydrants and other appurtenances as noted on the plans. Contractor shall break or cut the hydrant barrel a minimum of 2 feet below finish grade. The remaining barrel portion shall be filled with sand or concrete prior to backfilling.

14.2.2 Refer to Section 16.9. Contractor shall dispose of fire hydrant and other appurtenances off-site.

15. WATER SERVICES

- 15.1 Water services shall only be installed after disinfection and testing of the new water mains according to Section 13 -- "Water Main Disinfection" and Section 14 -- "Testing Requirements" in this Special Provision. No taps, except purification taps, shall be made before required testing is completed and the water main is accepted by the Water Works.
- 15.2 Contractor shall provide and install all required copper piping and a 4 inch by 8 inch brick or approved equal under each curb stop. The copper piping for water services shall be "Type K" seamless copper tubing conforming to ASTM B 88. All other materials will be provided by the Water Works.

The Contractor shall obtain the material furnished by the Water Works at the Water Works Distribution Office at 2500 North 25<sup>th</sup> Street. The Contractor shall give the Water Works a minimum of 24 hours advance notice (excluding Saturday, Sunday and Holidays) of when the Contractor intends to pick up the material at the Water Works Distribution Office.

Water services, including the curb stop box, shall have a minimum of 5 feet cover below the lowest elevation of the service crossing. Contractor shall construct the new water service from the corporation stop in the water main to the curb stop box perpendicular to the water main unless directed otherwise by the Water Works. Refer to plan details.
- 15.3 The Contractor shall give the Water Works a minimum of 24 hours advance notice (excluding Saturday, Sunday and holidays) of the intent to shut the water off. The Water Works reserves the right to not shut the water off without proper notice.
- 15.4 Contractor shall place a 1 inch curb stop key on the stop in a plumb position during installation and backfill of the curb box and again before placing any paving around the box.
- 15.5 Contractor shall cut off the bottom of the top section of the box, as necessary, to set the box to grade. Contractor shall adjust box to finished grade, as necessary, when final grading is approved.
- 15.6 Contractor shall provide and install 8 mil (nominal) polyethylene encasement to wrap corporation stop and the first 3 feet of new water service from the new water main. Any polyethylene encasement on the pipe that is damaged by service work shall be replaced and taped in place. All water service connections to new water mains shall be checked by the Water Works before being backfilled.
- 15.7 Contractor shall shut off the existing curb stop in order to connect to the existing private service line or set a new curb stop and box as directed by the Water Works. Contractor shall remove all abandoned curb boxes unless specifically directed otherwise for individual locations. This work shall be considered incidental to the project.
- 15.8 Returning the line to service may result in dislodging material within the private service line. The Contractor shall be responsible for responding to any subsequent complaints from the home owner, including cleaning of faucet screen(s), meter, and other plumbing facilities, which may be effected by the work. This work shall be considered incidental to the project.
- 15.9 The Contractor shall place a wooden 1 inch by 2 inch (minimum) stake at each curb stop when the new water service is completed. The stake shall extend approximately 6 inches above the final finish grade and shall be painted blue. Contractor shall maintain the stakes until the paving and seeding work is completed and the box is set at finish

grade. Payment will not be made for new water services unless the work described above is complete. Payment for the water service may be subsequently deleted if the stake(s) is not maintained in place as required.

- 15.10 Contractor shall have all curb stop boxes set to finish grade during completion of paving (if box is in the sidewalk, drive, etc.) and seeding work. If that paving and seeding work is not completed prior to December 1<sup>st</sup>, the Contractor shall set the box to finish grade such that it is visible and readily accessible and continue to maintain the blue stake(s) per paragraph 16.9 above.

All curb stop boxes not set at finish grade prior to December 1<sup>st</sup> shall be adjusted as necessary by the Council Bluffs Water Works. The \$500.00 charge for that work will be deducted from the Contract payment. The curb stop box has to be easily accessible for operation by the Water Works through the entire project, including the winter.

