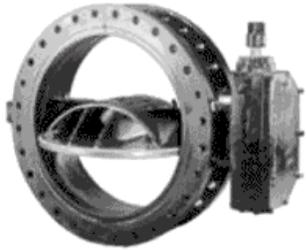


## 2. Butterfly Valves –

### Approved Manufacturer(s):



- **Clow/Kennedy/M&H (McWane Co.)**
- **Mueller/Pratt**
- **DeZurik**

**General:** Butterfly valves shall be acceptable for installation in the Colorado Springs Utilities Water Distribution System and shall conform to these Specifications.

**Size(s):** 16, 20, 24, 30, 36, 40, 42, and 54-Inch Nominal Diameter

**Pressure Class:** The Working Pressure for all sizes both flanged and mechanical joint valves shall be 250 psi. Flanged valves shall have Class 150 flanges or Class 300 flanges.

**Material:** Cast iron or ductile iron body

**Specifications:** All butterfly valves shall be manufactured in accordance with *AWWA C504* Class 250B valve body with the following additional requirements or exceptions:

Butterfly valves shall be of the rubber-seat type, cast iron or ductile iron body manufactured in accordance with *ASTM A126 CL B/A536*. Valve discs shall be Cast or Ductile Iron to *ASTM A126/A536* and shall rotate ninety (90) degrees from the full open position to the tight shut position and have a positive stop. All valves shall have an approved epoxy coating both internally to *AWWA C550* and *NSF 61*, and externally to *AWWA C116*.

Valve Operators. Valve operators shall be designed to hold the valve disc in any intermediate position between fully closed and fully opened without creeping or fluttering. All valves shall be equipped with a two-inch (2") operating nut. Valve operators shall be geared per the following:

- open right (clockwise) for Potable Water valves
- open left (counterclockwise) for Nonpotable Water valves

End Connections. Buried valves shall have mechanical joint ends with gasket gland and fasteners conforming to the *ANSI A21.11* and *AWWA C111*. Valves to be placed in vaults shall have flanged valve connections and shall have either *Class 125/ANSI 150* or *Class 250/ANSI 300* drilled pattern per *ASME/ANSI B16.1*. The type of flange is dependent upon psi of the butterfly valve and flanged fitting it is being attached to.

### Color.

Potable Water-Per Manufacturer's Specifications

Nonpotable-purple Color Pantone 512 or Pantone 522

## 2. Specialty Valves (to be evaluated on a case by case basis):

Plug Valves

Triple Offset

Insert Valves

## F. Pressure Reducing Valves

### 1. Pressure Regulating Valves

#### Approved Manufacturer(s):



- **CLA-VAL Company**

**General:** The valves shall be capable of maintaining a constant downstream pressure regardless of varying inlet pressures. When the downstream pressure exceeds the pressure setting of the control pilot, the main valve and pilot valve shall close drip-tight.

**Size(s):** To be determined by the Design Engineer and Colorado Springs Utilities

**Specifications:** Pressure regulating valves shall be accurate, single seated, hydraulically operated, pilot controlled, diaphragm type, globe valves.

**Model.** Cla-Val Model 90-01 (Uses Basic Value Model 100-01), Globe type –Flanged body. Valve Body and Cover, Grade *ASTM A536* for Ductile Iron and *ASTM A743* for Stainless steel

**End Connections.** All pressure regulating valves shall have ANSI CL 300 drilled flanged ends in accordance with *ANSI B16.42*, *B16.5*, and as determined by the Design Engineer.

## G. Pressure Relief Valves

### Pressure Relief Valves

#### Approved Manufacturer(s):



- **CLA-VAL Company**

**General:** The valves shall be installed where a fast opening – slow closing pressure relief valves is required to maintain a constant upstream pressure to close limits without causing surges. **Size(s):** To be determined by the Design Engineer and Colorado Springs Utilities

**Specifications:** Pressure relief valves shall be of the hydraulically operated, pilot controlled, single seated, diaphragm type, globe valves (with resilient disc) capable of maintaining a constant upstream pressure by bypassing or relieving excess pressure.

Model. Cla-Val Model 50-01 Series Pressure Relief Valve, with X101 Valve Position Indicator

End Connections. All pressure reducing valves shall have ANSI CL 300 drilled flanged ends in accordance with *ANSI B16.42*, *B16.5*, and as determined by the Design Engineer.

## H. Check Valves

### Check Valves

#### Approved Manufacturer(s):



- **CLA-VAL Company**

**General:** Check valves shall be used to establish flow in one direction and open when the pressure at the inlet exceeds the pressure at the discharge.

**Size(s):** To be determined by the Design Engineer and Colorado Springs Utilities

**Specifications:** Check valves shall be single seated, hydraulically operated, diaphragm type, globe valve (with resilient disc) capable of closing drip tight when pressure reversal occurs.

Model. Cla-Val 81-02 Series Check Valve, with X101 valve position indicator.

End Connections. All pressure reducing valves shall have ANSI CL 300 drilled flanged ends in accordance with *ANSI B16.42, B16.5*, and as determined by the Design Engineer.

## I. Air and Vacuum Relief

### Air and Vacuum Relief

#### Approved Manufacturer(s):



- **Vent-O-Mat**  
Air release and Vacuum Break Valves  
Series RBX  
Approved Sizes: 2”, 4”, 6”, and 8”.
- **A.R.I.**  
Combination Air Valve “Barak” for 6” and 8” water pipelines  
Series D 040 (D-040-P: with Nylon base or D-040-B: Brass base)  
Approved Sizes: 2”  
Non-corrosive or corrosion protected materials including—Nylon,  
plastic, cast iron, steel, stainless steel  
Working Pressures from 2 psi to 250 psi.

**General:** The valves shall be installed to control air during filling and draining of a pipeline and to release any accumulations of air, which may collect while the line is in operation and under pressure.

**Size(s):** To be determined by the Design Engineer and Colorado Springs Utilities

**Specifications:** Air and vacuum valves shall be combination valves with an air vacuum unit and a pressure unit, which are capable of operating independently. Air Release and Vacuum Break Valves shall be of a compact single chamber design with solid cylindrical High Density Polyethylene control floats housed in a tubular stainless steel or corrosion protected body with epoxy powder coated cast iron, or stainless steel ends secured by means of stainless steel tie rods.

The valve shall have an integral surge alleviation mechanism which shall operate automatically to limit transient pressure rise or shock induced by closure due to high velocity air discharge or the subsequent rejoining of separated water columns. The limitation of pressure rise must be achieved by deceleration of approaching water prior to valve closure. Relief mechanisms that act subsequent to valve closure cannot react in the low millisecond time span required and are therefore unacceptable.

Large orifice sealing shall be affected by the flat face of the control float seating against a nitrile/EPDM rubber ‘O’ Ring housed in a dovetail groove circumferentially surrounding the large orifice. Discharge of pressurized air shall be controlled by the seating and unseating of a small orifice on a natural/EPDM rubber seal affixed to the control float.

The intake/discharge orifice area shall be equal to the nominal size of the valve i.e. a six inch (6”) valve shall have a six inch (6”) intake/discharge orifice.

The valve design shall incorporate an over pressure safety feature that will fail without an explosive effect, such as is normally the case when highly compressed air is released suddenly.

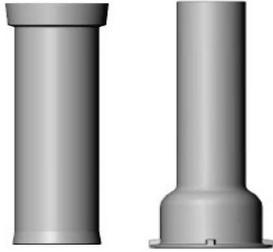
The feature shall consist of easily replaceable components such as gaskets, seals or the like.

**End Connections.** All air and vacuum valves shall have threaded end connections.

## J. Valve Boxes

### 1. 6" Valve box assemblies (Potable Water and Nonpotable Water)

#### Approved Manufacturer(s):



- **Castings, Inc.**, Slip Type C.I.
- **D & L**, M80
- **East Jordan Iron Works, Inc**, 8555 Series
- **Star Pipe Products, HD(F)35**
- **Tyler Union**, 8555 Series

**General.** All Gray iron valve boxes shall be rated for traffic service. Valve boxes shall conform to the Specifications described in this Section. See Detail Drawing [A 9-1](#) and [A9-2](#).

**Size(s):** Two Piece Slip Type, Top (26") plus Lid, Bottom (36")

**Materials.** Material for valve boxes shall be heavy duty classification cast or gray iron. Use of an aluminum alloy as a casting material is not acceptable.

**Specifications:** Gray iron castings shall be manufactured from iron conforming to *ASTM48* Class 35B for Gray iron and to the *ASTM A536* grade 80-55-06 for ductile iron. Castings shall also meet *Federal Specification A-A60005 (formerly RR-F-621E)*. Valve boxes shall be the three-piece (including lid), adjustable slip type, and the top section shall be without a flange. Castings shall be of uniform quality, free from sand holes, gas holes, shrinkage, cracks and other surface defects. Casting shall be reasonably smooth and well cleaned by shot blasting. Surfaces of the castings shall be free from burned-on sand and shall be reasonably smooth. Runners, risers, fins, and other cast-on pieces shall be removed from the castings and such areas ground smooth. Bearing surfaces between covers and top sections shall be cast or machined with such precision that uniform bearing shall be provided throughout the perimeter area of contact. Nominally, casting dimensional tolerances shall be  $\pm 1/16$ " per foot. All published casting weights are average and approximate values and shall vary  $\pm 5\%$ . All castings shall fit together properly and be fully interchangeable.

**Markings.** Each casting shall be identifiable and show the following optional markings including, but not limited to, name of the producing foundry, country of manufacture (such as "Made in USA" or "USA"), *ASTM A48*, CL 35B, cast or heat date and the individual part number. All castings shall be marked in accordance with all applicable laws and/or regulations.

## 2. Valve Box Lids

### Approved Manufacturer(s):



- **Castings Inc.**, sizes 1 ½”, 2”
- **D&L Supply**, Model M-8044, sizes 1 ½”
- **East Jordan Iron Works**, Model 6800, sizes 1 ½, 2, 2 ½, 4”
- **Star Pipe Products**, Model VBLID HD35, size 1 ½”
- **Tyler Union**, Model 145325, size 2”

**Size(s):** 5-1/4 inch drop lid With Skirt Lengths of 1-1/2, 2, 2-1/2, and 4 inches

### Lid Specifications:

Minimum weights for Valve Box “WATER” lids,

- Non-Locking Lid (Drop) approx. 13lb, – 1-1/2”, 2” and 2 ½” skirt.
- Locking Lid 18lb – 1- 1/2” skirt

All valve lids on Potable Water lines shall contain a recognizable inscription “WATER” cast on the top surface.

## 3. Valve box lid for Nonpotable Water

### Approved Manufacturer(s):



- **Trumbull**, Model 367-5049, Size 2” (or equivalent)

**Size(s):** 5-1/4 inch drop lid With Skirt Length of 2 inch

**Specifications:** All castings shall be marked in accordance with all applicable laws and/or regulations, shall be purple in color and be marked with “NON-POTABLE WATER” on the lid, and painted Nonpotable purple.

Weight: Minimum weights for Valve Box “NONPOTABLE WATER” lid, Non-Locking Lid (Drop) 13lb, with a 2” skirt.

#### 4. Debris Caps

##### Approved Manufacturers:



- 2B Enterprises

**General:** Debris caps are used to keep dirt and debris material out of Valve Boxes.

**Size(s):** Debris Caps are adjustable to all 6" valve boxes

**Specifications:** The 6" plug (Part # MC-6H) is designed for installation and removal inside a valve box riser and conduit. The large wing nut enables the installer to easily hand-tighten the plug. The plug sits inside of the valve box riser on the extension box riser knobs, and provides an effective seal against sedimentation and insects. The tightening nut provides an easy finger-hold for plug removal and retrieval. The nominal 6" plug will provide an effective seal for pipe inside diameters ranging from 5.98"– 6.37". The MC-6H includes water drainage holes in both compression plates.

##### Approved Manufacturer(s):



- **The Debris Cap™ manufactured by SW Services, Inc.**  
Model Number:  
DC400 – (special Colorado Springs Utilities Water applications)  
DC457 - Fits valve box top section (typical Tyler style)  
(Standard padlock model) Lockout/Tagout

**General:** Debris caps are used to keep dirt and debris material out of Valve Boxes.

**Size(s):** Debris Caps are adjustable to all 6" valve boxes

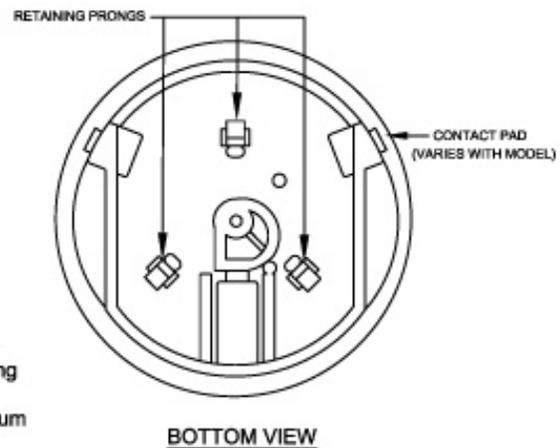
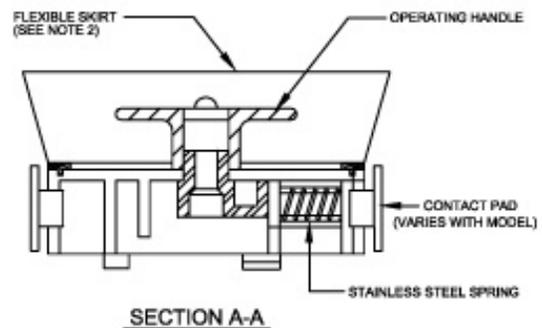
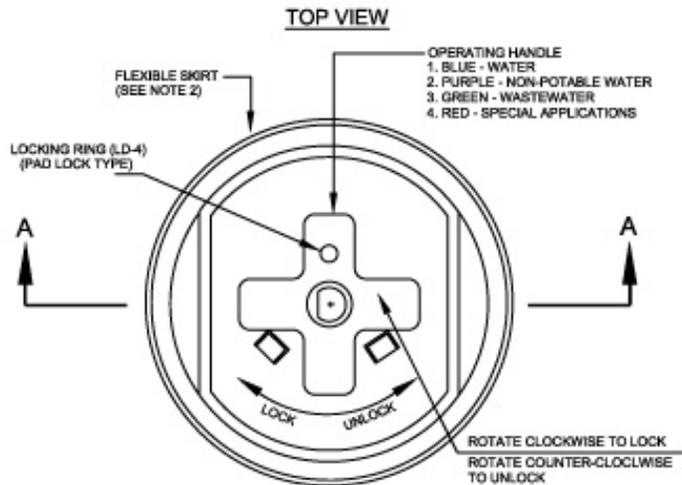
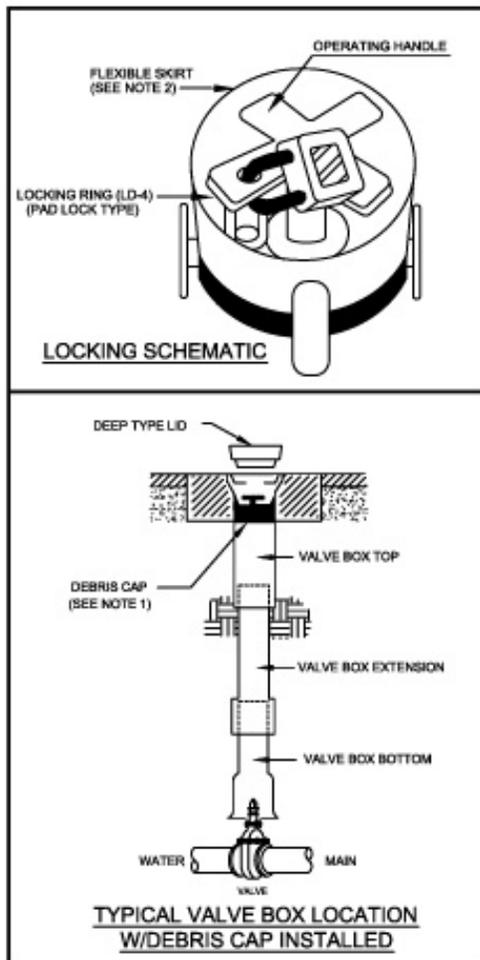
**Material:** Made of flexible rubber that can be cut to fit if needed.

##### Specifications:

See next page for drawing and details

##### Color Codes.

- Blue – Water,
- Purple – Nonpotable Water,
- Red – (Special Colorado Springs Utilities water applications) Lockout-Tag out



**GENERAL NOTES:**

1. Valve box is to be cleaned of all debris and obstructions prior to installation of the debris cap.
2. Debris cap shall be installed as close under the cast iron cover without interfering with cover operation.
3. Flexible skirt shall be trimmed to provide a smooth contact with the interior diameter of the pipe.
4. The debris cap shall be comprised of a hollow member having a cylindrical outer surface, a closure for one end and three point resilient contact pads projecting from the outer surface. The cap shall have a flexible skirt providing an outward seal preventing debris from getting past the cap. The cap must withstand, without slippage, a minimum vertical force of 50 pounds, at a loading rate of 1.0 in/minute. The cap shall be molded using General Electric ABS #him 4500. The cap shall have retaining prongs to retain a standard locating coil.

## K. Fire and Post Hydrants

### Fire Hydrants – Dry Barrel Modern Style, Static Pressure to 250 PSI

#### Approved Manufacturer(s):



[ 2700 ]

**AVK Series 2700, Modern style**



**Waterous Pacer WB-67-250**



**Mueller Super Centurion  
250**



**Clow Medallion “Mountain  
Hydrant”**

**General.** The following fire hydrant Specifications shall be met within the service area of the Colorado Springs Utilities Water Distribution System, regardless if the maintenance is performed by Colorado Springs Utilities or by private owners.

**Size(s).** Hydrants shall have a main valve opening size of five and one-quarter (5-1/4”) inches and shall be ordered for a six-foot (6’) bury unless otherwise required and approved by Colorado Springs Utilities. Hydrant bury will be measured from the bottom of the hydrant lateral pipe to bury line.

**Pressure Class:** Fire hydrants shall be rated for a Working Pressure of 250 psi

**Material:** Gray Iron to *ANSI/AWWA C110/A21.10, ASTM A126*, Ductile Iron to *ANSI/AWWA C110/A21.10, ASTM A395/A536* or *ANSI/AWWA C151/A21.51*, Copper and Brass Alloys comply to UNS designations for Hydrant Components and shall be Lead Free in accordance with NSF/ANSI 372 in the open position effective January 5, 2015 for all new installations and repair pieces.

**Specifications:** All fire hydrants shall be designed and manufactured in strict compliance with the latest version of *AWWA C502*. Fire hydrants shall meet all test requirements and be listed by Underwriters Laboratories Inc and have Factory Mutual Research approval. All references made in this Specification are to the above standards unless otherwise noted. The manufacturing facility for the hydrant must have current ISO 9001 certification. All brass alloys in the hydrant exposed to the potable water shall comply to UNS designations for Hydrant Components and shall be Lead Free in accordance with NSF/ANSI 372 in the open position effective January 5,

2015 for all new installations and repair pieces.

Warranty: Hydrants shall be warranted by the manufacturer against defects in materials or workmanship for a period of 10 years from the date of manufacture. No Fire Hydrant, more than 2 years old from the date of manufacture, shall be accepted into the Water Distribution System.

Type of Hydrant. Hydrants shall be the three-way type with one (1) pumper nozzle and two (2) hose nozzles, all located on the same horizontal plane. All hydrants shall be a “traffic-model” having upper and lower barrels joined at the ground line by a separate and breakable “swivel” flange providing 360<sup>0</sup> rotation of upper barrel for proper nozzle facing. This flange shall employ not less than four bolts. The safety flange segments shall be located under the upper barrel flange to prevent the segments from falling into the lower barrel when the hydrant is struck. The pressure seal between the barrels shall be an “o” ring. The proper ground line shall be cast or marked clearly on the lower barrel and shall provide not less than 18” of clearance from the centerline of the lowest nozzle to the ground. (Hydrant bury/groove line on hydrant assembly may vary with manufacturer for clearance distance from ground)

Inlet Connection. Hydrant base shall be provided with a mechanical joint inlet to accommodate 6-inch diameter DIP or PVC or HDPE pipe, all in accordance with *ANSI A21.11*, and *AWWA C111*.

