

SECTION 02667
WATER DISTRIBUTION SYSTEM

PART 1: GENERAL

1.1 **SCOPE**

- A) This section includes the construction of water distribution system facilities including: buried pressure piping and fittings; valves; fire hydrants; water services and meters; and appurtenances as shown on the drawings or as required to complete the work.
- B) Work under this section shall include, but not be limited to the following:
 - 1) Installation of all buried pipe, fittings, joint restraints, valves, fire hydrant assemblies and service connection assemblies.
 - 2) Installing connections to all existing and/or new facilities and provide temporary services as required.
 - 3) Disinfecting, dechlorinating, flushing, and pressure testing new pipelines and appurtenances for a complete and operable system.

1.2 **QUALITY CONTROL**

- A) Laboratory Services: Water quality testing services shall be provided by the Ute Water Conservancy District.
- B) Field Inspection:
 - 1) All new water distribution system facility installations shall be inspected by a Representative of the Ute Water Conservancy District. Inspection shall begin at the beginning of construction and continue through the testing, disinfection and flushing operations. Any defective work discovered after installation shall be removed and correctly replaced in a manner satisfactory to the Engineer, or Ute Water Districts Representative at the Contractor's expense.
 - 2) All defective materials shall be suitably marked and removed from the job site before the end of the following day.
- C) Final Inspection and Acceptance: The acceptance of all water facilities by the Ute Water Conservancy District will be based on the following:

- 1) Submittal of satisfactory results of required test (such as pressure test, leakage tests, disinfection tests, compaction tests, etc.) certified by an Engineer or approved by a certified testing laboratory.
- 2) Passing a final inspection of the work by the Ute Water Conservancy District.
- 3) Submittal of "As-Built" construction drawings.
- 4) Restoration of all non-public surface disturbance.
- 5) Restoration of all surface disturbance within the public right-of-way to the satisfaction of the City, County or State.
- 6) Contractor shall warrant the work for a period of one year from the date of acceptance against defects in material and workmanship.

1.3 SUBMITTALS

- A) Submittals shall be in accordance with the requirements of these Contract Documents and shall include the following:
- 1) Material, size and pressure class schedule of all pipe, pipe fittings and appurtenances.
 - 2) Special joint details and any special provisions required for assembly.
 - 3) Manufacture's literature for each size and type of pipe, fitting and valve and fire hydrant.
 - 4) A certificate from the pipe, valves and fittings manufacturer stating that the materials have been sampled and tested in accordance with the provisions of and meet the requirements of the designated specification.

PART 2: PRODUCTS

2.1 PIPE

A) General

- 1) All pipe shall be intended for use with potable water. Components in contact with potable water shall be certified to comply with NSF/ANSI 61, Drinking Water System Components – Health Effects, and a copy of the NSF/ANSI

61 certification shall be provided to Ute Water Conservancy District and the pipe bear the NSF hallmark.

B) Ductile Iron (DI) Pipe

- 1) All ductile iron pipe shall be designed, manufactured, tested, inspected, and marked in accordance with AWWA C150, AWWA C151 and Manual M41.
- 2) Standard pipe outside diameters (ODs) conform to the ductile iron and cast iron sizing system, referred to as cast iron or CIOD.
- 3) Ductile iron pipe shall be minimum Pressure Class 350 or minimum Special Thickness Class 52, unless otherwise shown or specified.
- 4) Ductile iron pipe shall have a nominal laying length of 18-feet or 20-feet. Random lengths are not acceptable.
- 5) Ductile iron pipe shall have standard thickness cement-mortar linings in accordance with AWWA C104.
- 6) Ductile iron pipe outside coatings shall be asphaltic, shop-applied standard thickness of 1-mil minimum, continuous and smooth, neither brittle when cold or sticky when exposed to the sun, and strongly adherent to the pipe in accordance with AWWA C151.
- 7) Ductile iron pipe shall be UL listed and a copy shall be provide to Ute Water Conservancy District.
- 8) Ductile iron pipe shall have cathodic bonding joint assemblies installed by the pipe manufacturer prior to delivery.
- 9) All ductile iron pipe and ductile iron pipe fittings, including buried fire hydrant sections shall be polyethylene encased conforming to AWWA C105.
- 10) Push-on joint type ductile iron pipe shall have a single, continuous molded, rubber-ring gasket in an annular recess in the pipe or fitting socket; designed and shaped properly to lock in place against displacement in accordance with AWWA C111. Joint accessories for push-on joint type pipe shall be provided by the manufacturer of the pipe for compatibility.
- 11) Mechanical joint type ductile iron pipe, only where indicated on the drawings, is a bolted joint of the stuffing-box type that consist of (1) a fabricated or cast bell provided with an exterior flange having bolt holes or slots, a socket with annular recesses for sealing gasket and plain end of pipe

or fitting; (2) a pipe or fitting plain end; (3) a sealing gasket; (4) follower gland with bolt holes; and (5) tee-head bolts and hexagonal nuts.

- a) Tee-head bolts and hexagonal nuts shall be made of corrosion-resistant, high-strength low-alloy steel meeting the minimum characteristic values, strength, and dimensions of AWWA C111 such as Cor-Blue or approved equal.
 - b) Mechanical joint restraints, required for mechanical joint fittings, shall be required for mechanical joint pipe where indicated on the drawings, specified herein.
- 12) Restrained joint ductile iron pipe where shown on the drawings to be positively restrained push-on joint pipe capable of being deflected after assembly. Joint accessories for restrained joint type pipe shall be provided by the manufacturer of the pipe for compatibility.
- a) Acceptable restrained joint ductile iron pipe products include: TR Flex and Flex-Ring pipe as well as Field Lok, Sure Stop, and Fast-Grip gasket systems.
- 13) Rubber gaskets shall be made of vulcanized styrene butadiene rubber (SBR). Reclaimed or natural rubber shall not be used. Gaskets shall be free from porous areas, foreign material, and other defects that make them unfit for the use intended. Quality control tests shall be available upon request.
- 14) A thin film of nontoxic, water soluble, NSF/ANSI 61 approved gasket lubricant shall be applied to the inside surface of the gasket and the spigot end of the pipe.
- 15) Flange joint pipe including flanged spools, only where shown on the drawings, shall meet the additional requirements of AWWA C115 suitable for the pressure specified.
- a) Gaskets shall be full face, synthetic rubber, and 1/8-inch thick conforming to flange dimensions, pipe manufacturer's requirements and AWWA C111/C115. For diameters 14-inch and larger 1/8-inch ring type compressed fiber, non-asbestos gaskets are required.
 - b) Flange bolts, washers, and nuts shall be stainless steel. Flange bolts shall be in accordance with ASTM A193, Grade B8 with heavy hex nuts in accordance with ASTM A194, Grade 8. Strain hardened stainless steel washers type 304.

- (1) All stainless steel bolts shall receive a coating of food-grade NSF/ANSI 61, non-conductive, anti-seize on the threads prior to installation.

16) Approved manufacturers of ductile iron pipe:

Manufacturers
American Cast Iron Pipe Company
McWane Ductile
U.S. Pipe and Foundry Company/Griffin Pipe Products

17) Ductile iron pipe installed shall be manufactured domestically in the US.

C) Polyvinyl Chloride (PVC) Pressure Pipe

1) 2-inch Through 3-inch PVC Pipe and PVC Fittings

- a) PVC pressure pipe 2-inch through 3-inch in diameter shall be Schedule 40 with socket type solvent weld joints meeting the requirements of ASTM D 1785 and NSF/ANSI 61.
- b) Nominal pipe lengths shall be 20 feet. Random lengths are not acceptable.
- c) PVC Fittings shall be Schedule 40 socket type solvent weld meeting the requirements of ASTM D 2466 and NSF/ANSI 61. Threaded type PVC adapters, caps, and 90° bends shall be Schedule 80.
- d) Solvent cement shall be regular- or medium-bodied, high-strength, low VOC as recommended by manufacturer under this specification.

(1) Approved manufacturers of solvent cement:

Manufacturer	Product
IPS Corporation	700, 702, 710 (2-inch only), 704, 705, 721

- e) Primer for all solvent weld joints shall be premium, fast acting, industrial strength, low VOC for wet and/or quick set applications.

(1) Approved manufacturers of primer:

Manufacturer	Product
IPS Corporation	Weld-On P-75 Wet 'R Dry

2) 4-inch Through 24-inch PVC Pipe

- a) PVC pressure pipe 4-inch through 24-inch in diameter shall be manufactured in accordance with AWWA C900 and NSF/ANSI 61.
- b) Pipe joints shall be made using an integral bell with an elastomeric gasket push-on type joint.
- c) Standard pipe outside diameters (ODs) conform to the ductile iron and cast iron sizing system, referred to as cast iron or CIOD.
- d) Minimum pressure class or dimension ratio (DR) of PVC pipe shall be DR18 unless otherwise indicated.
- e) Pipe shall have a nominal laying length of 20-feet. Random lengths are not acceptable.
- f) Restrained joint PVC pipe where shown on the drawings to be positively restrained non-metallic push-on joint pipe shall have coupling and locking splines; or integral bell and locking spline; or fusible type pipe.
- g) Approved manufacturers of PVC pipe including restrained joint PVC pipe:

Manufacturers
Diamond Plastics Corporation
IPEX
JM Eagle
North American Pipe Corporation
Underground Solutions
Vinyltech Corporation

2.2 PIPE FITTINGS

A) General

- 1) All fittings shall be intended for use with potable water. Components in contact with potable water shall be certified to comply with NSF/ANSI 61, Drinking Water System Components – Health Effects, and a copy of the NSF/ANSI 61 certification shall be provided to Ute Water Conservancy District and the pipe bear the NSF hallmark.
- 2) All fittings shall be ductile iron (DI) in accordance with AWWA C110 or AWWA C153 as specified herein except as otherwise specified for PVC fittings for 2- through 3-inch.
- 3) All DI fittings shall have mechanical joint (MJ) ends as specified herein, except as noted below or shown on the drawings.
 - a) DI Tees shall be flanged with a flanged by mechanical joint (FLxMJ) valve bolted directly to the tee or as shown on the drawings.
 - (1) If as shown on the drawings, only one of two branches include a FLxMJ valve, an adapter shall be provided as specified herein.
 - (2) If size 2- and 3-inch pipe line is installed off a tee, use IP tapped companion flange, stainless steel nipple (4" minimum length) and IP threaded gate valve.
- 4) Standard coating system shall be asphaltic coating with cement-mortar lining or fusion-bonded epoxy inside and outside as additionally specified herein or except as otherwise shown on the drawings.
 - a) Ductile iron fittings outside coatings shall be petroleum-asphaltic coating approximately 1 mil thick, shop-applied, continuous and smooth, neither brittle when cold or sticky when exposed to the sun, and strongly adherent to the fitting.
 - b) Ductile iron fittings inside linings shall be cement-mortar linings in accordance with ANSI/AWWA C104/A21.4. At the manufacturer's option, moist cement-mortar linings can be given a seal coat of asphaltic material for curing the cement mortar.
 - c) Fusion-bonded epoxy ductile iron fittings shall be in accordance with ANSI/AWWA C116/A21.16 and shall be applied to the interior and

exterior surfaces. DI caps, plugs, and sleeves not normally cement mortar lined shall have fusion-bonded epoxy interior and exterior.

