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STANDARD CONSTRUCTION SPECIFICATIONS FOR WATER SYSTEMS DIVISION 60

SECTION 60.01 GENERAL

Article 1.1 Scope of Work

The Work covered by these Specifications consists of providing all plant, labor, equipment, supplies, material, transportation, handling and storage, and performing all operations necessary to complete the construction of all water facilities that will be distributing water by the Anchorage Water and Wastewater Utility (AWWU). Requirements for earthwork including trench excavation and backfill are specified in Division 20 - Earthwork.

Article 1.2 Applicable Standards

The most recent revision of the following standards are hereby made a part of these Specifications:

ASTM A126	Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings
ASTM B88	Specification for Seamless Copper Water Tubing
ASTM D256	Test Methods for D-C Resistance of Plastics and Electrical Insulating Materials
ASTM D3035	Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Controlled Outside Diameter
ASTM D3261	Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing
ASTM D3350	Specification for Polyethylene Plastic Pipe and Fittings Materials
AASHTO M45	Sand for Cement Mortar
AWWA A100	Water Wells
AWWA C104/ ANSI A21.4	Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
AWWA C105/ ANSI A21.5	Polyethylene Encasement for Ductile Iron Piping for Water and Other Liquids
AWWA C110/ ANSI A21.10	Ductile-Iron and Gray-Iron Fittings, 3 in. through 48 in., for Water and Other Liquids

AWWA C111/ ANSI A21.11	Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings
AWWA C115/ ANSI A21.15	Flanged Ductile-Iron Pipe with Threaded Flanges
AWWA C151/ ANSI A21.51	Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids
AWWA C303	Reinforced Concrete Pressure Pipe, Steel Cylinder Type, Pre-Tensioned, for Water and Other Liquids
AWWA C500	Gate Valves for Water and Sewerage Systems
ANSI/ AWWA C502	Dry-Barrel Fire Hydrants
ANSI/ AWWA C504	Rubber-Seated Butterfly Valves
ANSI/ AWWA C600	Installation of Ductile-Iron Water Mains and Their Appurtenances
AWWA C651	Disinfecting Water Mains
ANSI/ AWWA C652	Disinfection of Water Storage Facilities
ANSI/ AWWA C800	Underground Service Line Valves and Fittings
AWWA C901	Standard for Polyethylene (PE) Pressure Pipe and Tubing, 1/2 in. through 3 in., for Water Service
ANSI/ AWWA D100	Welded Steel Tanks for Water Storage
ANSI/ AWWA D102	Coating Steel Water-Storage Tanks
SSPC-SP	Steel Structures Painting Council Surface Preparation Specifications
SSPC-PA	Steel Structures Painting Council Paint Application Specifications
NSF (Standard 61)	Drinking Water System Components – Health Effects

UBC	Uniform Building Code, latest edition adopted by MOA and current local amendments
IBC	International Building Code, latest edition adopted by MOA and current local amendments
UFC	Uniform Fire Code, latest edition adopted by MOA and current local amendments
IFC	International Fire Code, latest edition adopted by MOA and current local amendments
UMC	Uniform Mechanical Code, latest edition adopted by MOA and current local amendments
IMC	International Mechanical Code, latest edition adopted by MOA and current local amendments
UPC	Uniform Plumbing Code, latest edition adopted by MOA and current local amendments
NEC	National Electrical <u>Code</u> , latest edition adopted by MOA and current local amendments
NFPA	Other National Fire Protection Association Standards, latest edition adopted by MOA and current local amendments

Article 1.3 Survey

Survey shall be performed by the Contractor per Division 65 - Construction Survey.

Article 1.4 Pipe Insulation

Rigid board insulation required for frost protection of water mains and services shall be high density extruded polystyrene, Minimum 60 PSI, equivalent to R-20 per four inch (4") thick insulation. The design engineer may request authorization from the AWWU plan reviewer, prior to plan approval, to substitute expanded polystyrene rigid board insulation if the geotechnical report reflects suitable soil conditions. The designer shall submit analysis and justification demonstrating the insulation will not be exposed to seasonal ground water influxes or a high soil moisture content. Subsequent to AWWU's review and approval, all drawing references to substitute expanded for extruded insulation shall reflect "Expanded Polystyrene Rigid Board Insulation meeting ASTM D2842".

Article 1.5 Payment - General

Payment for all Work included in this Division shall be paid for in accordance with Division 10, Section 10.07 - Measurement and Payment, and shall include full payment for all Work described.

SECTION 60.02 FURNISH AND INSTALL PIPE

Article 2.1 General

The Work under this Section consists of the performance of all Work required for furnishing and installing water pipe, fittings, and bolts for ductile iron pipe, conductivity straps and thrust restraint systems. The Contractor shall install piping systems in accordance with these Specifications and manufacturer's recommendations, and in conformity with the lines and grades as shown on the Drawings, unless otherwise approved. The use of pipe containing asbestos materials shall be prohibited. Removal of existing wood stave water line shall be considered incidental to this Section and no separate payment shall be made.

Contractor shall provide seventy-two (72) hours written notice to the Engineer, the Anchorage Fire Department, and affected property owners/businesses prior to anticipated mainline flow interruptions. It shall be the Contractor's responsibility to coordinate "turn-off" and "turn-on" with the Engineer.

Article 2.2 Material

A. Ductile Iron Pipe

Ductile Iron Pipe shall conform to the requirements of AWWA C151, with cement mortar lining conforming to the requirements of AWWA C104/ANSI A24.1. Class 52 pipe shall be used for all pipe unless otherwise specified in the Special Provisions.

Fittings shall be a minimum of 250 pounds pressure rating, mechanical joint or all bell, lined or unlined, either cast iron or ductile iron, unless otherwise required by the Contract Documents. All fittings shall conform to the requirements of AWWA C110/ANSI A21.10. Rubber gasket joints for ductile iron pipe and fittings shall conform to the requirements of AWWA C111/ANSI A21.11.

All bolts and nuts supplied with fittings and appurtenances shall conform to ASTM A307 and A563, Grade A or B. All bolts shall be stamped with the grade marking on the head of the bolt, and shall be "307A" or "307B". All bolts and nuts shall be factory-coated with a blue fluoropolymer coating for corrosion resistance.

In areas of known high-corrosion conditions, stainless steel bolts and nuts shall be supplied with fittings and appurtenances. Stainless steel bolts and nuts shall be Type 316 stainless steel with a minimum tensile strength of 75,000 PSI and shall conform to ASTM F593 and F594. All bolts shall be stamped with the grade marking on the head of the bolt, and shall be "T-316", "316", or "F-593".

B. Concrete Cylinder Pipe

Concrete Cylinder Pipe shall conform to the requirements of AWWA C303 and as otherwise required by the Contract Documents.

C. Copper Service Pipe

Pipe used under this Specification shall be soft-drawn, seamless, annealed copper pipe, suitable for use as underground service water connections for general plumbing purposes, and shall comply with the requirements of ASTM B88 for Type K soft copper as manufactured by the American Brass Company, or equal.

D. Continuity Straps

Continuity straps shall be stranded or solid, rubber or plastic coated, Number 2 copper wire.

E. Thrust Restraint System

Unless otherwise detailed on the Drawings, ductile iron pipe joints shall be push-on rubber gasket types conforming to AWWA C111. Where specified on the Drawings and/or required in these Specifications, ductile iron pipe shall be installed with restrained-joint thrust restraint systems. Ductile iron thrust restraint systems shall be EBAA Iron MEGALUG[®], Romac Industries RomaGrip, or U.S. Pipe Field LOK[®] Gasket. If the ductile iron pipe restrained-joint system proposed for use in the Work is not one of these systems, the Contractor must field demonstrate to the Engineer the installation and/or construction of each new restrained-joint or restraining system. The Contractor shall provide AWWU with a minimum of forty-eight (48) hours notice, excluding non-working days, to coordinate the review of the field demonstration. The Engineer will ask for verification that the restrained-joint system is installed in accordance with the jointing system manufacturer's written instructions. If, in the opinion of the Engineer, the Contractor fails to install the restrained-joint system in accordance with the jointing system manufacturer's recommendations, the Contractor shall remove the disapproved system and replace with a new restrained-joint system. The Contractor shall provide access to the field demonstration location and all trench excavation, dewatering and backfill operations prior to, during, and after the restrained-joint system is reviewed by the The cost for coordinating and providing access for review of the Engineer. Contractor's installation and/or construction of the restrained-joint system shall be incidental to the bid item under construction.

All restrained-joint ductile iron installation areas shall include joints, fittings, and piping deflection points.

The Contractor shall provide pipe manufacturer submittals, which include thrust restraint calculations prior to construction.

F. High Density Polyethylene Pipe

The pipe and fitting material shall have a cell classification of 445574C in accordance with ASTM D3350. In addition, the material must exceed 1,000 hours when tested in accordance with the Ring Environmental Stress Crack Resistance Test (Radar Ring Test) with fewer than twenty percent (20%) failures. Also, the

extruded pipe shall have impact strengths greater than fifteen (15) foot-pounds per inch at thirty-two degrees Fahrenheit (32°F) when tested in accordance with the ASTM D 256 Charpie Impact Test. The material shall be listed by the NSF for potable water service and shall be precompounded. In-plant blending shall not be allowed.

The pipe shall be homogeneous throughout and free of visible cracks, holes, foreign inclusions or other injurious defects. It shall be uniform in color, opacity, density and other physical properties.

Butt fusion of the pipe and fittings shall be performed in accordance with the pipe manufacturer's recommendations as to equipment and technique. The fusion operation shall be performed by an individual who has demonstrated the ability to fuse polyethylene pipe in the manner recommended by the pipe supplier. The pipe supplier shall supply a representative to instruct the Contractor's crew on butt fusion and installation and witness the first twenty joints.

G. Material Limitations

Copper and ductile-iron pipe are the only pipe materials allowed on water service connections. Galvanized pipe, asbestos-cement pipe and the use of lead-tipped gaskets shall be prohibited.

Article 2.3 Construction

A Excavation and Backfill

The Contractor shall provide all excavation, backfill, and compaction necessary to install pipe in accordance with Division 20, Section 20.13 - Trench Excavation and Backfill.

B. Materials Delivery

Pipe and appurtenances shall be handled in such a manner to ensure delivery to the trench in a sound, undamaged condition. Particular care shall be taken not to damage the pipe, pipe coating, or lining. Before installation, the pipe and appurtenances shall be examined by the Engineer for defects.

The pipe shall not be strung out along the shoulders of the road for long distances if it causes inconvenience to the public. The amount of pipe strung at the job site shall be at the discretion of the Engineer.

Rubber gaskets shall be protected from freezing temperatures or direct sunlight.

C. Installation

Installation shall be in accordance with the requirements of ANSI/AWWA C600. The interior of the pipe and accessories shall be thoroughly cleaned of foreign

matter before being lowered into the trench. The pipe shall be kept clean during laying operation by plugging.

Pipe and appurtenances shall be carefully lowered into the trench by means of derrick, ropes, belt slings, or other suitable equipment. Under no circumstances shall any of the pipe or appurtenances be dropped or dumped into the trench. Care shall be taken to avoid abrasion of the pipe coating. Poles used as levers or skids shall be of wood and shall have broad, flat faces to prevent damage to the pipe and coating.

The trench bottom shall be graded to provide uniform support for the pipe barrel. Water shall be kept out of the trench by pumping, if necessary, until the jointing is completed. When Work is not in progress, open ends of the pipe, fittings, and valves shall be securely plugged so that no trench water, earth or other substances will enter the pipes or fittings. Where any part of the coating or lining is damaged, the repair shall be made by the Contractor at his expense and in a manner satisfactory to the Engineer. At a sufficient distance, prior to encountering a known obstacle or tie-in to an existing pipe, the Contractor shall expose and verify the exact location of the obstacle or pipe so that proper alignment and/or grade may be determined before the pipe sections are laid in the trench and backfilled. The connections shall be made by using specials and/or fittings to suit actual conditions. All connections larger than two inch (2") diameter made under pressure shall be made by AWWU forces.

Pipe ends left for future connections shall be plugged or capped, and restrained, as shown on the Drawings or as directed by the Engineer. The Contractor shall install vertically an eight foot (8') wood post, directly over the end of pipe.

Cutting of pipe shall be done in a neat and workmanlike manner without damage to the pipe.