Main Valve Assembly. Main valve of the hydrant shall be 5-1/4 inch diameter compression type which closes with the water pressure.

Gaskets for valves shall be a replaceable type fabricated of a resilient material, with a threaded bottom plate or nut, complete with seal to prevent leakage of the hydrant shaft.

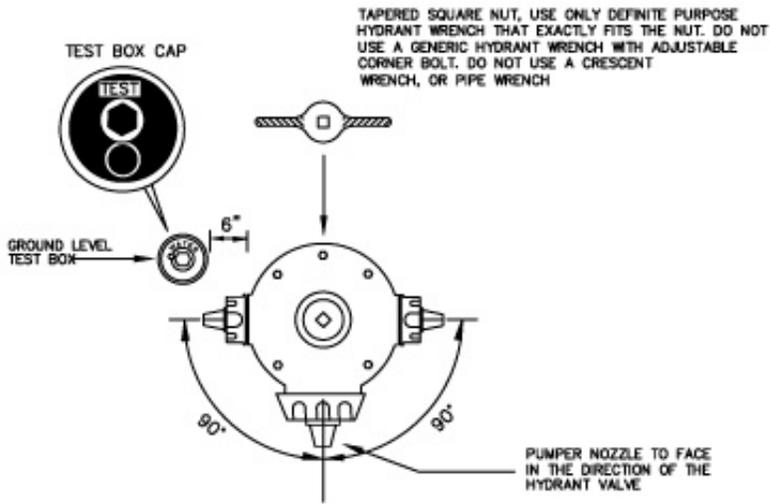
The valve assembly shall include one or more drain valves, which will work automatically with the main valve, and drain the barrel when the main valve is in the closed position. All parts of the main valve assembly shall be so designed that removal of the assembly from the barrel is accomplished without excavation.

Operating Shaft Nut. The operating shaft nut shall be a truncated pyramid in shape, 7/8 inch square on the bottom, 3/4 inch square on the top, with a finished height of 1-1/4 inches. See following drawings. Bushings in the bonnet shall be so constructed that it will prevent the operating nut from traveling during opening or closing operation; also the bushing shall house a gasket or seal to prevent moisture or foreign material from entering the lubricant reservoir. The hydrant shall **open by turning the operating nut to the right in a clockwise** direction and shall have an arrow on top of the bonnet to designate the direction of opening.

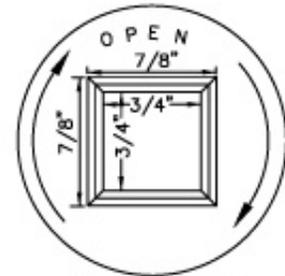
Pumper Nozzle and Cap. The pumper nozzle shall be 4-1/2 inch nominal diameters with 6 threads per inch. Threads shall be right-hand. All pumper nozzle caps shall be removed by turning counterclockwise.

Nozzle caps shall be furnished with a synthetic rubber gasket installed in a retaining groove and the dimensions and shape of the nozzle cap nut shall be the same as the operating shaft nut as described above. No lead is to be use in the hydrant joints. Nozzle caps shall be furnished with security chains with one end of each securely attached to the upper barrel section of the hydrant.

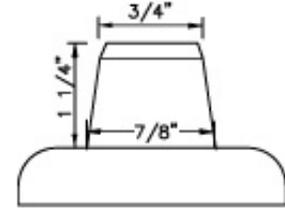
Hose Nozzles and Caps. The two hose nozzles shall be 2-1/2 inch nominal diameters with 7-1/2 threads per inch. Threads shall be right-handed. All nozzle caps shall be removed by turning **counterclockwise**. Each hose nozzle shall include a nozzle cap with nut, security chain.



**TOP ( PLAN ) VIEW**

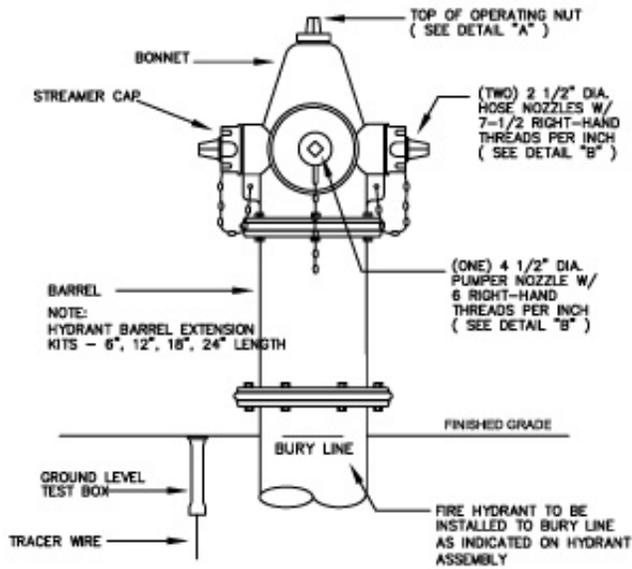


**FACE (PLAN) VIEW**



**PROFILE**

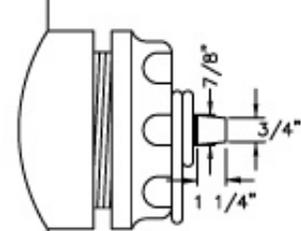
**DETAIL "A" - OPERATING NUT**



**FACE (FRONT) VIEW**



**FACE VIEW**

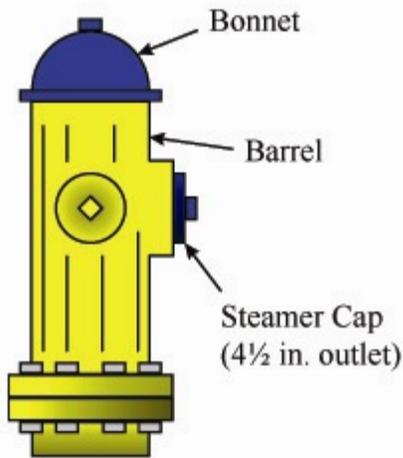


**PROFILE**

**DETAIL "B" - NOZZLE DETAIL**

## 1. Fire Hydrant Color Coding [Water Supplies for Fire Protection].

**Manufacturer:**



### **Potable Hydrant Paint:**

#### **Aervoe paint**

Fluorescent Green # 184

Ford Blue # 560

OSHA Safety Orange # 305

#### **Rustoleum paint**

Equipment Yellow # 2148

Safety Red # 2163

### **Non-Potable Hydrant Paint:**

#### **Aervoe paint**

OSHA Safety Purple #300

Gloss White #5019

#### **Rustoleum Paint**

Safety Purple #160830

Gloss White #2192

**The fire hydrant color codes are as follows:**

<b>Ford Blue</b>	<b>3000+ gpm bonnet and steamer cap</b>
<b>Ford Blue</b>	<b>1500 – 2999 gpm bonnet only</b>
<b>Bright Green</b>	<b>1000 -1499 gpm bonnet only</b>
<b>Bright Orange</b>	<b>500 – 999 gpm bonnet only</b>
<b>Red</b>	<b>Less than 500 gpm bonnet only</b>
<b>Yellow</b>	<b>All Barrels</b>

In all cases, the hydrant is painted yellow as delivered from the manufacturer. Bonnet and Steamer Caps are painted accordingly after construction placement.

The upper exposed section of the hydrant above ground shall be painted Equipment Yellow Rustoleum 2148 or Aervoe 5009. The buried portion of the hydrant shall be coated with black asphalt varnish.

**Nonpotable** Water hydrants shall be painted white on the barrel and purple on the steamer cap and bonnet.

**Coatings** Fire hydrants shall be coated to prevent atmospheric corrosion.

## L. Water Quality Device/Test Station

### 1. Post Hydrant

#### Approved Manufacturer(s):



- **AVK**  
Series 67  
Flushing/Sampling Hydrant  
4" MJ connection

**General:** Post Hydrants are used to test or flush the Water Main.

**Size(s):** 4 inch

**Pressure Class:** Post hydrants shall be rated for a minimum Working Pressure of 250 PSI.

**Material:** Ductile iron

#### Specifications:

- Mechanical joints shall comply with the requirements of *AWWA C111*, 4" in size for flushing hydrants.
- Post Hydrants shall meet or exceed *AWWA C502* where applicable.
- Post Hydrants shall be manufactured and tested in an *ISO 9001* certified facility.
- Post hydrants shall be of the compression type, opening against system pressure and closing with system pressure.
- All brass alloys in the hydrant exposed to the potable water shall comply to current UNS designations for Hydrant Components and shall be Lead Free in accordance with NSF/ANSI 372 in the open position effective January 5, 2015 for all new installations and repair pieces.

**Color:** Post Hydrant shall be painted John Deere Green in color Paint for Post Hydrants

#### Approved Manufacturer(s):



**Sherwin Williams**  
John Deere Green  
#B65T605  
**Rustoleum Paint**  
John Deere Green  
#7435830

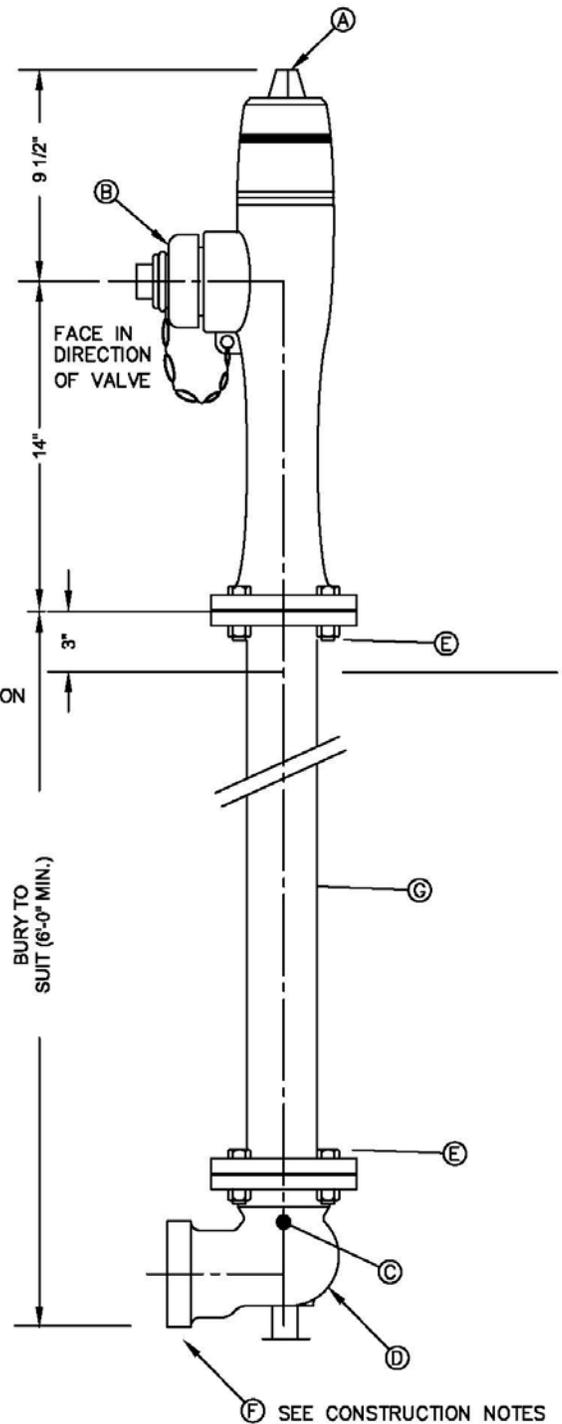
GENERAL NOTES:

1. POST TYPE HYDRANT IS A SPECIAL USE HYDRANT AND SHALL NOT BE USED FOR FIRE FIGHTING. (WATER SAMPLING OR FLUSHING APPLICATION)
2. ALL POST HYDRANTS SHALL BE PAINTED GREEN, FOR SAMPLING OR FLUSHING.
3. COMPLY WITH REQUIREMENTS OF AWWA C-502, DRY BARREL FIRE HYDRANTS AND AWWA C-550, PROTECTIVE EPOXY INTERIOR COATINGS FOR VALVES AND HYDRANTS.
4. OPENING IN A RIGHT DIRECTION
5. WORKING PRESSURE = 250 PSI

CONSTRUCTION KEY NOTES:

- A. WEATHERSHIELD – COLORADO SPRINGS UTILITY PER SPRINGS UTILITIES STANDARDS, OPEN RIGHT
- B. ONE 2½" HOSE NOZZLE CAP, THREADED PER SPRINGS UTILITIES STANDARDS.
- C. 2 1/4" MAIN VALVE OPENING.
- D. HYDRANT ELBOW BASE.
- E. STAINLESS STEEL BOLTS
- F. a. FLUSHING HYDRANT 4" MJ INLET CONFIGURATION
- G. BARRELS: 6" EXTENSION SECTIONS THROUGH 4'-6" WITH STAINLESS STEEL BOLTS

BURY LINE (GROUND LINE)  
PER MANUFACTURERS RECOMMENDATION



## M. Concrete for Thrust Restraint Blocks, Concrete Reverse Anchors and Vaults

### Concrete

**Cement.** All cement used shall be Portland Cement acceptable under the “*Standard Specifications and Tests for Portland Cement,*” *ASTM C150* and conform to the latest *ACI 318 Building Code Requirements*. Cement used shall be Type II.

**Aggregates.** The limits for deleterious substances and physical property requirements of the coarse aggregates shall be selected for the applicable class designation from those listed under severe weathering regions, Table 3, *ASTM C330*.

**Fine Aggregate.** Fine aggregate shall conform to *ASTM C330*. Fine aggregate shall consist of sand or other inert materials, or combinations thereof, and having hard, strong, durable particles, free from adherent coating. Fine aggregate shall be thoroughly washed to remove shale, coal, mica, clay, loam, alkali, organic matter or other deleterious matter.

1. Deleterious Substances. The amount of deleterious substances in the washed aggregate shall not exceed the following values:
  - a. Clay lumps and Friable Particles, % by weight 3.0 MAX
  - b. Coal and Lignite, % by weight 1.0 MAX
  - c. Friable Particles, % by weight 1.0 MAX
  - d. Sand equivalent 75 MIN
  - e. Fineness Modulus 2.3 -- 3.1 MAX
  - f. Sodium sulfate soundness, % by weight 10 MAX

2. Grading. Fine aggregate shall be regularly graded from coarse to fine in two (2) sizes and when tested by means of the *ASTM C330 Standard*, sieves shall conform to the following requirements expressed as percentages by weight:

Sieve Size or Test Procedure	Percent Passing or Test Requirement *(Concrete Sand)
3/8*	100
No. 4	95-00
No. 8	80-00
No. 16	50-85
No. 30	25-60
No. 50	5-30
No. 100	0-10
No. 200	** 0-3

- The fine aggregate shall have not more than 45% passing any sieve and retained on the next consecutive sieve.

**Coarse Aggregate.** Gravel and crushed stone shall conform to *ASTM C33*. Coarse aggregate shall consist of gravel, crushed stone, or other inert material or combinations thereof, and having hard, strong, durable pieces free from adherent coating. Coarse aggregate shall be thoroughly washed of clay, loam, bark, sticks, alkali, organic matter, shale, coal, mica, or other deleterious material.

1. Deleterious Substances. The amount of deleterious substances shall not exceed the following values:
  - a. Clay lumps and Friable Particles, % by weight 3.0 MAX
  - b. Coal and Lignites, % by weight 0.5 MAX
  - c. Sum of Clay Lumps, Friable Particles and Chert, 5.0 MAX % by weight
  - d. Abrasion, % by weight 50 MAX
  - e. Sodium Sulfate Soundness, % by weight 12 MAX
  
2. Grading. Coarse aggregate, when tested in conformity with *ASTM C136*, shall conform to one or more of the following gradings.

Sieve size or Test Procedure	Percent Passing or Test Requirement		
	No. 357	No. 467	No. 57
2 1/2"	100	--	--
2"	95-100	100	--
1 1/2"	--	95-100	100
1"	35-70	--	95-100
3/4"	--	35-70	--
1/2"	10-30	--	25-60
3/8"	--	10-30	--
No. 4	0-5	0-5	0-10
No. 8	--	--	0-5
No. 200	*1.0 MAX.	*1.0 MAX.	*1.0 MAX.

\*1.5 MAX. for crusher fines

**NOTE:** Size No. 67 may also be used on a case-by-case basis when approved by the Engineer. The above values are in percentages by weight from *AASHTO M-80 No. 357 and 467*.

**Water.** The water used in all concrete shall be free from objectionable quantities of silt, organic matter, alkali, salts, and other impurities.

**Admixtures.** An air-entraining agent shall be used in all concrete. The agent used shall conform to *ASTM C260*. The amount of air-entraining agent used shall be such as will affect the entrainment of 6% (+ or – 1%) of volume of the concrete.

A water-reducing admixture (WRA) may be used unless otherwise noted by Colorado Springs Utilities. The admixture shall conform to *ASTM C494* for Type A or Type D chemical admixture, shall contain no calcium chloride, and shall be compatible with the cement being used.

**Temperature Control.** No concrete shall be poured when the temperature is below 35° F or dropping during a 24-hour period preceding the pouring. Concrete which is being cured below 32° F shall be heated during curing.

**Concrete Quality.**

- a. All cast (poured or batch concrete)-in-place concrete for thrust reaction blocks, reverse anchors and encasements shall have a minimum 28 day compressive strength of 3,000 PSI and maximum slump of four inches (4'') ±.
- b. All cast (poured or batch concrete)-in-place and precast concrete for vaults and bridging shall have a minimum compressive strength of 4,000 PSI and maximum slump of four inches (4'') ±.

## Concrete Reinforcement

**General.** Reinforcements shall be accurately formed and shall be free from loose rust, scale and Contaminants, which will destroy or reduce bonding including mortar from previous concrete pours. Unless otherwise shown on the drawings or specified herein, all requirements shall conform to *ACI 318* and the *Uniform Building Codes*.

Reinforcements shall be accurately positioned on supports, spacers, hangers or other reinforcements and shall be secured in place with wire ties or suitable clips adequate to ensure against displacement during the course of construction.

**Material.** All deformed reinforcing bars shall conform to *ASTM A615*, minimum Grade 60, clean and void of rust.

Dowels, conforming to the requirements of *ASTM A15*, shall be intermediate grade plain bars rolled from billet stock.

**Bending.** Reinforcement shall be bent cold. Bars shall be full length and accurately bent to details shown on drawings. No bars partially embedded in concrete shall be field bent except as shown on the drawings or specifically permitted by the Engineer/Inspector.

## N. Safety Ladders

### Safety Ladders – (Ladder Up)

#### Approved Manufacturer(s):



- **Bilco Ladder UP Safety Post –**

Model-1 High Strength Steel/Black Enamel (regular conditions)

Model-2 High Strength Steel/Hot Dip Galvanized (corrosive conditions)

Model-3 Stainless Steel, Model-4 Mil Finish Aluminum

See manufacturer's specification for correct installation

**General:** The Bilco LadderUP safety post is to aid personnel to enter and exit a vault in a safe manner.

**Materials:** Steel

**Specifications:** The existing ladder must be structurally sound and securely anchored. LadderUP shall be designed with a telescoping tubular section that locks automatically when fully extended. Upward and downward movement shall be controlled by a stainless steel spring balancing mechanism. Unit shall be completely assembled with fasteners for securing to the ladder rungs in accordance with the manufacturer's instructions.

The LadderUP is furnished completely assembled ready to mount on the rear of an existing ladder with brackets on the climbing side. Included are two (2) channel clamping brackets, four (4) 2" stainless steel bolts and eight (8) stainless steel washers (washers used only when securing to  $\frac{3}{4}$ " square or round rungs).

## O. Manhole Ring and Covers

### Manhole Ring and Covers

#### Approved Manufacturer(s):



- **D&L Supply Company** –  
Model No. A-1423 (Heavy Duty)

**General:** Manhole ring and cover are for Water Vault applications

**Size(s):** 36 inch MH Ring and Cover, Inside Diameter = 37 inches, Outside Diameter = 45 inches

#### Material: Ductile Iron

**Specifications:** All heavy-duty manhole ring and covers shall be manufactured to meet *HS-20* traffic load conditions and shall have a minimum ring clearance diameter of 34-inches.

All covers shall be ductile iron, manufactured according to *ASTM A536*, Grade 60, or better.