- 5) All ductile iron pipe and ductile iron pipe fittings, including buried fire hydrant sections shall be polyethylene encased conforming to AWWA C105.
- 6) Acceptable manufacturers of DI fittings include:

Manufacturers
American Cast Iron Pipe Company
McWane Ductile (TR Flex Restrained Joint DI Fittings)
Sigma Corporation
Star Pipe Products
Tyler Union
U.S. Pipe and Foundry Company/Griffin Pipe Products

- 7) Ductile iron fittings installed shall be manufactured domestically in the US.

B) Mechanical Joint Fittings

- 1) All MJ bends, tees, reducers, sleeves, offsets, caps and plugs, adapters, combinations thereof, and other miscellaneous fittings 3-inches through 16-inches in diameter shall be ductile iron compact fittings in conformance with AWWA C153.
- 2) All MJ bends, tees, reducers, sleeves, offsets, caps and plugs, adapters, combinations thereof, and other miscellaneous fittings greater than 16-inches in diameter shall be ductile iron fittings in conformance with AWWA C110.
- 3) Unless other specified, the minimum working pressure for all MJ ductile iron fittings 3-inches through 24-inch in diameter shall be 350 psi.
- 4) Unless otherwise specified, the minimum working pressure for all MJ ductile iron fittings 30-inch through 48-inch in diameter shall be 250 psi.
- 5) Mechanical joint type DI fittings are a bolted joint of the stuffing-box type that consist of (1) a fabricated or cast bell provided with an exterior flange having bolt holes or slots, a socket with annular recesses for sealing gasket and plain end of pipe or fitting; (2) a pipe or fitting plain end; (3) a sealing gasket; (4) follower gland with bolt holes; and (5) tee-head bolts and hexagonal nuts.

- a) Mechanical joint restraints shall be manufactured of DI in accordance with ASTM A 536. MJ restraints are incorporated into the design of the follower gland often known as a retainer gland with dimensions such that it can be used with standardized MJ bell and tee-head bolts in accordance with AWWA C111, C110 and C153.
- b) Restraint mechanism shall consist of numerous individually activated gripping surfaces to maximize restraint capability. The gripping surfaces shall be wedges that are designed to spread the bearing surfaces on the pipe. Twist-off nuts, sized the same as tee-head bolts, shall be used to ensure the proper actuating of restraining devices. When the nut is sheared off, a standard hex nut shall remain.
- c) MJ restraint device shall have a pressure rating equivalent to the fitting with a safety factor of 2 and are specifically designed for use with PVC pipe or DI pipe.
- d) The use of MJ restraint devices in lieu of concrete thrust blocks for restraint is limited to applications specified herein or as shown on the drawings.
- e) External coatings shall be shop-applied suitable for direct bury service.
- f) Acceptable manufacturers of MJ restraints for PVC Pipe include:

Mechanical Joint Restaint – PVC Pipe	
Manufacturers	Models
EBAA Iron, Inc	Megalug Series 2000 PV
Ford Meter Box Company	UFR 1500
Romac Industries	PVC RomaGrip
Sigma Corporation	One-Lok SLCE
Smith-Blair	Cam-Lock for PVC
Star Pipe Products	StarGrip Series 4000
Tyler Union	TufGrip Series 2000

- g) Acceptable manufacturers of MJ restraints for DI Pipe include:

Mechanical Joint Restaint – DI Pipe	
Manufacturers	Models
EBAA Iron, Inc	Megalug Series 1100 PV
Ford Meter Box Company	UFR 1400
Romac Industries	DI RomaGrip
Sigma Corporation	One-Lok SLDE
Smith-Blair	Cam-Lock for DI
Star Pipe Products	StarGrip Series 3000
Tyler Union	TufGrip Series 1000

- 6) Mechanical joint restraints for PVC Pipe and DI Pipe installed shall be manufactured domestically in the US.
- 7) Rubber gaskets shall be made of vulcanized styrene butadiene rubber (SBR). Reclaimed or natural rubber shall not be used. Gaskets shall be free from porous areas, foreign material, and other defects that make them unfit for the use intended. Quality control tests shall be available upon request.
- 8) A thin film of nontoxic, water soluble, NSF/ANSI 61 approved gasket lubricant shall be applied to the inside surface of the gasket and the spigot end of the pipe.

C) Flanged Fittings

- 1) All flange-joint bends, tees, reducers, adapters, combinations thereof, and other miscellaneous fittings including flange spool pieces 3-inches through 48-inches in diameter shall be ductile iron fittings in conformance with AWWA C110.
- a) Gaskets shall be full face, synthetic rubber, and 1/8-inch thick conforming to flange dimensions, pipe manufacturer's requirements and AWWA C111/C115. For diameters 14-inch and larger 1/8-inch ring type compressed fiber, non-asbestos gaskets are required.
- b) Flange bolts, washers, and nuts shall be stainless steel. Flange bolts shall be in accordance with ASTM A193, Grade B8 with heavy hex nuts in accordance with ASTM A194, Grade 8. Strain hardened stainless steel washers type 304.
- (1) All stainless steel bolts shall receive a coating of food-grade NSF/ANSI 61 anti-seize on the threads prior to installation.

- 2) Unless otherwise specified, the minimum working pressure for all flanged ductile iron fittings shall be 250 psi.

D) Plain End Fittings

- 1) Plain end bends, tees, reducers, combinations thereof, and other miscellaneous fittings including spool pieces 3-inches through 48-inches in diameter shall be ductile iron designed to mate with the mechanical joint AWWA C110/C153 and push-on joint connections AWWA C111.

E) Tapping Sleeve

- 1) Tapping sleeves, in combination with resilient seat wedge gate valves and specialty equipment, are used to install cut-in type connections to existing water facilities with or without interruption performed by Ute Water Conservancy District.
- 2) Tapping sleeves shall meet the requirements of AWWA C223 with the additional requirements. Tapping sleeves shall be stainless steel meeting or exceeding the requirements of ASTM A 240 type 304 UNS. The stainless steel surface shall be descaled and passivated in accordance with ASTM A967 or ASTM A380.
- 3) The outlet shall be heavy gauge stainless steel; the outlet flange shall be ASTM A536, Grade 65-45-12 ductile iron with ANSI Class 125 and 150 drilling and recessed to accept tapping valve specified herein.
 - a) Bolts, nuts and washers shall be 304 stainless steel; heavy hex nuts coated to prevent galling.
 - b) Flange gasket shall be virgin styrene butadiene rubber (SBR) suitable for potable water meeting the NSF 61 requirements.
- 4) Tapping sleeves 4- through 8-inch pipe size shall be rated for a working pressure of 250 psi and 10- through 24-inch pipe size shall be rated for a working pressure of 200 psi.

- 5) Acceptable manufacturers of tapping sleeves are:

Manufacturers	Model
Ford Meter Box Company	FAST, FTSS DI Flange
Mueller Co	H-304 DI Flange
Romac Industries	Model SST, SST III DI Flange
Smith-Blair	Model 662,664 DI Flange

2.3 COUPLINGS AND ADAPTERS

- A) Couplings and adapters shall be limited in their application to connection of proposed pipe facilities to existing and proposed waterline facilities, temporary installations, and where specifically called for in the Contract Documents or approved by Engineer.
- B) Couplings to ensure a permanent watertight plain end connection to proposed pipe facilities shall be DI mechanical joint type solid sleeve couplings described in these specifications herein and includes approved manufacturers.
- C) Couplings to ensure a permanent watertight plain end connection to existing pipe facilities to accommodate a reasonable OD variance shall be a reducing or transition bolted sleeve-type coupling in accordance with AWWA C219 and in accordance with AWWA Manuals M11 and M41 for design.
- 1) End rings and center sleeves shall be coated in accordance with AWWA C210 or C213 with a minimum DFT of 12 mils suitable for direct bury.
 - 2) Bolts, heavy hex nuts, and washers (when used) shall be similar materials to minimize the possibility of galvanic corrosion. The manufacturer of the fitting shall supply proper bolts, nuts, and washers along with information as to the recommended torque to which the bolts shall be tightened.
 - 3) Acceptable manufacturers and models of bolted sleeve couplings:

Manufactures	Models
Dresser	Style 38, Style 138
Ford Meter Box Company	Style FC1, FC2
Hymax	Grip, Hymax 2
Romac Industries	XR501, Macro HP, Style 400
Smith-Blair	400 Series