New or exposed water services shall be fully backfilled prior to December 1<sup>st</sup>. Water services that are being worked on beyond December 1<sup>st</sup> shall be protected from the elements throughout the workday and be backfilled each evening. All water services that are exposed to the elements on or after December 1<sup>st</sup> may be backfilled, insulated or otherwise protected by the Water Works at their discretion. The \$500.00 plus materials charge for that work will be deducted from the Contract payment for the water main construction. The Contractor shall not be paid any additional cost for subsequent excavation or removal of temporary materials to resume or complete the work.

16. CUT AND PLUG / CUT AND CONNECT EXISTING WATER MAINS

- 16.1 This work will require the Contractor to locate, excavate, cut, and plug or connect the end of existing water mains after construction, disinfection, and testing the new water mains and after the water services are connected to the new main unless shown otherwise on the plans.
- 16.2 The Contractor shall submit a schedule for this work to the Engineer for approval at least 5 days advance notice (excluding Saturdays, Sundays and Holidays) before the work is proposed to be done. The Water Works will need to shut down existing mains for this work to be done and the Contractor shall coordinate with the Water Works in doing the work.
- 16.3 The Engineer reserves the right to have the Contractor reschedule the work for emergencies, water supply concerns, main breaks and other causes as necessary by the Water Works, without notice, additional compensation or additional working days.
- 16.4 The Engineer may require this work to be performed after normal working hours or on a Saturday without additional compensation to the Contractor. If the Engineer directs the work to be done on Sundays or Holidays (observed by the Contractor), additional compensation will be made for the overtime labor expenses unless otherwise noted on the plans.
- 16.5 The Contractor shall preassemble pipe and fittings to minimize the time that the water main has to be out of service. Contractor shall swab all preassembled pipe and fittings with a chlorine solution before installation. The Contractor shall excavate as necessary to allow Water Works to verify existing conditions and determine required fittings (including standard or over-size sleeves) and pipe lengths to accomplish the work.
- 16.6 The Water Works will not turn off water until excavation is complete and all fittings for all "cut and connects" and/or all "cut and plugs" for the shutdown are ready (pre-assembled) and stockpiled at each respective location.

- 16.7 The Engineer may require the Contractor to do more than one “cut and plug” and/or “cut and connect” simultaneously to minimize the disruption of service.
- 16.8 The Contractor shall give the Engineer a minimum of 24 hours advance notice (excluding Saturday, Sunday and holidays) of the intent to shut the water off, this is in addition to the customer notification requirements. Customers affected by this work shall have a minimum of 1 day advance notice for residential shut-offs and 2 days advance notice (excluding Saturdays, Sundays and Holidays) if any businesses are affected by the shut-off. If the “cut and plug” work is controlled by the disinfection and testing of a new water main, the Water Works will not attempt to notify the customer through direct communication or a door hanger notice form until the new water main has passed all the disinfection and testing requirements. Should renotification be required for any reason, the Water Works will notify the customer. The Water Works reserves the right to not shut the water off without proper notice.
- 16.9 Contractor shall remove (and salvage to the Water Works) all valve box lids from valves being abandoned in paved areas as part of the project. The boxes shall be filled with concrete, flush to the paving surface. Contractor shall remove (and salvage to the Water Works) all valve boxes and lids from valves being abandoned in non-paved areas as part of the project. This work shall be incidental to the project unless noted otherwise on the plans.

17. METHOD OF MEASUREMENT

17.1 Water Main Pipe and Insulation

- 17.1.1 The footage of pipe to be paid for shall be the number of linear feet of pipe in place, completed and approved. It shall be measured along the centerline of the pipe. The several classes, types and sizes shall be measured separately. All fittings and valves shall be included in the footage as typical pipe sections in the line being measured. Pipe inside a steel casing will not be paid for separately.
- 17.1.2 The water main pipe required to install the hydrants as shown on the plans and/or as directed by the Water Works shall not be measured for payment unless noted otherwise on the plans. The pipe and polyethylene encasement shall be incidental to the Fire Hydrant Assembly bid item.
- 17.1.3 Polyethylene encasement shall be considered incidental to the cost of piping, including the encasement of existing water mains.
- 17.1.4 Extra depth of water main placement, to avoid conflicts with existing gravity sewers, and as necessary to connect to or cross existing mains will not be measured separately for payment. The extra depth, when required, shall be incidental to the water main bid item.
- 17.1.5 Insulation with polyethylene encasement and insulation with aluminum jacket shall be measured along centerline of pipe.
- 17.1.6 The removal of existing and temporary caps, plugs, and thrust blocking shall be incidental to the pipe installation.