Thrust restraint systems of the type shown on the Standard Details shall be installed where the pipeline terminates or changes alignment, utilizing a tee, cross, bend, or similar fitting.

All ductile iron pipe, fittings, valve boxes, and hydrants shall be encased in one layer of polyethylene encasement in accordance with Section 60.07 - Polyethylene Encasement.

Water mains and services shall be constructed to meet all separation requirements of 18 AAC 80.020. Variance from the separation requirements requires a waiver from the Alaska Department of Environmental Conservation. The Contractor shall stagger the joints for the water pipe such that no joint shall be closer than nine feet (9') from the centerline crossing of water and sanitary sewer pipes. In addition, where water and sanitary sewer or storm sewer mains and services intersect, the vertical separation between the water and pipelines shall be eighteen inches (18") minimum between exterior pipe surfaces.

D. Alignment and Grade

Contractor shall lay the pipe in the trench so that after the line is completed, the bottom of the pipe conforms accurately to the grades and alignment given by the Engineer. A maximum two-tenths foot (2/10' or 0.2') deviation from design elevation and alignment will be allowed. The pipe shall be generally straight to visual observation as determined by the Engineer.

The Contractor shall check both line and grade and record measurements in a field book for each piece of pipe and appurtenance laid. The Contractor shall have instruments such as a transit and level for transferring alignment and grades from offset hubs. He also shall have in his employ a person who is qualified to use such instruments and who shall have the responsibility of placing and maintaining such construction guides. The Contractor will furnish to the Engineer a copy of the surveyor's notes for the newly installed pipe and appurtenances. The practice of placing backfill over a section of pipe to provide a platform for instruments shall be subject to the approval of the Engineer and shall be accomplished in accordance with Division 20, Section 20.13, Article 13.3 - Construction.

All adjustments to line and grade shall be done by scraping away or filling the earth under the body of the pipe and not by blocking or wedging up. Deflections from a straight line or grade, as required by vertical curves, horizontal curves, or off-sets shall not exceed eighty percent (80%) of the manufacturer's recommendations.

If the alignment requires deflection in excess of the above limitations, the Contractor shall furnish special bends to provide angular deflections within the limits allowable. Short radius curves and closures shall be formed by shorter lengths of pipe, bevels, or fabricated specials.

E. Jointing of Metal Pipe

The Contractor has the option of using either mechanical or push-on joints. All joints shall conform to the requirements of ANSI/AWWA C600.

The Contractor will be required to use mechanically restrained joints and fittings on all hydrant leads. The Engineer has the option of checking any or all mechanical joints to assure proper torque as specified by the manufacturer.

Two electrical continuity straps shall be installed on each side of every joint for pipes less than twelve inches (12") in diameter. Straps are to be welded to a clean, dry surface. All welds and uncoated surfaces are to be coated with coal tar pitch to the satisfaction of the Engineer.

Whenever flange connections are shown on the Drawings, called for in the Specifications, or required in the Work, the flange and fittings shall conform to the requirements of AWWA C110/ANSI A21.10 for two hundred fifty pound (250#) pressure ratings.

Contractor shall field demonstrate to the Engineer the installation and/or construction of each new restrained joint or restraining system. Contractor shall provide AWWU with a minimum of 48 hours notice, excluding non-working days, to coordinate the review of the field demonstration. The Contractor shall certify that the restrained joint system is installed in accordance with the manufacturer's instructions. If Contractor fails to install the restrained joint system in accordance with manufacturer's instructions, in the opinion of the Engineer, Contractor shall remove the disapproved system and replace with a new restrained joint system.

Contractor shall be responsible for access to the field demonstration location and all trench excavation, dewatering, and backfill operations prior to, during, and after the restrained joint system is reviewed by the Engineer. The cost for coordinating and providing access for review of Contractor's installation and/or construction of the restrained joint system shall be incidental to the bid item under construction.

Article 2.4 Flushing and Testing

Prior to any tests performed, all newly installed water facilities, including fire lines, shall be open-bore flushed. Water and sewer main and service trenches shall be substantially filled and compacted. The Contractor, at his option, shall perform the disinfection, hydrostatic testing and continuity testing in any order of sequence. The Contractor is made aware that in the event repairs are made on the system in order to pass the hydrostatic test, and these repairs are made subsequent to disinfection of the system, then the open-bore flush and the disinfection will be null and void and shall be repeated to the satisfaction of the Engineer after the repairs are made. Disinfection will not be allowed until all open-bore flush pipes are removed and the water system is sealed. Costs for repeat disinfection and flushing shall be incidental to the bid item for Furnish and Install Water Main.

Continuity tests will not be performed until all excavation has been completed and backfilled. AWWU's representative must be present for all testing and flushing.

A request to supply water for flushing, testing, and disinfecting shall be scheduled in writing with the Engineer at least 24 hours prior to obtaining AWWU-supplied water. The request for flushing, testing, and disinfecting will be subject to water availability. In the event of high water demand or low water availability within the AWWU water system, meeting Contractor's schedule may not be possible.

Contractor shall submit, in writing, for the Engineer to review and approve, a schedule and procedure for the testing and flushing of all newly installed pipe. When, in the opinion of the Engineer, the testing and flushing schedule and procedure is deficient, inadequate, improper, or conditions are such that the impact to existing water service areas are adversely affected by service interruptions, Contractor will be notified in writing by the Engineer. Such notification shall be accompanied by a statement of the corrective action to be taken. Contractor shall adhere to the testing and flushing schedule and comply with such instruction as directed by the Engineer.

A. Flushing

All newly installed water facilities shall be open-bore flushed to remove any foreign matter. Open-bore flushing shall be accomplished prior to hydrostatic testing and disinfection at each extremity of the main, including all stub-outs and dead ends. The Contractor shall furnish, install and remove all fittings and pipes necessary to perform the flushing, at no additional cost to the Municipality. Under no circumstances will open-bore flushing through hydrants or reduced outlets be permitted. Fire hydrant auxiliary valve shall be closed during flushing.

The Contractor shall notify the Engineer and AWWU forty-eight (48) hours in advance of any flushing operations. The Contractor shall provide a plan for approval by the Engineer for the disposal of the discharge waters from the open-bore flush for seven (7) days. The governing authority shall approve the discharge location and a discharge permit is required. Flushing of newly-constructed mains may be required between the hours of 1:00 a.m. and 6:00 a.m., depending upon the availability of water, as authorized by AWWU. The Municipality will not be responsible for any cost incurred by the Contractor for flushing.

B. Hydrostatic Testing

A hydrostatic test (Pressure Test) will be conducted on all newly constructed water mains, fire hydrant leads and stub-outs after open-bore flushing in the presence of requirements AWWU representative in accordance with the an of ANSI/AWWA C600 unless hereinafter modified. The Contractor shall furnish all necessary assistance, equipment, labor, materials, and supplies (except the test pressure gauge) necessary to complete the test to the satisfaction of the Engineer. The Contractor shall suitably valve-off or plug the outlet to the existing or previously-tested water main at his expense, prior to making the required hydrostatic test. Prior to testing, all air shall be expelled from the pipe. lf permanent air vents are not located at all high points, the Contractor shall, at his expense, install corporation cocks at such points so the air can be expelled as the line is slowly filled with water.

All main valves, fire hydrant auxiliary valves, fire hydrant main valves, and plugs shall be tested. All intermediate valves within the section being tested will be closed and reopened as directed by the Engineer during the actual test. Only static pressure will be allowed on the opposite side of the end valves of the section being tested.

All hydrostatic testing will be performed through test copper. Use of fire hydrant and service connections for testing will not be allowed.

The hydrostatic pressure shall be one hundred fifty (150) psi. The duration of each hydrostatic pressure test shall be thirty (30) minutes. After the required test pressure has been reached, pumping will be terminated. If the pressure remains

constant for 30 minutes without the aid of a pump, the results of the test shall be considered satisfactory as approved by the Engineer.

The Contractor shall notify the Engineer forty-eight (48) hours, (two (2) working days) prior to any test and shall notify the Engineer two (2) hours in advance of the scheduled time if the test is to be canceled. In the event the Engineer has not been notified of cancellation and the Contractor is not prepared for the test as scheduled, the Contractor shall reimburse the Engineer for all expenses incurred. These will include, but not be limited to, salaries, transportation and administrative costs.

C. Disinfection

Chlorine shall be used for disinfection per the current edition of ANSI/AWWA C-651. Chlorine shall be applied by one of the following methods: (1) liquid chlorine gas-water mixture, (2) direct chlorine gas feed, or (3) calcium hypochlorite and water mixture. Calcium hypochlorite shall be comparable to commercial products known as HTH, Perchloren or Machochlor. The chlorinating agent shall be applied at the beginning of the section through the test copper pipe adjacent to the feeder connection, insuring treatment of the entire line. Under no conditions shall the chlorinating agent be introduced through a fire hydrant. Water shall be fed slowly into the new line with chlorine applied in amounts to produce a dosage a minimum of twenty-five parts per million (25 ppm). Application of the chlorine solution shall continue until the required dosage is evident at all extremities of the newly laid line. Contractor may submit alternate disinfection methods to the Engineer for review.

Calcium hypochlorite shall be mixed into a solution of water and injected or pumped into the water main. During the chlorination process, all intermediate valves and accessories shall be operated. Valves shall be manipulated so that the strong chlorine solution in the line being treated will not flow back into the line supplying the water. Hydrostatic testing of a water line containing the chlorine mixture will not be allowed.

A residual of not less than ten parts per million (10 ppm) chlorine shall be retained in all parts of the water main after twenty-four (24) hours. After which this residual shall be flushed from the line at its extremities until the replacement water tests are equal chemically and bacteriologically to those of the permanent source of supply. The Contractor shall provide a plan for approval by the Engineer for disposal of chlorinated waters from the disinfection of the system. The governing authority shall approve the de-chlorination discharge method and location. In no instance shall a water main be chlorinated before open-bore flushing.

CHLORINATION

Pipe <u>Diameter</u> <u>(ID)</u>	Dosage (oz.) per 100 feet
4"	.34
6"	.76
8"	1.34
10"	2.10
12"	3.02
14" and larger	D ² x 3.02

- 1. D is the inside diameter in feet.
- 2. One Heaping Tablespoon $\cong \frac{1}{2}$ oz.

The above table is to be used as a guide for chlorinating water mains by the calcium hypochlorite and water mixture method. The Contractor shall use a dosage per one hundred feet (100') that results in a minimum chlorine solution of twenty-five parts per million (25 ppm).

This dosage takes into account that Contractors most frequently used granular HTH, which is sixty-five percent (65%) pure. If another chlorinating agent is used, the dosage must be adjusted. Caution should be exercised against producing too high a concentration of chlorine in the line, as approved by the Engineer.

D. Continuity Tests

The Contractor shall perform electrical conductivity tests on all ductile iron mains in the presence of a representative of the Engineer. Continuity testing shall also be performed on all water service connections and extensions greater than two inches (2") in diameter.

The Contractor shall maintain a circuit of six hundred (600) amperes DC current for a period of fifteen (15) minutes. Input current shall not exceed ten percent (10%) of the return circuit. All equipment necessary to maintain the circuit shall be supplied by the Contractor.

All continuity tests will be through wires connected to the main and brought to the surface. The use of water service thaw wires, fire hydrants and valves as substitutes for wires will not be accepted. All wires brought to the surface to complete the continuity test shall be removed to a depth of two feet (2') below finished street grade upon completion of the tests.

E. Test and Air Vent Copper Pipe Removal

The Contractor shall, upon acceptance of testing, remove all test and air vent copper pipe and close the corporation stop at the main with a copper disc and flare nut installed, in the presence of the Engineer.

Article 2.5 Measurement

Measurement for furnishing and installing water main shall be per linear foot of horizontal distance of the various sizes as set forth in the Bid Schedule. Measurement will be from station to station as staked in the field and as shown on the Drawings, except where the grade exceeds twenty-five percent (25%), in which case measurement will be by actual pipe length.

Article 2.6 Basis of Payment

Payment for this Work shall be in accordance with Division 10, Section 10.07 - Measurement and Payment, and shall include full payment for all Work described in this Section.