- D) Bolted, split sleeve couplings, restrained and nonrestrained, in accordance with AWWA C227 for use on plain end welded steel pipe only as approved by Ute Water Conservancy District.
- E) Flanged adapters are a restrained adapter flange coupling device designed to connect plain end pipe to a flanged pipe, valve or fitting. A flange adapter is a ductile iron or steel body with a flanged end and mechanical joint end and shall be used in lieu of threaded or welded flanges on plain end ductile or PVC pipe unless approved in writing by Ute Water Conservancy District. Specification requirements are described herein.
- 1) Acceptable manufacturers and models of flange adapters:

Manufactures	Models
EBA Iron, Inc	Megaflange Series 2100
Ford Meter Box Company	RFAP, RFAD
Romac Industries	RFCA, RFCA-PVC
Smith-Blair	Flange Lock

2.4 VALVES

A) General

- 1) All valves and appurtenances shall have the name, monogram, or initials of the manufacturer cast thereon. They shall be built and equipped for the type of operation as specified herein or as shown on the drawings. Valves shall be suitable for frequent operation and for long periods of inactivity. Valves shall be suitable for flows in either direction. Components shall be suitable for exposure to chloraminated water.
- 2) Where requested by the Contractor and approved by the Engineer, additional valves may be installed by the Contractor to facilitate installation, testing, or connection to existing pipe work. Unless otherwise specified in writing by the Engineer, such valves requested by the Contractor shall be provided at no additional cost to the Owner.
- 3) All buried valves shall be supplied with a 2-inch square operating nut. Operating nut shall be 1-5/16 -inch square at the top, 2-inch square at the base and 1-3/4 - inches high. Extension stems shall be provided for buried valves when the operating nut is four (4) feet or more below finished grade. Extension stem shall extend to within twelve (12) inches of the ground surface and shall be provided with spacers which will center the stem in the valve box.

- 4) At the minimum, joint restraints will be required at the valve; additional joint restraints maybe required at adjacent joints depending on proximity to the valve, test pressure and line size, with the approval of the Engineer.
- 5) Unless otherwise specified, all valves shall have a minimum pressure rating that will accommodate maximum pressure which will be experienced during hydrostatic leakage testing.

B) Valve Boxes (VB)

- 1) A cast iron valve box and lid shall be provided for each underground valve. Valve boxes shall be 2-piece, slip type sized for the type of valve and depth of bury. The use of extensions in preparation of final grade shall not be acceptable.
- 2) The valve box lid shall have the word "water" permanently cast on the top.
- 3) Valve box parts shall be made of gray cost iron in accordance with ASTM A 48, Class 35B. Aluminum alloy as a casting material is not acceptable.
- 4) Valve boxes shall be heavy duty 564A, with formed top to receive insert type traffic-rated cover.
- 5) All parts of valve boxes, bases, and covers shall be coated by dipping in black bituminous paint.

C) Gate Valves (GV)

- 1) Gate valves shall be resilient seated wedge gate valves designed and manufactured in accordance with AWWA C509 or AWWA C515, as applicable, with the following additional requirements.
- 2) Gate valves shall be iron body, resilient seated gate valves, fully bronze-mounted with non-rising stems. Valve bodies shall be designed to allow for the lifting of the valves by the bonnet flange, gland flanges, or other appurtenances.
- 3) Valve stems shall be made of bronze in accordance with ASTM B 763, Copper Alloy No.C99500 or stainless steel in accordance with ASTM A 276, Type 304, Type 316, or AISI 420. The stems shall consist of two O-rings.

- 4) Valves shall be suitable for frequent operation and for long periods of inactivity. Operating pressure for 3-inch through 12-inch shall be 200 psi and 14-inch through 16-inch shall be 150 psi; valves shall be drip-tight, zero leakage past the seat under rated pressure differential.
- 5) The bonnet gland bolts and nuts shall be in accordance with ASTM F 593, Type 304 stainless steel. The hot-dip galvanized process is not acceptable.
- 6) Flanged and mechanical joint end connections as indicated on the drawings. Flanges shall be sized and drilled in accordance with ANSI B16.1, Class 125; machined and finished in accordance with AWWA C207. Mechanical joint ends shall be as described in these specifications and AWWA C111.
- 7) Ferrous surfaces, except machined or bearing surfaces, shall be prepared in accordance with SSPC SP10. These interior and exterior surfaces shall be epoxy coated in accordance with AWWA C550.
- 8) Each valve shall be successfully operated and hydrostatic tested in accordance with AWWA C509 or AWWA C515 at the manufacture's plant.
- 9) The manufacturer shall provide affidavit of compliance in accordance with the AWWA Standard.
- 10) Acceptable manufacturers of resilient seated gate valves are:

Manufacturers
American AVK
Clow Valve Co.
Kennedy Valve
Mueller Co
US Pipe Valve & Hydrant

D) Tapping Valves

- 1) Tapping valves shall be resilient seated wedge gate valves specified herein and in accordance with AWWA C509 or AWWA C515 furnished with a tapping sleeve flanged end connection on one end of the valve.
- 2) The tapping sleeve flanged end connection on the fitting side shall have a machined projection on the flange to mate with a machined recess on the outlet flange of the tapping sleeve fitting.

- 3) The outlet end shall conform in dimensions to the AWWA Standards for hub or mechanical joint end, except that the outside of the hub shall have a large flange for attaching a drilling machine. The seat opening of the valves shall be larger than normal size to permit full diameter cuts.
- 4) Acceptable manufacturers of resilient seated gate valves are:

Manufacturers
American AVK
Clow Valve Co.
Kennedy Valve
Mueller Co
US Pipe Valve & Hydrant

E) Butterfly Valves (BFV)

- 1) Butterfly valves shall be rubber seated butterfly valves designed and manufactured in accordance with AWWA C504 except as herein modified.
- 2) Valves shall be suitable for throttling service, frequent operation, and long periods of inactivity. Valves shall operate with flows in either direction. Components shall be suitable for exposure to chloraminated water.
- 3) Butterfly valves shall be iron body rubber seated, rated for a differential pressure of 250 psi and a flow velocity of 16 ft/sec. Class 250B valves shall be ductile iron bodies. Valves shall be short-body. Unless specified otherwise, valves shall be intended for direct-bury use.
- 4) Butterfly valves shall be supplied with 2-inch square operating nut and open standard counter-clockwise. The type and class of valves shall be specified.
- 5) Unless otherwise specified or shown on the drawings, valves shall have flanged end or mechanical end as specified herein. Flanges shall be Class 125, flat faced, dimensions and drilling per ANSI B16.1 with full-sized bolt holes through the flange except where the shaft passes through the body. Flange gaskets and hardware as specified herein.
- 6) Butterfly valves shall be furnished with manual actuators designed and sized per AWWA M49 to meet torque requirements for the maximum differential pressure rating; actuators shall be sufficient to seat, unseat, and rigidly hold the disc in any position. The gearing of the actuator shall be totally enclosed and sealed with lubricant for a temperature range of -10°F to 150°F.

- 7) Interior and exterior surfaces except stainless steel, machined or bearing surfaces, and flange faces shall be shop-coated with an epoxy coating conforming to the requirements of ANSI/AWWA C550 to a minimum dft of 8 mil with NSF/ANSI 61 certification provided.
- 8) Acceptable manufacturers of resilient seated butterfly valves are:

Manufacturers
DeZurik
Kennedy Valve
M&H Valve Co
Mueller Co
Pratt
Val-Matic

F) Air Release Valves (ARV)

- 1) Air release valves shall be combination air-release and air vacuum valves designed and manufactured in accordance with AWWA M51 and AWWA C512.
- 2) Valves shall be capable of venting large quantities of air while filling pipeline systems; automatically releasing small pockets of air that accumulate during system operation; and admitting large quantities of air into pipeline system when internal system pressure drops below atmospheric pressure. Valves shall be suitable for frequent operation and long periods of inactivity. Components shall be suitable for exposure to chloraminated water.
- 3) Valves shall be a single body design capable of 300 psi maximum working pressure. Materials for valve construction shall comply with the requirements of the Safe Drinking Water Act for potable water.
- 4) Valve sizes, locations, and details shall be in accordance with the drawings. Valves shall be installed in a vertical position in an underground concrete manhole or concrete vault as applicable.
- 5) Valves, 1-inch and 2-inch shall be furnished with NPT inlets and 3-inch through 6-inch shall be furnished with flanged inlets that conform to the dimensions and drilling of ANSI B16.1, Class 125. A ¼-inch minimum NPT in the bottom of the valve body shall be provided.

6) Internal and external ferrous surfaces, except machined or bearing surfaces shall be prepared in accordance with SSPC SP10. These surfaces shall then be epoxy coated in accordance with AWWA C550 and NSF 61 compliant.

7) Acceptable manufacturers of combination air-release and air vacuum valves are:

Manufacturers
APCO
GA Industries
Val-Matic

2.5 SERVICE LINE PIPE, VALVES, FITTINGS AND TAPPING SADDLES

A) General

- 1) All service brass and bronze goods in contact with potable water shall be manufactured in accordance with AWWA C800 using lead-free copper alloy.
- 2) Components in contact with potable water must comply with the latest requirements of the Federal Safe Drinking Water Act, NSF/ANSI 61 and a copy of the certification shall be provided if requested.

B) Service Line Pipe

- 1) Water service line pipe shall be seamless copper water tube in accordance with ASTM B 88, furnished in coils, annealed, Type K Copper UNS No.12200, in accordance with AWWA C800.
- 2) Water service line pipe sizes include: ¾-inch, 1-inch, 1 ¼-inch, 1 ½-inch, and 2-inch nominal diameters. Unless otherwise shown on the drawings, service line pipe shall be ¾-inch.
- 3) Acceptable manufacturers of water service line pipe are:

Manufacturers
Cambridge-Lee Industries
Cerro Flow Products
CMC Howell Metal
Mueller Industries
Wieland Copper

- 4) Water service line pipe shall be manufactured domestically.