17.2 Appurtenant Items

- 17.2.1 The following items placed will be counted for each type and size of the items completed in place and accepted:

- A. Bends
- B. Reducers
- C. Tees
- D. Sleeves
- E. Plugs
- F. Crosses
- G. Gate Valves
- H. Fire hydrant assemblies
- I. Water services
- J. Water main tap for purification
- K. Other items listed in the contract, approved by the Engineer, or added by change order

17.2.2 The required polyethylene encasement of appurtenant items shall be considered incidental to the cost of the items.

17.2.3 The cost for the construction of required thrust blocks and required restraining devices shall be included in the bid items for the respective fittings, plugs, sleeves, and fire hydrant assemblies.

17.2.4 The cost for the flushing, purifying, and testing of the water main shall be considered incidental to the project.

17.2.5 The footage of trenchless pipe bored in place shall be the number of linear feet measured for payment along the center line of the pipe at the existing ground surface. The trenchless boring and measurement shall end and begin 3 feet from the nearest edge of the driveway, street, etc. to be bored unless noted otherwise on the plans. Payment will be made for the partially completed boring length and for the removal and replacement items should trenchless boring have to cease for a conflict. Any delays caused by obstructions encountered during construction or any delays during revision of the alignment shall not result in any additional costs to the Contracting Authority or any time extension.

17.2.6 Trenchless Bore Water Main, Setup

- 1) Contract unit price shall include all costs for mobilization, site preparation and set up for trenchless water main installation. Item shall be paid once for each location that a trenchless bore installation is called for in the plans. If two separate bores are extended and joined together in the field, only one set up item will be paid. If the Contractor decides to break a bore into shorter segments, only the plan quantity will be paid for this item, and additional setups will be at the Contractor's expense. Item will not be paid for water service installations that require trenchless construction.
- 2) Item shall be paid for an unsuccessful trenchless bore attempt due to unexpected debris or other obstructions in the bore path. This item shall be full compensation for an unsuccessful pilot hole. In addition to this item, payment for unsuccessful full diameter bore holes will be paid as described in Section 17.2.5.
- 3) Item will not be paid for a bore attempt that needs to be redone due to misalignment by the Contractor.
- 4) Only two unsuccessful attempts will be paid at a setup location. After the first unsuccessful attempt, The Contractor shall inform the Engineer of the failed attempt and mark the approximate location of the obstruction. Contractor

shall not reattempt a bore until the Engineer has been notified, and the approximate obstruction location has been marked by the Contractor. All subsequent attempts prior to that requirement being met will be at the Contractor's expense.

- 5) After two unsuccessful attempts the Contractor shall obtain authorization from the Engineer to make another attempt, to open cut the water main or proceed by other methods. Any unauthorized unsuccessful attempts at a location in excess of two will be at the Contractor's expense.
- 6) No payment or time extensions will be made for fees or lost time resulting from unsuccessful bore attempts or while an alternative is determined.

### 17.3 Water Services

17.3.1 The Contract unit price for each water service line shall include all costs for furnishing and installing copper piping and installing the curb stop and box. The items provided by the Water Works shall be obtained by the Contractor from the Water Works Distribution Office at 2000 North 25<sup>th</sup> Street. The Water Works will tap water mains for water services. The Contractor shall provide the copper piping and a brick or approved block under the curb stop valve/box per Plan details.

17.3.2 Trenchless boring for the installation of water services shall be allowed only where shown on the plans or as directed by the Engineer or Water Works. Where trenchless boring is specified, the open excavation shall end and begin 3 feet from the nearest edge of the driveway, street, tree, etc. to be bored unless noted otherwise on the plans. Trenchless boring method shall be approved by the Engineer.

No tunneling or water jetting shall be allowed. If utilities and/or other conflicts are encountered during boring, surface removal and excavation shall be completed as directed by the Engineer. Payment will be made for the partially completed boring length and for the removal and replacement items should trenchless boring have to cease for a conflict. Any delays caused by obstructions encountered during construction or any delays during revision of the alignment shall not result in any additional costs to the Contracting Authority or any time extension.