Unless specifically identified for payment under a separate pay item, the unit price bid to Furnish and Install (size) (type) Water Main shall include all labor, equipment and materials to furnish and install a functional potable water main including, but not limited to, the following incidental items: delivery of non-serviceable portions of removed pipe, valves, and fittings at a Contractor-furnished disposal site; delivery of serviceable portions of removed pipe, valves, and fittings to the Owner, when directed by the Engineer; installation of all pipe, tees, crosses, bends, caps, plugs, adapters, reducers, thrust restraint systems, and other fittings; installation of thrust blocks; adjustment to finish grade; cleaning and flushing; hydrostatic testing; provisions coordinating the supply of water as required for flushing and hydrostatic testing; disinfecting; continuity testing; protection and/or restoration of all existing utilities; maintenance of existing water distribution system flows; shoring and/or protection of existing light poles; maintenance and restoration of existing drainage patterns; restoration of existing driveways; signage, mail boxes, newspaper boxes, trees and shrubs located on private property; landscaping, utility markers, survey monumentation; removal and replacement of miscellaneous public or private improvements; preparation of off-roadway areas for topsoil and re-seeding; cleanup, and miscellaneous items required to complete the Work as shown on the Drawings.

Where the Work includes disconnecting existing water services from and existing water main and reconnecting them to a new water main, the disconnection and reconnection of those existing water services will be considered incidental to the price bid for installation of the new water main.

Trench excavation and backfill shall be paid for under Division 20, Section 20.13 - Trench Excavation and Backfill.

Payment shall be made on the following unit:

ITEM	UNIT
Furnish and Install (Size) (Type) Water Main	Linear Foot

SECTION 60.03 FURNISH AND INSTALL VALVES

Article 3.1 General

The Work under this Section consists of the performance of all Work required for furnishing and installing valves, including valve boxes and marker posts.

Article 3.2 Material

A. Gate Valves

Gate valves shall be iron body, fully bronze mounted, double disc, parallel or resilient seat valves as manufactured in accordance with the requirements of AWWA C500 "Gate Valves for Water and Sewer Systems." All valves shall be nonrising stem type with an O-ring seal and a two inch (2") square operating nut, and shall open counterclockwise. Valves shall be mechanical joint ends.

Gate valve bonnet bolts shall be Type 316 stainless steel with a minimum tensile strength of 75,000 PSI and shall conform to ASTM F593 and F594. All bolts shall be stamped with the grade marking on the head of the bolt, and shall be "T-316", "316", or "F593".

B. Butterfly Valves

Butterfly valves shall be of the rubber-seated tight-closing type. They shall meet or exceed the performance requirements of AWWA C504 for operational pressures of 150 psi working pressure and 300 psi hydrostatic pressure.

Mechanical joint valve ends shall be per AWWA C110/ANSI 21.10 and AWWA C111/ANSI 21.11 of the latest revision, and "Short-Body" in accordance with the requirements of Table 2 of ANSI/AWWA C504. Accessories (bolts, glands, and gaskets) shall be supplied by the valve manufacturer.

Butterfly valve actuator bolts that are exposed shall be Type 316 stainless steel with a minimum tensile strength of 75,000 PSI and shall conform to ASTM F593 and F594. All bolts shall be stamped with the grade marking on the head of the bolt, and shall be "T-316", "316", or "F593".

Valves must use full ANSI/AWWA C504 Class 150 B valve shaft diameter and full Class 150 B underground service operator torque rating throughout entire travel to provide capability for operation in emergency service.

Valve body shall be high-strength cast iron ASTM A126 Class B. For valves with the rubber seat mounted on the disc, the mating surface in the body shall be 304 or 316 steel. For valves containing the rubber seat in the body, the method of seat retention shall be in accordance with the requirements of ANSI/AWWA C504, except that no retaining fasteners or other hardware shall be permitted in the flow stream.

Valve operators, unless otherwise required by the Contract Documents, shall be of the traveling nut type, sealed, gasketed, and lubricated for underground service and capable of withstanding on overload input torque of four hundred fifty (450) foot-pounds at full open or closed position without damage to the valve or valve operator. The number of turns to operate the valve shall be a minimum of two (2) turns per inch of valve diameter for ninety degrees (90°) of closure travel at a maximum pull of eighty (80) pounds. All valves shall open counterclockwise and be equipped with two inch (2") square AWWA operating nut.

For butterfly valves twenty inches (20") and less, the valve shaft shall be one piece extending full size through valve bearings, disc and shaft seal. In the event that the shaft is turned down to fit connections to the operator, the limits of ANSI/AWWA C504, Section 3.3.2 shall be strictly observed. Carbon steel shafts, if used, shall have 304 or 316 stainless steel journals with static seals to isolate the interior of the disc and the shaft from the water.

For butterfly valves over twenty inches (20"), the valve shaft shall be of two-piece stub shaft type, made of 18-8 Type 304 stainless steel. Valve bearings and shaft seals for valves of all sizes shall meet the requirements of ANSI/AWWA C504 Section 3.6 and 3.7 respectively, with the following additional requirements:

- 1. Sleeve bearings shall have a maximum coefficient of friction of 0.1.
- 2. For underground service, packing shall be pressure-energized chevron or "O" ring type, not requiring adjustment and suitable for permanent duty.
- C. Pressure Reducing Valves

Pressure reducing valves shall be supplied as directed in the Contract Documents.

D. Valve Boxes

Valve boxes shall be cast iron of sliding, adjustable height type with round or oval bottom hood sections to fit over the top of the valve. The top section shall be recessed to receive a close fitting "eared" lid with the word "water" cast into it. Internal diameter of the smallest section shall not be less than five inches (5"). Minimum thickness of the metal shall not be less than five-sixteenth inch (5/16"). Castings shall be smooth and the workmanship shall be acceptable to the Engineer.

Valve boxes shall be of sufficient length (ten foot [10'] sections) for the pipe cover depth on the profile drawings and in accordance with the Standard Details.

E. Markers

Valve boxes shall be marked with markers consisting of two and one-half inch (2.5") O.D. galvanized steel pipe sections, seven feet (7) in length, with three feet (3)

buried in the ground. Markers shall be shop painted "Caterpillar Yellow" and painted with stenciled two inch (2") black numerals, showing the appropriate references. Markers shall be located on the nearest property line, due north, south, east or west of the valve at a maximum distance of fifty feet (50'), unless otherwise directed by the Engineer. Markers shall not be required where valve boxes are located in paved areas. Markers shall carry the following notation:

VB

(feet) (direction)

E. Live Tap Connections

Contractor shall provide all trench excavation, backfill, and compaction necessary to assist AWWU with the live tap connections. Excavation for live tap connections shall be unclassified and Contractor shall excavate substances encountered to the depth required for the live tap connections. Variations from the depth indicated in the Drawings will not be grounds for additional compensation. It shall be Contractor's responsibility to familiarize himself with the depth of water mains for the project. Contractor shall excavate for live tap connections in such a manner that the excavation is 90° to the main water line, whenever possible. The trench shall be long enough and of sufficient width at the bottom to allow installation of the valve for the live tap connection and provide safety for AWWU Operations personnel.

Contractor shall be responsible for, and shall bear the expenses incurred, if a water main should be damaged during excavation or backfilling. AWWU will repair all damaged mains; however, Contractor shall bear the cost of all material, labor, and other expenses.

Contractor shall provide assistance, equipment, labor, materials, and supplies (except the water main line valve) necessary to complete the live tap connection. Contractor shall notify the Engineer and AWWU 48 hours (two working days) prior to installation of the live tap connection. In addition, Contractor shall obtain all necessary permits for the live tap connection and pay all associated fees.

Tie back rods and/or tie back rod and shackle assemblies <u>will not</u> be acceptable as restrained joints or restraining system for valves and valve/pipe joint interface.

Unless otherwise detailed on the Drawings, valve and valve/pipe interface shall be push-on rubber gasket type conforming to AWWA C111. Where specified on the Drawings, restrained joint pipe shall be EBAA Iron MEGALUG®, Romac Industries RomaGrip, or approved equal.

Contractor shall provide pipe manufacturer submittals which include thrust restraint calculations prior to construction.

Article 3.3 Construction

The Contractor shall provide all trench excavation, backfill, and compaction necessary to install valves in accordance with Division 20, Section 20.13 - Trench Excavation and Backfill.

Valves or valve boxes shall be installed where shown on the Drawings. Valve box components shall be plumb and centered over the operating nut. The valve operator shall be placed on the side of the water main away from the centerline of the street or easement. On fire line installations, a valve shall be placed outside the building so that all fire hydrants will remain in service in the event water service to the building must be shut off for any reason.

Valves shall have the interiors cleaned of all foreign matter before installation. If the valve is at the end of the line, it shall be plugged prior to backfilling. The valve shall be inspected by the Engineer in the open and closed positions to ensure that all parts are in working condition.

Provisions shall be made to prevent soil infiltration into the valve box. Wrap burlap inside bottom section under the packing gland and wrap three (3) layers of non-woven geotextile fabric around the outside of the valve and base section of the valve box and secure the fabric at the top and bottom with tape. Encase the valve box with eight-mil polyethylene, encasement, taped securely in place.

The Contractor shall expose all valve boxes for prefinal and final inspection. After final inspection of the valves located in unpaved areas, sawdust shall be poured directly over the valve box lid and covered with gravel to facilitate location in the future.

Article 3.4 Measurement

The quantity to be paid shall be the actual number of valves of each class and size (including valve boxes and marker posts) furnished, installed and accepted.

Article 3.5 Basis of Payment

Payment for this Work shall be in accordance with Division 10, Section 10.07 - Measurement and Payment, and shall include full payment for all Work described in this Section.

Payment shall be made on the following unit:

ITEM	UNIT
Furnish and Install (Size) Gate Valve	Each
Furnish and Install (Size) Butterfly Valve	Each

SECTION 60.04 FURNISH AND INSTALL FIRE HYDRANTS

Article 4.1 General

The Work under this Section consists of the performance of all Work required for the furnishing and installation of "L-Base" Fire Hydrant Assemblies, including the fire hydrant leg pipe, auxiliary gate valve, valve box, joint restraint, guard rails, and fire hydrants.

Article 4.2 Materials

A. Fire Hydrants

Fire hydrants shall conform to the requirements of ANSI/AWWA C502 for Dry Barrel Fire Hydrants. Fire hydrants shall be Mueller Centurian or equal.

- 1. All fire hydrants shall be supplied with a five and one-fourth inch (5.25") main valve opening.
- 2. All single pumper hydrants shall be furnished with a six inch (6") ANSI Class 125 standard mechanical-joint end. All double pumper hydrants shall be furnished with an eight inch (8") ANSI Class 125 standard mechanical-joint.
- 3. All connections shall be mechanical-joint unless otherwise indicated in the Contract Documents.
- 4. Single pumper hydrants shall be furnished with two (2) two and one-half inch (2.5") hose connections and one (1) four and one-half inch (4.5") pumper connection. Double pumper hydrants shall be furnished with one (1) two and one-half inch (2.5") hose connection and two (2) four and one-half inch (4.5") pumper connections.
- 5. Unless otherwise required by the Contract Documents, all hydrants shall be furnished with a barrel length that will allow a minimum of ten feet (10') of bury.
- 6. The main valves shall be of the compression type, where water pressure holds the main valve closed permitting easy maintenance or repair of the entire barrel assembly from above the ground without the need of a water shutoff.
- 7. All fire hydrants shall be furnished with a breakaway flange which allows both barrel and stem to break clean upon impact from any angle. Traffic flange design must be such that repair and replacement can be accomplished above ground.
- 8. Painting and coating shall be in accordance with cited AWWA Specifications. After installation, the hydrant section from the traffic flange to the top of the operating nut shall be painted "Caterpillar Yellow."

- 9. Operating and nozzle nuts shall be pentagon shaped with one and one-half inch (1.5") point to flat measurements.
- 10. Hose nozzle threading shall be in conformance with NFPA #194 for National (America) Standard Fire Hose Coupling Screw Threads.
- 11. All working parts shall be bronze or noncorrosive metal in accordance with the requirements of ANSI/AWWA C502.
- 12. All hydrants shall be right hand opening (clockwise).
- 13. All hydrants shall be non-draining. Drain plugs shall not be removed.
- B. Auxiliary Gate Valves

All gate valves and valve boxes shall be furnished and installed in accordance with Section 60.03 - Furnish and Install Valves.

