

**SECTION - 900**

**CONSTRUCTION MATERIALS**

## **900 – CONSTRUCTION MATERIALS**

### **900.00.00 – Scope**

This section describes and specifies the materials commonly used in all City of Cave Junction, Department of public works projects. Materials specific only to particular phase of construction, such as paving, water or storm sewer shall be included in that materials section.

### **900.01.00 – Materials Testing and Quality Assurance**

The standard materials test methods for the materials contained in these standards and specifications shall be conducted by a materials testing laboratory certified to perform the tests as required by the qualifying agency or institution. The tests shall include all tests requested by the City, or a consulting engineer acting in agency for the City to determine the initial design elements as well as quality assurance testing in the field.

City, state, county or a combination of such funding may fund City projects. Public Works facilities may also be constructed in conjunction with private development and accepted by the City of Cave Junction. In these cases specific or specialized materials may be approved by the Public Works Department on a particular project. These materials and conditions will be specified on the approved drawings.

### **910.00.00 – Aggregate**

Aggregate shall include all classes of crushed rock to be used in construction of Public Works facilities that has been mechanically plant produced by a certified source described and specified as follows.

#### ***910.00.01 – Aggregate Source Certification***

All aggregate sources must have a current certification from ODOT. Copies of aggregate source certification shall be supplied to the City of Cave Junction at time of preconstruction meeting. The certification shall identify the source by its state designated source number and situs.

#### **910.10.00 – Crushed Rock**

##### ***910.10.02 – Base Aggregate***

Certifications required for sieve sizes ¾"-0 through 2-½" - 0 crushed rock base materials shall conform to all the requirements as set forth in Oregon Standard Specifications for Construction, latest edition, Section 02630, Base Aggregate.

Crushed aggregate base and sub-base shall meet the following gradation and quality specifications:

**Table 910-1 Base Aggregate Sieve**

Separated Sizes	2-½"-0	2"-0	1-½"-0	1"-0	¾"-0
<u>Sieve Size</u>			<u>Percentages Passing (by weight)</u>		
3"	100				
2-½"	95 – 100	100			
2"	-	95 – 100	100		
1 ½"	-	-	95 – 100	100	
1-¼"	55 – 75	-	-	-	
1"	-	55 – 75	-	90 – 100	100
¾"	-	-	55 – 75	-	90 – 100
½"	-	-	-	55 – 75	-
3/8"	-	-	-	-	55 – 75
¼"	30 – 45	30 – 45	35 – 50	40 – 55	40 – 60
No. 10	(1)	(1)	(1)	(1)	(1)

(1) Of the fraction passing the ¼" sieve, 40% to 60% shall pass the No. 10 sieve.

**910.10.03 – Sub-base Aggregate**

This term is used to describe durable, natural pit-run shale, coarse gravel, cobbles, and boulders mixed with natural fractions of sand, and cemented sand and gravel that has been reduced to a 4" minus size by processing through a crusher, that would not be acceptable as a crushed rock base course material because of contamination by cementitious materials or poor gradation. The material shall be certified to meet the following requirements:

Gradation	Screen/Sieve Size	Percent Passing
4"	4"	100
	3"	-
	2"	55 - 75
	1"	-
	½ "	25 - 45

**910.10.04 – Clean Drain Rock**

This material shall be clean washed 1" drain rock produced from screened creek gravels. The primary use of this rock will be for bedding under storm sewer pipes to allow the flow of ground water beneath the pipe. Clean Drain Rock shall only be used in

situations where there is excessive ground water and the City Engineer directs its use. The Public Works inspector at the project site shall visually accept the material.

## **910.11.00 – Trench Backfill and Bedding Aggregate**

### **910.11.01 – Requirements**

Trench backfill and bedding shall conform to the following requirements:

- a) *Bedding for Water Mains* – Material for bedding shall consist of ¾"-0 minus crushed rock meeting the grading requirements in Section 910.10.02, Base Aggregate above, unless otherwise directed by the Public Works Department.
- b) *Bedding for Storm Sewers* - Material for bedding shall consist of ¾"-0 crushed rock meeting the grading requirements in Section 910.10.02, Base Aggregate above, unless otherwise directed by the Public Works Department.
- c) *Bedding for Water Service lines and Utilities* – This bedding material shall consist of clean uniformly graded coarse sand produced from crushed gravels with a maximum particle size of 1/4". At least 90 to 100 percent shall pass the No. 4 sieve and not more than 5 percent shall pass the No. 200 sieve. Sand bedding, within the paved section of the street, shall be compacted by mechanical means using a vibraplate, jumping jack, or similar device. Decomposed Granite and Pea Gravel are not approved.
- d) *Pipe Zone* – Pipe zone material shall consist of ¾"-0 crushed rock meeting the grading requirements in Section 910.10.02, Base Aggregate unless otherwise directed by the Public Works Department.