### 17.4 Cut and Plug Existing Water Main

17.4.1 The Contract unit price for each Cut and Plug Existing Water Main shall include any necessary concrete plugs for the abandoned water main and removal of existing pipe, fittings, and thrust blocks as necessary. Price shall include not less than 20 feet of new pipe as necessary. Price shall include any overtime costs associated with doing this work beyond the normal work day or on a Saturday when directed by the Engineer. Water main fittings required for this work will be measured separately for payment.

### 17.5 Cut and Connect Existing Water Main

17.5.1 The Contract unit price for each Cut and Connect Existing Water Main shall include any necessary concrete plugs for the abandoned water main and removal of existing pipe, fittings, and thrust blocks as necessary. Price shall include not less than 20 feet of new pipe as necessary. Price shall include any overtime costs associated with doing this work beyond the normal work day or on a Saturday

when directed by the Engineer. Water main fittings required for this work will be measured separately for payment.

#### 17.6 Granular Materials

17.6.1 Measurement for payment will be in tons at locations shown on the plans or as directed by the Engineer. Measurement will be based on the actual scale tickets of individual loads from the supplier and provided to the Engineer. Scale tickets of individual loads shall be delivered to the Engineer within 24 hours of the granular material placement. Scale tickets of individual loads received by the Engineer after the 24 hour period will not be included for payment.

#### 17.7 Select Backfill for Water Main

17.7.1 Measurement for payment of select backfill will be measured in cubic yards based on the actual number of truck loads of material hauled to the project in each type of truck used or on actual scale tickets of individual loads from the supplier and provided to the Engineer at locations directed by the Engineer. Truck load counts and scale tickets of individual loads shall be delivered to the Engineer within 24 hours of the select backfill placement. Load counts or scale tickets of individual loads received by the Engineer after the 24 hour period will not be included for payment.

### 18. BASIS OF PAYMENT

#### 18.1 Water Main Pipe and Insulation

18.1.1 The footage of pipe as determined from the measurements shall be paid for at the Contract unit price per linear foot of the various classes, types and sizes. This payment shall be full compensation for furnishing, hauling and installing the pipe, polyethylene encasement, tracing wire system, for excavation, for all testing, for backfilling and compaction, for jointing, and for all labor, material, equipment, tools and incidentals necessary to complete the main, in accordance with the contract documents. Water main inside a steel casing will not be paid for separately.

18.1.2 Insulation with polyethylene encasement and insulation with aluminum jacket shall be paid for at the Contract unit price per lineal foot.

#### 18.2 Appurtenant and Miscellaneous Items

18.2.1 The number of units of each item shall be paid for at the Contract unit price per each for each item respectively. This unit price as agreed upon in the Contract, shall constitute full compensation for furnishing and placing all materials, for all excavation, for testing, for backfilling and compaction, for jointing, and for all labor, material, equipment, tools and incidentals necessary to complete the units in accordance with the contract documents.

18.2.2 Hangers, bolts, inserts and appurtenances for securing the insulated water main shall be paid as a lump sum. Refer to Pipe Materials Section.

18.2.3 The footage of trenchless bored pipe as determined from the measurements shall be paid for at Contract unit price per linear foot. This payment shall be full compensation for all labor, material, equipment, tools and incidentals necessary to perform this work. The footage of pipe furnished and installed will be measured separately at the Contract unit price per linear foot of the various classes, types

and sizes of water main installed.

18.3 Granular Materials

18.3.1 The Contractor will be paid the Contract unit price per ton. This payment shall be full compensation for all equipment, labor, and tools necessary for excavation, furnishing, hauling, placement, compaction and removal (if required) of the granular material in accordance with the contract documents.

18.4 Select Backfill for Water Main

18.4.1 For the number of cubic yards placed in accordance with the contract documents, the Contractor will be paid the Contract unit price per cubic yard. This payment shall be full compensation for all equipment, labor, and tools necessary for removal and disposal off site of the unsuitable material, furnishing, hauling, placement and compaction of the select backfill material in accordance with the contract documents.