All rings shall be iron, manufactured according to *ASTM A48*, Class 35B, or better.

**Markings:** All manhole assemblies shall be stamped with the name and model identification of the Approved Manufacturer.

**Gasket:** Manhole lid and ring will need to be ordered special with a 1/16 inch Neoprene flat gasket, Lid and ring are specially drilled for additional bolts for securing the lid to the ring with gasket for a tight seal,

Inverted rings shall not be permitted within Colorado Springs Utilities' System.

#### Adjustment rings

#### Approved Manufacturer(s):



- **EJ- Infra-riser**

**Size(s):** 38 inch ring for Water Vaults

**General:** Adjustment rings are used to raise a manhole ring and cover to meet changes in grade.

**Material:** Polyethylene

**Specifications:** Ring is to be manufactured to *AASHTO HS25* and *ASTM D1248*

## P. Tracer Wire

### Tracer Wire (Blue for Potable Water and Purple for Nonpotable Water)

#### Approved Manufacturer(s):



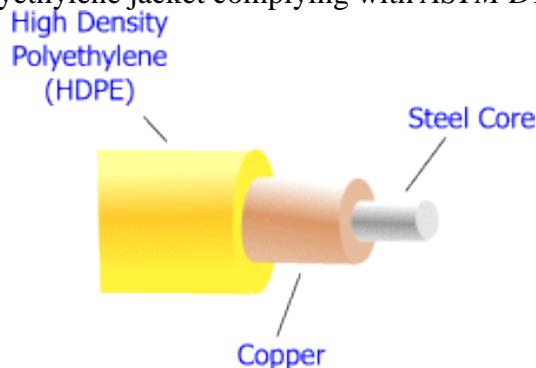
- **Copperhead**
- **Agave Wire LTD**
- **Pro Trace**
- **Pro-Pak Industries**
  
- Or Equivalent copper, copper clad or steel tracer wire.

**General:** Tracer Wire shall be used with all buried PVC and HDPE pipe installations for location of the pipe for future construction.

**Specifications:** Direct bury wire shall be #12 AWG Solid, steel core soft drawn high strength tracer wire or copper clad steel, 380# average tensile break load, 30 mil high molecular weight-high density polyethylene jacket complying with *ASTM D1248*. Wire may also be #12 AWG solid copper or copper clad steel. Wire insulation will be colored **BLUE** for water, **Purple** for Nonpotable Water in accordance with the *American Public Works Association [APWA] uniform color code* to signify a water application. Wire is to be used in all PVC and HDPE direct buried applications.

#### Boring Applications

Wire shall be #12 AWG Solid, steel core hard drawn extra high strength horizontal directional drill tracer wire, 1150# average tensile break load, 45 mil high molecular weight-high density polyethylene jacket complying with *ASTM D1248*.



**Long Bore applications:** Tracer Wire shall be , 302/304 Stainless Steel, 7 x 19 stranded, 45 mil jacket, 600 Volts, (3/16") extra-high-strength 1150# break load preferred, wire will have a polyethylene HDPE insulation. During bore applications more than one wire must be pulled in at the same time in case of breakage of a wire during the bore application.

**Anodes on tracer wire:** 1 lb anodes are to be placed on tracer wire at approximately 1000 foot intervals for direct bury. One on each end for boring applications longer than 1000 feet. See High Potential Magnesium Anodes below.

## Q. Marking Tape

Trench Marking tape (Blue for Potable Water, Purple for Nonpotable Water)



Potable Water Marking Tape is an option and used when directed by Colorado Springs Utilities



Nonpotable Marking Tape is required in all applications.

**General:** Marking tape is utilized in trenches as additional cautionary measure for buried water lines.

**Specifications:** Marking tape shall be non-traceable, poly-vinyl, 3 to 6 inches in width.

The Potable Water marking tape shall be blue and shall be printed with “Caution Buried Potable Water Line Below” or “Caution Buried Colorado Springs Potable Water Line Below”.

The Non-Potable Water marking tape shall be purple and shall be printed with “Caution Buried Nonpotable Water Line Below” or “Caution Buried Colorado Springs Nonpotable Water Line Below”. At times it may be permissible to have the purple tape marked as “Reclaimed Water”.

**Installation:** One tape shall be laid in place over the indicated length of water main at the top of the pipe zone approximately 1 foot above the buried pipe and a second tape shall be placed 2 feet below the proposed finished grade for the indicated length of the pipe.

## R. Cathodic Protection

### 1. Coatings and Wraps

#### Approved Manufacturer(s):

N/A



#### Polyethylene Encasement Material

**General:** Polyethylene encasement (Low Density AWWA Polywrap) is used to deter corrosion on metal pipe and fittings.

**Specifications:** The (low density) polyethylene film shall meet the following test requirements:

Tensile Strength	3600 PSI minimum ( <i>ASTM D882</i> )
Elongation	800% minimum ( <i>ASTM D882</i> )
Dielectric Strength	800 V/Mil thickness minimum ( <i>ASTM D149</i> )
Thickness	8 mils minimum
Impact resistance:	600 g minimum ( <i>ASTM D1709</i> Method B)
Propagation Tear Resistance:	2550 gf, min. in machine and transverse direction ( <i>ASTM D1922</i> )

The virgin material used to manufacture linear low-density polyethylene film shall be in accordance with *ASTM D4976*, *ANSI A21.5/AWWA C105*. The polyethylene film shall be marked with the manufacturer's name, year of manufacture, *ANSI/AWWA* standard, film thickness, application range of nominal pipe diameter size (s), and warning label.

## 2. Wax Tape

### Approved Manufacturer(s):

#### Trenton:

Wax Tape Primer Brown

Wax Tape

Poly-Ply

**General:** Wax Tape is a three part system that is used to coat underground metal fittings.

### Installation:

Primer Application Procedures: Wire brush and wipe the surface clean and as dry as possible.

Apply Wax-Tape Primer by hand, rubbing and pressing the primer firmly onto the surface, especially if the surface is wet, cold or rusty to displace any moisture and ensure adhesion to the surface. After application of the primer, #1 Wax-Tape may be applied.

Color	Brown
Pour point	100-115°F
Flash point	350°F
	minimum
Coverage (approximate)	1 gal/100sf

Wax Tape Application Procedures: Wrap #1 Wax-Tape using a 1" overlap. On straight pipe apply slight tension to ensure contact with surface. On irregular surfaces allow slack so the tape can be molded into conformity. In either case, press and form the tape so there are no air pockets or voids under the tape. Also, press and smooth out the lap seams to ensure they are sealed. The tape does not require curing or drying time so it can be backfilled immediately.

Outer wrap: For belowground pipes that are 10" or larger, apply a Trenton Poly-Ply outer wrap. For aggressive soil conditions a Trenton outer wrap, a rock shield or select backfill should be considered or a plastic wrap for protection. Wrap should have a thickness of 70-90 mils.

### 3. High Potential Magnesium Anodes

#### Approved Manufacturer(s):

NA



#### General Information:

High-potential magnesium anode bagged, in sizes from 9, 17, 32 and 48/50 pounds with a 20 foot lead wire.

<b>High Potential – Chemical Composition ASTM B843 Industry Standard for MC high potential magnesium anodes</b>	
Magnesium Alloy:	
Aluminum	0.010% maximum
Manganese Zinc	0.5 – 1.3%
Impurities:	
Silicon	0.05% maximum
Copper	0.02% maximum
Nickel	0.001% maximum
Iron	0.03% maximum
Other	0.05% maximum
Magnesium:	Remainder

#### Tracer Wire Anode:



1 lb anodes are to be placed on tracer wire at approximately 1000 foot intervals.

#### 4. Zinc End Cap

Approved Manufacturer(s): NA



**General:** Zinc end caps shall be made from Special High Grade zinc conforming to *ASTM B6*, with suitable alloying additives for Type I anode. Composition of the anode alloy content shall conform to the limits prescribed as follows and shall be 6 oz:

<b>Zinc End Cap</b>	
Aluminum	0.1 - 0.5 %
Manganese Zinc	0.5 – 1.3%
Cadmium	0.025 – 0.07 %
Iron	0.005 % maximum
Lead	0.006 % maximum
Copper	0.005 % maximum
Others (total)	0.10 % maximum
Zinc	Remainder

The zinc end caps shall be free of flash, burrs, cracks, blow holes, and surface slag, consistent with good commercial practice.

## 5. Test Stations

### Ground Level Test Box

#### Approved Manufacturer(s):



#### Copperhead:

Concrete/Driveway box –

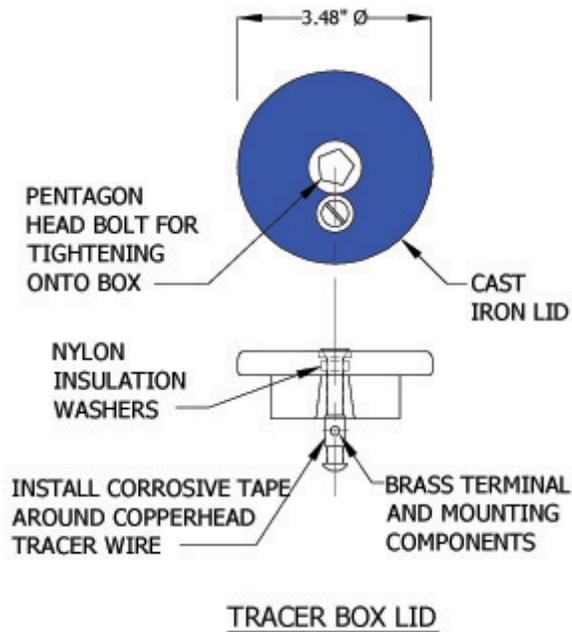
CD14\*TP

Landscape Lite Duty box –

LD14\*TP

**General:** In-ground tracer wire test station box(landscaping and concrete)

Color: lid will be Blue for Potable Water. The ground level test box shall be placed in conjunction with the installation of fire hydrants to attach the tracer wire.



## Pipeline Test Station

### Approved Manufacturer(s):



### Maloney

Supplied by Colorado Springs Utilities

**General:** The Maloney Combination Pipeline Marker and Test Station offers the versatility of a pipeline warning marker and a cathodic protection test station that is capable of:

- Pipe-to-soil potential measurements
- Measurements and/or restriction of anode current output
- Measurements of IR drop along the pipeline
- Tests for shorted casings and pipeline bondings

The cathodic protection Test Station is molded as part of the LineMRKR fitting. The combination LineMRKR/Test Station is also designed to enable test readings to be taken without removing the cover. Test lead terminal connections are available with 1/4" x 20 NC x 1-1/2" silicone-bronze machine screws with 2 nuts and washers, or highest quality non-corrosive 5-way hex-head binding post rated for 30 Ampere current capacity and 1000 Volt working voltage.

## S. Flow-Fill

### Flow-Fill

#### General Information:

Flow-fill may be used when compaction cannot be reached or where a utility needs to be encased for secondary containment. The following materials Specifications may be used for flow-fill with approval of the governing authority:

City of Colorado Springs Specifications:

#### **INGREDIENTS LBS./C.Y.**

Cement 42 (0.47 sack)

Water 325 (39 gallons or as needed)

Coarse Aggregate (Size No. 57) 1700

Sand (ASTM C-33) 1845

The maximum desired 28-day strength is 60 psi (not a Specification requirement). The above combination of material, or an equivalent, may be used to obtain the desired "flowable-fill".

CDOT Specifications:

Structure backfill (flow-fill) meeting the following requirements shall be used to backfill bridge abutments. The Contractor may substitute Structure backfill (flow-fill) for Structure backfill (Class 1) or Structure backfill (Class 2) to backfill culverts and sewer pipes.

Flow-fill is a self-leveling low strength concrete material composed of cement, fly ash, aggregates, water, chemical admixtures and/or cellular foam for air-entrainment. Flow-fill shall have a slump of 7 to 10 inches, when tested in accordance with *ASTM C143* or a minimum flow consistency of 6 inches when tested in accordance with *ASTM D6103*. Flow-fill shall have a minimum compressive strength of 50 psi at 28 days, when tested in accordance with *ASTM D4832*. Flash Fill shall not be used in lieu of flow-fill.

Flow-fill placed in areas that require future excavation, such as utility backfill shall have a Removability Modulus (RM) of 1.5 or less.

Removability Modulus, RM, is calculated as follows:

$$RM = \frac{W^{1.5} \times 104 \times C^{0.5}}{10^6}$$

where :    W = unit weight (pcf)  
              C = 28-day compressive strength (psi)

Materials for Structure backfill (flow-fill) shall meet the requirements specified in the following subsections:

#### **Fine Aggregate for Concrete:**<sup>1,4</sup>

Fine aggregate for flow-fill shall conform to the requirements of *AASHTO M6*. The amount of material finer than 75 µm (No. 200) sieve shall not exceed 3% by dry weight of fine aggregate, when tested in accordance with *AASHTO T11* or *Colorado Procedure 31, Method D*, unless otherwise specified. The minimum sand equivalent, as tested in accordance with *AASHTO T 176* shall be 80 unless otherwise specified. The fineness modulus, as determined by *AASHTO*

T27, shall not be less than 2.50 or greater than 3.50 unless otherwise approved.

**Coarse Aggregate for Concrete:**<sup>2,4</sup>

Coarse aggregate for concrete shall conform to the requirements of *AASHTO M80*, except that the percentage of wear shall not exceed 45 when tested in accordance with *AASHTO T96*. Coarse aggregate shall conform to the grading in the table below. Sizes 357 and 467 shall each be furnished in two separate sizes and combined in the plant in the proportions necessary to conform to the grading requirements. Compliance with grading requirements will be based on the combination and not on each individual stockpile.

**Portland Cement:**

Hydraulic cement shall conform to the requirements of the following Specifications for the type specified or permitted:

Portland Cement *ASTM C150*

Blended Hydraulic Cement *ASTM C595*

Hydraulic Cement *ASTM C1157*

All concrete, including precast, prestressed and pipe shall be constructed with one of the following hydraulic cements unless permitted otherwise.

*ASTM C 150 Type I*

*ASTM C 150 Type II*

*ASTM C 150 Type V*

*ASTM C 595 Type IP* consisting of no less than 70% portland cement

*ASTM C 595 Type IP(MS)* consisting of no less than 70% portland cement

*ASTM C 595 Type IP(HS)* consisting of no less than 70% portland cement

*ASTM C 1157 Type GU*, consisting of no more than 10% limestone

*ASTM C 1157 Type MS*, consisting of no more than 10% limestone

*ASTM C 1157 Type HS*, consisting of no more than 10% limestone

Cement shall be from a preapproved source listed on the Department's Approved Products List. The cement intended for use on the Project shall have been tested and accepted prior to its use. Certified Test Reports showing that the cement meets the Specification requirements and supporting this statement with actual test results shall be submitted to the Engineer prior to the tested material being incorporated into the Project. Certified Test Reports shall indicate the percentage of pozzolan and limestone incorporated into the cement.

The cement shall be subject to sampling and testing by the Department. Test results that do not meet the physical and chemical requirements may result in the suspension of the use of the cement until the corrections necessary have been taken to insure that the material meets the Specifications.

The Contractor shall provide suitable means for storing and protecting the cement against dampness. Cement which, for any reason, has become partially set or which contains lumps of caked cement shall not be used.

Cement salvaged from discarded or used bags shall not be used.

**Fly Ash:**<sup>3,4</sup>

Fly ash for concrete shall conform to the requirements of *ASTM C 618*, Class C or Class F with the following exceptions:

- (1) The loss on ignition shall not exceed 3.0%.
- (2) The CaO in Class F fly ash shall not exceed 18%.

Fly ash shall be from a preapproved source listed on the Department's Approved Products List. The fly ash intended for use on the Project shall have been tested and accepted prior to its use. Certified Test Reports showing that the fly ash meets the Specification requirements and supporting this statement with actual test results shall be submitted to the Engineer.

Preapproval shall include submission of a report from the supplier documenting the results of testing the fly ash from that source in accordance with the *Toxicity Characteristic Leaching Procedure (TCLP)* described in *40 CFR 261, Appendix II*. The report shall include the results of *TCLP* testing for heavy metals and other Contaminants found in the fly ash. The report shall list the Contaminants tested, and the allowable levels for each Contaminant tested. A new report shall be submitted for each preapproved source annually. Additional *TCLP* testing may be required when the Department suspects that the fly ash source may have been contaminated.

The fly ash shall be subject to sampling and testing by the Department. Test results that do not meet the physical and chemical requirements may result in the suspension of the use of fly ash until the corrections necessary have been taken to insure that the material meets the Specifications.

**Water :**

Water used in mixing or curing shall be reasonably clean and free of oil, salt, acid, alkali, sugar, vegetable, or other substance injurious to the finished product. Water will be tested in accordance with, and shall meet the suggested requirements of *AASHTO T26*. Water known to be of Potable quality may be used without test. Where the source of water is relatively shallow, the intake shall be so enclosed as to exclude silt, mud, grass, or other foreign materials.

**Air Entraining Admixture:**

Air-entraining admixtures shall conform to the requirements of *AASHTO M154*.

Admixtures which have been frozen will be rejected in accordance with subsections 106.08 and 106.09.

**Chemical Admixtures:**

Chemical admixtures for concrete shall conform to the requirements of *AASHTO M194*.

Admixtures which have been frozen will be rejected.

<sup>1</sup> Fine aggregate not meeting the requirements of Fine Aggregate for Concrete subsection may be used if testing indicates acceptable results for strength and air content.

<sup>2</sup> Coarse aggregate not meeting the requirements of Coarse Aggregate for Concrete subsection may be used if testing indicates acceptable results for strength and air content.

<sup>3</sup> Fly ash not meeting the requirements of the Fly Ash subsection may be used if testing indicates acceptable results for strength and air content.

<sup>4</sup> Industrial by-product aggregates (foundry sand, bottom ash, etc.) and fly ash not meeting the requirements of the Fly Ash subsection shall submit a report from the supplier documenting the results of testing in accordance with the *Toxicity Characteristic Leaching Procedure (TCLP)* described in *40 CFR 261*. The report shall include the results of *TCLP* testing for heavy metals and other Contaminants. Materials shall not exceed the *TCLP* limits of *40 CFR 261.24* for heavy metals.

Cellular foam shall conform to *ASTM C869* and *ASTM C796*

Sieve Size	Coarse Aggregates (from AASHTO M43)									Fine
	No. 3	No. 357	No. 4	No. 467	No. 57	No. 6	No. 67	No. 7	No. 8	
	50 mm to 25.0 mm (2" to 1")	50 mm to 4.75 mm	37.5 mm to 19.0 mm (1½")	37.5 mm to 4.75 mm (1½")	25.0 mm to 4.75 mm (1" to ½")	19.0 mm to 9.5 mm (¾")	19.0 mm to 4.75 mm (¾")	12.5 mm to 4.75 mm (½")	9.5 mm to 2.36 mm (3/8" to #8)	4.75 mm to 150 µm (#4 to #100)
63 mm	10	10								
50	90 – 100	95 – 100	10	10						
37.5	35 – 70		90 – 100	95 – 100	10					
25.0	0 – 15	35 – 70	20 – 55		95 – 100	10	10			
19.0			0 – 15	35 – 70		90 – 100	90 – 100	10		
12.5	0 – 5	10 – 30			25 – 60	20 – 55		90 – 100	10	
9.5			0 – 5	10 – 30		0 – 15	20 – 55	40 – 70	85 – 100	100
4.75		0 – 5		0 – 5	0 – 10	0 – 5	0 – 10	0 – 15	10 – 30	95 – 100
2.36					0 – 5		0 – 5	0 – 5	0 – 10	80 – 100
1.18									0 – 5	50 – 85
600										25 – 60
300										10 – 30
150 µm										2 – 10

## 4.5 Water Service Line

### A. Copper Service Line Pipe and Fittings

#### 1. Corporation Stop

**Approved Manufacturer(s):** Corporation Stop (Copper connection)



- **Cambridge Brass-** 301NL-AxCx Series
- **Ford-** FB600NL Series
- **Mueller-** B25000N Series
- **A.Y. MacDonald-** 74701 Series

**General:** Corporation Stop shall be used to tap at the Water Main for a service connection. Corporation Stop shall be CC x Flare,

**Sizes:** 3/4", 1", 1 1/2", 2"

**Materials:** No Lead Brass

**Specifications:** Ball Corp with CC Thread x Flare Outlet (300 psi – Maximum working pressure)

quarter turn open/close, Ball Type, “No-Lead Brass”, rated to 300 PSI. Fittings and valves to conform to *Federal Public Law 111-380*, effective date 1-04-2014. Inlet shall be an AWWA taper CC thread. Outlet shall be a Copper Flare straight connection.