C) Corporation Stops

- 1) Corporation (corp) stops are valves attached to all service saddles at the main. Corp stops shall be brass fittings with full-way bore with inlets for AWWA iron pipe threads and compression outlets to adapt to copper pipe.
- 2) Acceptable manufacturers of corporation stops are:

Manufacturers	Models
A.Y. McDonald	Ball Model 74704BQ
Ford Meter Box Co	Ball FB1100-x-Q-NL
Mueller Co.	Type300 Ball Model B-25028N

D) Service Saddles

- 1) Service saddles (tapping saddles) are fittings that attach circumferentially to the water main to provide for attachment of a corporation stop.
- 2) DI and AC pipe service saddles shall be double bronze strapped tapping saddles with AWWA iron pipe threads.
 - a) Acceptable manufacturers of DI and AC pipe service saddles are:

Manufacturers	Models
A.Y. McDonald	3826
Ford Meter Box Co	202B-xxx-TAP IP Thread 202BS-xxx-TAP IP Thread 202BSD-xxx-TAP IP Thread
Mueller Co	BR2B IP Thread BR1S IP Thread BR2S IP Thread

- 3) PVC pipe service saddles shall be stainless steel strapped bronze tapping saddles with AWWA iron pipe threads; saddles shall provide full support around the circumference of the pipe, have a bearing area of sufficient width along the pipe axis so that the pipe will not be distorted when the saddle is tightened.

- a) Acceptable manufacturers of C900 PVC pipe (4-inch through 24-inch) service saddles are:

Manufacturers	Models
A.Y. McDonald	3846, 3856
Ford Meter Box Co	202BS-xxx-TAP IP Thread 202BSD-xxx-TAP IP Thread
Mueller Co	BR2S IP Thread BR2W IP Thread
Romac Industries	202BS IP Thread

- b) Acceptable manufacturers PVC pipe saddles (2-inch through 3-inch)

Manufacturers	Models
A.Y. McDonald	
Ford Meter Box Co	FS300W-xxx-Tap IP Thread F1-xxx-xxx-IPx
Mueller Co	500/510 Series IP Servi-Seal
Romac Industries	SS1 IP Tap Repair Clamp
Smith-Blair	Full Circle Repair Clamp w/IP Tap Service

E) Brass and Bronze Goods

- 1) Where connecting to existing water service lines, Contractor shall supply all required fittings to make connections, plug services and blow offs.
- 2) Fittings are generally no-lead (no more than 0.25% total lead content) brass; typically with compression style ends.
- 3) Couplings

Manufacturers	Types	Models
A.Y. McDonald	Coupling CTS	74758-22
Ford Meter Box Co		
Mueller Co	Coupling 3 part union	H-15403N

- 4) Branch wye fittings for gang services shall be brass MIP x CTS manufactured by A.Y. McDonald, Ford Meter Box, and Mueller Co.
- 5) Threaded pipe nipples shall be brass or stainless steel with IP thread.
- 6) Plugs and caps shall be brass with IP thread.

2.6 WATER METERS

- A) All meter pit assemblies, including cones and lids, yokes and water meters, shall be provided by the Ute Water Conservancy District.
 - 1) Meter pits generally include concrete pit rings; CI cone, CI frost lid and CI top lid drilled to accept radio read meters. Cast iron goods shall be thoroughly cleaned and coated with a black bituminous paint.
 - 2) Yokes are copper with brass valves and goods; ends will have a CTS compression inlet with a FIP outlet.

2.7 FIRE HYDRANTS

- A) General
 - 1) All fire hydrants shall conform to local fire district requirements unless otherwise required.
 - 2) Dry-barrel fire hydrants shall be designed and manufactured in accordance with AWWA M17 and AWWA C502 with the following additional requirements or exceptions.
- B) Fire hydrants shall be designed for a minimum working pressure of 150 psi.
- C) Fire hydrants shall be the three-way type with one pumper nozzle and two hose nozzles located on the same horizontal plane at least 18-inches above the ground line.
 - 1) Hose nozzles (2) shall be 2 ½-inch nominal diameter ports with 7 ½-inch threads per inch (2.5-7.5 NH), National Standard in accordance with NFPA Standard 1963. Hose nozzle caps shall be furnished with security chains; the end shall be securely attached to the upper barrel section of the fire hydrant.
 - 2) Pumper nozzle (1) shall be 4 ½-inch nominal diameter port; nozzle dimensions as specified herein. Pumper nozzle caps shall be furnished with security chains; the end shall be securely attached to the upper barrel section of the fire hydrant.
 - a) Grand Junction Fire District and Grand Junction Rural Fire District:
 - (1) Threads per inch (tpi) shall be 4.
 - (2) Outside (major) diameter of male thread is 5.282 inches.

- (3) Diameter of root (minor) male thread is 4.932 inches.
 - (4) Pitch diameter is 5.12 inches.
- b) Lower Valley Fire District:
- (1) An integral 5-inch quick, universal ¼ turn hose to hydrant connection (commonly referred to as a Storz Nozzle) and metal cap which can be opened by a standard hex nut hydrant wrench shall be factory-installed from the manufacturer.
- 3) Hydrants shall have a main valve opening of 5 ¼-inches, compression type that closes with water pressure. The components of the main valve assembly shall be designed so that removal of the assembly from the barrel may be accomplished without excavation.
 - 4) Hydrant base shall be provided with a mechanical joint inlet to accommodate 6-inch DI or C900 PVC pipe complete as specified herein.
 - 5) Hydrants shall be equipped with traffic features that include a breakaway flange or lug system with a shaft coupling that prevents damage to the barrel section upon impact.
 - 6) The upper and lower operating rods shall be stainless steel. The operating nut shall be bronze or DI, pentagon shaped with a finished height of 1 1/8-inch. The dimensions from point-to-flat shall be between 1 ¼-inch and 1 3/8-inch, top to the bottom of the nut, respectively.
 - 7) A stop nut located in the hydrant bonnet on the operating shaft shall prevent the over travel of the main valve when it is being opened.
 - 8) The hydrant shall open by turning the operating nut left or counter-clockwise and shall have an arrow on the top of the bonnet to designate the direction of opening.
 - 9) The upper exposed section of the fire hydrant shall be thoroughly cleaned and painted with a prime coat of a rust inhibitive primer followed by a 10 mil DFT shop coat of heavy duty enamel paint. The paint color:
 - a) Grand Junction Fire District and Grand Junction Rural Fire District:
 - Bonnet shall be “OSHA Safety Yellow”
 - Body shall be “OSHA Safety Green”

- b) All other Fire Districts fire hydrants shall be painted “OSHA Safety Red”
- 10) Exposed exterior surfaces below the bury line shall be coated with asphalt varnish in accordance with AWWA C502. Interior of the hydrant shall be coated with an epoxy coating in accordance with AWWA C502 and NSF 61. The hydrant shoe and connecting gland shall be lined and coated with fusion-bonded epoxy in accordance with AWWA C502.
- 11) Fire hydrants shall be oriented so as to optimize access to nozzles; pumper nozzle shall generally face the street, or as directed by the Engineer.
- 12) Ute Water standard detail for fire hydrant assemblies require concrete thrust blocks as shown regardless of the use of joint restraints.
- 13) Acceptable manufacturers of fire hydrants:

Manufacturers	Model
Kennedy Valve	Guardian K81-D
Mueller Co	Super Centurion

2.8 BACKFILL AND BEDDING MATERIAL

- A) Unless otherwise shown on the drawings or specified herein, all pipe bedding materials shall be in conformance with the applicable trench excavation and backfill specifications contained herein.

2.9 CONCRETE

- A) Concrete for thrust blocks or pipe anchorage shall be Portland Cement concrete with minimum compressive strength at 28 days of 3000 psi.
- B) High early concrete specified in the Contract Documents shall achieve compressive strength of 2,500 psi in 24 hours minimum.
- C) Reinforcing steel shall be deformed bars conforming to ASTM A615, Grade 60; hooked epoxy-coated rebar shall be used for concrete overbends. A fiber mesh additive, in lieu of reinforcing steel, to concrete is acceptable for most thrust block installations with approval from Ute Water’s Engineer.

2.10 TRACER WIRE

- A) A continuous insulated minimum 10 gauge solid copper tracer wire shall be supplied with all pipe with 2-inch wide PVC tape.
- B) Tracer wire shall have blue 0.03-inch thick high molecular weight polyethylene (HMWPE) insulation suitable for direct burial applications.
- C) Additional wire shall be installed as necessary to allow the tracer wire to be looped up at all fire hydrants and air vents at underground vaults.

2.11 BLOWOFF ASSEMBLY

- A) A Blowoff Assembly is required for evacuating air and flushing water facilities. Blowoff assemblies generally include: service saddles, valves, and pipe according to the Standard Details and sized according to the schedule provided in specifications herein.
 - 1) A Type B Blowoff Assembly for installations where the main is to be permanently dead-ended, such as a cul-de-sac.
 - 2) A Type A Blowoff Assembly for installations where the main is to be temporarily dead-ended, such as the boundary of a subdivision filing, a Type A Blowoff shall be installed unless a fire hydrant, which can serve additionally as a blowoff, is located at the main's temporary end.

PART 3: EXECUTION

3.1 PRODUCT HANDLING, UNLOADING, AND STORAGE

- A) Care shall be taken during transporting and all handling to avoid damaging pipe and appurtenances. Loading and unloading shall be accomplished with the material under control at all times and under no circumstances shall the material be dropped. Material shall be securely wedged and restrained during transportation and supported on blocks when stored in the shop or field. Manufacturer's recommendations shall be carefully followed during material handling and storage.
- B) The Contractor shall be responsible for unloading and loading materials at the jobsite. Slings (other than nylon straps), hooks, or pipe tongs shall be padded and used to properly prevent damage to pipe and appurtenances.
- C) Store all pipe on a flat surface so that the blocking will support the barrel evenly; if possible, pipe and appurtenances shall be handled in unit packages with proper

supports. When unit packages are stacked, care shall be exercised to ensure the height of the stack does not result in instability that could cause stack collapse, pipe damage, or personal injury. Generally, stack height should not exceed eight (8) feet.