19. STEEL CASING

19.1 Casings shall be ASTM A 53, Grade B, steel for casing pipe sizes up to 26 inches or ASTM A 139, Grade B, for casing pipe sizes up to 90 inches or API-5L, Grade B, steel for casing pipe sizes 30 inches and larger, wall thickness size and length as indicated on the Plans. Contractor shall provide Engineer with a certification of material using a Shop Drawing Transmittal Form.

19.2 Ends of casing pipe shall be sealed using 1/8 inch thick synthetic rubber seals with stainless steel clamps, "EndSeals" as manufactured by Power Seal Pipe Line Products, Corporation; Model BWM ES as manufactured by the BWM Company; Model AW as manufactured by Advanced Products & Systems, Inc.; or approved equal.

19.3 Casing chocks, model 4810 as manufactured by Power Seal Pipeline Products Corporation; Model BWM-SS as manufactured by the BWM Company; or approved equal shall be placed around the water main pipe to ensure approximate centering within the carrier pipe and to prevent damage during installation and shall not create a dielectric cell. Chocks shall be Type 304 stainless steel with elastomeric PVC liner per ASTM D 149. Chocks shall be center restrained. Installation shall conform to the latest edition AWWA C600 and manufacturer's recommendations.

19.4 Water main pipe installed in the steel casing pipe will not be paid for separately.

19.5 Shop Drawings shall be submitted for all items in this Section. Refer to Section 1.10.

20. CASING INSTALLATION

20.1 When designated on the plans, the casing pipe shall be installed by a jacking or boring operation. Casing pipe shall be bored or jacked on line and grade. Deviation from true line or grade will be sufficient cause for abandoning the casing pipe in-place, after filling with flowable mortar and relocating the casing pipe to a new location. If additional fittings are required due to deviation from true line, grade or casing pipe relocation, the Water Works may consider this additional work incidental to the installation of casing.

20.1.1 If the casing is damaged during installation, the Water Works may require the Contractor to remove and replace the damaged section by jacking additional casing or other approved means.



- 20.1.2 The maximum alignment deviation of the water main centerline shall be:  
Horizontally:  $\pm 1.0$  foot per 100 feet of bore and jack; Vertically:  $\pm 0.2$  foot up to 200 feet of bore and jack;  $\pm 0.3$  foot between 200 feet and 300 feet of bore and jack.
- 20.2 Contractor shall expose the end of the casing pipe for the Engineer to verify the alignment compliance. This work shall be completed before the bore and jack equipment leaves the site and before payment is made for the work.
- 20.3 Water main polyethylene encasement shall not be required through the casing pipe.
- 20.4 If tracing wire is required per the plans, it shall be secured to each end of the steel casing, but not extend through the casing.
- 20.5 Before proceeding with any boring or jacking operation, the Contractor shall verify that his jacking and receiving pit conform to OSHA requirements.
21. TRACER WIRE
- 21.1 Tracing Wire: Contractor shall furnish and install a No. 12 AWG solid single copper conductor tracer wire with a minimum of 0.045 inches of LLDPE insulation wire along water main where specified. The wire shall be specifically for use for direct bury tracer wire. A No. 12 THHN wire shall not be used.
- 21.2 Tracing wire termination shall be inside of a tracer wire access box. The box shall be figure No. TWABADJ (adjustable standard duty) as manufactured by Valvo, Inc. or approved equal. Standard locking lid shall be labeled "water." Box shall be set behind a hydrant, abutting a valve box or at a witness post as shown on the plans or as directed by the Water Works.
- 21.3 Bare 1 pound Magnesium anodes, packaged in a cardboard box, shall be placed at each end of the tracing wire and additional anodes are required to be spaced at a maximum of 1000 foot intervals.
- 21.4 Tracing wire shall be attached securely to the top of the water main. Tracing wire shall be taped to the water main in 5 foot intervals.
- 21.5 Tracing wire shall not be required when the water main is installed in a steel casing. Tracer wire shall be secured to each end of the steel casing.
- 21.6 All tracing wire systems will be tested by the Water Works before final acceptance of the project. Tracing wire systems shall be operable and ready for testing before being paved over. Contractor shall make any necessary repairs to provide a complete installation.