Fitting shall be manufactured and tested to *ANSI/AWWA C800* and *ASTM B584*.

Brass Components shall be constructed of *UNS* Copper Alloy No. C89520 or C89833 for chemical and mechanical requirements of the current standards.

All fittings and valves shall have an identifying mark indicating that it is made of “no-lead” brass alloy, e.g. “NL”



## 2. Copper Flare Curb Stops:

### Approved Manufacturer(s):

### Curb Stop (Copper connection)



- **Cambridge Brass**– 202NL-CxCx Series
- **Ford**- B22-xxxNL Series
- **Mueller**-B2504N Series
- **A.Y. MacDonald**- 76100 Series

**General:** Curb Stop shall be used as a point of access at the property line of premises.

**Sizes:** ¾”, 1”, 1 ½”, 2”

**Materials:** No Lead Brass

**Specifications:** Corporation Stop shall be Flare x Flare, quarter turn open/close, Ball Type, “No-Lead Brass”, rated to 300 PSI. Fittings and valves to conform to *Federal Public Law 111-380*, effective date 1-04-2014.

Inlet shall be an AWWA copper flare. Outlet shall be a copper flare straight connection.

Fitting shall be manufactured and tested to *ANSI/AWWA C800* and *ASTM B584*.

Brass Components shall be constructed of *UNS* Copper Alloy No. C89520 or C89833 for chemical and mechanical requirements of the current standards.

All fittings and valves shall have an identifying mark indicating that it is made of “no-lead” brass alloy, e.g. “NL”



### 3. Copper Repair Couplings:

#### Approved Manufacturer(s):



#### Flare x Flare Coupling (Copper connection)

- **Cambridge Brass**– 118NL-CxCx
- **Ford**- C22-xx
- **Mueller**- H15400N x
- **A.Y. MacDonald**- 74758 x

**General:** Coupling shall be used only when the length of the service line exceeds the length of a new pipe coil or in the case of a emergency repair.

**Sizes:** ¾”, 1”, 1 ½”, 2”

**Materials:** No Lead Brass

**Specifications:** Coupling shall be Flare x Flare, “No-Lead Brass”, rated to 300 PSI. Fittings and valves to conform to *Federal Public Law 111-380*, effective date 1-04-2014. Inlet shall be an AWWA copper flare. Outlet shall be a copper flare straight connection. Fitting shall be manufactured and tested to *ANSI/AWWA C800* and *ASTM B584*. Brass Components shall be constructed of *UNS* Copper Alloy No. C89520 or C89833 for chemical and mechanical requirements of the current standards. All fittings and valves shall have an identifying mark indicating that it is made of “no-lead” brass alloy, e.g. “NL”

#### 4. Copper pipe (Type K)

**Approved Manufacturer(s):**



- Cerro (or equivalent)

**General:** All copper Water Service Lines shall be type K soft copper tubing and shall meet *ASTM B88* and *NSF 61*

**Sizes:** ¾, 1/, 1-1/2, 2- inch Tubing

## B. HDPE CTS Service Line Pipe and Service Fittings:

### 1. Corporation Stops

#### Approved Manufacturer(s):



Cambridge Brass 301NL AXHX



A.Y. McDonald 74701BQ-X



Ford FB1000NL-X-G



Mueller B-25008N-X

### 2. Curb Stops

#### Approved Manufacturer(s):



Cambridge Brass 202NL- HXHX



A.Y. McDonald 76100Q-X



Ford B44NL-XXX-G



Mueller B-25209N-X

**General:** All HDPE service line fittings shall be CC by compression or compression by compression in copper tube sizing (CTS) and shall be ordered to fit both Type K Copper and HDPE DR9.

**Sizes:** 1", 1 ½", 2"

**Materials:** No Lead Brass

**Specifications:** All HDPE service line brass fittings shall be;

1. Full Port, Brass, 300 psi, CTS, Compression Connections for taps, Curb Stops, and connectors. Corporation Valve shall have AWWA thread to connect to the main with a compression end to connect to the HDPE service line.
2. All Corps and Curb Stops shall be manufactured and tested to the current *ANSI/AWWA C800* and *ASTM B62* and *B584*
3. Brass Components to be constructed of *UNS* Copper Alloy No. C83600-85-5-5-5. for chemical and mechanical requirements of current standards
4. Fittings and valves shall be Lead Free in accordance with the *Safe Drinking Water Act* as amended by the *Federal Reduction of Lead in Drinking Water Act 111-380*, effective date 1-04-2014
5. Fitting shall be *NSF 61* certified.

All fittings and valves shall have an identifying mark indicating that it is made of “no-lead” brass alloy, e.g. “NL”



Corrosion Protection . Corrosion Protection for all fittings (See Section [2.6I](#)) and detail for PE Service Line and Building Entry Detail see Detail Drawings [B1-5](#), [B1-6](#), [B1-7](#), and [B1-9](#).

### 3. HDPE Service Line Pipe

#### Approved Manufacturer(s):



- Centennial Plastics, CenCore
- Cresline CE Blue
- Driscoplex-CP Chem 5100 Ultra-Line
- JM Eagle Pure-Core 4500
- ADS PolyFlex

\*\*All HDPE Service line pipe must be PE 4710 Compliant by Jan. 5, 2015

**General:** HDPE Water Service Line is used in place of copper tubing.

**Sizes:** 1, 1-1/2, 2-inch CTS sized pipe

**Material:** Polyethylene HDPE DR9 PE4710 Copper Tubing Size (CTS) Service Line pipe

**Specifications:** Polyethylene CTS Service Lines shall be manufactured in accordance with the current versions of:

- AWWA C901
- ASTM D2732
- ASTM D3350
- ASTM D4976
- ASTM D3261
- NSF 61

**Marking:** HDPE, DR9, CTS (Copper Tubing Size), 250 PSI, PE4710, AWWA C901, ASTM D2737, NSF61.

#### Color(s):

Potable Water: Black with Blue Stripe/Lettering or Blue with White Lettering

Nonpotable Water: Black with Purple Stripe/Lettering or Purple for Nonpotable Water

#### a) HDPE Pipe Materials.

Black PE materials used for the manufacture of polyethylene pipe and fittings shall be PE 4710 high density polyethylene meeting ASTM D3350 cell classification 445474C. The material shall be listed and approved for Potable Water in accordance with NSF 61. The manufacturer shall certify that the materials used to manufacturer PE CTS Service Line pipe meet these requirements.

#### b) Potable Water Tubing - PE 4710 Copper Tube Size HDPE to ASTM D2737

The minimum size of a HDPE Service Line, per Pikes Peak Regional Building is 1"; this is because the internal diameter of a ¾" HDPE pipe is not the same as the internal diameter of a ¾" copper pipe.

Pressure Class	Pipe Size (inch)	Minimum Wall (inch)	O.D. (inch)	Approximate I.D. (inch)	Typical Type "K" copper I.D. (inch)
250	1"	0.125	1.125	0.860	0.995
	1 1/2"	0.181	1.625	1.241	1.481
	2"	0.236	2.125	1.625	1.959

Flow capacities of HDPE CTS pipe varies with the inside diameter of pipe, pressure source, length of pipe connection to the Structure, height and number of fixtures within the building. It may be necessary to up-size the service line to a larger size to get the necessary flow capacity.

**Connections:** No splice connections are allowed in the service line from the Corporation Stop to Curb Stop and from the Curb Stop to meter set.

#### 4. HDPE Service Line Fittings

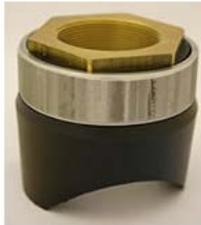
##### c) Stiffeners



Stainless steel CTS inserts are required at all HDPE service line connections to fittings

##### d) HDPE Service Line Taps

#### Approved Manufacturer(s):



**Poly-Cam - Series 415** - Nominal Pipe size 6" – 24" (DIPS), Branch outlet size 1", 1.5" to 2" CC thread (AWWA thread) DR 9 pipe rating, Working Pressure 230 psi

HDPE Sidewall fusion tapping saddle

**General:** All Taps for Water Service to be made on a HDPE main shall be accomplished with a HDPE Sidewall fusion tapping saddle.

**Specifications:** Sidewall fusion fittings shall meet or exceed the requirements of:

- NSF61
- Be manufactured of PE4710 according to *ASTM D3350* (Black) Cell Classification 445574C
- Female threaded insert of Brass alloy manufactured in accordance to *AWWA C360* and *C800* and conforms with "Lead Free Brass", *Federal Public Law 111-380*, effective date 1-04-2014.
- stainless compression ring Grade type 304 or 316

## 5. HDPE Service line Couplings for Transition to Copper

### Approved Manufacturer(s):



AY McDonald 74758-22



Mueller 110 Compression Connection



Ford C44-xxS-Q-NL



Cambridge Brass Series 118



Watts Series 45

**A solid sleeve stiffener is required for use on HDPE whenever inserted into a compression fitting.** **General:** Transition couplings are to be used to transition from HDPE service line material inside the foundation to type K copper service line before the meter configuration. Couplings are not allowed for use on new Water Service Lines.

**Sizes:** ¾”, 1”, 1 ½”, 2”

**Specifications:** Transition couplings shall be compression by compression in copper tube sizing (CTS) and shall be ordered to fit both Type K Copper and HDPE DR9. Couplings shall be manufactured in accordance with *ANSI/AWWA C800*. Brass components shall conform to *ASTM B62* and *ASTM B584*, *UNS C83600-85-5-5-5*. Transition couplings shall be pressure rated to the pressure rating of the pipe material. Couplings shall be Lead Free in accordance with the *Safe Drinking Water Act* as amended by the *Federal Reduction of Lead in Drinking Water Act 111-380*. Coupling shall be NSF 61 certified.

Coupling listed above are approved per El Paso County Regional Building.

All fittings and valves shall have a identifying mark indicating that it is made of “no-lead” brass alloy, e.g. “NL”



## 6. Repair Couplings for HDPE Service Line Only

Approved Manufacturer(s):

### HDPE ONLY



Cambridge Brass, Series 119NL-HxHx

### HDPE and Type K Copper



Mueller H-15403



Ford C44NL-xx-G



Cambridge Brass, Series 118NL-BxBx



AY McDonald 74758-22

**A solid sleeve stiffener is required for use on HDPE whenever inserted into a compression fitting.**

**General:** Repair couplings may be used for repairs only. Couplings are not allowed for use on new Water Service Lines.

**Sizes:** 3/4", 1", 1 1/2", 2"

**Specifications:** Repair couplings shall be compression by compression in copper tube sizing (CTS) and shall be ordered to fit both Type K Copper and HDPE DR9. Couplings shall be manufactured in accordance with *ANSI/AWWA C800*. Brass components shall conform to *ASTM B62* and *ASTM B584*, *UNS C83600-85-5-5-5*. Transition couplings shall be pressure rated to the pressure rating of the pipe material. Couplings shall be Lead Free in accordance with the *Safe Drinking Water Act* as amended by the *Federal Reduction of Lead in Drinking Water Act 111-380*. Coupling shall be *NSF 61* certified.

All fittings and valves shall have a identifying mark indicating that it is made of “no-lead” brass alloy, e.g. “NL”



## C. Saddle Connections

### Saddle Connections.

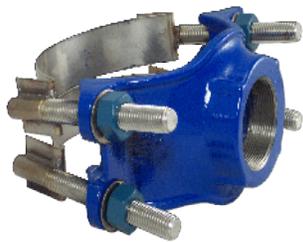
#### Approved Manufacturer(s):



DIP saddle connection with bales

#### For DIP Pipe

- **Mueller:** DR 2 A for DIP (4" -16") – Double bales
- **Smith-Blair:** Style 313 for DIP (4" – 18") – Double bales
  - Style 366 for DIP (20" – 36") – Triple bales
- **Ford:** F202E for DIP (4" – 30") – Double bales
- **JCM:** JCM 408 Coated Saddle for DIP (4" – 24") – Double



PVC saddle connection with bands

#### For PVC Pipe

- **Mueller:** DR 2 S for PVC (4" – 24") – Double bands
- **Smith-Blair:** Style 317 for PVC (4" – 24") – Double bands
- **Ford FCD 202:** for PVC (4" – 30") – Double bands
- **JCM:** JCM 406 Coated Saddle for PVC (4" – 24") – Double bands

**General:** Saddle connections shall be used to tap C900 PVC, Steel, Cast and Ductile Iron Pipe for 1 ½" and 2" type K copper service taps only

**Pressure Class:** The saddle shall be rated to a Working Pressure of 300 psi.

**Material:** Cast or Ductile Iron

**Specifications:** The body shall be made of Ductile Iron conforming to *ASTM A536*. The inlet shall be an AWWA taper ("CC") thread. The body shall be coated with fusion bonded flexi epoxy or nylon.

Saddles shall meet or exceed *ASTM A536*, *B633* and *A563*. Saddle shall meet *AWWA C800* and be *NSF 61* certified. PVC saddle connections shall have 2 stainless steel straps. DIP saddle connections shall have 2 bales.

## D. Tapping Sleeve

### Tapping Sleeves.

#### Approved Manufacturer(s):



- JCM Industries

**For taps 4” and greater only with the approval of Colorado Springs Utilities.**

**General:** Water Service Lines 4” and greater in size shall be connected to the existing Water Distribution System with a tee and three valves per Section [2.6D.1](#). At the discretion of Colorado Springs Utilities tapping sleeves may be used where a Water Distribution System shut down is not feasible. Tapping of the existing Water Distribution Main shall be done by Colorado Springs Utilities.

#### Materials:

Body	18-8 Type 304 Stainless Steel sleeve
Outlet	Flanged outlet- CF8 Cast Stainless Steel 18-8 Type 304 with ANSI 150lb. Drilling recessed for Tapping Valve per <i>MSS-SP 60</i> .
Bolts	304 Stainless Steel.
Working Pressure	250 PSI Minimum rated.
Gasket	Gasket will be compounded for use in water applications.
Flanged outlet	Meets or exceeds <i>AWWA C111/ANSI 21.11</i>

## E. Stop Box

### Curb Stop Box

#### Approved Manufacturer(s):



- Tyler 6500 Series
- Star
- Castings Inc.
- Mueller H-10374

**General:** A Curb Stop box shall be placed over all Curb Stops 2 inches and less for operation of the Curb Stop.

**Size(s):** 2-1/2 inch wide, 30 inch Top section, 39 inch Bottom section, 30 inch Extension

**Material:** Grey iron casting

**Specifications:** Grey iron castings shall be manufactured from iron conforming to *ASTM A48 Class 35B* for Grey iron and to the *ASTM A536-84 grade 80-55-06* for ductile iron. Castings shall also meet *Federal Specification A-A60005 (formerly RR-F-621E)*. Curb Stop box parts shall be made of grey cast iron; the use of an aluminum alloy as a casting material is not acceptable.

## F. Meter Loop Installation

### 1. Frost Proof Meter Pits

#### Approved Manufacturer(s):



#### For ¾-inch meters

- **DFW Plastics, Inc** -20” Dia. (Rotec Series – DFW-2036)
- **Carson Industries** (Mid-States Plastics, Inc) 20” Dia. (B Series)

#### For 1-inch meters

- **Carson Industries** (Mid-States Plastics, Inc) 24” Dia. (B Series)

### 2. Meter Pit lids

#### Approved Manufacturer(s):



#### Metal Meter Pit Lid:

Manufacturer	Model
--------------	-------

- |                  |         |
|------------------|---------|
| • <b>Ford</b>    | V82     |
| • <b>Mueller</b> | H-14062 |

#### Composite Meter Pit lid:

Manufacturer
--------------

- |                             |                       |
|-----------------------------|-----------------------|
| • <b>GMI Composite Inc.</b> |                       |
| 1313-004                    | Black                 |
| 1313-305                    | Lavender (Nonpotable) |

#### General Information:

The only pit acceptable to Colorado Springs Utilities for 5/8-inch and ¾-inch meters is a plastic pit, 20-inches inside diameter by approximately 36-inches in height, with a frost-proof cover. For 1-inch meters, the only acceptable pit is a plastic pit, 24- inches inside diameter by approximately 36-inches in height, with a frost proof cover.

#### Material:

Pit cover lid shall be nonmetallic in nature and shall be made of a polymer construction. Cover lid shall be tested in accordance to the procedures outlined in *AASHTO M306*.

Pit lids shall be certified to *H-20* loading, and be approved for use in with the current Colorado Springs Utilities AMR program. Cover lid to include attachment for transmitter unit beneath the lid and a pentagon bolt lock with a worm screw assembly. The AMR transmitter ring shall be attached under lid with stainless steel screws. Lid shall be compatible with similar lid and covers used in the Colorado Springs Utilities Water Distribution System.

### 3. Copper Setter and Yoke

**Approved Manufacturer(s):**



- **A.Y. McDonald**
- **Ford Meter Box Company**
- **Mueller**

**General:** Copper setters shall be used in outside meter pits for ¾” and 1” meters only. The ¾” and 1” yokes can be installed in a 20” diameter pit. It is recommended by the manufacturer, that a 2” gap be maintained between the sidewall of the pit and the valve and meter to avoid freezing.

**Size:** ¾” and 1”

**Materials:** Copper and Brass

**Specifications:** Yolks shall be vertical in and out, manufactured in accordance with ANSI/AWWA C800. Brass components shall conform to *ASTM B62* and *ASTM B584*. Fittings and valves to conform to *Federal Public Law 111-380*, effective date 1-04-2014. Copper tubing shall be made in compliance with *ASTM B75* or *B88*. Connections to the tandem coppersetter shall be flared or threaded. Solder joints shall be lead free. Refer to Detail [B1-5](#).

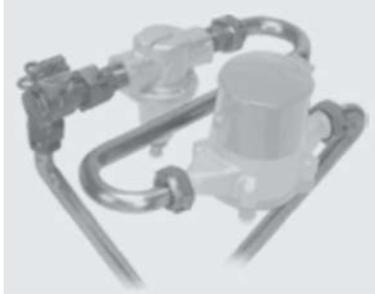
All fittings and valves shall have a identifying mark indicating that it is made of “Lead Free” brass alloy, e.g. “NL”



**COLORADO SPRINGS UTILITIES WILL SUPPLY THE WATER METER**

#### 4. Tandem Copper Setter

##### Approved Manufacturer(s):



- **A.Y. McDonald**
- **Ford Meter Box Company**
- **Cambridge Brass**

##### General Information:

Tandem copper setters shall be used in outside meter pits for ¾” and 1” meters only. The ¾” and 1” tandem copper setter and yokes can be installed in a 20” diameter pit. It is recommended by the manufacturer, that a 2” gap be maintained between the sidewall of the pit and the valve and meter to avoid freezing.

**Materials:** Copper and Brass

**Specifications:** Tandem copper setters shall be vertical in and out manufactured in accordance with *ANSI/AWWA C800*. Brass components shall conform to *ASTM B62* and *ASTM B584*. Fittings and valves shall be “Lead Free Brass” and conform to *Federal Public Law 111-380*, effective date 1-04-2014. Connections to the tandem coppersetter shall be flared or threaded. No backflow is required in the tandem coppersetter. Copper tubing shall be made in compliance with *ASTM B75* or *B88*. Solder joints shall be lead free. Refer to Detail [B1-5](#).

All fittings and valves shall have a identifying mark indicating that it is made of “no-lead” brass alloy, e.g. “NL”



**COLORADO SPRINGS UTILITIES WILL SUPPLY THE WATER METER**

**5. Pressure Reducing Valve**  
**(Internal meter configuration)**

**Approved Manufacturer(s):**



- **WATTS, LF25AUB-Z3** (or equivalent)

**General:** Pressure reducing valves shall be installed before the meter to reduce the pressure and protect the plumbing system. Design requirements shall be in conformance with Section [2.7I](#).

**Pressure Class:** Pressure reducing valves shall be rated to a minimum pressure of 300 psi and shall be capable of reducing pressure to 25-75 psi.