- D) Plastic pipe, if stored outside for long periods of time shall be covered with an opaque material to protect it from sunlight. Gaskets shall be protected from excessive exposure to heat, direct sunlight, oil, grease or other contaminants.
- E) Lower all pipe and fittings into trench in a manner to prevent damage to pipe or fittings. Heavy impact may cause a slight longitudinal indentation in the outside of PVC pipe and a crack on the inside. This may result in a split as soon as the pipe is placed under pressure. Any pipe that has been impacted shall be examined closely for this type of damage. Any observed gouges or scratches that extend 10 percent or more into the pipe wall shall justify rejection of that pipe.
- F) All pipe and appurtenances are subject to inspection on delivery. Neither inspection nor failure to provide inspection shall relieve the Contractor of the responsibility to provide materials meeting the requirements of the Contract Documents. Materials not conforming to the requirements of these specifications and AWWA Standards shall be made satisfactory or replaced.

3.2 SURVEYING

- A) Water facilities, including pipe, fittings, valves, meter services, hydrants, and other appurtenances shall not be installed without line and grade stakes approved by Ute Water Inspector. Line and grade for water mains shall be established under the direct supervision of a PLS.
- B) The correct alignment and elevation of water mains, as shown on the approved drawings, is the responsibility of the PE. Approval by Ute Water Inspector does not relieve the PLS of responsibility of field errors.
- C) If a water main is to be extended in an existing street and if the PE that prepared the plans can show the ground line is to remain unchanged, grade stakes shall not be required. The water main shall be installed with 54-inch of cover.

3.3 INSPECTION

- A) The installation of new facilities shall be inspected and approved by Ute Water.
- B) Ute Water personnel are not responsible for Contractor jobsite safety compliance or the enforcement of applicable safety regulations and standards.

- C) Ute Water requires compliance with these specifications, especially with regard to the quality of workmanship and approved materials.
- D) The Contractor shall give at least 2 days' notice to Ute Water's Engineer (970-242-7491) prior to the start of construction. Construction is not allowed within the 2-day notification period.

3.4 TRENCHING

- A) Comply with federal regulations for the protection of workers and the safety of the general public according to AWWA M3.
- B) Trench excavation shall proceed in advance of pipe installation only so far as can be backfilled the same day, or as permitted by the Contract Documents.
- C) The discharge from any trench dewatering pumps or directional drilling operations shall be discharge to natural drainage channels, storm sewers, or containment reservoirs as approved by regulatory authorities having jurisdiction and in a manner that prevents property damage, erosion, or siltation.
- D) Where necessary to prevent caving or trench instability, trench excavations in unstable soils shall be adequately supported with steel sheeting or trench boxes. Before sheeting is withdrawn, or trench boxes moved forward, they shall be raised, in place, just above the pipe crown to safely allow the Contractor to completely fill any voids left in the pipe zone.
- E) Unless otherwise specified herein or shown on the drawings, the width of the trench at the top of the pipe shall permit the pipe to be laid and joined properly and to allow the backfill to be placed in accordance with the Contract Documents. Trench widths are based on the nominal pipe diameter plus the distance from each side of the pipe to the face of the trench (or the back of the sheeting or trench box, if used). As a guide:
 - 1) For pipe twenty-four (24)-inches in diameter or less, trench width shall not exceed width of the pipe plus nine (9) inches on each side.
 - 2) For pipe greater than twenty-four (24)-inches in diameter, trench width shall not exceed width of the pipe plus fifteen (15) inches on each side.
- F) Unless otherwise directed or called for on the drawings, all pipe trenches shall be excavated below the proposed pipe invert as required to accommodate the depths of pipe bedding material as scheduled on the drawings.

- G) When excavation in rock, meeting the definition of rock as defined in Section 02226, is necessary, said rock shall be removed to provide additional clearance below the pipe zone as shown in the Contract Documents.
- H) Blasting for excavation shall be permitted with approval by the Engineer and only after securing approval(s) from federal, state, and other authorities having jurisdiction.
- I) Trees, shrubs, fences, and all other property and surface structures shall be protected during construction, unless their removal is shown in the Contract Documents. All properties that have been disturbed shall be restored as completely as practical to their original condition.
- J) When material is found to include ashes, cinders, refuse, organic material, or other unsuitable material, this material shall be removed with approval from the Engineer according to the Contract Documents.
- K) When the bottom of the trench consists of material that is unstable as determined by Ute Water's Engineer to such a degree that removal is impractical, a foundation for the pipe or appurtenance shall be constructed according to the Contract Documents

3.5 ALIGNMENT AND GRADE

- A) Waterlines shall be laid and maintained on lines and grades established in the Contract Documents. Fittings, valves, hydrants, and appurtenances shall be installed at the required locations, unless field conditions warrant otherwise and these changes are approved in accordance with the Contract Documents.
- B) Prior to excavation, an investigation shall be conducted to determine the location of existing underground utilities, structures, conflicts, and potential for corrosive soil conditions. Special precautions shall be taken when the water main being installed crosses or is adjacent to a facility that is cathodically protected.
- C) Generally, waterlines shall be installed at a depth of bury of 54-inches measured from the top of pipe to finish grade unless specifically approved by the Engineer.
- D) When waterlines are designed to be laid in a straight line and/or at a specific grade, the deviation from line and grade shall not be in excess of 0.2 feet horizontally for line and 0.1 feet vertically for grade.
- E) Variations from the bury depth may be necessary to avoid underground obstructions. A minimum of six (6) inches of clearance shall be maintained

between the pipe and obstructions unless federal, state, and other local regulations require otherwise or as deemed necessary to prevent future damage.

3.6 UTILITY CONFLICTS

- A) The Contractor shall be responsible for exposing potential utility conflicts far enough ahead of pipeline construction to make necessary adjustments in grade and alignment of the new work within the recommended limits of pipe and fitting deflection and/or the lines and grades stated in the Contract Documents.
- B) The Contractor shall be responsible for informing the Engineer of the need for a grade and/or alignment adjustment.
- C) The Contractor shall not deviate from the design line and grade stated in these Contract Documents without the approval of the Engineer.

3.7 SANITARY SEWER CROSSINGS

- A) The physical relationship between water lines and sanitary sewers shall conform to requirements of the Colorado Department of Public Health and Environment (CDPHE). The minimum horizontal spacing between sewer lines and water lines shall be ten (10) feet measured center line to center line.
- B) Where sewer lines and water lines cross, the sewer pipe shall be a minimum of eighteen (18) inches clear distance vertically below the water line. If this clear distance is not feasible, the crossing must be constructed so as to protect the water line. Minimum protection shall be as follows:
 - 1) When sewer crosses over water pipe, no matter what the separation distance, the sewer line shall be concrete encased with reinforced concrete to a distance of 10-feet on each side of the waterline as shown on the Standard Detail Drawing.
 - 2) When the sewer crosses under the water pipe with less than 18-inches separation the sewer line shall be concrete capped to springline a distance of 10-feet on each side of the waterline as shown on the Standard Detail Drawing.
- C) In all cases, suitable backfill or other structural protection shall be provided to preclude settling and/or failure of the sewer or water piping, especially the higher pipe.
- D) Contractor shall contact Engineer when sewer lines are found within the above described zone. Engineer may field verify the need for concrete encasement of

sewer lines. Contractor shall install ductile iron sewer lines only after direction from the Engineer.

3.8 OPERATION OF EXISTING VALVES

- A) The Owner will operate or supervise the operation of all existing valves during the course of the work. The Contractor shall not operate any existing valve unless specifically instructed to do so by the Engineer or the Owner.
- B) The Contractor shall be responsible for coordination of the work with the Owner to provide for the timely operation of existing valves. Owner will require advance notice necessary to coordinate service outage notifications to customers.
- C) The Contractor shall coordinate and perform the work so as not to require the Owner's personnel to operate any valves outside of the Owner's normal work hours.

3.9 SANITARY PRACTICES DURING INSTALLATION

- A) Pipe shall not be laid in standing water. Precautions shall be taken to prevent dirt, debris, or other foreign materials from entering the pipe during all phases of construction. Tools, rags, and other materials shall be kept out of the pipe at all times.
- B) At the end of each day, or at other times when the trench site is left unattended, the open ends of the pipe shall be sealed with a water tight plug to prevent trench water and foreign materials from entering the pipe. If water is in the trench, the seal shall remain in place as long as water is able to enter the pipe.

3.10 PIPE INSTALLATION

- A) Pipe shall be laid and joined one length at a time to the required line and grade. Pipe shall be placed with the bell end facing the direction of laying unless otherwise specified.
- B) Where pipe is laid on grades in excess of fifteen percent (15%), the bells shall face upgrade. Where pipe is laid on grades in excess of twenty percent (20%), pipe anchorage systems shall be required.
- C) The outside of the spigot and the inside of the bell shall be cleaned immediately before the pipe or fittings are installed. If the pipe contains dirt or other foreign matter, the interior of the pipe shall be cleaned as necessary to remove the material prior to installation.

- D) As the pipe is placed in the trench, bell holes shall be dug and the pipe supported on bedding materials the full length of the barrel.
- E) Where required, lubricate the outer surface of the rubber gaskets and the spigot end of the pipe using approved lubricant meeting the requirements of the Federal Safe Drinking Water Act, NSF/ANSI 61.
- F) Assemble the pipe in accordance with the manufacturer's recommendations. Regardless of the method used to assemble the pipe, the pipe shall be kept in alignment during installation of the spigot into the bell end or the fitting.
- G) The spigot and the bell shall be aligned and pushed until the reference line on the spigot is flush with the end of the bell. Pushing shall be done in a smooth, steady motion. Pipe that is not furnished with a depth mark shall be marked prior to the assembly to ensure the spigot end is inserted to the full depth of the joint.
- H) When it is necessary to deflect pipe from a straight line in either horizontal or vertical plane, the amount of deflection listed by the manufacturer shall be limited to 75% of those values.
- I) After each length of pipe is installed in the trench, the pipe shall be secured in place with approved backfill material tamped under and along sides to prevent movement. Additional backfill material shall be placed and compacted in suitable lift layers to the height shown on the plans and details or as directed. The remainder of the trench shall be backfilled as specified and called for in the Contract Documents.
- J) Pipe ends shall be kept clear of backfill at all times.
- K) Wherever piping passes through walls, a wall casting pipe or sleeve shall be installed unless otherwise shown on the drawings.