C. Thrust-Restraint System

Unless otherwise detailed on the Drawings, Contractor shall provide push-on rubber gasket type conforming to AWWA C111. Where specified on the Drawings and/or Standard Details, Contractor shall install EBAA Iron MEGALUG®, Romac Industries RomaGrip, U.S. Pipe Field LOK® Gasket System, or approved equal, on restrained joint pipe. Contractor shall ensure all restrained-joint installation areas shall include joints, fittings, and piping deflection points.

D. Guard Posts

The Contractor shall install guard posts at each hydrant installation in accordance with the Standard Details. If, in the opinion of the Engineer, the guard posts are not to be installed, they shall be delivered to the Anchorage Water and Wastewater Utility storage yard. Measurement and payment for guard posts shall be incidental to the Bid item "Furnish and Install Fire Hydrant Assembly."

Article 4.3 Construction

The Contractor shall provide all trench excavation, backfill and compaction necessary to install the fire hydrant assembly in accordance with Division 20, Section 20.13 - Trench Excavation and Backfill.

The Contractor shall install the hydrant assemblies in accordance with the Standard Details.

The fire hydrant auxiliary valve shall be closed during installation and remain closed during all main line open bore flushing operations. The auxiliary gate valve shall be opened for hydrostatic pressure testing and disinfection and while the hydrant is being raised by AWWU under pressure. All fire hydrant legs shall be installed level. The fire hydrant barrel shall be installed plumb. Fire hydrants will be adjusted to final grade by the AWWU

Operations Division. The Contractor shall provide AWWU with a minimum of seventy-two (72) hours notice, excluding non-working days, to coordinate fire hydrant adjustment. The Contractor shall be responsible for access to the hydrant location and all trench excavation, dewatering and backfill operations prior to, during, and after the fire hydrants are adjusted by AWWU personnel. The cost for coordinating and providing trenching operations are incidental to the fire hydrant installation. Any adjustments to the fire hydrant traffic flange on a Municipal Contract will be made by AWWU at no cost to the Contractor. Adjustment to other fire hydrants will be made by Anchorage Water and Wastewater Utility on a reimbursable basis.

Hydrants installed but not available for use shall be covered with burlap and securely tied.

In lieu of valve box markers for the auxiliary gate valves, the Contractor shall paint in two inch (2") black lettered stencils, the direction and distances to the nearest one-tenth foot (1/10' or 0.1') the distance to the valve box on the face of the fire hydrant directly below the bonnet flange.

Article 4.4 Measurement

The method of measurement to furnish and install fire hydrants shall be as follows:

A. Single Pumper Fire Hydrants

Fire hydrants six inch (6") leg to main, six inch (6") auxiliary gate valve and valve box, guard post installation, and thrust-restraint system shall be paid for at the unit price as set forth in the Bid Schedule. The price shall include full compensation for furnishing and installing single pumper hydrants as shown in the Standard Details.

B. Double Pumper Fire Hydrants

Fire hydrants eight inch (8") leg to main, eight inch (8") auxiliary gate valve and valve box, guard post installation, and thrust-restraint system shall be paid for at the unit prices as set forth in the Bid Schedule. The price shall include full compensation for furnishing and installing double pumper hydrants as shown in the Standard Details.

Article 4.5 Basis of Payment

Payment for this Work shall be in accordance with Division 10, Section 10.07 - Measurement and Payment, and shall include full payment for all Work described in this Section.

Payment shall be made under the following units:

ITEM	UNIT
Furnish and Install Fire Hydrant Assembly (Single Pumper)	Each
Furnish and Install Fire Hydrant Assembly (Double Pumper)	Each

SECTION 60.05 FIRE LINES

Article 5.1 General

The Work required under this Section consists of the performance of all Work required for the furnishing and installation of fire lines including thrust-restraint system, fittings, valves, and valve boxes.

Article 5.2 Material

Refer to Section 60.02, SubArticles 2.2.A – Ductile Iron Pipe, 2.2.D – Copper Service Pipe, and 2.2.E – Thrust Restraint System for material specifications.

Article 5.3 Construction

A. General

A fire line that originates at a water utility main has the primary purpose of providing fire protection inside a building. No connections, other than those for additional fire protection, will be allowed on the fire line outside the building. Domestic water obtained from a fire line will be connected and metered inside the building.

Valves and valve boxes shall be installed where shown on the Drawings.

B. Excavation and Backfill

The Contractor shall provide all excavation, backfill, and compaction necessary to install fire lines in accordance with Division 20, Section 20.13 - Trench Excavation and Backfill.

C. Materials Delivery

Refer to Section 60.02, SubArticle 2.3.B – Materials Delivery, for material delivery specifications.

D. Installation

Installation shall be in accordance with Section 60.02, SubArticle 2.3.C – Installation, amended as follows: Thrust-restraint systems shall be installed for a distance of forty feet (40') in both directions from all fittings.

E. Alignment and Grade

Refer to Section 60.02, SubArticle 2.3.D. - Alignment and Grade, for alignment and grade specifications.

F. Jointing of Metal Pipe

The Contractor has the option of using either mechanical or push-on joints. All joints shall be made in conformance with AWWA C-600. The Contractor will be required to use mechanically restrained joints on all hydrant leads. The Engineer has the option of checking any or all mechanical joints to assure proper torque as specified by the manufacturer.

Butterfly valves shall be used on lines sixteen inches (16") and larger. Refer to Section 60.03, SubArticle 3.2.B. - Butterfly Valves, for specifications.

Two electrical continuity straps shall be installed on each side of every joint for pipes less than twelve inches (12") in diameter. Straps are to be welded to a clean, dry surface. All welds and uncoated surfaces are to be coated with coal tar pitch to the satisfaction of, and as approved by, the Engineer.

Article 5.4 Fire Hydrants and Valve Boxes

Refer to Section 60.04, Article 4.2 - Material for Fire Hydrant Specifications and Section 60.03, Article 3.2 - Material for Valve Box specifications.

Article 5.5 Flushing and Testing

Prior to any tests performed, all newly installed fire lines shall be open-bore flushed. The Contractor, at his option, shall perform the disinfection, hydrostatic, and continuity test in any order of sequence. Hydrostatic testing of a water line containing a chlorine mixture shall not be allowed. Contractor is hereby notified, that in the event repairs are made on the system in order to pass the hydrostatic test, subsequent to completion of system disinfection and flushing, all previous tests, including open-bore flushing, shall be declared void and shall be repeated to the satisfaction of the Engineer. Costs for repeat disinfection and flushing shall be incidental to the price bid for Furnish and Install Fire Line.

A. Flushing

All newly installed fire line shall be open-bore flushed to remove any foreign matter. Open-bore flushing shall be accomplished prior to hydrostatic testing and disinfection at each extremity of the line, including all stubouts and dead ends. The Contractor shall furnish, install, and remove all fittings and pipes necessary to perform the flushing, at no additional cost to the Municipality. Under no circumstances will open-bore flushing through hydrants or reduced outlets be permitted.

It will be the Contractor's responsibility to notify the Engineer and AWWU forty-eight (48) hours in advance of any flushing operations. The Contractor shall provide a plan for approval by the Engineer for the disposal of the discharge waters from the open-bore flush. The governing authority shall approve discharge location. Spent flushing water shall not be discharged to the sanitary sewer system. The governing authority shall approve the discharge location. Flushing of newly constructed mains

may be required between the hours of 1:00 a.m. and 6:00 a.m. depending upon the availability of water as authorized by AWWU. The Municipality will not be responsible for any cost incurred by the Contractor for flushing.

B. Hydrostatic Testing

A hydrostatic test will be conducted on all newly constructed fire lines, fire hydrant leads and stubouts after open-bore flushing in the presence of an AWWU Inspector in accordance with the requirements ANSI/AWWA C600. The Contractor shall furnish all necessary assistance, equipment, labor, materials, and supplies (except the test pressure gauge) necessary to complete the test to the satisfaction of the Engineer.

All main line valves, fire hydrant auxiliary valves, fire hydrant main valves, and plugs shall be tested. All intermediate valves within the section being tested will be closed and re-opened as directed by the AWWU during the actual test. Only static pressure will be allowed on the opposite side of the end valves of the section being tested.

All hydrostatic testing will be performed through test copper or fire line riser in building. Use of fire hydrants and service connections for testing will not be allowed.

All fire lines and stubouts for future fire line connections shall be hydrostatically pressure tested at two hundred pounds per square inch (200 psi) for two (2) hours, in accordance with the Fire Underwriter's requirements as outlined in the National Fire Codes.

If the pressure decreases below the required test pressure during the two (2) hour period, the preceding portion of that test will be declared void. Cracked or defective pipe, gaskets, mechanical joints, fittings, valves, or hydrants discovered as a consequence of the hydrostatic tests shall be removed and replaced with sound material at the Contractor's expense. The test shall then be repeated until the results are satisfactory. Use of leakage tests shall not be allowed.

C. Disinfection

Refer to Section 60.02, Article 2.4 - Flushing and Testing Disinfection for specifications.

D. Continuity Tests

Refer to Section 60.02, SubArticle 2.4.D - Continuity Tests for specifications.

E. Test and Air Vent Copper Removal

Refer to Section 60.02, SubArticle 2.4.E - Test and Air Vent Copper Removal for specifications.

Article 5.6 Measurement

Measurement for furnishing and installing fire lines shall be per linear foot of horizontal distance of the various sizes as set forth in the Bid Schedule. Measurement will be from station to station as staked in the field and as shown on the Drawings, except where the grade exceeds twenty-five (25) percent, in which case measurement will be by actual pipe length.

Article 5.7 Basis of Payment

Payment for this Work shall be in accordance with Division 10, Section 10.07 - Measurement and Payment, and shall include full payment for all Work described in this Section.

Unless specifically identified for payment under a separate pay item, the unit price bid to Furnish and Install (size) (type) Fire Line shall include all labor, equipment and materials to furnish and install a functional fire line including, but not limited to, the following incidental items: delivery of non-serviceable portions of removed pipe, valves, and fittings at a Contractor-furnished disposal site; delivery of serviceable portions of removed pipe, valves, and fittings to the Owner, when directed by the Engineer; installation of all pipe, tees, crosses, bends, caps, plugs, adapters, reducers, thrust restraint systems, and other fittings; installation of thrust blocks; adjustment to finish grade; cleaning and flushing; hydrostatic testing; disinfecting; continuity testing; protection and/or restoration of all existing utilities; maintenance of existing water distribution system flows; shoring and/or protection of existing light poles; maintenance and restoration of existing drainage patterns; restoration of existing driveways; signage, mail boxes, newspaper boxes, trees and shrubs located on private property; landscaping, utility markers, survey monumentation; removal and replacement of miscellaneous public or private improvements; preparation of off-roadway areas for topsoil and re-seeding; cleanup, and miscellaneous items required to complete the Work as shown on the Drawings.

Excavation and backfill shall be paid for under Division 20, Section 20.13 - Trench Excavation and Backfill.

Payment shall be made on the following unit:

ITEM

UNIT

Furnish and Install (Size) (Type) Fire Line

Linear Foot

SECTION 60.06 WATER SERVICE LINES

Article 6.1 General

The Work under this Section consists of the performance of Work required for furnishing and installing water service lines including fittings, key boxes, and valve boxes.

A service line provides potable water to a building or lot for domestic or commercial use.

A permit shall be purchased from AWWU permit section prior to any and all construction (either on or off property in the AWWU service area).

Twenty-four (24) hours notification shall be given to AWWU Inspector prior to making the connection available for inspection.

Before an on-property service line permit for any new subdivision can be released for construction, all property corners shall be established and identified.

Article 6.2 Material

A. Pipe

Ductile iron pipe or soft drawn seamless copper Type K shall be used for all service lines.

B. Key Box, Valve Box

The key box or valve box shall provide a clear and unobstructed access to a curb stop or valve to enable the AWWU operation of the curb stop or valve. Key boxes and valve boxes shall be wrapped with eight mils (8-mils) thick polyethylene encasement. Key boxes or valve boxes shall not be in contact with a gas main. Key boxes or valve boxes shall be installed in the standard location as shown in the Standard Details.

Key boxes shall be of an acceptable construction as outlined in this Article for construction and as shown in the Standard Details for Typical Water Service Connects. Key boxes shall be installed with a standard location marker as defined in the Design Criteria of the Anchorage Water and Wastewater Utility.