**Size(s):** ¾”-2”

**Materials:** Brass

**Specifications:** Pressure reducing valves shall meet the requirements of *ASSE 1003*, the *International Plumbing Code* and *NSF 61*. Fittings and valves shall be “Lead Free Brass” and conform to *Federal Public Law 111-380*, effective date 1-04-2014.

It is recommended that pressure reducing valves have a strainer.

All fittings and valves shall have a identifying mark indicating that it is made of “no-lead” brass alloy, e.g. “NL”



## **6. Water Meter**

### **COLORADO SPRINGS UTILITIES WILL SUPPLY THE WATER METER**

Acceptance testing for new water meters:

- a) All new water meters received by Colorado Springs Utilities are to be certified and tested by the manufacture for accuracy. Each meter shall be furnished with a tag attached to the meter displaying the results of the certified accuracy tests performed by the manufacturer.
- b) Colorado Springs Utilities tests all new commercial and industrial water meters to verify accuracy. Commercial and industrial water meters (1 ½” and above) must be  $\pm 3\%$  accurate to pass the acceptance testing.
- c) Colorado Springs Utilities performs a sample test of 1% of all new residential meters to verify accuracy. Residential meters (5/8” through 1”) must be  $\pm 3\%$  accurate to pass the acceptance testing.
  - Colorado Springs Utilities performs "As Found" tests on all removed meters. Meters must be  $\pm 3\%$  to pass the "As Found" accuracy testing.
  - All rebuilt or repaired water meters will follow the same accuracy limits as denoted in b and c before being placed into service by Colorado Springs Utilities.

## 7. Ball Valve

Approved Manufacturer(s): N/A



**General:** Ball Valve used with meter assembly

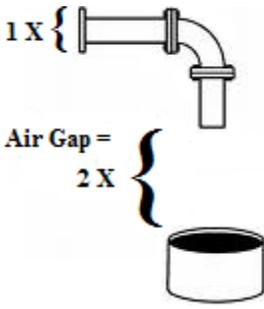
**Pressure Class:** Ball valves shall be rated to a minimum pressure of 250 psi

**Specifications:** Ball valves shall be approved per the *International Plumbing Code* and manufactured with “Lead Free Brass” in compliance with *Safe Drinking Water Act, Federal Public Law 111-380*, effective date 1-04-2014. Valve shall meet the requirements of *NSF 61*. All fittings and valves shall have a identifying mark indicating that it is made of “no-lead” brass alloy, e.g. “NL”



### G. Backflow Prevention Assemblies and Methods

All Brass Components used for Potable Water applications shall be Lead Free in accordance with the *Safe Drinking Water Act* as amended by the *Federal Reduction of Lead in Drinking Water Act 111-380*, and shall be *NSF 61* certified. The Backflow Prevention Assembly must be approved by the Foundation for Cross-Connection Control and Hydraulic Research of the University of Southern California.

Device, Assembly or Method	Degree of Hazard	Type of Cross Connection	Continuous Line Pressure	Containment	Isolation	Installation Requirements
<p><b>Air Gap</b></p> 	<p>High Hazards Low Hazards Non-hazardous Nuisance</p>	<p>Indirect and Direct</p>	<p>Allowed</p>	<p>Approved</p>	<p>Approved</p>	<p>An Air-Gap shall be at least twice the diameter of the effective discharge opening of a supply line, measured vertically, above the flood level rim of the vessel and in no case less than one (1) inch. An approved method for Containment where utility supply pressure is not required.</p>
<p><b>Reduced Pressure Assembly (RP)</b></p> 	<p>High Hazards Low Hazards Non-hazardous Nuisance</p>	<p>Indirect and Direct</p>	<p>Allowed</p>	<p>Approved</p>	<p>Approved</p>	<p><b>Oriented in accordance with USC listing.</b> See schematics for installation and clearance requirements. Pit, vault or installations where submersion may be possible is prohibited. Detector assemblies of all types are prohibited.</p>

<p><b>Double Check Valve Assembly (DC)</b></p> 	<p>Low Hazards Non-hazardous Nuisance</p>	<p>Indirect and Direct</p>	<p>Allowed</p>	<p>Approved</p>	<p>Approved</p>	<p><b>Oriented in accordance with USC listing.</b> See schematics for installation and clearance requirements. Pit, vault or installations where submersion may be possible is prohibited. Detector assemblies of all types are prohibited.</p>
<p>Indirect - Application subject to backsiphonage only.</p>						
<p>Direct - Application subject to backpressure and backsiphonage.</p>						

## BACKFLOW PREVENTION ASSEMBLIES AND METHODS

All Brass Components used for Potable Water applications shall be Lead Free in accordance with the *Safe Drinking Water Act* as amended by the *Federal Reduction of Lead in Drinking Water Act 111-380*, and shall be *NSF 61* certified.

Device, Assembly or Method	Degree of Hazard	Type of Cross Connection	Continuous Line Pressure	Containment	Isolation	Installation Requirements
<p><b>Pressure Vacuum Breaker (PVB)</b></p> 	<p>High Hazards</p> <p>Low Hazards</p> <p>Non-hazardous Nuisance</p>	<p>Indirect only</p>	<p>Allowed</p>	<p>Not Approved</p>	<p>Approved</p>	<p><b>Oriented in accordance with USC listing.</b> Critical level of device must be 12" (twelve inches) above highest downstream plumbing or outlet. Pit, vault or installations where submersion may be possible are prohibited. Adequate clearance for testing and repair.</p>
<p><b>Spill Resistant Vacuum Breaker (SVB)</b></p> 	<p>High Hazards</p> <p>Low Hazards</p> <p>Non-hazardous Nuisance</p>	<p>Indirect only</p>	<p>Allowed</p>	<p>Not Approved</p>	<p>Approved</p>	<p><b>Oriented in accordance with USC listing.</b> Critical level of device must be 6" (six inches) above highest downstream plumbing or outlet. Pit, vault or installations where submersion may be possible are prohibited. Adequate clearance for testing and repair.</p>
<p>Indirect - Application subject to backsiphonage only.</p>						
<p>Direct - Application subject to backpressure and backsiphonage.</p>						

## NON-TESTABLE BACKFLOW PREVENTION DEVICES

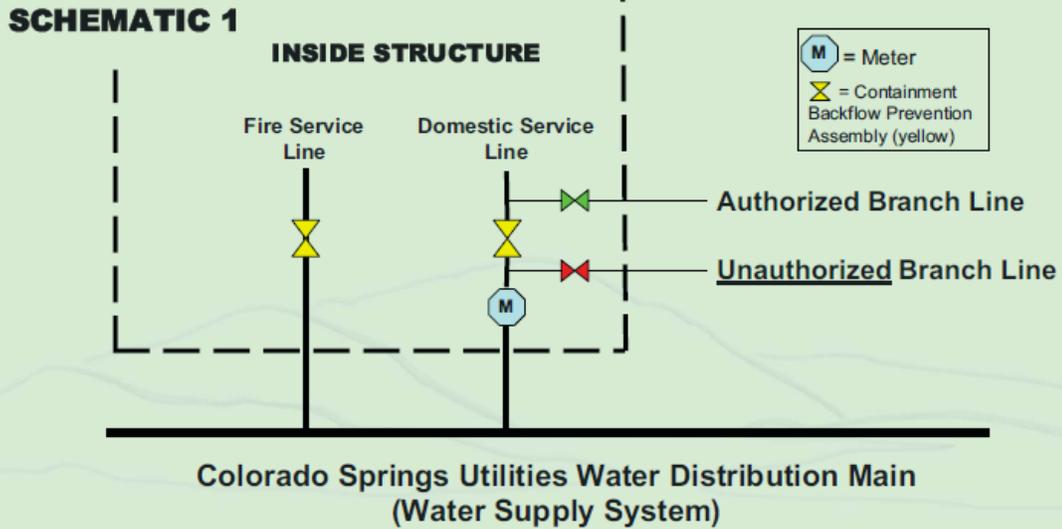
All Brass Components used for Potable Water applications shall be Lead Free in accordance with the *Safe Drinking Water Act* as amended by the *Federal Reduction of Lead in Drinking Water Act 111-380*, and shall be *NSF 61* certified.

Backflow Prevention Device	Degree of Hazard	Type of Cross Connection	Continuous Line Pressure	Containment	Isolation	Installation Requirements
<p><b>Dual Check with Intermediate Atmospheric Vent</b></p> 	<p>Non-hazardous Nuisance</p>	<p>Indirect and Direct</p>	<p>Allowed</p>	<p>Not Approved</p>	<p>Approved</p>	<p>Installed in accordance with manufactures guidelines. Must maintain Air Gap at atmospheric vent. Pit, vault or installations where submersion may be possible are prohibited. Non-testable device.</p>
<p><b>Atmospheric Vacuum Breaker (AVB)</b></p> 	<p>Non-hazardous Nuisance</p>	<p>Indirect Only</p>	<p>Not Allowed</p>	<p>Not Approved</p>	<p>Approved</p>	<p>Critical level of device must be 6" (six inches) above highest downstream plumbing or outlet. No downstream valves allowed. Pit, vault or installations where submersion may be possible are prohibited. Non-testable device.</p>

<p><b>Hose Connection Vacuum Breaker</b></p> 	<p>Non-hazardous Nuisance</p>	<p>Indirect Only</p>	<p>Allowed</p>	<p>Not Approved</p>	<p>Approved</p>	<p>Installed in accordance with manufactures guidelines. Pit, vault or installations where submersion may be possible are prohibited. Non-testable device.</p>
<p><b>Dual Check Valve</b></p> 	<p>Non-hazardous Nuisance</p>	<p>Indirect and Direct</p>	<p>Allowed</p>	<p>Not Approved</p>	<p>Approved</p>	<p>Installed in accordance with manufactures guidelines. Pit, vault or installations where submersion may be possible are prohibited. Non-testable device.</p>
<p><b>Strainer</b></p> 	<p>n/a</p>	<p>n/a</p>	<p>n/a</p>	<p>n/a</p>	<p>n/a</p>	<p>Installed in accordance with manufacturers guidelines. Strainer may not be modified.</p>
<p>Indirect - Application subject to backsiphonage only.</p>						
<p>Direct - Application subject to backpressure and backsiphonage.</p>						

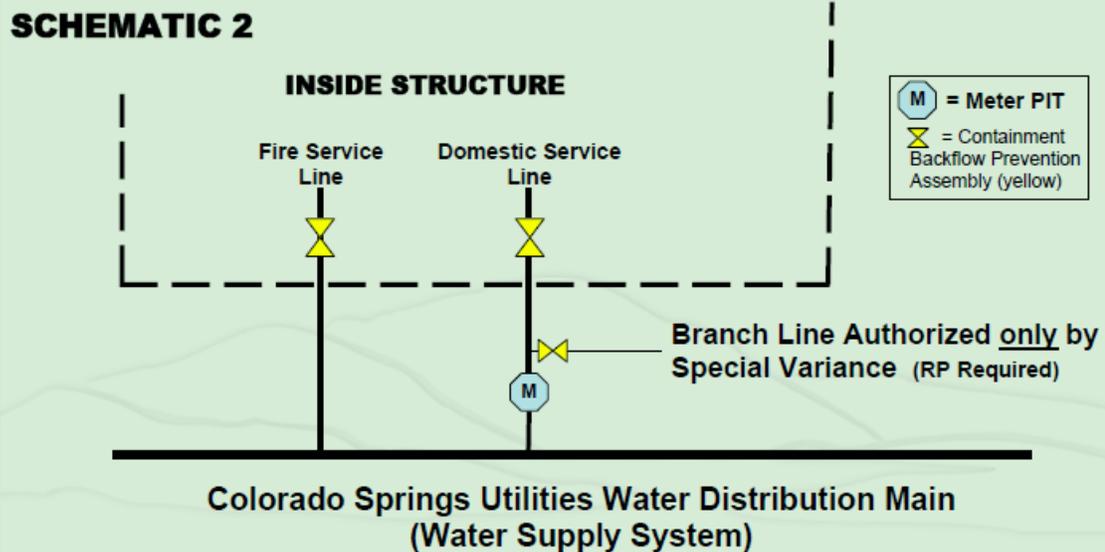
# CONTAINMENT Ref. City Code §12.4.1208 A&B

An Approved Backflow Prevention Assembly shall be installed on each Service Line, at the User's expense, within a User's Potable Water System, immediately following the meter, and in all cases, before the first branch line leading off the Service Line.



# CONTAINMENT Ref. City Code §12.4.1208 C

Where installation of an Approved Backflow Prevention Assembly immediately following the meter is not feasible on a service line connected prior to April 8, 2001, the Executive Director may designate alternate location(s) for the installation of the backflow prevention assembly.



## 4.6 Miscellaneous

### A. Repair Clamp (Full Circle)

Approved Manufacturer:

- JCM Industries



**General:** Full circle repair clamps may be used for Private Water Main leaks and by Colorado Springs Utilities on Public Water Main Leaks for a temporary repair. Repair clamps may not be used in new Construction or on Owner/Developer owned Water Mains still under a 2 year warranty.

**Material:** All repair clamps shall be made of stainless steel designed for lightweight and easy handling of all leak conditions and have 360 degree gasket coverage.

**Working Pressure:** Clamp width should equal or exceed pipe diameter for higher working pressures (250 psi).

**Specifications:**

Panel/Band	Type 304 (18-8) Stainless Steel per <i>ASTM A240</i> .
Gasket	Gridded virgin Styrene Butadene Rubber (SBR) per <i>ASTM D2000</i> compounded and suitable for Potable Water within a temperature range of 150° F constant, 180° F intermittent. 1/4" thick Nitrile (Buna-N, NBR), Chek-0-Seal with multi o-ring sealing ribs from 100% new rubber may be substituted.
Armor/Bridge Plate	Type 304 (18-8) Stainless Steel per <i>ASTM A240</i> , Vulcanized and recessed into the gasket to ensure uniform compression against the pipe.
Bolts, Hex Nuts & Washers	Bolts & Hex Nuts are Type 304 (18-8) Stainless Steel per <i>ASTM A193</i> and <i>A194</i> .
Lugs	CF- 8 Cast Stainless Steel Type 304 (18-8) Stainless Steel per <i>ASTM A240</i>
Sidebars	Type 304 (18-8) Heavy Gauge Stainless Steel, Tungsten Inert Gas (TIG) welded to form strong permanent fusion with the repair clamp band.
Passivated	All welds shall be fully passivated by means of a chemical technique which restores the corrosion resistant characteristics of the stainless steel.
Manufacturers Recommendations	Repair Clamps are not recommended for use in joining plain end pressure pipe.

## B. Pipeline Utility ID post and labels

### Approved Manufacturer(s):

### Utility Marker Post:



- **Rhino Marking & Protection Systems**
- **Carsonite**
- **Electromark**

**General:** Post is used to mark cross country water lines

**Size(s):** 66" length

**Material:** Carsonite Fiberglass

**Specification:** Fiberglass Utility marker post – 66" length, 4" wide – 3-rail post, blank

**Color:** **Blue** post and label for Water lines.

**Purple** post and label for Nonpotable water lines.

### B. Post Labels:



**General:** Line markers are to be installed with Colorado Springs Utilities decal and telephone number.

Line marker post labels for water and Nonpotable are available for pick-up from Colorado Springs Utilities LYSC warehouse.

#### 4.7 Nonpotable Irrigation Pipelines

##### Nonpotable Irrigation Pipelines:

**General:** Nonpotable Water Service Lines shall meet the material requirements as specified above for the Water Service Line and meter loop. After the meter loop and Backflow Prevention Assembly the irrigation main and laterals shall meet the following material Specifications based on irrigation system pressures.

**Material:** Landscape irrigation mains and laterals smaller than 2 inches in size shall be PVC purple pipe or copper with tape, of appropriate pressure class, or of materials approved by Colorado Springs Utilities Water/Wastewater Standards.

All 2 1/2inch and larger Nonpotable irrigation mains and lateral lines shall be one of the following materials:

- PVC pipe shall be purple *ASTM D1785* PVC 1120 compound Schedule 40 and 80 pipes, of appropriate pressure class.
- High Density Polyethylene Pipe piping shall be black with purple stripe of appropriate pressure class.
- Soft Copper Tubing to *ASTM B88* Type K with purple tape
- Ductile Iron pipe and fittings shall meet the requirements of ANSI/AWWA C151/A21.51 with purple identification tape or purple vinyl wrap as described in Section [8.13A](#).

##### Golf Course Applications Only.

Fittings shall be Ductile Iron fittings (IPS), slanted, deep bell, gasketed style made in accordance with *ASTM A536*, Grade 65-45-12 manufactured for Golf Course Irrigation systems, commercial turf irrigation and rural water systems as outlined in Section [8.10C.1](#).

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## CHAPTER 5

### Construction Practices

#### 5.1 General

The purpose of Chapter 5 of these *Water Line Extension & Service Standards (Water LESS)* is to set forth the criteria to be used when constructing both Public and Private Water Systems and Water Service Lines to serve a proposed or an existing development. The Owner/Developer is responsible for hiring a qualified Contractor who will construct the Water Main based on Approved Construction Plans and these *Water LESS*. The Owner/Developer is ultimately responsible for all requirements identified in these *Water LESS*. Colorado Springs Utilities will inspect the Construction of the Water Main to ensure it meets these criteria and the Approved Construction Plans.

#### 5.2 New Construction Procedures

Following approval of the Construction Plan(s), the Owner/Developer may proceed with Construction. The Owner/Developer and their Contractor shall observe the following:

- Construction shall commence within 1 year of the approval date shown on the plans or the plans must be resubmitted for review and approval (all approval signatures must be re-signed). If Construction is halted for more than 6 months, plans must be resubmitted for review and approval. Plans must show all phases of the Project to be constructed upon submittal; any deviation from the original Approved Construction Plan will need to be re-approved by Colorado Springs Utilities.
- Water Mains 16 inch and greater shall be modeled for shutdown (if applicable) by Colorado Springs Utilities to determine system impact prior to Construction, per Section [2.6D.2](#).
- The Contractor is responsible for obtaining and complying with all required licenses, permits, notices and plans in accordance with all federal, state and local Regulatory Agencies. Upon request, the Contractor shall provide Colorado Springs Utilities with a copy of all approved permits, notices and plans prior to the start of Construction.
- Special conditions that involve another Authority Having Jurisdiction, such as crossing a railroad, highway, wetland, forest, wildlife, or waterway, the Fountain Mutual Irrigation Co. irrigation ditch (within the City of Colorado Springs) may exist. All conditions of the other agency must be satisfied. The Contractor shall be responsible for contacting any relevant Authorities Having Jurisdiction prior to start of Construction. Should a conflict in the plans and Specifications occur between Colorado Springs Utilities and the other agency, the more stringent Specifications yielding a higher degree of integrity shall prevail.
- All necessary Easements shall be obtained prior to the start of Construction.
- The Contractor is responsible for developing adequate provisions to notify Customers who may experience outages. Customers shall be notified by Colorado Springs Utilities a minimum of 24 hours in advance of service shutdown. Shutdowns shall be kept to a minimum to minimize impact to Customers. See Section [5.12C](#).
- After receipt of plans by the Colorado Springs Utilities Inspections' Office and verification that necessary requirements are met and approved by Colorado Springs Utilities, the Contractor shall give at least 2 working days (excluding weekends and holidays) notice to the Colorado Springs Utilities Inspection Section, prior to beginning Construction. Construction shall not commence sooner than 2 working days after

receipt of Approved Construction Plans to the Colorado Springs Utilities Inspections office, nor prior to the arrival of a Colorado Springs Utilities Inspector at the Site.

### **5.3 Applicability of Standards to Repairs**

Repairs to Private Water Mains, Public Water Mains still under warranty, existing Water Mains damaged as a result of Construction, and Water Service Lines are subject to these *Water LESS* and shall be inspected by Colorado Springs Utilities. Colorado Springs Utilities shall be notified of any repairs immediately. Reference Sections [5.13C.8](#) and [5.21J](#) for repair procedures.

### **5.4 Safety & Health**

Colorado Springs Utilities expects every Contractor to comply fully with all applicable federal, regional, and local Safety & Health regulations. Additionally, Contractors hired by Colorado Springs Utilities shall comply with the requirements of their contract with Colorado Springs Utilities. In the event multiple standards apply, the requirements of the most stringent standard shall prevail. Requirements set forth in the *29CFR1926* (OSHA Construction) and/or *29CFR 1910* (OSHA General Industry) standards shall be considered the minimum acceptable safety standards.