3.11 FITTING INSTALLATION

- A) All connections shall be made in strict accordance with manufacturer's recommendations.
- B) The connection of pipe with plain ends of the same diameter in new construction shall be accomplished with ductile iron, mechanical joint solid sleeve couplings unless otherwise approved by the Engineer.
- C) Contractor shall use the correct rubber gaskets with the ductile iron bell or fitting, and specifically designed for the pipe OD equivalent used.

D) Mechanical Joint Fittings

- 1) The outside of the spigot, the inside of the bell, and the rubber gasket shall be thoroughly cleaned to remove oil, grit, excess coating, and other foreign matter.
- 2) Lubrication and additional cleaning shall be provided by brushing both the gasket and plain end with soapy water or a thin film of nontoxic, water soluble, NSF/ANSI 61 approved lubricant just prior to slipping the gasket on the plain end.
- 3) The gland shall be slipped on the spigot end of the pipe with the lip extension of the gland toward the socket or bell end. The rubber gasket shall be placed on the spigot end with the thick edge toward the gland.
- 4) Pipe shall be pushed in until the spigot end fully penetrates the bell. The gasket shall then be pressed into place evenly within the bell around the entire joint. The DI gland shall be moved along the pipe into position for bolting. Bolts shall be inserted and nuts shall first be screwed finger tight with the final tightening to be done to the Manufacturer's specifications with a torque-limiting wrench.
- 5) Pipe equipped with locking gaskets providing mechanical joint restraint shall be installed according to the Manufacturer's recommendation. The bell end of the locking gasket pipe shall be spray-painted safety red.
- 6) Nuts spaced 180 degrees apart shall be tightened alternately to produce equal pressure on the gland.

E) Flanged Fittings

- 1) When installing flanged fittings, care shall be taken to ensure flanged mating faces and gaskets are clean and free of dirt and foreign matter.
- 2) Flanged faces should bear uniformly on the gasket, and the bolts should be tightened according to the manufacturer's requirements for torque and generally in a progressively crisscrossed pattern.
- 3) The flange shall be assembled and installed in accordance with the recommendations and instructions of the Coupling Manufacturer.
- 4) Stainless steel bolts shall receive a coating of food-grade NSF/ANSI 61 anti-seize on the threads prior to installation.

F) Couplings

- 1) When installing bolted sleeve-type couplings, care shall be taken to ensure connecting pipe ends, couplings, and gaskets are clean and free of dirt and foreign matter with special attention given to the contact surfaces of pipe, gaskets, and couplings.
- 2) The couplings shall be assembled and installed in accordance with the recommendations and instructions of the Coupling Manufacturer.
- 3) Coupling bolts shall be tightened to secure a uniform annular space between the end rings. The body of the pipe and the bolts shall be tightened approximately the same amount. Diametrically opposite nuts shall be tightened progressively and evenly. Final tightening shall be done to the Coupling Manufacturer's specifications with a torque-limiting wrench.

3.12 CUTTING PIPE

A) General

- 1) Cutting pipe for insertion of valves, fittings, or closure pieces shall conform to all safety recommendations of the manufacturer of the cutting equipment. Cutting shall be done in a safe, professional manner to prevent damage to the pipe.
- 2) Where new or existing pipe requires cutting in the field it shall be done in a manner to leave a smooth end at right angles to the pipe centerline. The pipe shall be marked around its entire circumference prior to cutting.
- 3) After cutting and dressing or beveling, the reference mark on the spigot shall be accurately relocated and marked at the proper distance from the end as recommended by the manufacturer. The reference mark may be located by using a factory marked end of the same size as a guide.

B) Ductile Iron Pipe

- 1) Ductile iron pipe selected for cutting should be field-gauged. A mechanical joint gland inserted over the barrel might serve as a convenient indicator for this purpose. Pipe can be selected by measuring with a tape in accordance with the manufacturer's recommendations.
- 2) Ductile iron pipe may be cut using an abrasive pipe saw, rotary wheelcutter, guillotine pipe saw, milling wheel saw, or oxyacetylene torch only if recommended by the pipe manufacturer.

- 3) Existing gray-iron pipe may be cut using a hydraulic squeeze cutter, abrasive pipe saw, rotary wheelcutter, guillotine pipe saw, milling wheel saw.
- 4) Cut ends and rough edges of the pipe shall be ground smooth as required. For push-on joint connections, the cut end shall be beveled by methods recommended by the manufacturer. The width and general appearance of the bevel shall closely resemble the bevel on an original pipe end.
- 5) Any lining or coating damaged during the cutting process, as determined by the Engineer, shall be cause for removing the damaged section by recutting the pipe or for rejecting the pipe altogether.

C) PVC Pipe

- 1) Circular saws, handsaws, or similar equipment may be used for cutting PVC pipe.
- 2) For push-on joint connections, the cut end shall be beveled. Factory finished beveled end may be used as a guide to determine the angle and length of taper. The end may be beveled using a plastic pipe beveling tools which will cut the correct taper automatically. A portable type sander or abrasive disc may also be used to bevel the pipe end.
- 3) For PVC pipe connection commonly found to ductile iron fittings, valves, hydrants, or other appurtenances, the insertion depth of these joints are significantly less than those of PVC pipe. Before assembly or insertion, the spigot end shall be squarely cut, deburred, and given only a slight outer bevel. If the pipe spigot end has the factory bevel, the factory bevel shall be removed or shortened to ensure that the gasket will be in full contact with the nonbeveled portion of the pipe.

D) Asbestos Cement (AC) Pipe

- 1) Methods of AC pipe cutting that produce a smooth square-cut end, without damage to the pipe, and that do not produce airborne particles, shall be employed. Abrasive discs are prohibited unless they are equipped with local exhaust ventilation and a high-efficiency particulate air (HEPA) filter dust collection system.
- 2) Contractor shall dispose of demolished materials off-site in accordance with applicable laws, ordinances, rules, and regulations. Upon request, provide the original disposal manifest to the Ute Water Conservancy District.

3.13 POLYETHYLENE ENCASEMENT

- A) All ductile iron pipe, ductile iron pipe fittings, valves, appurtenances including buried fire hydrant sections shall be polyethylene encased conforming to AWWA C105.
- B) Polyethylene film shall be fitted to the contour of the ductile iron pipe, fittings and appurtenances creating a snug, but not tight encasement, preventing contact between the pipe, fitting and the surrounding backfill. Lumps of clay, mud, cinders, etc., on the pipe surface shall be removed prior to installation of the polyethylene encasement.
- C) Repair cuts, tears, punctures, or damage to polyethylene with adhesive tape or with a short length of polyethylene sheet, or with a tube cut open, wrapped around the pipe to cover the damaged area and secured in place.
- D) Provide openings in encasement for service connections, blowoffs, air valves, and similar appurtenances by cutting an 'X' in the polyethylene and temporarily folding back the film. After the appurtenance is installed, tape the slack securely to the appurtenance and repair the cut and any other damage areas with tape.
- E) Exercise care to prevent damage to the polyethylene encasement when placing backfill. Backfill material shall be free from cinders, refuse, boulders, rocks, and stones that could damage the polyethylene.

3.14 CATHODIC PROTECTION

- A) Cathodic protection and electrical insulation shall be installed as required by Contract Documents. Care shall be taken to electrically insulate between dissimilar materials and at service line connections to metallic water mains.
- B) Contractor shall install the cathodic bonding joint assemblies provided by the ductile iron pipe manufacturer across ductile iron pipe joints. Additional protection and care to ensure these assemblies don't damage the polyethylene encasement shall be provided; may include overlaying several layers of PVC tape to the bonding joint assemblies.
- C) After the assembly of cathodic protection and electrical insulation joints are complete, Ute Water will test the assembly. The Contractor shall make necessary repairs until the joint passes the test.

3.15 CONNECTION TO EXISTING, IN-SERVICE MAINS

- A) The Contractor must provide at least 2 business days' notice to the District prior to connecting to existing mains so that the District can notify customers of a planned outage. The fire department having jurisdiction for the affected area shall be notified 2 days in advance of service interruptions.
- B) A normal outage shall be a maximum of 8 hours. If an outage is to be longer than 8 hours, the work shall be done in a manner that minimizes the inconvenience to customers, such as working at night in a continuous operation until service is restored.
- C) Immediately prior to installation, all fittings, valves and appurtenances, including tool surfaces which will come in contact with potable water, shall be thoroughly cleaned by washing with potable water and then swabbed or sprayed with a minimum one percent (1%) solution of chlorine in accordance with the requirements of AWWA C651.
- D) Cut-In Connections
 - 1) All valves shall be operated by or under the supervision of a Ute Water District Representative.
 - 2) Prior to taking any waterline out of service, the Contractor shall assemble all personnel, equipment, and materials necessary to complete the work, completely assemble all fitting assemblies and check components for compatibility with the existing waterline, and accomplish all excavation that is required to make the connection in as short of time possible or within a time period approved by the Ute Water District Representative.
 - 3) Ute Water does not guarantee the water tightness of its valves on existing facilities. If existing valves leak, Ute Water will assist in reducing the leakage; however, the Contractor shall use appropriate methods to work with the resulting leakage.
 - 4) In situations where an existing pipe joint is found adjacent to a proposed connection and the Engineer determines that construction operations may compromise the joint, the Contractor shall remove the existing pipe between the joint and the new work as directed by the Engineer, and replace that section with new materials.
- E) Tapping Sleeves

- 1) Tapping sleeves or tees shall be spaced to provide clearance between the completed services lines and meter pits/vaults, fire hydrants, and similar underground structures. Minimum manufacturer spacing requirements between tapping sleeves and pipe or fitting joints shall be provided.
- 2) Contractor shall fully support the weight of the tapping tee, associated valve and the existing pipeline. Under no circumstances shall the weight of the tapping unit be supported by the existing pipe. Pipe which is damaged due to failure of the Contractor to follow this requirement shall be replaced at no additional cost to the Owner.