Valves shall be of an acceptable construction as outlined in Section 60.03, Article 3.2 - Materials and the Standard Details for Typical Valve Box. Valves shall be installed with a standard marker as defined in Section 60.03, SubArticle 3.2.E - Markers.

Article 6.3 Construction

A. Excavation and Backfill

The Contractor shall provide all excavation, backfill, and compaction necessary to install water source lines in accordance with Division 20, Section 20.13 - Trench Excavation and Backfill.

B. Service Connections

A corporation stop or main valve shall be installed at a point in the service line as close to the main water supply as possible. There shall be line pressure in the main at all times connections are being made. All service lines two inches (2") and smaller shall be constructed of seamless, soft drawn, Type K copper. All service connections larger than two inches (2") shall be made of ductile iron and shall be accomplished by AWWU connection crews. The Contractor may make the connection by special agreement with the AWWU Permits Section. All ductile iron pipe installations shall be flushed, hydrostatic tested, and disinfected as outlined in Section 60.02 - Furnish and Install Pipe.

In the event a Contractor elects to make the connection to an AWWU main water supply, it shall be installed in a manner consistent with the Standard Specifications and Standard Details. A water service line shall not cross property lines of adjoining lots. The key box shall be installed to the edge of the right-of-way or edge of permanent easement of the lot being served, no closer than five feet (5') from adjoining property lines, and shall be marked by means of a Carsonite (or equal) marker extended two feet (2') above grade, painted blue. The connection shall be inspected by an AWWU Inspector at the time the connection is made or the excavation be exposed in its entirety for his inspection. The permit shall be posted and available at the time of inspection.

No unions will be allowed in the right-of-way on newly constructed service lines.

Where water service lines intersect with sanitary sewer pipelines, the water service line shall be located to provide a minimum vertical separation of eighteen inches (18") between the water pipe and sanitary sewer pipeline, with the separation distance measured from outside of water pipeline to outside of sanitary sewer pipeline.

As-built records shall include the pipe station of service connection at the main, service length and distance to the nearest property corner.

C. Excavation

The Contractor shall excavate whatever substances that are encountered to the depth required for the connections. Depth for water service connections will be a minimum of ten feet (10') below proposed finished grade. The ten foot (10') depth below finished grade shall be maintained five feet (5') past the footings, before the

depth shall be less than ten feet (10'). Variations in depth from the depth stated above will not be grounds for additional payment. It shall be the Contractor's responsibility to familiarize himself with the depth of water mains for the project. The portion of the right-of-way that extends from the main to the key box (curb stop) will be excavated in such a manner that will allow the service connection to be installed horizontally (no slope). The Contractor shall excavate for water connections in such a manner that the excavation is ninety degrees (90°) to the street line, whenever possible. Two services shall not be installed in a single trench when separation between keyboxes is greater than twelve feet (12'). The ditch shall be long enough to allow the key box to be set at the property line.

Trenches shall be of sufficient width at the bottom to allow for laying of the particular service (minimum two and one-half feet [2.5'] for single service). Excavation of all fill materials to virgin ground is required to provide safety for workmen utilizing the trench.

The Contractor shall expose the mains to be tapped for distance of four feet (4') in length. Excavation on both sides of the pipe shall be carried to the bottom of the pipe. Excess excavation below required level shall be backfilled and compacted with sand or gravel at the Contractor's expense as directed by the Engineer.

No water service shall be within a horizontal distance of ten feet (10') from the sanitary sewer service, footing drain or storm service.

The Contractor shall be responsible for, and shall bear the expenses incurred, in the event that a main should be damaged during excavation or backfilling. The water Utility will repair all damaged mains; however, the Contractor shall bear the cost of all material, labor, and other expenses thereof. If approved by AWWU, the Contractor may repair the damaged main.

All on-property installations shall be constructed to the same standard as off-property installations.

D. Backfill

At such time as the Engineer may direct, but only after the service lines and appurtenances have been properly completed and inspected, the trenches and appurtenant structures shall be backfilled. The backfilled material, free from large clods, frozen material or stones, shall be placed by the Contractor in conformance with the codes and regulations of the Municipality.

The Contractor shall exercise due care in backfilling to keep the service box and thaw wire vertical and in place. In the event the service box or thaw wire is displaced, the Contractor will be required to excavate and restore the service box and thaw wire to the proper position. Any work necessary to restore the service box and thaw wire to the proper position will be performed at the Contractor's expense.

A thaw wire constructed to a #2 copper plastic or rubber coated wire shall be attached to the corporation stop on one inch (1") connections by an approved method. On one and one-half $(1 \ 1/2")$ and two inch (2") connections, the thaw wire shall be attached to the saddle on the main. Three inch (3") through ten inch (10") connections shall have continuity straps attached in the same manner as that of main line installation.

E. Disconnects

If an existing service line is replaced by a new service or becomes unusable due to a replat of the property, it shall be disconnected at the main, at no cost to the Municipality. The disconnect shall be witnessed by an AWWU inspector.

F. Hydrostatic Testing

All newly installed water mains and all new services shall be subject to a hydrostatic pressure test of 150 pounds of pressure. This pressure test may be performed at the same time that the hydrostatic test is performed on the new water main. A bleeder will be installed at each service line key box and extended one foot (1') above the existing ground. The bleeder will be capped after testing is complete. The bleeder may not be used for the on-property system and must be disconnected at the time of the on-property hook-up.

Article 6.4 Measurement

Measurement for Furnishing and Installing Water Service Lines shall be per linear foot of horizontal distance of the various sizes as set forth in the Bid Schedule. Measurement will be from station to station as staked in the field and as shown on the Drawings, except where the grade exceeds twenty-five percent (25%), in which case measurement will be by actual pipe length.

Article 6.5 Basis of Payment

Payment for this Work shall be in accordance with Division 10, Section 10.07 - Measurement and Payment, and shall include full payment for all Work described in this Section.

Unless specifically identified for payment under a separate pay item, the unit price bid to Furnish and Install (size) Water Service Lines shall include all labor, equipment and materials to furnish and install a functional potable water service including, but not limited to, the following incidental items: verify location of existing water services; disconnection and reconnection of customer's existing services where the Work includes replacement of existing services; clearing and grubbing; trench excavation and backfill; excess excavation and backfill; excavation dewatering; trench support system; furnishing and installing Class C bedding; compaction of fill; installation of pipe, fittings, adapters, or other necessary appurtenances; polyethylene encasement; hydrostatic testing, flushing, disinfection, water service insulation; disposal of unusable or surplus material; seeding; protection of existing utilities; restoration of existing drainage patterns; removal and replacement of existing

culverts, guardrail, fences, landscaping, and other public or private improvements; finish grading; and cleanup.

Where the Work includes disconnecting existing water services from an existing water main and reconnecting them to a new water main, the disconnection and reconnection of those existing water services will be considered incidental to the costs bid for installation of the new water main.

Fittings and appurtenances as shown on the Drawings or not specifically identified for payment under a separate pay item but required for normal completion of water service line installation, will be considered incidental and shall be included in the linear foot cost of the water service lines.

Payment shall be made under the following unit:

ITEM

UNIT

Furnish and Install (Size) Water Service Line

Linear Foot

SECTION 60.07 POLYETHYLENE ENCASEMENT

Article 7.1 General

The Work under this Section consists of providing all operations pertaining to the furnishing and installation of one layer of polyethylene encasement on all ductile and cast iron mains and services, fittings, fire hydrants, valve boxes, etc.

Article 7.2 Material

The polyethylene encasement material for pipe shall be 8-mils thick and conform to AWWA C105/ANSI A21.5.

Article 7.3 Construction

The polyethylene encasement shall be installed in strict conformance to the methods described in the most current editions of ANSI/AWWA C105/A21.5 and the Ductile Iron Pipe Research Association's "A Guide for the Installation of Ductile Iron Pipe."

Bedding and backfill material around pipelines with polyethylene encasement shall be placed using protective measures such as shields, guards, coating systems, and/or other methods as needed to protect the polyethylene encasement from becoming torn, punctured or otherwise damaged during the Work. Damage to the integrity of the polyethylene encasement shall be either repaired or the pipeline removed and the polyethylene encasement replaced as directed by the Engineer. Costs for repair and/or replacement of damaged polyethylene encasement shall be considered incidental to the installation of the polyethylene encasement and/or the installation of the pipeline protected by the encasement.

Article 7.4 Measurement

Measurement of all sizes of polyethylene encasement for pipe shall be the same as the measurement of the pipe installed, except that polyethylene encasement installed on fire hydrant legs and barrel sections and valve boxes shall be incidental to the item under construction.

Article 7.5 Basis of Payment

Payment for this Work shall be in accordance with Division 10, Section 10.07 - Measurement and Payment, and shall include full payment for all Work described in this Section.

Payment shall be made on the following basis:

ITEM

UNIT

Polyethylene Encasement

Linear Foot
SECTION 60.08 TEMPORARY WATER SYSTEMS

Article 8.1 General

The Work under this Section consists of the performance of all operations pertaining to the construction, installation, maintenance and removal of temporary water service during construction of this project to current AWWU customers in the area. It is the intent that the Contractor maintains water service during the entire period of construction activities to all current customers in the project area.

The Contractor shall submit a plan for any temporary water systems to the State of Alaska, Department of Environmental Conservation (ADEC) for review and approval prior to beginning Work on such system. The plan must identify the type of system, the method of construction and the maintenance and operation procedures to be used. The plan must identify service to each existing customer except those who agree in writing to have their service temporarily disconnected. The Contractor shall obtain such agreement. To be submitted with the plan are any agreements between the Contractor and property owner regarding access and use of private property. The methods to be employed in maintaining water service are left to the Contractor. Surface piping, trailer mounted supply systems, and so forth may all be considered as long as they comply with current health standards and requirements. A copy of the ADEC approved plan shall be provided to the Engineer, along with copies of any agreements with property owners referred to above.

The Contractor shall also submit the name and phone number of a contact person and at least one alternate who shall be available on a twenty-four (24) hour basis for repair and/or maintenance of the temporary water system. In the event that the Contractor fails to repair and/or maintenance, all costs associated with said repairs and/or maintenance shall be deducted from the Contract amount.

Article 8.2 Material

The Contractor shall use only those materials and equipment listed in this Section to supply temporary water service. Temporary water service shall be supplied under the service criteria outlined in this Section. All equipment used must be specifically designed and properly disinfected for he storage, handling, and delivery of potable water.

Service shall be supplied to each structure presently served by AWWU. The following minimum criteria shall be use for service to each structure:

- A. Forty (40) psi minimum, one hundred (100) psi maximum delivery pressure measured at the connection to the structure.
- B. Five (5) gallons per minute flow at the above delivery pressure measured at the connection to the structure. Commercial and other business structures may require higher water flows.

- C. Potable water system and water quality shall conform to 18 AAC 80 Alaska Drinking Water Standards.
- D. All services to structures shall be valved to allow individual control of service to each structure.

Materials used for temporary water service shall conform to the requirements of these Specifications. The temporary water service system shall be constructed from one or more of the following materials: polyvinyl chloride (PVC), high-density polyethylene (HDPE), copper, ductile iron, cast iron or galvanized steel.

The primary water feeder pipe shall be a minimum of three inches (3") in diameter.

Article 8.3 Construction

All temporary water service equipment shall be disinfected per ANSI/AWWA C652, Disinfection of Water Storage Facilities and ANSI/AWWA C651, Disinfection of Water Mains. All bacteriological samples required under these Specifications shall be done by a testing laboratory certified by the State of Alaska.

All temporary service equipment shall be disinfected prior to connecting to a residence or business and shall be disinfected each and every time the equipment is moved or connected to another residence per above-referenced Specifications.

The Engineer shall be notified twenty-four (24) hours prior to the installation of any temporary water system. The Engineer shall be present to inspect the disinfection process of any temporary water service system.

No residence presently serviced by the AWWU system shall be without water for a period greater than six (6) hours in any twenty-four (24) hours period. Each residence or business owner shall be notified seventy-two (72) hours before they are transferred on or off the temporary water system and before any other service interruption. Prior to constructing temporary water services on private property, the Contractor shall secure a written "Permission to Enter" from the property owner. Such permission shall hold the Municipality of Anchorage, AWWU, and its agents harmless for any claims resulting from damage or harm sustained due to the Contractor's operation. The Contractor shall also provide a copy of each "Permission to Enter" form to the Engineer.