#### **A. Contractor Responsibilities**

The Contractor shall be solely responsible for initiating, maintaining, and ensuring the safety of all parties involved with, and/or affected by their activities. The Contractor shall comply with all applicable OSHA regulations relating to the safety of persons and/or property, or to the protection of persons and/or property from damage, injury, or loss; and shall implement and maintain all necessary safeguards for such safety and protection. The Contractor shall notify the owners of adjacent property and other utility owners when execution of Construction may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property. All damage, injury, or loss to any property caused, directly or indirectly, in whole or in part, by the Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the work, or anyone for whose acts any of them may be liable, shall be remedied by the Contractor.

The Contractor shall provide both a safe access route to, and a safe environment within, the area where Colorado Springs Utilities employees must perform their respective duties.

Additionally, the Contractor shall provide the necessary protection to prevent damage or loss to other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, Structures, utility infrastructure, and appurtenances not designated for removal, relocation, or replacement in the course of Construction.

#### **B. Safety Representative**

The Contractor shall designate a qualified and experienced safety representative that is OSHA certified as a Competent Person, at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs. The Competent Person shall ensure the excavation conforms to standard industry (OSHA) practices for the protection of personnel and prevention of cave-in hazards.

### **C. Hazard Communication Programs**

The Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with applicable regulations.

### **D. Emergencies**

In emergencies affecting the safety or protection of persons, the Construction, or property at the Site or adjacent thereto, the Contractor is obligated to act to prevent threatened damage, injury, or loss.

### **E. Traffic Control and Public Access**

Traffic control and public access shall be coordinated with and in accordance with, the regulations of the appropriate Authority Having Jurisdiction. These may include, but are not limited to, the following entities:

- The City of Colorado Springs - Traffic Department
- El Paso County - Traffic Division
- State of Colorado - Department of Transportation

Barricades, detours, and signage shall be designed and installed in accordance with the *Manual of Uniform Traffic Control Devices (MUTCD)*. Barricades and other devices shall be used to keep both the public and the workers from risk of damage, injury, or loss.

### **F. Safety of Colorado Springs Utilities Employees**

Colorado Springs Utilities reserves the right to refuse performance of any requested or required activity in an area that they deem to be unsafe; performance of the requested or required activity will not commence until the Contractor has addressed the safety concern(s). In the event the Contractor contests the safety concern, the Colorado Springs Utilities Safety Department and/or OSHA will be consulted to make a final determination about the concern(s).

## **5.5 Surveying and Construction Staking**

### **A. General**

All control points, hubs and stakes shall be set by a Professional Land Surveyor licensed to practice in the State of Colorado, or their authorized representative, and reviewed by the Inspector. Review of the staked alignment and elevations by the Inspector does not relieve the Owner/Developer from the responsibility for staking or installation errors. Street Right-of-Way, public utility Easement and/or property lines, and offset hubs and stakes must be set and in visible evidence before Construction can proceed. Property corner stakes at street intersections and lot corner points must be in place and visible during Construction to provide the Inspector a reference for checking Record Drawing measurements.

Normal practice is to set offset hubs and stakes 5 feet to 20 feet off the centerline of the proposed facilities. Offset stakes must be marked with an identification of the item being staked. Centerline hubs and stakes may be used in addition to the offset hubs and stakes; however, they may not be set in place of the offset hubs and stakes.

All hubs and stakes shall be flagged to increase their visibility. Staking shall be scheduled to ensure continual work progress. Any replacement of hubs or stakes shall be at the expense of the Contractor.

### **B. Water Mains**

For Water Mains and Water Service Lines 4 inches in diameter and greater, the following shall be identified with offset hubs and stakes with stationing per the Approved Construction Plans

- Water Main centerline (a maximum distance of 50 feet apart on straight lines and 25 feet apart on curves),
- grade to the pipe flow line elevation,
- points of curvature (P.C.) and points of tangency (P.T.) of curves,
- valves, tees, crosses, and couplings,
- horizontal and vertical bends (identified with two hubs and stakes to triangulate the location of the bend),
- fire hydrants (identified with two hubs and stakes to triangulate the location of the fire hydrant),
- fire hydrant traffic flange (4 inches above the finish grade unless otherwise recommended by the hydrant manufacturer),
- Vault corners and
- any other appurtenance necessary for Construction as identified by the Inspector.

### **C. Water Service Lines**

For Water Service Lines 2 inches in diameter and less, the following shall be identified with offset hubs and stakes per the approved Utility Service Plans:

- Water Service Line tap,
- Curb Stop,
- outside meter Pit,
- outside Backflow Prevention Assembly,
- Water Service Line location where it enters the Structure to be served (Commercial Water Service Lines only) and
- any other appurtenance necessary for Construction as identified by the Inspector.

## **5.6 Inspection**

All work for both Public and Private Water Mains and Service Lines, including new installation, replacement, retrofits, relocations, or repairs of existing facilities shall be inspected by a Colorado Springs Utilities' Inspector who shall have the authority to halt Construction if, in their opinion, these standard construction practices are not being followed. Whenever any portion of these *Water LESS* is violated, Colorado Springs Utilities shall order further Construction to cease until all deficiencies, including the removal of non-compliant completed work, are corrected.

All materials used shall be subject to the inspection and approval of the Inspector. The Inspector has the right to perform any testing deemed necessary to ensure compliance of the material with these *Water LESS*. No material shall be used before being inspected and approved by the Inspector. Failure or neglect on the part of the Inspector to condemn or reject non-compliant materials or construction, shall not be construed to imply their acceptance should their non-compliance become evident at any time prior to completion of

a 2 year warranty period. New materials rejected by the Inspector shall be immediately removed from the job Site.

#### **A. Inspector Overtime**

Overtime work shall be defined as work performed on Saturdays, Sundays, and Colorado Springs Utilities observed holidays [Per *City Code § 1.1.105 (B)*] or on weekdays before or after the Inspector's regularly scheduled 8-hour workday.

All overtime work performed shall be subject to charges for inspection by Colorado Springs Utilities. All overtime inspection work performed as a result of work being carried on by the Contractor will be charged to the Contractor at one and one-half times the normal rate for Inspectors, with double time charged after 16 consecutive hours, on Sundays, and on Colorado Springs Utilities' observed holidays. Inspectors shall be paid for meals if they work past 5:30 pm on the weekdays and every six hours thereafter. Meals shall be paid every 6 hours on the weekends and on holidays where overtime is scheduled less than 12 hours in advance. The Inspector may charge for 1 hour of work in lieu of a meal.

Equipment used for overtime work will be subject to charges at straight time. The equipment usually includes the Inspectors' vehicles.

All overtime worked by the Colorado Springs Utilities' Inspectors shall be authorized in writing by the Contractor on forms available from the Inspector.

Colorado Springs Utilities observed Holidays include the following:

New Year's Day, Martin Luther King Jr. Day, President's Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day, the day following Thanksgiving Day, and Christmas.

Colorado Springs Utilities reserves the right to change this holiday schedule as needed based on operational requirements. Holidays that fall on Saturday will be observed on the preceding Friday, and holidays that fall on Sunday will be observed on the following Monday.

### **5.7 Temporary Hydrant Meter**

#### **A. Permit Required**

Use of fire hydrants, other than by CSFD or Colorado Springs Utilities, requires a *Temporary Water Service (Fire Hydrant Use) Permit*, and adherence to all terms and conditions of the permit and associated requirements. Permit availability for this use is subject to Colorado Springs Utilities discretion and the prevailing Stage of the Water Shortage Ordinance. Permits may be obtained from Colorado Springs Utilities Customer Contract Administration (719) 668-8111. Colorado Springs Utilities will designate the fire hydrant(s), which shall be used by the Customer. The permit must be visibly displayed while the fire hydrant is in use or readily available at the request of Colorado Springs Utilities personnel.

**B. Backflow Prevention**

Reduced Pressure Backflow Prevention Assemblies (RPs) shall be installed on all hydrant connections. Backflow equipment shall be certified before use and the certification shall not expire before the permit expires.

**C. Certification and Testing of Meters and Backflow Prevention Assemblies**

Temporary meters and RPs are available for rent from the Colorado Springs Utilities Meter Shop (719-668-7240), or Customers may use their own temporary meter and RP. Customer-owned temporary meters shall be certified by the Colorado Springs Utilities Meter Shop prior to use. Customer-owned RPs shall be tested by a licensed third-party backflow tester prior to use. Certifications and meter test results for Customer owned equipment shall be provided to Colorado Springs Utilities at the time of Permit application. Customer must return to the meter shop for a final read to close the permit, including Customer owned meters.

**D. Installation**

See Detail Drawing [A5-5](#).

**5.8 Sub Grade Completion Prior to Excavation**

In new development, excavation for the Water Main shall not begin until the Contractor is within 7 inches of final grade.

Road construction shall be to at least the sub grade stage prior to excavation of the Water Main trench. Sub grade elevation is defined as an elevation, which lies approximately 7 inches below the finished street grade. The road surface shall be smooth, clear of debris and free from deep holes, ruts and large rocks which may hamper main installation.

**5.9 Excavation & Trenching**

This section sets forth the requirements for excavation and trenching operations it is not intended to outline or review excavation and trenching safety.

**A. Locates**

The Contractor is responsible for calling the Utility Notification Center of Colorado (UNCC) at 811 for locations of Utility infrastructure prior to excavation. Excavation may commence only after location documentation is received.



**Know what's below.  
Call before you dig.**



Colorado Springs Utilities' locators are not responsible to locate Private Water Mains or Private Water or Wastewater Service Lines. Colorado Springs Utilities cannot guarantee the accuracy of underground utility infrastructure and Structures as shown on plans. Colorado Springs Utilities will not be responsible for any damage to Utility infrastructure unless inaccurately located.

The Contractor shall proceed with caution in the excavation and preparation of the trench so that the exact location of underground utility infrastructure both known and unknown, may be determined, and shall be held responsible for the repair of such Structures when broken or otherwise damaged. The Contractor may be required to notify Colorado Springs Utilities prior to excavation around its infrastructure.

### **B. Exploratory Excavation**

Whenever, in the opinion of the Colorado Springs Utilities, it is necessary to explore and excavate to determine the location of underground utility infrastructure that may interfere with Construction, the Contractor shall make the explorations and excavations for such purposes at the Contractor's expense.

### **C. Excavation to Line and Grade**

All excavations shall be made to the lines and grades as established by the Approved Water Construction Plans and these *Water LESS*. Pipe trenches shall be excavated to the depth required to provide a uniform and continuous bearing and support for the pipe on solid undisturbed ground at every point between bell holes. Bell holes shall be provided at each pipe joint to permit the joint to be made properly. Any part of the bottom of the trench excavated below the specified grade shall be corrected with approved material and thoroughly compacted in accordance with these *Water LESS*. The finished line and grade of the trench shall be prepared accurately.

Deviation from line and grade may be allowed when approved by the Inspector, in accordance with these *Water LESS*, and shall be coordinated by the Contractor with the Owner/Developer and Design Engineer.

### **D. Excavation & Trenching**

Construction shall be planned to minimize the duration any excavation or trench must remain open. Trenches should only be excavated a distance far enough ahead of the pipe installation as required to expedite Construction. The Inspector may limit the length of open trench based on Site conditions, environmental conditions, and potential safety concerns.

#### **1. Pavement and Road Surfaces**

The Contractor shall obtain the necessary permits and remove pavement and road surfaces as part of the trench excavation. The width of pavement removed shall be kept to a minimum, while meeting the requirements of the Authority Having Jurisdiction. All existing asphalt or concrete surfacing should be cut vertically in a straight line. This material shall not be used in any fill or backfill of the trench and must be properly disposed of in accordance with all applicable regulations.

## **2. Trench Width**

Ledge rock, boulders and large stones shall be removed to provide a clearance of at least 6 inches below and on each side of all pipe, fire hydrants, valves, fittings and appurtenances.

The minimum bottom of trench width shall be excavated to allow for the placement of pipe and proper compaction of the pipe embedment zone.

## **3. Trench Stability**

The trench shall be dug under the direction of a Competent Person; the Competent Person is responsible to ensure the stability of the trench, and nearby surface encumbrances. The use of shoring or shielding may be required to limit the size of the excavation or the width of the trench, to protect workers, to protect existing and/or new infrastructure, and/or to provide stability to adjacent surface encumbrances

All excavation and trenching support is the sole responsibility of the Contractor. The presence of a Colorado Springs Utilities employee in no way implies approval of excavation and/or trench support methods utilized. Colorado Springs Utilities reserves the right to refuse performance of any requested or required activity in or around any excavation or trench they deem to be unsafe.

## **4. Excavated Material**

All excavated material shall be piled and equipment placed and used in a manner that will not endanger Construction and that will avoid obstructing traffic. Hydrants, Vault covers, manholes, valve boxes, and other utility infrastructure controls shall be left unobstructed and accessible during Construction.

## **5. Frost**

No pipe or appurtenance shall be installed upon the bottom of the trench into which frost has penetrated, or at any time when the Inspector deems there is danger of ice formation or frost penetration at the bottom of the excavation. No pipe or appurtenance shall be installed unless backfilling can be completed before the formation of ice and frost.

## **E. Excavation for Structures**

Except as otherwise dictated by construction conditions, the excavation shall be of such dimensions as to allow for the proper installation and removal of concrete forms, placement of precast Structures, and to permit the Construction of the necessary pipe connections. Care shall be taken to ensure that the excavation does not extend below established grades. Should an area be “over excavated”, the excavated area shall be filled in with approved material deposited in horizontal lifts not more than 6 inches in thickness and compacted in accordance with these *Water LESS*.

## **F. Excavation in Poor Soil**

If the bottom of the excavation is found to be unstable material that, in the opinion of the Inspector, cannot satisfactorily support the pipe or Structure, the Contractor shall further excavate and remove such unsuitable material to the width and depth specified by the Inspector. It must be removed and replaced with an approved material, which will support the pipe or Structure properly. The Contractor may be required to

construct a special foundation or support for the pipe or Structure, consisting of pilings, or other materials.

#### **G. Protection of Existing Structures and Utilities**

Adequate protection, temporary support, and maintenance of all underground Structures and surface encumbrances, utilities and other obstructions encountered in the progress of Construction shall be furnished by the Contractor at their expense. Any Structures, Utility infrastructure or obstructions disturbed or damaged shall be restored or replaced at the direction of the Inspector.

#### **H. Surplus Excavation Material**

All surplus excavation material shall be removed from the job Site and disposed of properly.

#### **I. Blasting**

In general, blasting will be allowed in order to expedite Construction if a permit by the local Authority Having Jurisdiction is granted and a copy is presented to Colorado Springs Utilities. All explosives and appurtenances shall be transported, handled, stored, and used in accordance with the laws of the local, state, and federal governments, as applicable.

The Contractor shall control all blasting so as not to damage any existing Structure or facility. The protection of life and property and all liability for blasting shall be placed solely on the person or persons conducting the blasting operation. The Inspector shall fix the hours of blasting in accordance with the permit of the local Authority Having Jurisdiction. At least 3 working days in advance of blasting, the Contractor must notify owners or occupants of nearby Structures or facilities that are within a minimum distance of 500 feet. The notice shall be in writing and state the date, the time of blasting, and who is responsible for the blasting. The Contractor shall notify Colorado Springs Utilities of any blasting at least 2 working days in advance. Such notice shall be in writing. The Contractor shall notify the local Fire Department 3 working days in advance of any blasting.

The Contractor shall control blasting to avoid making any excavation unduly large or irregular and so as not to shatter the rock on the bottom or sides of any excavation or surface upon or against which concrete is to be placed. If, in the opinion of Colorado Springs Utilities, blasting is liable to damage foundations or supports, concrete, other utilities or Structures, all blasting shall be terminated and the Contractor shall continued excavation by jack hammering, barring, wedging, or other methods.

#### **J. Dewatering**

All pipe trenches and structural excavations shall be kept free from water during pipe laying and other related work. The method of dewatering shall provide for a completely dry foundation at the final lines and grades of the excavation.

The excavation shall be dewatered so that any water is below the pipe invert. Care shall be taken to prevent water, dirt, and other material from entering the pipeline.

Whenever Groundwater is encountered in an excavation and needs to be discharged to Groundwater or surface water, a certification under the *Construction Dewatering*

(CDW) *General Permit* is required from the CDPHE Water Quality Control Division (Division) before discharge can occur. If the Site is covered by a *Permit for Discharge of Stormwater Associated with Construction* permit and the conditions in I.C.3.c of the permit are met, a separate CDW permit will not be required for a discharge to the ground.

If the discharge will be injected into the ground via an injection well, this would not require a *CDW Permit* from the Division, as the EPA would have regulatory authority. Reference *EPS Region 8 - Underground Injection Control (UIC) Program* for permitting information.

If contaminated Groundwater or soils are present the Division may require sampling of parameters reflective of the Groundwater contamination prior to issuing the permit. Either a *Remediation Activities Discharging to Surface Water Permit* or a *Remediation Activities Discharging to Ground Water Permit* may be required by the Division to manage contaminated waters.

There are several methods to obtain preliminary Groundwater contamination information:

- Brownfield Sites: <http://epa.gov/swerosps/bf/bfmapper.htm>
- Site Contamination: <http://www.cdphe.state.co.us/hm/HMSiteCover.htm>
- Oil and Public Safety for Leaking Underground Storage Tanks: <http://oil.cdle.state.co.us/>
- Voluntary Clean-Up Sites: <http://emaps.dphe.state.co.us/hmtrackreporter/VCRAFront.aspx>

Please note this is not a comprehensive list of all known Groundwater contamination, but is meant to help start the process.

A copy of all dewatering permits or approvals from the Division shall be presented to the Colorado Springs Utilities Inspector prior to dewatering activities.

The Contractor shall not allow water to rise until any concrete has set and the forms have been removed. The Contractor shall not allow water to rise unequally against unsupported structural walls.

## **5.10 Removal or Abandonment of Existing Main**

Water Mains shall be removed or abandoned as indicated on the Approved Construction Plan and in accordance with Section [2.6G.6](#) of these *Water LESS*. Materials to be removed from the Site may be re-used as a part of the new construction (i.e. fire hydrants) at the discretion of the Inspector.

### **A. Salvageable Materials Procedure**

The Inspector shall determine if materials are salvageable. When a Contractor is removing a Public Water Main and will not be reusing the pipe or appurtenances on the current Project, then the salvageable materials must be returned to Colorado Springs Utilities. These materials shall be taken to the Gravel Production yard at 3890 S. US Highway 85/87. The Inspector will call the Gravel Production (GVP) Supervisor at 719-660-1994, 2 working days in advance to make arrangements for the Contractor to deliver the materials to the GVP Yard. Hours for delivery are 7:30 am

to 3:00 pm Monday through Friday, excluding holidays. The Contractor shall clean the pipe or appurtenance of dirt, debris, concrete, and asphalt. No trench excavation material is to be taken to the GVP Yard. There will be a metal recycle container at the GVP Yard for placement of these materials. When the materials are delivered, the GVP yard attendant will direct the Contractor where to place the materials either in the metal recycle container or near the container in case the materials need to be broken up to fit into the container.

If greater than 240 feet of pipe is to be salvaged, then upon notification and arrangement by the Inspector, the GVP Crew will bring a trailer to the construction Site. The Contractor will load the materials onto the GVP trailer and the GVP personnel will deliver it directly to a metal recycle facility.

The above procedure only applies to metal pipe and appurtenances. PVC and HDPE pipe are not deemed to be salvageable.

### **B. Asbestos Material**

If any suspected Asbestos-containing materials (ACM) are encountered on Colorado Springs Utilities Water Mains, appurtenances, or Service Lines during Construction, the Contractor shall not disturb the material and shall be responsible for immediately contacting the Colorado Springs Utilities Project Manager or Inspector and Colorado Springs Utilities' Environment, Health and Safety Division, Regulatory Services Section (EVS/RSS) to assist in the proper handling of ACM.