In certain cases where the depth of trench exceeds 8' in depth, is a safety hazard, and where the pipe diameter is too large to adequately compact material beneath the haunches of the pipe, the Public Works Department may authorize the use of clean washed and screened 1" clean drain rock conforming to Section 910.10.04, Clean Drain Rock from the bedding to the spring line of the pipe. The quality of the clean rock shall be visually determined and approved by the Public Works Department.

- e) *Variable Zone Trench Backfill* - Backfill, from 6" above the pipe to the top of newly compacted sub-grade (varying depth), within the City street section right-of-way the material shall consist of ¾"-0 crushed rock meeting the grading requirements in Section 910.10.02, Base Aggregate **or:**

Under existing pavement, a 1 sack mix, cement and sand slurry otherwise meeting the requirements of Section 945.00.00, Cement-Sand Slurry may be substituted for ¾"-0 crushed rock noted above.

- f) *Upper Zone Trench Backfill* - Under existing pavement, backfill from the bottom of the pavement section to 36" below finished grade (top of the variable zone), a 1 sack

cement and sand slurry mix meeting the requirements of described in Section 945.00.00, Cement-Sand Slurry shall be installed.

In newly constructed streets, within the City street section right-of-way, from the top of sub-grade to the top of the pipe zone (or top of the variable zone), the backfill material shall consist of ¾"-0 crushed rock meeting the grading requirements in Section 910.10.02, Base Aggregate.

g) *Trench Backfill Outside of Street R/W* - Backfill over natural ground, outside the City street section Right-of-Way, from a minimum of 6" above the pipe (top of pipe zone) to finished grade. Unless other wise specified, material consisting of 4" crushed rock conforming to Section 910.10.03; or of ¾"-0 crushed rock meeting the grading requirements in Section 910.10.02, Base Aggregate; or decomposed granite or selected material approved by the Public Works Department may be used.

### **911.00.00 – Aggregate Material Tests**

Aggregate material tests shall be performed in accordance with the requirements of source certification per ODOT.

### **915.00.00 – Sub-grade and Trench Reinforcement Rock**

This section describes rock material that is acceptable for reinforcing soft areas of trench or street sub-grades. These areas are typically over excavated and then are brought to the designed sub-grade elevation with reinforcement material. These materials may be also incorporated into the approved design where the cost of additional crushed sub-base above the minimum required thickness is required to meet equivalent pavement thickness design criteria.

#### **915.01.01 – Material Requirements**

The material shall meet all of the requirements for grading as follows:

Pit – Run basalt shale material shall be selected from the quarry site that is fractured, of durable quality, and that can be further broken down to individual pieces by towed, self-propelled grid or vibratory grid rollers.

**Decomposed Granite and un-fractured Creek Run Gravels are not approved!**

Gradation - The grading shall be such that the maximum size shall not exceed 75% of the compacted thickness of the layer, in which, it is to be incorporated. The aggregate fraction passing a ¼" sieve shall constitute not less than 10% or more than 50% of the whole, by weight. Not more than 8% of the total aggregate shall pass a No. 200 sieve. Within the above limits, the aggregate shall be uniformly graded so that the materials will be dense and firm when watered and compacted.

Abrasion - The source material from which aggregate materials are obtained, Produced or manufactured when tested in accordance with AASHTO T 96, shall have a percentage of wear of not more than 45.

Sand Equivalent – Aggregates to be incorporated in the work shall have a Sand Equivalent value of not less than 30.

Determination – Determination of designated sizes and grading shall be by percentages of weight for each screen in conformance with AASHTO T 27.

Liquid Limit and Plasticity - Liquid limits of the material used shall not exceed 30 and plasticity index shall not exceed 5.

## **920.00.00 – Rip-rap**

### ***920.10.01 – General Requirements***

Loose riprap of the required sizes or classes shall conform to the requirements of Oregon Standard Specifications for Construction, latest edition, Section 00390, Rip-Rap Protection.

## **925.00.00 – Hot Mix Asphalt Concrete Paving (HMAC)**

### ***925.10.01 – General Requirements***

Plant produced HMAC shall be supplied by an approved company regularly engaged in the production of plant-mix asphaltic concrete for use in public works projects, using aggregates, asphaltic cement, plant, and equipment conforming to the standards of the Asphalt Institute. Asphalt and aggregate materials shall be subject to approval by the Public Works Department preceding mixing as stated below in Section 925.10.02, Mix Design.

Plant mixed HMAC shall be subject to final approval after blending and mixing at the plant or the place of delivery prior to final rolling. Approval will be based on periodic sampling of the materials at the plant or work site. Certified copies of the Suppliers plant test results shall be delivered upon request to the PWD to confirm field test results.