3.16 BLOWOFF ASSEMBLY

- A) Install a Type B Blowoff Assembly for installations where the main is to be permanently dead-ended, such as a cul-de-sac according to Standard Details and sized according to the schedule provided in specifications herein.
- B) Install a Type A Blowoff Assembly for installations where the main is to be temporarily dead-ended, such as the boundary of a subdivision filing; unless a fire hydrant, which can serve additionally as a blowoff, is located at the main's temporary end. Construct blowoff according to Standard Details and sized according to the schedule provided in specifications herein.

3.17 PIPE ANCHORAGE

- A) Pipe anchorage systems shall be installed as shown on the drawings or as specified herein.
- B) All plugs, caps, tees, and bends of 1 1/4" or more on waterlines that are 4-inches in diameter or larger shall be securely anchored by concrete thrust blocking or restrained joints as approved by the Engineer. The use of threaded tie back rods for thrust restraint shall not be used unless specifically shown on the drawings or directed by the Engineer.
- C) Thrust blocks shall be installed where specified herein, shown on the drawings, or as directed by the Engineer. Installation shall be in conformance with drawing details and the following:
 - 1) All concrete thrust blocks shall be placed using forms as necessary to allow access to the bolt circles after the placement of the thrust blocking concrete. The bearing surface shall be placed so that the pipe and fitting joints will be accessible for repair. Concrete shall in no case extend around more than one-half the circumference of the fitting at any point.

- 2) A plastic sheet or other similar protection shall be placed between the concrete and any portions of the valve, fitting, or nuts and bolts with which the concrete comes in contact. Do not encase pipe joints or cover bolt circles with concrete.
- 3) Concrete thrust blocking shall be placed between undisturbed earth and the fittings to be anchored. If, in the opinion of the Engineer, the undisturbed earth against which the bearing surface will be established is compromised by adjacent trenches or excavations, the Contractor shall excavate additional material as required to establish a new bearing surface that is consistent with the size, configuration, and location of the piping.
- 4) Newly installed water mains and fire service lines shall not be hydrostatically tested until field-placed concrete has been allowed to set undisturbed for a minimum of 24 hours.

3.18 SERVICE TAPS

- A) Service pipe and fittings shall conform to plan details. Installation shall be in accordance with pipe manufacturer's recommendations.
- B) All service connections for DI and PVC pipe shall be saddle tapped. Direct tap type services shall not be allowed.
- C) Strictly adhere to the Manufacturer's requirements to field cut or bore to maximize the opening through the service tap and corporation stop.

3.19 WATER METERS

- A) All meter pit assemblies, including cones and lids, yokes and water meters, shall be provided by the Ute Water Conservancy District and installed by Contractor according to the Standard Details.
- B) All meter pit assemblies shall be as indicated on plans, field staked for location, and on the property serviced. All meter pit assemblies shall be constructed so that the cast iron lid is at an elevation 0.1-feet above final grade without unnecessary grade ring risers.

3.20 FIRE HYDRANTS

- A) Installation shall be in accordance with AWWA C600 and constructed where indicated on plans, field staked for location and grade or directed by the Engineer.

- B) Hydrants shall be set a minimum of three (3) feet behind the curb/sidewalk or within the utility corridor right-of-way unless otherwise shown or directed. Hydrants shall stand true and plumb with a minimum horizontal clearance of 3-feet.
- C) Fire hydrants shall be set so that the elevation of the bury line is within ± 2 -inches of final grade; doing so should locate the center of the safety breakaway flange a minimum of 2 inches and a maximum of 6 inches above finished curb, sidewalk or finished grade.
- D) Where utility conflicts may require changes in grade, Contractor shall pothole existing utilities far enough in advance to allow the proper height hydrants to be planned and installed.
- E) Hydrants set too high or too low shall be removed and replaced with an appropriate hydrant by the Contractor at no additional cost. The use of extension kits manufactured specifically for the fire hydrant make and model to raise low hydrants must be approved by the Engineer in advance.

3.21 VALVE AND VALVE BOX INSTALLATION

- A) Valve installation shall be in accordance with AWWA C600 and applicable sections contained herein. A valve box shall be supplied for each valve, conforming to plan requirements and at locations shown on plans or staked in field.
- B) Valve boxes shall be centered over the valve and installed plumb, with the cover flush with the finished grade. Valve boxes shall be set so they do not transmit shock or stress to the valves.
- C) Backfill shall be placed around the valve boxes and thoroughly compacted in conformance with the compaction requirements for the adjacent backfill, and in a manner that will not damage or displace the valve box from proper alignment or grade. Misaligned valve boxes shall be excavated, plumbed and backfilled at Contractor's expense.
- D) Valve boxes shall be kept free of rocks and debris at all times.
- E) Tracer wire, only as indicated on the Contract Documents or as required by the Ute Water Inspector, shall be looped up at valve boxes.

3.22 AIR RELEASE VALVES (ARV)

- A) By design, the location of ARVs is along the highpoint of the pipeline. The ARV should be installed as close as possible to the pipeline; as practical, minimize lay length of appurtenances to maximize the clearance between the ARV and the vault.
- B) The concrete manhole or vault shall be founded firmly on grade beams of adequate surface bearing area to support the structure. Field modify as necessary to maintain clearance between the vault and pipeline to accommodate possible settlement without potentially bearing on the pipeline.
- C) Construct manhole or vault to ensure manhole cover is flush with final grade without unnecessary manhole risers.

3.23 INSTALLATION OF TRACER WIRE

- A) Tracer wire shall be installed with all pipe and secured with 2-inch wide PVC tape to the top of the pipe at about 8 foot intervals.
- B) When splicing tracer wire to connect a new roll of wire or to connect wire from lateral water lines, the wire shall be tied together in an overhand knot, the end of the insulation strip off to expose at least 3/4" of bare wire, the wire twisted together and then a silicone-filled wire nut screwed over the end to completely cover and seal the exposed wire.
- C) Tracer wire shall be brought up at all fire hydrants, vent pipe and, as directed, looped up into at least one valve box at valve clusters
- D) Contractor, at his expense, will be responsible for testing the tracer wire to ensure that there is complete continuity of signal. The continuity of the tracer wire shall be tested in each direction from a valve box or fire hydrant with an electronic locator. Any areas that do not show continuity will be fixed at the Contractor's expense.

3.24 CLEANING POTABLE WATER MAINS

- A) All water mains shall be cleaned in accordance with AWWA C651 and as specified herein.
- B) Minimum Blowoff Assembly size for water mains shall be as shown in the following table:

Water Line Size	Minimum Blowoff Size
2- to 3-inch	1-inch

4- to 8-inch	2-inch
10- to 16-inch	4-inch
18- to 20-inch	6-inch
Larger than 20-inch	8-inch (or as directed)

- C) Prior to completion of pressure and leakage testing and prior to being placed into service, all new water mains and repaired portions or extensions of existing mains shall be disinfected by chlorination by the Contractor in accordance with AWWA C651 except as may be modified herein.

3.25 DISINFECTING POTABLE WATER MAINS

- A) All water mains shall be disinfected in accordance with the requirements of AWWA C651 except as modified herein.
- B) All new water lines shall be disinfected by introducing chlorinated water from a water truck or other means, approved by the Engineer, into the new line. Initial (high) chlorine residual shall not be less than 50 ppm. The use of chlorine tablets glued into the pipe with permatex will not be allowed.
- 1) Dry chlorine powder, that has 68% Calcium Hypochlorite as the active ingredient, or liquid chlorine bleach, that has 5% by weight chlorine, shall be used at the rate as set forth:
- a) Dry chlorine powder shall be mixed at the rate of 0.62 pounds of powder per 1000 gallons of water.
 - b) Liquid chlorine bleach shall be mixed at the rate of one gallon per 1000 gallons.
 - c) The amount of chlorinated water required for various sizes of water lines is shown in the following table:

Pipe Diameter (inch)	Cross-Sectional Pipe Area (ft ²)	Volume per 100 feet of Pipe (gallons)
2	0.02	16
3	0.05	37
4	0.09	66
6	0.20	147
8	0.35	261
10	0.55	408
12	0.79	588

18	1.77	1322
24	3.14	2350
30	4.91	3672

- 2) Powdered chlorine or liquid chlorine bleach shall be thoroughly mixed with clean water in a water truck or other storage container. After mixing the solution shall be tested to insure that it is at least a 50ppm chlorine residual. If there is not at least a 50ppm residual more powdered chlorine or liquid chlorine bleach shall be added to bring the residual up to 50ppm. The chlorine residual shall be tested using a commercially available chlorine residual tester that measures concentrations above 10ppm.
 - 3) After the water line has been completed and before making connections to services or other water mains, except those shown on the drawings, water line shall be slowly loaded with chlorinated water from a potable or disinfected water truck or tank until all air has been expelled. Air shall be bled from all service lines and fire hydrant laterals to ensure adequate disinfection of all lines, valves, fittings and appurtenances.
- C) The dosage of chlorinating agent shall be of the amount to produce a minimum chlorine residual of 50 mg/L of free chlorine at all points in the line. Tests with the DPD method shall be made at selected points to determine the residual.
 - D) Where the Contractor chooses to use other methods for disinfecting the water line he shall submit a detailed plan to the Engineer, for Engineer's approval, indicating methods of introducing chlorine to the water line, methods for flushing the line and the means by which heavily chlorinated water will be disposed of.
 - E) Chlorinated water shall be retained in the lines for sufficient time to accomplish the desired disinfection but not less than 24 hours. All valves and hydrants in the line shall be operated during the retention period. At the end of this 24 hour period, the treated water in all portions of the main shall have a residual of not less than 25 mg/L free chlorine.
 - F) Valves shall be manipulated so that the strong chlorine solution in the line being treated will not flow back into lines adjoining the new line. Check valves may be used if desired.
 - G) Water mains taken out of service for inspection, repair, or other activities may or may not require disinfection and sampling, depending on the risk as determined by the Engineer and Inspector.