Whenever possible, Colorado Springs Utilities requires that ACM be removed from its Collection and Distribution Systems. A State of Colorado Certified abatement contractor must conduct all Asbestos abatement. A list of approved abatement contractors may be obtained from, EVS/RSS. Replacement of the ACM shall be completed with acceptable materials as defined in these *Water LESS*.

The possible types of Asbestos-containing materials that may be encountered include Asbestos-cement (transite pipe), tar or felt/tar coated steel pipe, Asbestos-containing wrap on steel pipe, and Asbestos gasket material, usually gray or black in color.

All steel Water Mains coated with either gray or black tar, or felt tar or with pipe wrap other than plastic that may contain Asbestos must be treated as ACM unless testing shows otherwise. The Contractor may contact Colorado Springs Utilities EVS/RSS to collect suspect coating or gasket samples for determination of Asbestos content. If results indicate the material does not contain Asbestos, the Contractor may proceed with normal pipe repair/removal.

All ACM abatement must be managed by the Contractor and their abatement contractor on behalf of Colorado Springs Utilities in accordance with Federal and State Standards including the following:

- *Colorado Air Regulation No. 8, Part B – Control of Hazardous Air Pollutants 5 CCR 1001-10*
- *40 CFR Sec. 61, Subpart M - National Emission Standard for Asbestos*
- *40 CFR Sec. 763, Subpart G - Asbestos Worker Protection*
- *OSHA-29 CFR 1910.1001-General Industry Standards-Asbestos*

- *OSHA-29 CFR 1926.1101-Construction Standards-Asbestos*
- *CDPHE Hazardous Materials and Waste Management Division Regulations Pertaining to Solid Waste Sites and Facilities 6CCR 1007-2, Part 1 Section 5 Asbestos Waste Management*

ACM abatement shall be accomplished without rendering the material friable and making the Asbestos airborne. Power equipment that may cause ACM to become friable shall not be used to remove coating or wrap which may contain Asbestos. The minimum amount of coating that may contain Asbestos should be removed when installing a repair clamp, welding of a repair plate to the leak, or removal of the section of pipe.

For regulated materials (transite pipe, gaskets and coatings that are friable) the CDPHE, Air Pollution Control Division must be notified of ACM removal greater than 260 linear feet or a volume equivalent to a 55-gallon drum. A permit is also required from CDPHE for abatement/removal when the material may be rendered friable. Additional notification is required if an Asbestos release occurs. (*Regulation 8 III.E.1 Notices*)

For all Projects requiring disposal of ACM-contaminated media (e.g., soil, water), the Contractor/Developer or their abatement/removal contractor must contact Colorado Springs Utilities EVS/RSS for management assistance.

All ACM waste must be disposed using a Special Waste Manifest to either Waste Management, Inc.'s Colorado Springs Landfill (preferred location) or Denver Arapahoe Disposal Site for friable or non-friable ACM.

The Contractor/Developer or their abatement contractor must provide Colorado Springs Utilities with copies of all records regarding Asbestos abatement including notifications, permits, CDPHE correspondence, air monitoring and exposure assessments, and waste disposal manifests/shipment records.

The Contractor/Developer and the abatement contractor will be held responsible for cleanup of any ACM released to the environment from failure to follow proper abatement techniques and failure to comply with the above regulations.

## **5.11 Pipe Bedding**

### **A. Installation of Bedding**

After completion of the trench excavation and proper preparation of the foundation, a minimum of 6 inches of bedding material shall be placed on the trench bottom for support under the pipe. Bell holes shall be dug deep enough to provide a minimum of 2 inches of clearance between the bell and bedding material. All pipes shall be installed in such a manner as to ensure full support of the pipe barrel over its entire length. After the pipe is adjusted for line and grade, and the joint is made, the bedding material shall be carefully placed and tamped under the haunches of the pipe and in the previously dug bell holes.

Tamping is defined as the act of placing bedding material under the haunches of the pipe, paying particular attention to voids, bell hole, and sling holes. The purpose of tamping is to ensure uniform support for the pipe.

For all pipes, the limits of bedding shall be from 6 inches below the bottom of the pipe to 12 inches above the top of the pipe. Tamping of bedding is required. Tamped lifts shall not exceed 6 inches. Bedding shall be tamped to provide a firm base for backfill. Backfill shall be installed per the City of Colorado Springs Standard Specifications or the Specifications of the Authority Having Jurisdiction.

**B. Bedding Material**

If approved by the Inspector, bedding material may be comprised of on-site excavated material provided that large rocks, boulders, and stones greater than 3/8 inch have been removed. The material shall be capable of supporting the weight of the pipe, fittings, and other appurtenances.

If the on-site material is deemed unsuitable by the Inspector, the Contractor shall import suitable bedding. Imported bedding material shall be a clean non-corrosive, well-graded sand or other approved material as determined by the Inspector. The well-graded sand shall have the following gradation limits when tested by means of laboratory sieves:

WELL-GRADED SAND	
Sieve Size	Total Percent Passing by Weight
3/8 Inch	100
No. 4	95-100
No. 8	80-100
No. 16	50-85
No. 30	25-60
No. 50	10-30
No. 100	2-10

If approved by Colorado Springs Utilities, fines from the trench wall and soil pile may be used to provide uniform support for the pipe. No rock or stone larger than 3/8 inch, or any other detrimental substance including but not limited to trash, frost, or clay shall be placed closer to the pipe than 6 inches. Colorado Springs Utilities reserves the right to require the use of imported bedding material at any time.

**5.12 Water Main Connections to Colorado Springs Utilities System**

**A. Connections**

Connections to Colorado Springs Utilities Water Main shall be made in accordance with the Approved Construction Plans and Section [2.6D](#). Connections to Colorado Springs Utilities system shall be accomplished in a neat and professional manner. An Inspector shall be present at all times during the construction of the connection.

There is only one nominal dimension of the spigot outside diameter and the bell inside diameter for each size of ductile iron push-on joint pipe. Connections to

existing Asbestos pipe and other odd diameter pipe shall be made with an approved transition coupling.

### **B. Operation of Valves**

It may be necessary to operate existing valves when connecting to the Water Distribution System. Only Colorado Springs Utilities personnel shall operate valves on the existing Water Distribution System owned by Colorado Springs Utilities. The Contractor shall give the Inspector 2 working days' notice to arrange for the operation of valves after the valves have been identified, raised, cleaned, and inspected per Section [2.6D.1](#). Colorado Springs Utilities does not guarantee water tightness of valves on existing facilities. If existing valves leak, Colorado Springs Utilities will assist in reducing the influx of water, but the Contractor must use approved methods at his own disposal to work with the resulting leakage. Colorado Springs Utilities is not liable for any damages (financial or otherwise) that the Contractor sustains as a result of lost time due to leaking valves.

### **C. Interruption of Service**

Installation of a connection that will require closing valves may cause an interruption of Water Service to existing Colorado Springs Utilities' Customers.

The Contractor will be responsible for furnishing Colorado Springs Utilities with all necessary information as to the date and time the interruption will begin and the total time required for restoring Water Service. For Potable Water Service interruptions, the Inspector will coordinate and will arrange for all notifications to residential and commercial Customers and the Fire Department 24 hours in advance of the shutdown. A description of the boundaries of the affected area and the location of all fire hydrants in that area shall be provided to the Fire Department.

A normal Water Service interruption shall be a maximum of 8 hours. If the interruption will be greater than 8 hours, the work shall be done in a manner to minimize the inconvenience to Customers, such as working at night in a continuous operation until service is restored. Connections, which require interruption longer than 8 hours, shall be subject to review by Colorado Springs Utilities to establish appropriate timing of the connection. The Contractor shall be responsible for evaluating and identifying operational and Customer impacts resulting from an interruption and taking the appropriate measures to minimize these identified impacts. The Contractor may be responsible for incurred Customer damages for outages that go longer than expected.

If, in the process of installing a connection, there is a Customer that cannot be out of water, appropriate means shall be taken to provide and convey water. The water source and means of conveyance shall be provided by the Contractor and approved by Colorado Springs Utilities.

Temporary water connections are allowed. The Contractor shall be responsible for the Construction and disinfection of the temporary connection per Section [5.19](#). All temporary connections shall be reviewed and approved by Colorado Springs Utilities.

Where connecting tees and crosses, the Contractor shall be required to restore the Water System after connection. A temporary plug and blow off valve assembly may

be installed on the extension ends of the tee or cross to enable Flushing and disinfection of the connection prior to the construction of the proposed Water Main.

### **5.13 Pipe and Fittings**

#### **A. Hauling, Handling, and Storage of Materials**

All material handling equipment and material handling methods shall be in accordance with the manufacturer's recommendations.

The Contractor shall be responsible for the safe storage of materials until they have been incorporated in the Project. Stored materials shall be kept safe from damage and contamination.

All materials shall be handled so that the coating and lining are not damaged. If, however, any part of the coating or lining is damaged, the replacement or repair of the damaged materials shall be done to the satisfaction of Colorado Springs Utilities Inspector.

The Contractor shall be responsible for all materials furnished and shall replace at their expense all such materials found defective or damaged in handling after delivery by the manufacturer. This shall include the furnishing of all materials and labor required for the replacement of installed materials discovered defective prior to final acceptance of the work.

Materials furnished by Colorado Springs Utilities shall be loaded onto or into the Contractor's vehicle(s) by Colorado Springs Utilities. Upon final loading and acceptance by the Contractor or his representative, the Contractor shall be totally responsible for such materials from the time the materials leave Colorado Springs Utilities supply area until installation is complete and final acceptance made. The Contractor shall return any unused or excess materials to Colorado Springs Utilities.

Any material furnished by Colorado Springs Utilities which is transported to the job Site by the Contractor and later determined defective, through no fault of the Contractor, shall be returned to the Colorado Springs Utilities supply area by the Contractor and exchanged for new or undamaged materials.

All materials shall be picked up at or returned to the designated Colorado Springs Utilities' warehouse or storage facility between the hours of 8:00 AM and 3:00 PM, Monday through Friday, excluding holidays.

#### **B. Inspection of Materials**

All material used within the Water System shall be in conformance with the Approved Materials identified in Chapter [4.1](#). Materials not approved for use shall be immediately removed from the Site.

All materials furnished shall be new and undamaged. Everything necessary to complete all installations in accordance with the standards of Colorado Springs Utilities shall be furnished and installed whether shown on Approved Construction Plans or not.

Acceptance of materials, or the waiving of inspection thereof, shall in no way relieve the Contractor of the responsibility for furnishing materials meeting the requirements of these *Water LESS*.

Each pipe or fitting shall be thoroughly examined for cracks and other defects before installation. Any observed gouge or scratch that extends 10 percent or more into the pipe side wall thickness shall be rejected. PVC pipe, more than 1 year old from the date of manufacture, as indicated on the print line, may be rejected at the discretion of the Inspector. Bell ends and spigot ends are to be examined with particular care. Defective pipe or fittings shall be laid aside for inspection by the Inspector who will prescribe corrective repairs or rejection. Rejected materials shall be removed from the job Site immediately.

### **C. Installation of Pipe**

#### **1. Sanitary Requirements**

The Contractor shall prevent environmental contamination (e.g., ground water, storm water, animals, insects, etc.) from entering the Potable Water Distribution System and Water Service Lines. Precautions shall be taken to protect the interior of pipes, fittings, and valves against contamination during installation. All Water Main installations shall follow the standards recognized by the American Water Works Association (AWWA) Best Management Practices which include but are not limited to the following:

- Inspect that the pipe is clean and dry prior to transportation and staging
- Interior of the pipe and pipe fittings should be kept free of Contaminants
- Protect the pipe along the trench by keeping the ends sealed until installation
- The pipe section shall remain sealed until it is ready for connection; this will prevent the flow of any water in the trench from entering the pipe
- Pipe delivered for construction shall be strung so as to minimize entrance of foreign material
- Prior to filling the pipeline, the pipe shall be cleaned and free of debris
- When the installed pipe is left unattended the pipe ends shall be sealed with a watertight seal

#### **2. Lowering of Material into the Trench**

Proper equipment and tools as specified by the manufacturer of the material shall be provided and used by the Contractor when unloading and lowering materials into trenches.

If damage occurs to any pipe, fitting, valves, hydrants or Water Main appurtenances during handling, the damage shall be immediately brought to the attention of the Inspector. The Inspector shall have the discretion to require removal and inspection of any material believed to be damaged or defective at any time during Construction. The Inspector shall prescribe corrective repairs or rejection of the damaged items.

#### **3. Laying of Pipe**

All lumps, blisters and excess coatings shall be removed from the bell-and-spigot end of each DIP pipe and fitting, and the outside of the spigot and the inside of the bell shall be brushed and wiped clean, dry and free from oil and grease before the

pipe or fitting is installed. A similar inspection process shall be performed for both PVC and HDPE pipe.

As each length of pipe is placed in the trench, it shall be brought to correct line and grade. The pipe shall be secured in place with approved backfill material and tamped. No blocking shall be left at any point under the pipeline.

#### **4. Slip Joint Ductile Iron Pipe**

The rubber gasket shall be flexed in such a manner so to insert and seat correctly into the gasket recess of the bell socket. Since different brands of pipe require different types of gaskets, the Contractor shall exercise caution to ensure that the correct type of gasket is used and installed correctly.

A thin film of approved gasket lubricant shall be applied to both the inside face of the gasket and the spigot end in accordance with the manufacturer's recommendations.

The spigot end of the pipe shall be placed in the bell end with care to prevent the joint from contacting the ground. Pipe furnished without a depth mark on the spigot end shall be marked before assembly to ensure insertion to full depth of the joint. The pipe shall be kept in straight alignment and the joint shall be completed by pushing the pipe home with a slow, steady pressure, per industry standards. If the pipe is pushed home with a backhoe bucket, a wooden shield must be placed between the backhoe bucket and the end of the pipe. The spigot end of field-cut pipe lengths shall be filed or ground to resemble the spigot end of such pipe as manufactured. A new depth mark shall be measured and marked before assembly to ensure insertion to full depth of the joint.

Upon completion of joining slip joint pipe, an inspection shall be made to assure that the gasket is correctly aligned and not twisted or turned in the gasket recess of the bell socket.

Whenever it is necessary to deflect ductile iron slip joint pipe, the amount of deflection shall not exceed the maximum deflections specified by Colorado Springs Utilities. See Detail Drawing [A4-1](#).

#### **5. Mechanical Joint Ductile Iron Pipe**

Lubrication of the joint and rubber gasket shall be done in accordance with the pipe and fitting manufacturer's Specifications. Because of the length of bevel, it is required that the bevel be removed, prior to installing into a mechanical joint fitting.

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.

The pipe shall be pushed in, until the spigot end fully penetrates the bell. The gasket shall then be pressed into place, within the bell, evenly around the entire joint. The gland shall be moved along the pipe into position for bolting. The bolts inserted and the nuts threaded finger-tight, then tightened with a torque limiting

wrench. Torques for the various sizes of bolts shall be per the manufacturer's recommendations.

Nuts spaced 180 degrees apart shall be tightened alternately in order to produce equal pressure on all parts of the gland.

## **6. Slip Joint PVC Pipe**

Lubrication of the spigot and rubber gasket shall be done in accordance with the pipe manufacturer's Specifications. Care shall be taken that only the correct rubber gasket, compatible with the annular groove of the bell, is used. Insertion of the gasket in the annular groove of the bell or coupling must be in accordance with the manufacturer's recommendations. Pipe that is not furnished with a depth mark shall be marked before assembly to assure that the spigot end is inserted to the full depth of the joint. The spigot end of field cut pipe lengths shall be filed or ground to resemble the spigot end of such pipe as manufactured. A new depth mark shall be measured and marked before assembly to assure insertion to full depth of the joint.

The spigot and bell or coupling shall be aligned and pushed until the reference line on the spigot is flush with the end of the bell or coupling. Pushing shall be done in a smooth, steady motion. Upon completion of joining the pipe, an inspection shall be made to assure that the gasket is correctly aligned and not twisted or turned in the gasket recess of the bell socket.

PVC pipe has reduced flexibility and impact resistance as temperatures approach and drop below freezing. Extra care should be used in handling and installing PVC pipe during cold weather.

## **7. Cutting and Fitting of Pipe**

Pipe shall be cut, whenever necessary, to conform to location of fittings, line or grade. All cuts shall be straight and true, and in a workmanlike manner so as to leave a smooth end without damaging the pipe or its cement lining. All burrs shall be removed from the ends of cut pipe, and the end lightly rasped or filed. For slip joint application the pipe shall be beveled in accordance with the manufacturer's recommendations (typically 15 degrees for PVC, 45 degrees for DIP). All cuts shall be in accordance with the manufacturer's recommendations with regard to "cut" and "do not cut" zones for the various materials and size of pipes. All tools used in cutting pipe shall meet manufacturer Specifications.

## **8. Repair to Existing Pipe Lines**

Solid sleeve couplings with mechanical joint restraints are to be utilized when making repairs to 4 inch and larger Water Mains, Service Lines and hydrant laterals. The use of repair clamps will be at the discretion of the Inspector.

A 17 lb high potential anode shall be attached to all DIP/steel pipe repairs, and/or metal appurtenances. Where a PVC repair is installed a 17 lb high potential anode shall be attached to the existing metal pipe on either side of the repair. Tracer wire shall be installed on top of PVC pipe repairs for locating purposes.

## **9. Joint Lubricant**

Joint lubricant shall be per the pipe manufacturer's Specifications. Joint lubricant shall be non-toxic and water-soluble and meet current EPA and NSF Standards.

## **10. Pipe Alignment and Grade**

In laying pipe, the intent is to lay to finished line and grade within a tolerance of 3 inches plus or minus. Pipe, fittings, valves and hydrants shall be installed at staked locations and elevations. Spigots shall be centered in bells, and all valve and hydrant stems shall be plumb. Pipe shall be laid with the bell ends facing in the direction of laying unless directed otherwise by Colorado Springs Utilities. Where pipe is to be installed on a grade of 5 percent or greater, the laying shall start at the bottom and shall proceed upward with the bell ends of the pipe upgrade.

When laying pipe on curves, the intent is to lay to the staked alignment. The pipe shall be kept in alignment by placing bends, deflecting the pipe, or placing high-deflection couplings on the curve as shown on the Approved Construction Plans.

For Ductile Iron Pipe, deflections may be achieved at slip joints per Detail Drawing [A4-1](#). No deflection is allowed past 80 percent of the manufacturer's recommendation. Deflection of the joints is not allowed with slip joint PVC pipe. Deflections on PVC pipe shall be achieved with high deflection couplings per Detail Drawing [A4-1](#). Full lengths of pipe should be used when utilizing high deflection couplings. Short lengths may be used as necessary to accomplish the curvature at the discretion of the Inspector. Lengths shall be a minimum of 5 feet. Bends shall be used whenever individual deflections exceed those allowed per Detail Drawing [A4-1](#).

All pipes shall be installed to the depth shown on the Approved Construction Plans and Section [2.6H.1](#). If difficulties arise when crossing obstructions and where specifically approved by Colorado Springs Utilities, a water line lowering may be required. See Detail Drawings [A7-1](#) and [A7-2](#).

Any changes in alignment and grade must be authorized by the Inspector and coordinated with the Contractor and Design Engineer.

## **11. Fire Service Lines 4 inches and Greater**

All Fire Service Lines shall be constructed in accordance with these Construction Standards, Detail Drawings [B 2-5](#), Section [2.7C.1](#), and the Approved Construction Plans.

Fire Service Lines shall be staked in the field for line and grade prior to Construction, including but not limited to bends, fittings, and valves. Any deviation from the approved design, specifically the addition of bends or an increase in the degree of bends, shall require a re-submittal by the Design Engineer and review and approval by Colorado Springs Utilities and Colorado Springs Fire Department.

Fire lines should enter the building perpendicular to the outside wall whenever possible, and should never be underground for more than 3 feet inside the building.

All Fire Service Lines shall be hydro-statically tested from point of connection at the main to point of connection to the sprinkler system at 200 psi, or 50 psi above static pressure for a minimum of 2 hours. This test is best performed before completely backfilling so that all joints are exposed.

The Fire Service Line is to be flushed at a velocity of 10 feet per second, or whatever is available for fire flow. Flushing of Fire Service Lines shall meet the requirements of NFPA and shall be witnessed by the Colorado Springs Fire Department.

## **12. Bridging and Encasement**

Bridging and encasement may be required at the discretion of the Inspector with coordination and design by the Design Engineer.