### ***925.10.02 – Mix Design***

Each local supplier of HMAC shall establish current mix design(s) with ODOT, as of January 1<sup>st</sup> of the year preceding construction for the standard classes of asphaltic concrete it intends to supply for public works projects or street construction to be dedicated to the City.

The mix design shall be prepared by an ODOT certified laboratory and shall conform to all of the requirements and standards of the Oregon Standard Specifications for

Construction, latest edition, for Level 3 and Level 4 duty pavements, 1" (Level II), ¾" (Level III), and ½" (Level IV) dense graded mixes, as defined by Section 00745, unless otherwise approved by the Public Works Department.

Where a supplier has not supplied the annual mix design for asphaltic concrete to ODOT, or a special mix design is required, the supplier shall be required to submit the mix design prepared by an ODOT Certified laboratory, meeting ODOT standards, to the Public Works Department for approval by the at least 10 days prior to incorporation of the mix into the project.

The mix designs shall be prepared using the Suppliers aggregates, and shall include gradation, percentage of asphaltic cement, and maximum density, according to the ODOT method (RICE) or the Marshall method.

The asphaltic concrete mix shall conform as applicable to the requirements for mixing temperatures, hauling, and placing temperatures of the Oregon Standard Specifications for Construction, latest edition, Section 00745.

### **930.00.00 – Portland Cement Concrete (PCC)**

#### **930.10.01 – General**

Plant mixed Portland Cement Concrete (PCC) for use in all Public Works facilities construction shall be produced by a company regularly engaged in the production of ready-mix concrete, using aggregates, cement, additives, plant and equipment that conforms to the applicable requirements of Oregon Standard Specifications for Construction, latest edition, Section 02001, Concrete, and applicable requirements of the American Concrete Institute (ACI).

#### **930.10.02 – Requirements**

- a) Compressive Strength – Unless otherwise specified herein or shown on the plans or details, or as directed by the City Engineer, all PCC shall have a minimum compressive strength of 3000 psi after 28 days.
- b) Aggregate –
  1. Miscellaneous Concrete Structures - Unless otherwise specified, the maximum size aggregate shall be ¾".
  2. Major Concrete Structures – The aggregate gradation shall be selected and designed in accordance with the type of structure and applicable sections of Oregon Standard Specifications for Construction, latest edition, Section 02001 Concrete and Section 02690, PCC Aggregates.
- c) Unless otherwise specified or approved, maximum slumps for concrete shall be required as follows:

1"- Machine-placed curbs, or curb and gutter

3" - Thrust blocking, concrete encasement for pipes, and manhole bases  
3"- Formed and poured curbs, or curb and gutter

4"- Formed, reinforced concrete structures, sidewalks, driveway aprons, wheelchair ramps, catch basins and curb inlets

- d) Air Entrainment: Concrete which will be subject to freezing and thawing, Such as curb and gutter sections, sidewalks, driveway aprons, and wheelchair ramps, shall have 4% to 7% entrained air, per Oregon Standard Specifications for Construction, latest edition, Section 00440.12.
- e) Certification: Upon request, the concrete supplier shall provide the Public Works Department with copies of the load ticket showing the batch date, type of material, quantity, delivery date and time; mix or yield design and any other reasonable information to substantiate the quality or type of material placed.

### **930.10.03 – Joint Materials**

Generally, joint materials shall conform to Oregon Standard Specifications for Construction, latest edition, Section 02440, Joint Materials. Joint materials for residential sidewalks may be a high quality asphalt impregnated fiberboard.

## **935.00.00 – Topsoil**

### **935.10.01 – General**

Topsoil material(s) shall conform to the Oregon Standard Specifications for Construction, latest edition, Section 01040.14, Topsoil. Material shall be fertile, loamy, natural surface soil consisting of sands, silts, clays and organic matter in combination. Such topsoil material shall be free from substances toxic to plant growth and noxious weeds as defined by the Oregon Department of Agriculture as Type "A" or Type "B"; and from roots, refuse, sticks and lumps when tested according to AASHTO T 88.

Projects that include Low Impact Development in the design of stormwater control, shall refer to ODOT Hydraulics Manual, Chapter 14.8. For plantings in Low Impact Development projects, refer to Oregon Standard Specifications for Construction latest edition, Section 01040 – Planting.

### **935.10.02 – Quality Control of Source**

Each source shall be well drained and, before stripping, shall have healthy crops of grass or other vegetative growth, free from noxious weeds as defined above including Canadian Thistle, Morning-Glory, Blackberry, Horsetail, Tansy Ragwort or other plants designated as a noxious weed by State or County officials.



## **940.00.00 – Geo-textile Construction Fabric**

### **940.10.01 – General**

Unless otherwise specified, all woven and non-woven geo-textile materials shall conform to the Oregon Standard Specifications for Construction, latest edition, Section 02320, Geosynthetics as applicable.