- H) The Contractor shall furnish required materials and apparatus and perform the work of disinfection. If additional taps and open trenches at points of connection are required, the Contractor shall bear the responsibility of making taps and maintaining open trenches until a satisfactory analysis has been obtained.

3.26 CLEARING THE MAIN OF HEAVILY CHLORINATED WATER

- A) Following chlorination, all heavily chlorinated water shall be flushed into a water truck from the lines at their extremities until the replacement water throughout the lines shall, upon test, have a chlorine residual of no more than that of the existing system to which the new line is connected.
- B) Heavily chlorinated water that is in the water truck shall be disposed of in accordance with all Federal, State and Local laws and regulations. The environment into which the chlorinated is to be discharged shall be inspected. If there is any possibility that the chlorinated discharge will enter any stream, storm drain, or any drainage feature, then a neutralizing chemical shall be applied to the chlorinated water prior to discharge from the water truck.
- C) The table below shows the neutralizing chemicals that can be used and their respective dosages, in pounds, per 1000 gallons of water:

Residual Chlorine (ppm)	Sulfur Dioxide (SO ₂)	Sodium Bisulfite (NaHSO ₃)	Sodium Sulfite (Na ₂ SO ₃)	Sodium Thiosulfate (Na ₂ S ₂ O ₃ -5H ₂ O)
1	0.008	0.012	0.014	0.012
2	0.017	0.025	0.029	0.024
5	0.042	0.063	0.073	0.060
10	0.083	0.125	0.146	0.120
25	0.21	0.313	0.365	0.30
50	0.42	0.625	0.73	0.60

3.27 FLUSHING AND CLEANING

- A) After all of the heavily chlorinated water has been removed from the new water line, fire hydrants and service lines, the main shall be flushed to remove all dirt and debris that may be in the line. Contractor shall flush the line to obtain a minimum velocity of at least 2.5 fps in the line.
- B) Upon completion of flushing Ute Water Conservancy District will obtain water samples for laboratory analysis to test for the presence of coliform bacteria. Should the initial treatment prove ineffective, the chlorination shall be repeated as

set forth in Paragraph 3.25 at no additional cost to the Ute Water District until confirmed tests show acceptable results.

3.28 PRESSURE AND LEAKAGE TESTS

- A) The Contractor shall furnish the pump, pipe connections, taps, gauges, auxiliary water container, bulkheads, plugs and other necessary equipment and perform pressure and leakage tests on all lines unless otherwise directed by the Engineer. All equipment and material that will come in contact with water entering the distribution system shall be clean and disinfected prior to use. Water shall be potable water that has only been stored in clean disinfected containers.
- B) Tests shall be conducted on all pipelines or valved sections thereof. Tests on lines anchored or blocked by concrete shall not be conducted until the concrete has taken permanent set.
- C) Hydrostatic leakage testing shall be performed in conformance to the applicable sections of AWWA C600 or local jurisdiction requirements, whichever is more stringent, except as modified below. Unless otherwise authorized by the Ute Water District, all hydrostatic leakage tests shall be witnessed by the Engineer or the Districts field Representative.
- D) The test pressure shall be 150 lbs./sq. in., or 50 percent (50%) above the normal operating pressure, whichever is greater. Hydrostatic pressure shall be applied by pumping water from an auxiliary supply. The Contractor shall accurately determine the amount of water required to reach the initial test pressure and the amount of makeup water required to maintain the test pressure during the test period.
- E) The test pressure shall be maintained for a minimum of four (4) hours and additional time as required for thorough inspection to find any leaks or defects in the water main and appurtenances. Should the pipe section fail to pass the tests, the Contractor shall find and correct failures and repeat the tests until satisfactory results are obtained at no additional cost to the Owner.
- F) Where test pressure is 250 psi or less, the hydrostatic test shall be performed with the hydrant line valves open.
- G) Before applying the specified test pressure, air shall be expelled completely from the pipe, valves, and hydrants. If permanent air vents are not located at all high points, the Contractor shall install corporation stops at such points so that the air can be expelled as the line is filled with water. After all the air has been expelled, the corporation stops shall be closed and the test pressure applied. At the

conclusion of the pressure test, the corporation cocks shall be removed and plugged or left in place at the discretion of the Owner.

H) Allowable Leakage

- 1) No pipe installation will be accepted if the leakage or makeup water is greater than that determined by the formula outlined below or local jurisdiction requirements, whichever is more stringent.

$$L = \frac{SD\sqrt{P}}{148,000}$$

Where:

- L = allowable leakage, in gallons per hour
- S = length of pipe tested, in feet
- D = nominal diameter of the pipe, in inches
- P = average test pressure during the leakage test, in pounds per square inch (gauge)

This formula is based on an allowable leakage of 10.49 gpd/mi./in. of nominal diameter at a pressure of 150 psi.

- 2) The allowable leakage in gallons per hour per 1,000 feet at various pressures and pipe sizes is shown below. In the event of discrepancies between formulas and table values, the more stringent shall apply.

Average Test Pressure (psi)	Nominal Pipe Diameter (inch)							
	3	4	6	8	10	12	18	24
250	0.32	0.43	0.64	0.85	1.07	1.28	1.92	2.56
225	0.30	0.41	0.61	0.81	1.01	1.22	1.82	2.43
200	0.29	0.38	0.57	0.76	0.96	1.15	1.72	2.29
175	0.27	0.36	0.54	0.72	0.89	1.07	1.61	2.15
150	0.25	0.33	0.50	0.66	0.83	0.99	1.49	1.99
125	0.23	0.30	0.45	0.60	0.76	0.91	1.36	1.81
100	0.20	0.27	0.41	0.54	0.68	0.81	1.22	1.62

- 3) If the pipe structure under test contains sections of various diameters, the allowable leakage shall be the sum of the computed leakage for each size. No additional leakage allowance will be given for fire hydrant assemblies.

3.29 CLEANUP

- A) Cleanup and surface restoration area shall conform to the requirements contained herein and shall closely follow pipe-laying activities.
- B) Contractor shall remove all excess materials, broken pavement, construction equipment, etc., within three (3) days after pipe is laid in any area.
- C) Contractor shall level and resod lawn areas, grade and gravel shoulder or parking areas, and replace any signs, mailboxes, etc. which were removed or damaged.

PART 4: SPECIAL PROVISIONS

4.1 MEASUREMENT AND PAYMENT

- A) When not listed in the Proposal, all "WATER DISTRIBUTION SYSTEM" costs will be considered incidental work for which no separate payment will be made.
- B) When listed in the Proposal, payment for work specified under this section will be made at the prices named in the Proposal for the following items installed, tested, disinfected and acceptable to the Engineer.
 - 1) Mainline pipe to be paid for at the unit prices named in the Proposal for each size and type of pipe. Length to be measured horizontally along centerline of pipe without deducting for valves and fittings. Unless otherwise listed in the Proposal, cost of mainline pipe, fittings and appurtenances shall be included in the unit price for mainline pipe.
 - 2) Unless otherwise listed in the Proposal, valves are to be paid for at the unit price named in the Proposal for each size and type of valve complete with valve box and cover.
 - 3) Each fire hydrant assembly to be paid for at the unit price named in the Proposal. Payment for each fire hydrant assembly shall include hydrant, lateral pipe or spool piece, gate valve and valve box and cover, fittings, mainline tee, thrust blocking, support block and all appurtenances (including Storz Adapter as necessary), as well as excavation, backfill, compaction and surface restoration.
 - 4) All mainline connections named in the Proposal to be paid for at the lump sum prices named in the Proposal. Unless otherwise listed in the Proposal, payment for each mainline connection shall include fittings, pipe thrust restraint and all appurtenances inclusive of valves, as well as excavation, backfill, compaction and surface restoration outside of the specified trench pay limits.

- 5) Each air release valve assembly to be paid for at the unit prices named in the Proposal. Unless otherwise listed in the Proposal, payment for each air release valve assembly to include service saddle or mainline tee and companion flange (as required), pipe, valves, fittings, manhole (or vault) and grade beams, manhole cover and frost lid, air vent, drain line and all appurtenances, as well as excavation, backfill, compaction and surface restoration.
 - 6) All near and far side water service to be paid for at the unit prices named in the Proposal. Payment for each service to include fittings, pipe and all appurtenances, as well as surface preparation (saw cutting or other), excavation, backfill, compaction and surface restoration.
- C) No payment to be made for pipe or valves which have not passed a hydrostatic leakage test.
 - D) Quantities to be computed by the Engineer from measurement of actual work completed and accepted.
 - E) Unless otherwise listed in the Proposal, pipe anchorage and thrust restraint systems to be considered incidental work for which no separate payment will be made.
 - F) Unless otherwise listed in the Proposal, blowoff assemblies for line terminations to be considered incidental work for which no separate payment will be made.
 - G) Unless otherwise listed in the Proposal, sanitary sewer concrete caps or encasements to be considered incidental work for which no separate payment will be made.
 - H) Unless otherwise listed in the Proposal, polyethylene encasement as required to be considered incidental work for which no separate payment will be made.
 - I) Payment indicated to include complete compensation for all labor, equipment, materials and incidentals involved in the work as listed in the Proposal and as specified under this section. No additional compensation to be allowed.

END OF SECTION