## **13. Casing Pipe**

Whenever it is necessary to provide a casing for the Water Main, the Water Main shall not be inserted into the casing without providing casing spacers for the Water Main. Casing size, length, type and side wall thickness will be per the Approved Construction Plans. See Section [2.6H](#) and Detail Drawings [A7-3](#) and [A7-4](#).

Casing spacers shall be spaced a maximum of 8 feet apart along the length of the carrier pipe with one casing spacer 2 feet on each side of a pipe joint and 2 feet from the end of the casing and the rest evenly spaced. Reference Detail Drawing [A7-4](#).

Casing spacers shall be cathodically protected per Section [2.6I](#).

## **14. Crossings and Lowerings**

No taps or intersection fittings shall be permitted within a Water Main lowering section from one Isolation Valve to the other Isolation Valve as shown in the Water Main Detail Drawings [A7-1](#) and [A7-2](#).

With the installation of a half lowering section, taps or intersection fittings may be installed a minimum of 10 feet from the outside edge of the utility infrastructure.

## **D. Installation of Fittings and Appurtenances**

All fittings shall be installed per the manufacturer's Specifications and these *Water LESS*. All pipe fittings shall be mechanical joint, flanged, and/or plain end in compliance with these *Water LESS*. Mechanical joint restraints shall be used for restraining bends, reducing couplings, tees, crosses, solid sleeves, offsets, anchor pipe, valves and hydrants. Plain ends may be used for reducing coupling. See Detail Drawing [A4-5](#).

All mechanical joint pipe restraints shall be incorporated in a follower gland and shall include a restraining mechanism which, when actuated, imparts multiple wedging

action against the pipe, increasing its resistance as the pressure increases. Twist-off nuts, sized the same as tee-head bolts, shall be used to ensure proper actuating of restraining devices.

Beveled ends of pipe are not allowed in mechanical joint fittings.

The use of “wyes” and 90 degree bends in main extensions or Private Water Main Extensions is strictly prohibited except in special installations as directed by Colorado Springs Utilities.

## **1. Valves**

Line valves are required as shown on the Approved Construction Plans and per Section [2.6G.8](#) of these *Water LESS*. The Inspector may require the installation of additional valves not shown on the Approved Construction Plans, when determined necessary in the field, with the coordination of the Owner/Developer and/or the Design Engineer. Where necessary, the Inspector shall require the installation of additional line valves in order to avoid exposing Customers to high chlorine residual during disinfection of pipelines. See Detail Drawing [A9-1](#).

A concrete reverse anchor is required to be set on one side of all line valves on the opposite side of the valve in the direction of flow. See Detail Drawing [A4-5](#). The concrete reverse anchor for line valves requires two MJ restraints be installed within the concrete block. The MJ restraints shall be installed in opposite directions, facing each other within the concrete on DIP pipe. A single MJ application will provide proper restraint on PVC pipe. See Detail Drawing [A4-8](#).

All valves must be opened RIGHT for Potable Water with a red operating nut. Valves shall be operated prior to installation to ensure good operating condition. Valves shall be installed in the open position. Valves shall be set and joined to the pipe per Section [5.13D.1](#).

Valves shall be installed in such a manner that the valve stems and valve boxes are accessible and valve stems operable and plumb. If valves are installed greater than 6 feet in depth a false stem may be required to be installed on the operating nut. See Detail Drawing [A9-2](#).

All butterfly valves shall be buried horizontal with the valve shaft horizontal and the operating nut shaft vertical.

## **2. Valve Boxes**

### **a) Installation**

All buried valves shall be provided with a 6 inch cast iron valve box, slip type. The valve box shall be of a design, which will not transmit shock or stress to the valve and shall have enough extension capability to be raised to final street grade. The valve box shall be centered and plumb over the operating nut of the valve, with the box cover set to the required elevation. Before placement of final paving and after the placement of base course, the Inspector shall inspect to ensure proper elevation of the water valve box. Prior to paving any street, the Contractor shall be responsible for locating, repairing or replacing, cleaning and raising all valve

boxes to the finish street surface as shown on Detail Drawing [A9-1](#). The Contractor shall ensure that valve boxes are plumb and raised to the finished street surface no later than 30 days after paving.

b) Inspection

Prior to paving a street with a newly constructed Water Main within the Right-of-Way, a final inspection is required by the Inspector. Inspections should be requested 2 working days in advance of paving. A copy of the paving letter must be available at the inspection Site for proper validation.

c) Debris Caps

All valves boxes shall be fitted with a debris cap. Lock out tag out debris caps may be required at the direction of Colorado Springs Utilities per Section [2.6E.3](#).

### 3. Fire Hydrants

Fire hydrants shall be installed per the Approved Construction Plans and Section [2.6G.10](#). Any relocation or addition of fittings on Fire Hydrant Laterals may require re-submittal to Colorado Springs Utilities and CSFD. Under no circumstances shall any size or manner of tap be made on a fire hydrant branch line between the hydrant and the hydrant valve.

Both public and private fire hydrants shall be installed in accordance with these *Water LESS* and shall be inspected and approved by a Colorado Springs Utilities Inspector.

a) Installation

All hydrants shall stand plumb and be installed as indicated per Detail Drawings [A5-1](#) through [A5-6](#). Fire Hydrant Laterals greater than 20 feet in length or having more than one joint in the lateral shall be restrained with a bell restraint.

When a fire hydrant is designed deeper than the required maximum of 6 feet and approved by Colorado Springs Utilities, the maximum allowed depth of a fire hydrant from shoe to flange is 8-1/2 feet deep, accomplished utilizing a 6-1/2foot hydrant with a 2 foot riser extension. It will be the Contractor's responsibility to set the safety flange at the proper elevation.

Tapered square nuts shall be installed on all fire hydrants per Section [4.4K](#). The Contractor shall use a hydrant wrench with a tapered square box designed specifically for Colorado Springs Utilities fire hydrants to operate the fire hydrant. The use of any other wrench may result in fines and hydrant repair costs to be paid by the Contractor.

Bollards shall be installed at locations shown on the Approved Construction Plans or at the direction of the Inspector. Bollards shall be installed per Detail Drawing [A5-4](#).

b) Anchorage

The bottom of the hydrant shoe shall be supported with 18 inch x 18 inch x 4 inch precast concrete paver stones placed below and behind the shoe. The shoe of each hydrant shall be well braced against the unexcavated earth at the end of the trench with a poured in place concrete thrust block. The hydrant shall be

restrained to the hydrant valve and the hydrant valve restrained to the tee with anchor pipe, mechanical joint pipe restraints or slip joint restraints as shown on Detail Drawing [A5-3](#).

When a fire hydrant is installed at the termination point of a main extension, then a concrete reverse anchor will be required for the fire hydrant valve and the fire hydrant shall be secured to the valve as described above. Additional concrete reverse anchors may be required at the direction of the Inspector.

c) Cathodic Protection

All ductile iron pipe and fittings, from finished ground level on the hydrant barrel up to and including the tee, shall be encased in polyethylene wrap (NOTE: Do not wrap weep hole). Any electrically discontinuous pipe or fittings shall be bonded per Section [2.6I](#). A minimum 17 lb anode shall be installed on the hydrant. A test station shall be installed with every fire hydrant as shown in Detail Drawing [A5-3](#).

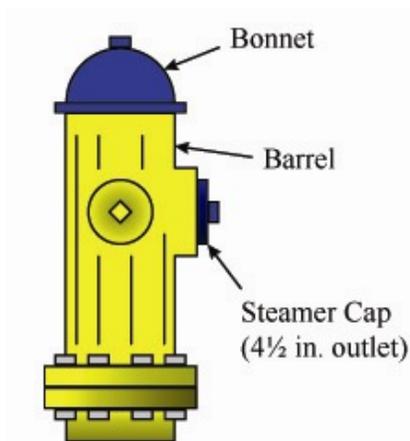
d) Drainage

Wherever a hydrant is set, drainage shall be provided at the base of the hydrant by placing rock from the bottom of the trench, to at least 12 inches above the top of the shoe of the hydrant, and to a distance of 6 inches over the weep hole. The weep hole plug shall be removed prior to placing rock. The minimum distance from the bottom of the trench to the bottom of the hydrant shoe shall be 4 inches. The minimum quantity of rock placed shall be 1/3 cubic yard. The rock shall be a well-graded gravel, cobble, or crushed rock, free of dirt. Crushed concrete shall not be used. The Contractor shall surround the drain rock with an impermeable liner to prohibit the infiltration of smaller particles into the drain bed. Reference Detail Drawing [A5-3](#).

e) Color Coding

The Contractor shall paint the fire hydrants according to the following:

Fire Hydrant Color Coding [Water Supplies for Fire Protection – June 2008]



The fire hydrant color code is as follows:

Ford Blue	3,000+ gpm bonnet and steamer cap
Ford Blue	1,500 – 2,999 gpm bonnet only
Bright Green	1,000 -1,499 gpm bonnet only
Bright Orange	500 – 999 gpm bonnet only
Red	Less than 500 gpm bonnet only
Yellow	All Barrels

The following or equivalent colors are acceptable for compliance with the color-coding standard:

Manufacturer: Aervoe paint  
Fluorescent Green # 184  
Ford Blue # 560  
OSHA Safety Orange # 305

Manufacturer: Rustoleum paint  
Equipment Yellow # 2148  
Safety Red # 2163

In all cases, the barrel remains painted yellow as delivered from the manufacturer. Waterous fire hydrants will have the top painted but not the caps.

Nonpotable Water hydrants shall be painted purple and white per Section [4.4K](#).

Manufacturer: Aervoe paint  
OSHA Safety Purple #300  
Gloss White #5019

Manufacturer: Rustoleum paint  
Safety Purple #160830  
Gloss White #2192

The Inspector shall number the fire hydrants.

#### **4. Temporary Blow Off Valves, and Water Quality Devices**

The Contractor shall furnish, and install temporary blow-off valves and flushing assemblies at locations shown on the Approved Construction Plans and per Section [2.6G.12](#). See Detail Drawings [A2-4](#) thru A2-8.

In order to prevent the transmission of traffic loads to the discharge piping, the Contractor shall ensure that the discharge piping is centered in the valve box.

The Contractor shall surround the drain port with a sufficient amount of crushed rock/gravel to provide an adequate drainage area to flow away from the shoe.

Temporary blow off and flushing assemblies shall not daylight into an open drain, ditch, creek, or waters of the state unless approved by Colorado Springs Utilities and the CDPHE.

## **5.14 Concrete Thrust Reaction Blocks, Restrained Joints, and Concrete Reverse Anchors**

The Contractor shall be responsible for verifying soil conditions prior to the placement of any concrete thrust reaction blocks (CTRBs), restrained joints, or concrete reverse anchors (CRAs). If Site conditions vary from the approved plans, the Design Engineer shall be required to re-design any CTRBs, restrained joints, or CRAs. Additional CRAs may be required at the discretion of the Colorado Springs Utilities Inspector.

### **A. Installation**

During installation, care shall be taken not to block outlets or to cover bolts, nuts, clamps or other fittings or to make them inaccessible. See Detail Drawings [A4-2](#), [A4-3](#), [A4-7](#), and [A4-8](#). Bearing surface areas are minimum areas to bear against the undisturbed trench wall. If, in the opinion of the Inspector, the soil bearing capacity is not sufficient to provide adequate restraint based on minimum bearing areas, then the minimum bearing area shall be increased to a size that will ensure adequate restraint. In every instance, the CTRB or CRA shall bear against undisturbed earth.

All debris, water and ice shall be removed from the place to be occupied by the concrete. Concrete shall not be placed on frozen subgrade. All concrete shall be placed in the presence of the Inspector unless inspection has been waived prior to the placement.

When it is impossible, due to over excavation or other cause, to place a thrust block or anchor against undisturbed earth, restrained joint pipe shall be required per Detail Drawing [A4-4](#) to anchor the fittings to the main.

Ductile iron tie lugs may be used to tie back mechanical joint fittings, pipe and valves with threaded rods to a CRA where additional thrust restraint is required. Rods shall be cathodically protected per Section [2.61.2](#).

### **B. Form Work for Thrust Blocks and Anchors**

All forming for concrete thrust blocks and reverse anchors will be done by bulk heading around the shape of the thrust block or anchor with burlap or reinforced paper sacks filled with sand or earth. Sacks shall be of a size easily handled when filled, and shall be left in place in the trench. Wood forms may be used in some cases; however, all wood will be removed before backfilling. No horizontal struts or braces required for trench shoring shall remain in the concrete thrust blocks. Prior to placing concrete, the forms and ditch bank shall be inspected and approved by the Inspector.

### **C. Concrete and Curing Time**

Thrust blocks shall be concrete with no less than 1 part cement to 2-1/2 parts sand and 5 parts stone, and having a compressive strength of not less than 3,000 PSI after 28 days.

Minimum curing time for concrete thrust blocks shall be 18 hours for blocks containing more than 2 cubic yards but less than 6 cubic yards, and 2 working days for blocks containing more than 6 cubic yards but less than 12 cubic yards. Thrust blocks containing more than 12 cubic yards will be cured as directed by the Inspector.

No Water Main will be charged or pressurized without the approval of the Inspector. All thrust blocks and anchors must meet the minimum curing time unless, under certain circumstances, the Inspector may elect to shorten or extend the time of curing.

#### **D. Compaction of Fill over Thrust Blocks and Anchors**

Backfill may be placed over thrust blocks and anchors once the surface has set sufficiently to resist the weight of the backfill. However, no tamping or compacting shall be allowed above the thrust block or anchor for a minimum of 36 hours after placement or as directed by the Inspector.

### **5.15 Structures and Vaults**

Precast and poured-in-place Vaults shall be made waterproof after installation or construction by use of sealants, epoxies or other approved methods.

Colorado Springs Utilities may require installation of a precast Vault(s) when weather or field conditions warrant.

Steel reinforcement and concrete shall conform to Section [4.4M](#). All Specifications regarding reinforcing bar placement, size, clearances, measurements, etc., shall be strictly followed. All concrete shall be placed at temperatures of not less than 40 degrees Fahrenheit and maintained at this temperature for at least 7 days. Artificial heating and coverings shall be provided when necessary.

All manhole rings, covers, and ladder rungs need to be placed so that the center of the rung is in line with the center of the manhole opening. Pipe arches, sleeves, etc., shall conform to Detail Drawings [A6-5](#) and [A6-6](#). All Vaults shall be installed with two air vent pipes located behind the curb line, to allow air to circulate in and out of the Vault. Vent pipes shall be installed on opposing sides of the Vault to maximize the air circulation within the Vault. See Detail Drawing [A6-1](#) for vent piping schematic (roof and floor location). The color code of the vent pipes shall be blue for Potable Water and purple for Nonpotable Water. The sump hole shown in the Detail Drawings is to be located at the lowest point in the floor of the Vault to allow for drainage. The Contractor shall be responsible for cleaning the Vault/Pit at the end of the job of all debris (i.e. loose materials, water, mud, etc.).

The Inspector shall be notified when reinforcing bar is in place prior to pouring any concrete. Failure to obtain approval of reinforcing bar placement shall be cause for non-acceptance of a poured-in-place installation.

Field control tests shall be performed by qualified personnel in the presence of the Inspector, when determined necessary by Colorado Springs Utilities. Tests may include slump tests, air content tests and compression test cylinders. Acceptable curing and temperature control shall be achieved and maintained by the Contractor.

### **5.16 Tracer Wire**

Tracer wire shall be installed on top of all PVC, HDPE, and un-bonded DIP Water Mains and Service Lines. Insulated tracer wire shall be used to locate the pipe, being taped every 10 feet to the top of the pipe. A 1 lb pound anode shall be attached to the end of the tracer wire for new Dead End Mains and stubs. For long runs of pipe, a 1 lb pound anode will be

attached to the tracer wire every 1,000 feet. Any exposed wire shall be wrapped with corrosion tape.

Tracer wire shall be brought above ground and connected in a test station at each fire hydrant per Detail Drawing [A5-3](#).

## 5.17 Cathodic Protection

### A. Coatings and Wraps

All pipe, fittings and appurtenances shall be coated or wrapped per the Approved Construction Plans, the manufacturer's Specifications and Section [2.6L.1](#).

Where polyethylene tubing is specified, it shall be installed per Detail Drawing [A8-1](#) and the following:

- Clean all dirt and cinders from the surface of the pipe. Dry the pipe.
- Cut tubing 2 feet longer than the pipe, slip over the spigot end of the pipe and bunch the tubing so that it will not be damaged when lowering the pipe into the trench.
- Dig bell holes at joint locations, lower the pipe into the trench and make up the joint.
- Slip the tubing around the entire length of the pipe and overlap the tubing 1 foot past the joint and tape the tubing tightly in place.
- Pull the tubing from the next pipe section over the joint and overlap 1 foot past the joint tape as noted above.
- In wet trench installations the tubing shall be secured by wrapping tape around the pipe every 2 feet.
- Cuts, tears, punctures, or other damage to the tubing shall be repaired with tape or a short length of tubing.

Where fittings are wrapped with polyethylene, the tubing may be cut to fit and slipped under the body of the fitting. The seams shall be made by bringing the edges of the polyethylene together over the top of the fitting, folding them over twice, and taping them. The polyethylene shall overlap the joint a minimum of 1 foot.

### B. Protection of Bolts and Rods

Bolts shall be protected from corrosion by one of the following methods:

1. Wax tape
  - Wire brush and scrape the bolt free of dirt, loose coating, and loose rust.
  - Apply a film of wax tape primer making sure to cover the bolt completely. Press the primer to displace moisture and air.
  - Wrap the wax tape around the bolt with a 1 inch overlap. Mold the tape so there are no air pockets or voids under the tape. Press the lap seam to ensure it is sealed.
  - Apply plastic outer wrap.
2. Zinc anodes
  - Screw anode on the bolt end ensuring it is tight to the bolt.
3. Zinc and epoxy coated bolts
  - Install bolts per the manufacturer's recommendations taking care not to damage the epoxy coating.

All rods shall be protected from corrosion with either a zinc and epoxy coating, zinc end caps, wax tape, or by encasing them in 3-inch polyethylene tubing and securing with tape as above. Where the rods are in contact with concrete they shall be coated. See Detail Drawing [A8-11](#).

### **C. Insulating from Concrete**

Areas of metal pipe and appurtenances which are to be in contact with concrete thrust blocks, bridging blocks, anchors or encasement shall be protected against corrosion with polyethylene tubing or other protection as approved by the Inspector.

### **D. Holiday Testing and Detection (Jeeping) for Coated Pipe**

Holiday testing on coated steel pipe will be performed both at the manufacturing facility and in the field just before pipe installation. Proper equipment and voltage levels recommended by the manufacturer for the specific coating and thickness being tested will be used. The equipment will be in proper working order, properly grounded and all manufacturer recommendations followed. Testing will be in accordance with *AWWA C209 Section 5.2*. Required repairs shall be made in accordance with the manufacturer's recommendations.

### **E. Bonding Joints**

All 4 inch and larger ductile iron pipelines requiring cathodic protection shall be bonded at every joint and fitting (except at Insulating Joints). Two coated copper wires or one bonding strap for cathodic protection shall be thermite welded to DIP pipe at each joint and fitting. The size of the wire and the weld shall be per the Approved Construction Plans, manufacturers' recommendations, and Detail Drawing [A 8-1](#) and [A 8-2](#). The following steps shall be taken to electrically bond DIP pipe joints:

- Remove any external coating on the pipe by lightly grinding the area to bright metal using an abrasive wheel grinder.
- Position the bonding wire or strap at the weld location.
- Complete the weld with the proper mold and weld charge size.
- Inspect and clean the weld connection.
- Protect the connection and exposed metal with a primerless handicap or corrosion tape.

The Contractor shall furnish all material required for bonding. In certain circumstances straps may be required by Colorado Springs Utilities in place of wire to bond joints.

### **F. Insulating Joint**

Insulating joints shall be installed per the Approved Construction Plans, Section [2.61.4](#) of these *Water LESS*, and Detail Drawing [A8-3](#). Special care shall be exercised during the installation of these joints to prevent electrical continuity across the joints.

The joints shall be tested for electrical continuity after installation. If the joint does not provide electrical isolation it shall be rejected and will need to be repaired or replaced at the Contractor's expense.