Following the successful installation of the temporary water system, the existing water service shall be appropriately disconnected at a main shutoff valve inside the structure. Qualified personnel who are familiar with building plumbing systems shall accomplish the disconnection of the existing water service. This Work shall be performed to prevent backfeeding water through the service connection.

Fire hydrants may be used as a water source for a temporary water system. The Contractor will be required to obtain a hydrant permit from AWWU and will be required to meet all permit conditions (winter use of a hydrant shall required special permission from AWWU). In addition, the Contractor shall provide a gate valve assembly at the fire hydrant

as a shutoff valve for the temporary water system. The Contractor shall be responsible for any damage to the hydrant and temporary service piping and shall repair such damage at no cost to the Owner.

Article 8.4 Measurement

Providing temporary water service as required throughout the project shall be measured as lump sum.

Article 8.5 Basis of Payment

Payment for this Work shall be in accordance with Division 10, Section 10.07 - Measurement and Payment, and shall include full payment for all Work described in this Section.

Payment shall be made under the following unit:

ITEM

UNIT

Temporary Water System

Lump Sum

SECTION 60.09 REPLACE VALVE BOX

Article 9.1 General

The Work under this Section consists of performing all operations pertaining to the removal, disposal, and replacement of mainline, fire line, and/or fire hydrant valve boxes that have become separated and/or misaligned to such an extent as to require replacement, from the top of the valve to final finished grade, including trhe replacement of all valve box sections, lids, and dust pans.

Article 9.2 Material

All materials used in the replacing mainline and fire hydrant valve boxes shall conform to the requirements defined in Section 60.03 - Furnish and Install Valves and the Standard Details.

Backfill shall be Type II Classified material to the subgrade elevation.

Article 9.3 Construction

All construction shall be in accordance with the provision of Section 60.03 – Furnish and Install Valves.

All locations where replacing a valve box is required shall be excavated to the top of the valve and conform to the procedures outlined in Section 60.03 - Furnish and Install Valves, concerning installation of the valve box and the Standard Details.

Article 9.4 Measurement

Valve boxes replacement will be measured per unit, complete in place.

Article 9.5 Basis of Payment

Payment for this Work shall be in accordance with Division 10, Section 10.07 - Measurement and Payment, and shall include full payment for all Work described in this Section.

Payment shall be made under the following unit:

ITEM	UNIT
Replace Valve Box	Each

SECTION 60.10 RESET VALVE BOX SECTIONS BELOW FINISHED GRADE

Article 10.1 General

The Work under this Section includes all operations pertaining to the reconnection of mainline, fire line, and/or fire hydrant valve box sections that have separated below finish grade. Work under this Section also includes the requirements of the Drawings and applicable sections of this Division and Division 20 – Earthwork. All broken and/or missing valve box components are to be replaced with new materials furnished and installed by the Contractor in accordance with these specifications.

Article 10.2 Material

All materials used in the reconnection of mainline and fire hydrant valve boxes shall conform to the requirements defined in Section 60.03 - Furnish and Install Valves and the Standard Details.

Backfill shall be Type II Classified material to the subgrade elevation.

Article 10.3 Construction

All construction shall be in accordance with the provision of Section 60.03 – Furnish and Install Valves.

All locations where reconnections are required shall be excavated to the depth required to perform the reconnection. The Contractor shall be responsible for removing the liner inside the valve box casing and determining the location of the separation. Care shall be used to ensure that soil or other foreign matter does not enter the valve box standpipe.

Article 10.4 Measurement

Resetting Valve Box Section Below Finish Grade will be measured per unit, complete in place. The same valve shall not be paid for under this pay item if it is paid for under Section 60.09 - Replace Valve Box. In particular, related work includes, but is not limited to, removal of debris from inside the valve box standpipe, trench excavation and backfill, disposal of unsuitable or surplus material, mechanical compaction, adjust mainline valve box to finish grade, replace broken valve box components, and classified materials. No separate measurement for payment will be made.

Article 10.5 Basis of Payment

Payment for this Work shall be in accordance with Division 10, Section 10.07 - Measurement and Payment, and shall include full payment for all Work described in this Section.

Payment shall be made under the following unit:

ITEM	UNIT	
Reset Valve Box Sections Below Finished Grade	Each	

SECTION 60.11 REPLACE TOP SECTION OF VALVE BOX

Article 11.1 General

The Work under this Section consists of performing all operations for the removal, disposal, and replacement of mainline and fire hydrant valve box top section(s), lid(s), and dust pan(s) that are missing or damaged in the opinion of the Engineer. The Contractor is to provide all labor, materials and supervision required to furnish and install new valve box components needed to rehabilitate existing valve boxes.

Under this Section, rehabilitation of existing valve boxes can include the following items of Work:

Removal and replacement of valve box lids.

Removal and replacement of valve box dust pans.

Removal and replacement of valve box top sections.

The valve box components to be removed and replaced for a specific valve box are identified in the Drawings. The Contractor is to reuse those components that are not to be replaced in assembly of the rehabilitated valve box.

Article 11.2 Material

Materials used in this Work shall conform to the requirements of Section 60.03, Article 3.2 - Material.

Article 11.3 Construction

The Contractor shall excavate around the valve box as needed to access the Work. All excavation, shoring, dewatering, backfill and compaction efforts required to access the Work shall be per Division 20 – Earthwork. All importation of fill and/or disposal of unsuitable material, excavation, and backfill efforts shall be considered incidental to Work, and will not be paid separately.

Upon completion of the Work, the Contractor shall restore the existing grades and surrounding area to preconstruction conditions. Any pavement, sidewalk, curb and gutter, landscaping, and/or other improvements disturbed and/or damaged by the manhole rehabilitation effort shall be restored by the Contractor to preconstruction conditions. Restoration of these conditions shall be considered incidental to the Work, and will not be paid separately.

The Contractor shall remove and replace those valve box components identified in the Drawings. The rehabilitated valve box shall be configured according to the requirements of this Division and the Standard Details.

The Contractor shall use care in protecting those component parts of the existing valve box that are to be reused in the rehabilitated valve box.

Article 11.4 Measurement

Rehabilitated valve box assemblies shall be measured as units complete in place with the components identified in the Drawings replaced and accepted by the Engineer.

All effort required to complete the Work, including excavation, shoring, dewatering, backfilling, restoration of Work area to existing preconstruction conditions, and/or other items of Work needed to complete the Replace Top Section of Valve Box effort shall be considered incidental to the completion of the Work and shall not be paid for separately.

Article 11.5 Basis of Payment

Payment for this Work shall be in accordance with Division 10, Section 10.07 - Measurement and Payment, and shall include full payment for all Work described in this Section.

Payment shall be made under the following unit:

ITEM	UNIT
Remove and Replace Valve Box Lids	Each
Remove and Replace Valve Box Dust Pan	Each
Remove and Replace Valve Box Top Section	Each

SECTION 60.12 ABANDON PIPELINE IN PLACE

Article 12.1 General

The Work under this Section includes all operations pertaining to the abandonment of pipeline in place. Where shown on the Drawings, or otherwise directed by the Engineer, the Contractor shall abandon an existing pipeline in place in accordance with the requirements of this Section.

Article 12.2 Material

Sand slurry shall consist of a mixture of water and sand with an approximate ratio of seven (7) gallons of water per cubic foot of sand. Sand may consist of native material with a particle size distribution such that one hundred percent (100%) of the material passes the No. 4 U.S. Standard Sieve and contains no lumps, frozen material, organic matter, or other deleterious material.

Article 12.3 Construction

Wherever existing pipe is to be abandoned in place, the Contractor shall empty the line of all water, fill the pipe full with sand slurry, and plug the ends. Placement of the sand slurry shall be by means of a tremie pipe or other method that shall enable uniform placement of the sand slurry throughout the length of the pipe being abandoned. The Contractor shall demonstrate the entire pipe to be abandoned has been filled prior to the installation of end caps. Validation shall include placement of a predetermined volume of sand slurry into the pipe to be abandoned.

In the event the pipeline to be abandoned is cracked or crushed, the Contractor shall excavate to the next joint of pipe and install the plug. Crushed pipe sections or portions thereof shall be removed and disposed of by the Contractor.

All excavation, shoring, dewatering, disposal of unsuitable material, backfilling, and compactive effort required for completion of this Work shall conform to the requirements of Division 20 – Earthwork.

During the execution of this effort, the Contractor shall maintain vehicular traffic and pedestrian access as required in Division 10 - Standard General Provisions.

The Contractor shall restore the Work area to preconstruction conditions.

The Contractor shall notify the Engineer twenty-four (24) hours in advance of abandoning each main and shall provide safe access for the inspection of the process.

Article 12.4 Measurement

Measurement of quantities of pipeline to be abandoned in place shall be per lineal foot of pipeline to be abandoned for each nominal pipeline size. Length shall include pipeline that is removed due to damaged ends.

Removal and disposal of pipeline sections that have damaged ends and cannot be plugged in place shall be considered incidental to the Abandon Pipeline in Place scope of Work identified in this Section.

Any excavation, shoring, dewatering, disposal of unsuitable material, backfilling, compactive effort, maintenance of vehicular traffic and/or pedestrian access, paving, landscaping, or restoration of existing preconstruction conditions necessary to complete the Abandon Pipeline in Place scope of Work identified in this Section that is not specifically address by a separate bid item shall be considered incidental to the Work completed under this Section. Costs incurred for completion of these incidental Work items are considered including in the unit cost bid for completion of the Work in this Section.

Article 12.5 Basis of Payment

Payment for this Work shall be in accordance with Division 10, Section 10.07 - Measurement and Payment, and shall include full payment for all Work described in this Section.

Payment shall be made under the following unit:

ITEM

UNIT

Abandon Pipeline in Place (Pipeline Nominal Size) (Type of Pipe)

Linear Foot

SECTION 60.13 CONNECT TO EXISTING WATER SYSTEM

Article 13.1 General

This Section consists of all Work necessary for furnishing all material, labor, and equipment necessary for locating, excavating, and assisting Municipal crews in making a live tap into an existing water main.

Article 13.2 Material

The Contractor shall obtain the live tap permit to initiate the connection process. The live tap permit will be issued by AWWU at no cost to the Contractor.

AWWU will supply the gate valve and valve box for the live tap.

AWWU will furnish the tapping machine and personnel to operate the tapping machine.

All materials used in the construction of connections to the existing water main shall conform to the requirements of Section 60.02 - Furnish and Install Pipe.

Article 13.3 Construction

The Contractor shall be responsible for trench excavation and backfill in accordance with Division 20, Section 20.14 - Trench Excavation, Backfill and Compaction for Service Connections. Excavation shall meet all OSHA standards.

The Contractor shall provide all necessary equipment and manpower to assist AWWU personnel in moving piping, valves, tapping machines and miscellaneous items into and out of the trench during the entire time AWWU personnel are working to complete the installation of the water line tap.

Connections to existing water mains shall utilize existing stubs, tees, crosses and valves. New valves may not be installed downstream of existing valves unless an active service or branch exists downstream of the existing valve.

The Contractor may choose to perform a valve leakage test of the existing valve in the presence of an AWWU inspector prior to making a connection. The quantity of water lost per hour shall be recorded and added to the completed main during pressure testing. Contractor shall remove existing valves found to be unacceptable and replace with a new valve.

Where no existing point of connection exists a live tap will be performed by AWWU for new mains up to twelve inches (12") in diameter. New mains larger than twelve inches (12") require the installation of a tee or cross.

AWWU will provide the staff, tapping machine, connection valve and valve box.

AWWU staff will complete the installation of the water main tap and new connection.

Contractor shall backfill around the tapped water main and new valve, and install the AWWU-furnished valve box assembly.

Contractor shall be responsible for all shoring, dewatering, disposal of unsuitable material, backfilling, and compaction effort.

During the execution of this effort, the Contractor shall maintain vehicular traffic and pedestrian access, as required in Division 10 – Standard General Provisions.

The Contractor shall restore the Work area to preconstruction conditions, as required by Division 10 – Standard General Provisions. Landscaping, paving and concrete work shall conform to Division 75 – Landscaping Improvements, Division 40 – Asphalt Surfacing, and Division 30 – Portland Cement Concrete, respectively, and the Standard Details.

The Contractor shall provide seventy-two (72) hours notice to the Engineer prior to anticipated flow interruption and/or physical connection to existing water systems to coordinate "turn-offs" with municipal crews. The actual connections shall be made only during periods of low water demand, as determined by the Owner.

The Contractor shall notify any property owners or residents, seventy-two (72) hours prior to interruption of any utility services. Disruption of water service to any structure shall be limited to six (6) hours in any twenty-four (24) hour period when authorized by the Engineer. Where the existing main line service to structures will be disrupted in excess of six (6) hours, the Contractor shall furnish and install a temporary water system. If the water service is disrupted in excess of six (6) hours, with or without the temporary water system, a penalty of \$150 will be assessed per structure per violation within the twenty-four (24) hour period.

Construction of connections to existing water mains shall be in accordance with this Division and Section 60.02 - Furnish and Install Pipe.

The valve box shall be installed and adjusted to final grade by the Contractor.

Article 13.4 Measurement

Connect to existing water main shall be measured per each unit, complete in place.

Article 13.5 Basis of Payment

Payment for this Work shall be in accordance with Division 10, Section 10.07 - Measurement and Payment, and shall include full payment for all Work described in this Section.

Payment shall be made under the following unit:

ITEM

Connect to Existing Water Main (Identify Location, Type of Pipe and Nominal Pipe Size) UNIT

Each

SECTION 60.14 REMOVE AND SALVAGE EXISTING FIRE HYDRANT

Article 14.1 General

The Work under this Section consists of removing and salvaging serviceable portions of existing fire hydrant assemblies identified in the Drawings and delivering them to AWWU's Operations Building at 325 East 94th Court, Anchorage, Alaska.

Article 14.2 Material

Materials used in this Work shall conform to the requirements of Section 60.02, Article 2.2 - Materials.

Article 14.3 Construction

The Contractor shall excavate, expose and remove the fire hydrant assemblies identified in the Drawings to be salvaged.

The hydrant assembly components to be removed and salvaged at each hydrant location where the hydrant is to be salvaged include:

Hydrant Hydrant shoe Hydrant gate valve Hydrant gate valve box Hydrant leg

Upon inspection of the exposed hydrant assembly components, the Engineer may determine that one or more of the components are not salvageable. These items are to be transported by the Contractor to a disposal site approved for disposal of construction debris.

The Contractor shall install a plug in the branch connection on the tee in the water main where the hydrant assembly is removed. If the water main is to remain in active service, the plug shall be tested for leakage according to Section 60.02, Article 2.4 – Flushing and Testing, prior to the water main being covered with fill. Disinfect the existing water main at the locations where the hydrant assemblies are removed per AWWA C651.

Excavation, shoring, dewatering, disposal of unsuitable material, backfilling, and compaction, shall all conform to the requirements of Division 20 – Earthwork.

During the execution of this effort, the Contractor shall maintain vehicular traffic and pedestrian access as required in Division 10 – Standard General Provisions.

The Contractor shall restore the Work area to preconstruction conditions as required by Division 10 – Standard General Provisions. Landscaping, paving and concrete work shall conform to Division 75 – Landscaping Improvements, Division 40 – Asphalt Surfacing and Division 30 – Portland Cement Concrete, respectively, and the Standard Details.

Article 14.4 Measurement

Removing, disposing of or salvaging, and delivery of existing fire hydrant serviceable portions will be measured per each fire hydrant removed and salvaged in accordance with this Section.

Article 14.5 Basis of Payment

Payment for this Work shall be in accordance with Division 10, Section 10.07 - Measurement and Payment, and shall include full payment for all Work described in this Section.

Payment shall be made under the following unit:

ITEM	UNIT	
Remove and Salvage Existing Fire Hydrant	Each	

SECTION 60.15 RELOCATE WATER MAIN

Article 15.1 General

The Work under this Section consists of providing all operations pertaining to relocating water mains. In the preparation of the Drawings, efforts have been made to determine exact elevations of live utilities; however, elevations of utilities shown are not represented as exact and are shown to include approximate location only. The Engineer shall have the final say as to whether the main is raised or lowered.

Article 15.2 Construction

Where a water main crosses the location of a sewer, the water main shall be raised or lowered sufficiently to permit a minimum (outside diameter) vertical distance of eighteen inches (18") from the sewer line. If the water main elevation is below the sewer line elevation, refer to Division 50, Section 50.13 - Polyethylene Encasement. The Contractor may employ either of the following methods for raising or lowering a water main. He may raise or lower lengths of the water main as necessary on either side of the proposed sewer to allow the main to pass under or over the sewer, providing the deflection at any joint does not exceed the pipe manufacturer's recommendations, or the water main may be raised or lowered using four (4) pipe bends no to exceed twenty-two and one-half degrees ($22 \frac{1}{2}$ °). In special cases only, and when approved by the Engineer in advance, forty-five degree (45°) bends may be used. The method of lowering and materials to be used shall be approved by the Engineer prior to commencing Work. The Contractor shall give forty-eight (48) hours notice to AWWU and the Engineer prior to any planned water shutoff.

Water lines two inches (2") in diameter and smaller shall not be construed as water mains.

Any necessary lowering of water lines two inches (2") or smaller shall be included under the conditions set forth in the General Provisions for the moving and relocation of utilities occupying space within the area of construction. With the approval of the Engineer, the Contractor may lower water lines two inches (2") in diameter or smaller, but separate payment shall not be made for such lowering. The cost shall be included in the unit bid price as specified in Division 20, Section 20.13 - Trench Excavation and Backfill.

Article 15.3 Measurement

Raising or lowering existing water mains will be measured as units complete in place without regard to the diameter of the water main or length required to be lowered.

Article 15.4 Basis of Payment

Payment for this Work shall be in accordance with Division 10, Section 10.07 - Measurement and Payment, and shall include full payment for all Work described in this Section.

Payment shall be made under the following unit:

ITEM UNIT Relocate Water Main Each

SECTION 60.16 RAISE OR LOWER WATER SERVICE

Article 16.1 General

The Work under this Section consists of providing all operations pertaining to raising or lowering existing water services when the grade(s) of such services interfere(s) with the construction of new sanitary or storm sewers. The Work includes, but is not limited to, trench excavation and backfill, compaction, furnishing trench backfill, disposal of unsuitable or surplus material, and water service line piping.

Article 16.2 Materials

Materials to be used in the Work shall conform to Section 60.06, Article 6.2 - Material.

Article 16.3 Construction

Where a conflict in grade occurs between new storm and/or sanitary sewers, and an existing water service connection, the Contractor shall excavate the water service connection from the point of interception to a sufficient distance to raise or lower the water service such that the grade conflict will be eliminated. In no case will the length of raising or lowering of the water service exceed fifty feet (50').

If the clearance between the raised or lowered water service and the storm/sanitary sewer is less than three feet (3'), insulation board (R-20) shall be installed in accordance with Section 60.10, Article 1.4 - Insulation. However, in no case shall the vertical separation distance between the service connection and the storm drain and/or sanitary sewer be less than eighteen inches (18") without an ADEC separation waiver.

All excavation, backfill, and pipe laying shall be performed in accordance with the applicable provisions of Division 20 - Earthwork and this Division. Any materials needed to complete the raising or lowering of a water service shall be provided by Contractor and considered incidental to the Contract.

The existing water service shall be disinfected according to AWWA C651 prior to being place back in service.

Article 16.4 Measurement

Measurement for raising or lowering water service lines will be measured as units complete in place.

Fittings and appurtenances not specifically identified for payment under a separate pay item, but required for normal completion of raising or lowering water service lines will be considered incidental and shall be included in the unit cost of the Work.

Disinfection of the raised or lowered water service line shall be considered incidental and shall be included in the unit cost of the Work.

Any excavation, shoring, dewatering, disposal of unsuitable material, backfilling, compactive effort, maintenance of vehicular traffic and/or pedestrian access, paving, landscaping, or restoration of existing preconstruction conditions necessary to complete the Raise or Lower Water Service scope of Work identified in this Section that is not specifically addressed by a separate bid item shall be considered incidental to the Work completed under this Section. Costs incurred for completion of these incidental Work items are considered included in the unit cost bid for completion of the Work in this Section.

Article 16.5 Basis of Payment

Payment for this Work shall be in accordance with Division 10, Section 10.07 - Measurement and Payment, and shall include full payment for all Work described in this Section.

Payment shall be made under the following unit:

ITEM

UNIT

Each

Raise or Lower Water Service

SECTION 60.17 FURNISH AND INSTALL GALVANIC ANODES

Article 17.1 General

The Work under this Section consists of the performance of all Work required for furnishing and installing galvanic anodes for added protection of water pipe from corrosion. The Contractor shall install galvanic anodes in accordance with these specifications and in conformity with the detail shown on the Drawings, unless otherwise approved.

Article 17.2 Definitions

In these Contract Documents, the following words or expressions shall have the meaning given below:

AWG	American Wire Gauge
BDC	Bottom Dead Center of the Pipe
HMWPE	High Molecular Weight Polyethylene
NACE	National Association of Corrosion Engineers

Article 17.3 Materials

A. Anodes

Anodes utilized for typical galvanic anode system installation shall be prepackaged magnesium style anodes weighing seventeen (17) pounds. Anode composition shall consist of the following:

Element	<u>Amount (%)</u>
Cu	0.001
Si	0.01
Zn	2.5-3.5
Mn	0.2-0.5
Ni	0.001
AI	5.5-6.5
Fe	0.005
All Others	0.01
Magnesium	Balance

Anodes shall be packaged in a low resistive backfill consisting of seventy-five percent (75%) gypsum, twenty percent (20%) bentonite, and five percent (5%) sodium sulfate.

Anodes shall be provided with #8 AWG stranded copper, single-conductor cable with HMWPE insulation. Lead wire cable shall be rated for six hundred (600) volts and designed for direct burial applications.

B. Pipe Connection Lead Wire

Lead wires shall be of sufficient length for splice-free routing between the anode and the pipe and shall be #8 AWG stranded copper, single-conductor cable with HMWPE insulation. Lead wire cable shall be rated for six hundred (600) volts and designed for direct burial applications.

C. Thermite Welding Equipment and Materials

Equipment and materials used to bond the #8 AWG HMWPE to the pipeline shall be "CADWELD" type as manufactured by ERICO Products, Inc. of Cleveland, Ohio, or approved equal. Thermite weld caps, designed to protect the CADWELD bonds from corrosion, shall be Royston "Handy Cap 2" or approved equal.

Article 17.4 Installation

A. General Requirements

Excavation, shoring, dewatering, disposal of unsuitable material, backfilling, and compaction, shall all conform to the requirements of Division 20 – Earthwork.

During the execution of this effort, the Contractor shall maintain vehicular traffic and pedestrian access as required in Division 10 – Standard General Provisions.

The Contractor shall restore the Work area to preconstruction conditions as required by Division 10 – Standard General Provisions. Landscaping, paving and concrete work shall conform to Divisions 75 – Landscaping Improvements, Division 40 – Asphalt Surfacing, and Division 30 – Portland Cement Concrete, respectively, and the Standard Details.

B. Anode Installation

The following is a list of general procedures utilized for typical installation of galvanic anodes:

1. Anode Placement

Anodes shall be installed twelve to thirty-six inches (12" to 36") from the side wall of the pipe, to a centerline depth in-line with the approximate horizontal plane of the pipe's BDC. Anodes may be placed on either side of the pipeline, one anode per every second pipe section (joint).

2. Lead Wire Connection to Pipe

The #8 AWG HMWPE lead wires shall be attached to the top dead center of the pipe. Lead wire connection to the pipe shall utilize exothermic weld connection methodology as outlined above and on the drawings. Contractor shall follow CADWELD manufacturer's instructions for use.

3. Backfilling

Extreme care shall be taken not to damage the anodes or direct buried lead wires during backfill procedures.

Article 17.5 Measurement

Measurement for furnishing and installing anodes shall be per each anode installed. The price shall include full compensation for furnishing and installing anodes as described herein and as shown on the Drawings.

Any excavation, shoring, dewatering, disposal of unsuitable material, backfilling, compactive effort, maintenance of vehicular traffic and/or pedestrian access, paving, landscaping, or restoration of existing preconstruction conditions necessary to complete the Furnish and Install of Galvanic Anodes scope of Work identified in this Section that is not specifically addressed by a separate bid item shall be considered incidental to the Work completed under this Section. Costs incurred for completion of these incidental Work items are considered included in the unit cost bid for completion of the Work in this Section.

Article 17.6 Basis of Payment

Payment for this Work shall be in accordance with Division 10, Section 10.07 - Measurement and Payment, and shall include full payment for all Work described in this Section.

Payment shall be made under the following unit:

ITEM UNIT Furnish and Install Anode Each

SECTION 60.18 ABANDON PRIVATE WATER WELL

Article 18.1 Description

The Work under this Section consists of furnishing all material, labor, and equipment necessary to abandon existing private water wells as described in this Section.

The depths to the bottom of the boring, depth to static groundwater and locations of the wells to be abandoned are described in the Special Provisions.

Article 18.2 Materials and Construction

The Contractor shall use the following procedure when abandoning the wells:

- 1. Remove the existing well pump and appurtenances. The well pump and appurtenances shall be carefully removed to avoid damage and delivered to the property owner after removal.
- 2. Backfill the well casing to ten feet (10') above the screen with disinfected sand or gravel. Sand shall be used as backfill adjacent to water bearing strata consisting of sand, and gravel shall be used as backfill adjacent to water bearing strata consisting of gravel. Disinfected sand or gravel is defined as sand or gravel washed in a one part per million chlorine/water solution prior to the backfilling operation. The Contractor shall provide proof to the Engineer that any imported sand or gravel has been disinfected prior to backfilling the casing.
- 3. If the aquifer is pressurized, place a seal over the top of the disinfected sand or gravel to seal the aquifer. The seal may consist of bentonite chips or other suitable means, as approved by the Engineer.
- 4. Backfill the next section of well casing for a minimum distance of ten feet (10') with concrete or cement grout. If necessary, the depth of the concrete or cement grout may have to exceed ten feet (10') to ensure the lower aquifer is thoroughly sealed. The concrete or cement grout shall be placed from the bottom upward through a pipe or tremie in such a way as to avoid segregation or dilution of the material. The concrete or cement grout shall be allowed thirty-six (36) hours to cure prior to proceeding with the next step.
- 5. Backfill the next section of well casing to fifteen feet (15') below the ground surface with gravel. Disinfected gravel is not required in this zone.
- 6. Excavate the area adjacent to the top of the well to a depth of five feet (5') and cut the casing at this level. Then backfill the remaining ten feet (10') of well casing with bentonite, concrete, or cement grout. Weld a metal cap on top of the well casing to ensure the well is sealed.

- 7. Backfill the area within a two foot (2') minimum radius from the center of the well casing to a level which is two inches (2") above the top of the sealed well casing with concrete or cement grout to preclude the downward migration of water along the outside of the casing. Then backfill the remainder of the excavated hole with native soils.
- 8. As part of this bid item, the Contractor shall be responsible for topsoil and reseeding all lawn areas damaged by the Contractor during the well abandonment operation. In addition, the Contractor shall be responsible for the repair and/or replacement of all existing utilities, driveways, trees, utility markers, survey monuments, fences, retaining walls, buildings, sidewalks, gardens, landscaping, and other private improvements damaged by the Contractor as a result of the well abandonment operation.
- 9. The Contractor shall provide a log of the well abandonment to the Engineer prior to receiving final payment for this Work. The log shall describe the materials used in the abandonment and the depths below existing grade each type of material was used, in addition to any other pertinent information regarding the abandonment.

The Contractor may employ, at his/her option, an alternate method of abandoning the wells that conforms to the requirements of ANSI/AWWA Standard A 100. In the event the Contractor elects to obtain approval to employ an alternate method, he/she shall first secure the approval of the ADEC and then submit a Substitution Request form to the Engineer for approval. The substitution request shall clearly identify the method the Contractor wishes to employ; clearly reference applicable sections of ANSI/AWWA Standard A 100 which allow the Contractor's proposed method of abandonment; and, include written approval from the ADEC specific for these particular walls.

Excavation, shoring, dewatering, disposal of unsuitable material, backfilling, and compaction, shall all conform to the requirements of Division 20 – Earthwork.

During the execution of this effort, the Contractor shall maintain vehicular traffic and pedestrian access as required in Division 10 – Standard General Provisions.

The Contractor shall restore the Work area to preconstruction conditions as required by Division 10 – Standard General Provisions. Landscaping, paving and concrete work shall conform to Division 75 – Landscaping Improvements, Division 40 – Asphalt Surfacing, and Division 30 – Portland Cement Concrete respectively, and the Standard Details.

Article 18.3 Measurement

Measurement for payment shall be per each well abandoned in accordance with the requirements of this Section or ADEC requirements if an alternate method of well abandonment is employed and approved by the Engineer.

Any excavation, shoring, dewatering, disposal of unsuitable material, backfilling, compactive effort, maintenance of vehicular traffic and/or pedestrian access, paving,

landscaping, or restoration of existing preconstruction conditions necessary to complete the Abandon Existing Private Water Well scope of Work identified in this Section that is not specifically addressed by a separate bid item shall be considered incidental to the Work completed under this Section. Costs incurred for completion of these incidental Work items are considered included in the unit cost bid for completion of the Work in this Section.

Article 18.4 Basis of Payment

Payment for this Work shall be in accordance with Division 10, Section 10.07 -Measurement and Payment, and shall include full payment for all Work described in this Section.

Payment shall be made under the following unit:

UNIT

Abandon Private Water Well

Each

ITEM

SECTION 60.19 ADJUST KEY BOX

Article 19.1 General

The Work under this Section consists of providing all materials, equipment and labor and performing all operations necessary for adjusting existing key boxes to finished height and/or finished grade. All broken and/or missing keybox components are to be replaced with new materials furnished and installed by the Contractor in accordance with these specifications.

Article 19.2 Material

All materials used in the key box adjustment shall conform to the requirements defined in Section 60.06 - Water Service Lines and the Standard Details.

Article 19.3 Construction

Key boxes to be adjusted will be identified by the Engineer. In all cases the maximum height of the adjusted key box will be flush with the final ground surface. If excavation is required to adjust the key box, the ground surface will be restored to its original condition unless otherwise indicated in the Drawings. The Contractor shall be responsible for ensuring that the valve box is vertical, clean, to proper grade, and readily accessible for operation of the valve.

Any damage to a key box resulting from construction under this Contract shall be repaired or the damaged portion replaced at the Contractor's expense. Adjustments to key boxes to be lowered will include cutting excessive length of key box, threading, and installing threaded unions to complete adjustments. Only threaded joints will be allowed in the Work. "Quick-connect" style connections assembled with set screws will not be allowed in the Work.

Where key box is located in concrete slab, adjustment will include cutting concrete, installing pavement riser and lid, and restoring disturbed area to original condition.

Contractor shall adjust the valve box to finish grade prior to placement of asphalt pavement. After-the-fact cutting of new asphalt for adjustments is not accepted. Any adjustment(s) requiring cutting of new asphalt shall not be paid and shall be deducted from the quantity.

Article 19.4 Measurement

Adjusting key boxes will be measured per unit, complete in place.

Article 19.5 Basis of Payment

Payment for this Work shall be in accordance with Division 10, Section 10.07 - Measurement and Payment, and shall include full payment for all Work described in this Section.

Payment shall be made under the following unit:

ITEM	UNIT
Adjust Key Box	Each
Adjust Key Box (Concrete Slab or Asphalt Paving)	Each

SECTION 60.20 ADJUST VALVE BOX TO FINISH GRADE

Article 20.1 General

The Work under this Section consists of providing all operations pertaining to adjustment of existing mainline or hydrant valve boxes to finish grade, including the replacement of any and all broken valve box sections, lids, and dust pans.

Article 20.2 Material

All materials used in the adjustment of mainline valve boxes shall conform to the requirements of the utility company having jurisdiction over the water system.

Article 20.3 Construction

All valve box adjustments will be accomplished as directed by the Engineer. During the adjustment of the valve boxes, the top section will be replaced with a new top section, dust pan, and lid market "water," per the water utility specifications. Any salvaged top sections will be identified by the Engineer. All salvaged top sections will be delivered to the Street Maintenance Storage Yard by the Contractor. Any damage to a mainline valve box resulting from construction under this contract shall be repaired or the damaged portion replaced at the Contractor's expense. The Contractor shall be responsible for ensuring that the valve box is vertical, clean, to proper grade, and readily accessible for operation of the valve.

Contractor shall adjust the valve box to finish grade prior to placement of asphalt pavement. After-the-fact cutting of new asphalt for adjustments is not accepted. Any adjustment(s) requiring cutting of new asphalt shall not be paid and shall be deducted from the quantity.

Article 20.4 Measurement

Mainline valve box adjustments will be measured per unit, complete in place.

Article 20.5 Basis of Payment

Payment for this Work shall be in accordance with Division 10, Section 10.07 - Measurement and Payment, and shall include full payment for all Work described in this Section.

Payment shall be made under the following unit:

ITEM	UNIT
Adjust Valve Box to Finish Grade	EACH

MUNICIPALITY OF ANCHORAGE STANDARD SPECIFICATIONS

DIVISION 60 WATER SYSTEMS STANDARD DETAILS

STANDARD CONSTRUCTION SPECIFICATIONS MISCELLANEOUS DIVISION 60 INDEX OF STANDARD DETAILS

- 60-1 MJ Cap and Plug
- 60-2 Thrust Block
- 60-3 Typical Valve Box
- 60-4 Single Pumper "L" Base Fire Hydrant Assembly
- 60-5 Double Pumper "L" Base Fire Hydrant Assembly
- 60-6 Fire Hydrant Guard Posts
- 60-7 Water Service Connect 1"
- 60-8 Water Service Connect 1-1/2" and 2"
- 60-9 Irrigation System
- 60-10 Connecting Ductile Iron Pipe to Ductile Iron Pipe
- 60-11 Typical Pipe Angle Marker
- 60-12 Relocate Water Main (Storm Drain)
- 60-13 Anode Detail
- 60-14 Adjust Service Key Box

	4"-12"	14"-48"	
MJ PLUG			
NOTES: 1. MECHANICAL JO 2. COST OF THIS	DINT RESTRAINT FITTING TO BE	EBAA IRON MEGALUG® (INCLUDED IN BID PRICE	OR EQUAL. OF PIPE.
MUNICIPALITY SCALE: NTS APPROVED: REVISED: 10/07	M	J CAP AND PLUC	SECTION # 60.02 DETAIL # 60-1



MJ CAP





REVISED: OF ANCHORAGE

APPROVED:

10/07

THRUST BLOCK

DETAIL # 60 - 2





NOTES:

- 1. HYDRANT BARREL SHALL BE INSTALLED PLUMB AND THE LEG SHALL BE LEVEL.
- 2. DRAIN PLUGS TO BE PROVIDED BY CONTRACTOR.
- 3. ALL HYDRANTS SHALL BE PAINTED CATERPILLAR YELLOW.
- 4. HYDRANT GATE VALVE BOX TO BE INSTALLED ACCORDING TO DETAIL FOR TYPICAL VALVE BOX.
- 5. ALL PIPE AND FITTINGS FROM THE MAIN TO THE HYDRANT SHOE SHALL BE RESTRAINED BY USE OF MEGALUG® AND/OR FIELD LOK® GASKETS OR EQUAL.
- 6. ALL BACKFILL MATERIAL AROUND HYDRANT BARREL SHALL BE NFS.





- 3. ALL HYDRANTS SHALL BE PAINTED CATERPILLAR YELLOW.
- 4. HYDRANT GATE VALVE BOX TO BE INSTALLED ACCORDING TO DETAIL FOR TYPICAL VALVE BOX.
- 5. ALL PIPE AND FITTINGS FROM THE MAIN TO THE HYDRANT SHOE SHALL BE RESTRAINED BY USE OF MEGALUG® AND/OR FIELD LOK® GASKETS OR EQUAL.
- 6. ALL BACKFILL MATERIAL AROUND HYDRANT BARREL SHALL BE NFS.








MUNICIPALITY SC AF OF ANCHORAGE	ICALE: NTS IPPROVED: IEVISED: 10/07	WATER SERVICE CONNECT 1-1/2" AND 2"	SECTION # 60.06 DETAIL # 60-8
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MUNICIPALITY	SCALE:		SECTION #
	APPROVED:	IDDICATION SYSTEM	MISC.
	REVISED:		DETAIL #
OF ANCHORAGE	10/07		60-9