### **940.10.02 – Requirements**

- a) Sub-grade Geo-textile – Only woven fabric is acceptable and shall meet the above requirements. Application and installation shall meet the requirements set forth in the requirements set forth in the plans or as described further herein and Oregon Standard Specifications for Construction, latest edition, Section 00350, Geosynthetic Installation.
- b) Pavement Overlay Geo-textile – **Contact the Public Works Department.**
- c) Embankment Geo-textile – Both woven and non-woven fabric is acceptable shall meet the above Materials requirements. Application and installation shall meet the requirements set forth in the plans or as described further herein and Oregon Standard Specifications for Construction, latest edition, Section 00350, Geosynthetic Installation.
- d) Drainage Geo-textile – Both woven and non-woven fabric is acceptable within the range of application and shall meet the above Materials requirements. Application and installation shall meet the requirements set forth in the plans or as described further herein and Oregon Standard Specifications for Construction, 2015, Section 00350, Geosynthetic Installation.

## **945.00.00 – Cement-Sand Slurry**

### **945.10.01 – Requirements**

As described in Oregon Standard Specifications for Construction, latest edition, Section 02010, except that the cement and sand slurry mix shall consist 1 standard sack Type II cement having a 7" slump, plus or minus 1-1/2" when tested according to AASHTO T 119. This mix shall be used in all applications requiring the use of cement-sand slurry unless otherwise specified or directed.

Sand shall meet the requirements Oregon Standard Specifications for Construction, latest edition, Section 02690.30, Fine Aggregates except that 100 percent shall pass the No. 4 (3/16") sieve.

## **960.00.00 – Miscellaneous Materials**

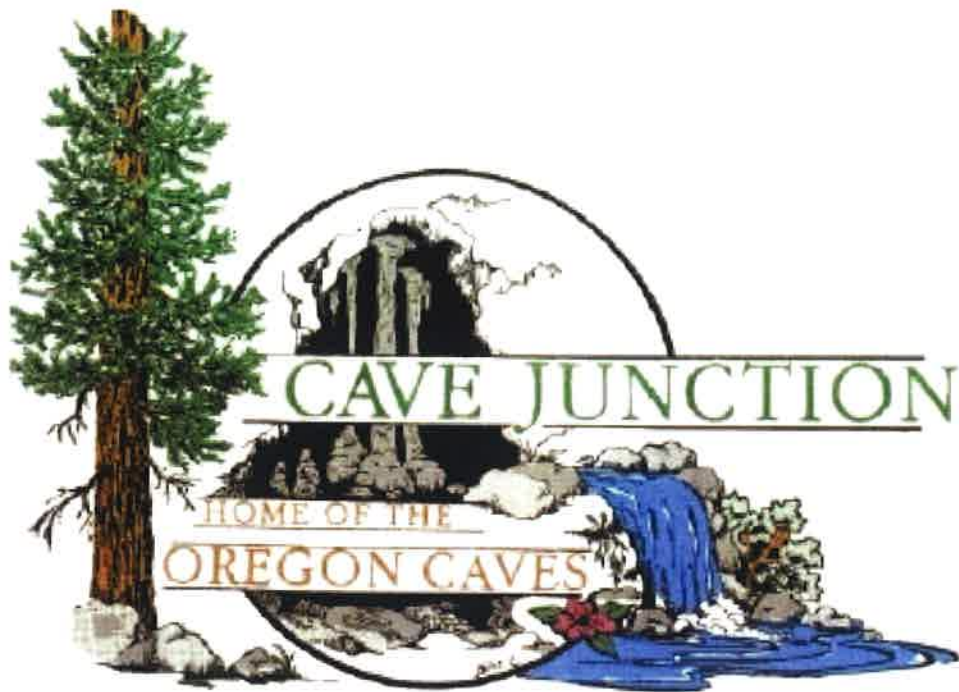
### ***960.10.01 – Locating Tape for Marking Discovered Utilities***

Marking tape meeting ODOT or APWA requirements shall be minimum, 2" wide, heavy duty, non-fading, metallic/plastic material(s) that bear a repeated warning with the name or type of utility being marked, and shall be supplied in the following colors:

Example: "CAUTION: BURIED ELECTRIC LINE" (Red)

1. Water – Blue
2. Storm Drain – Green
3. Sanitary Sewer – Green
4. Gas – Yellow
5. Electrical – Red
6. TV Cable – Orange
7. Phone – Orange

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*JOSEPHINE COUNTY, OREGON*

**DIVISION 1:**  
**WATER SYSTEM DESIGN STANDARDS MANUAL**  
**Guidelines for Development**

**Effective: March 1st, 2021**

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**Section 1 – General Design Requirements**

- 1.1 The purpose of this manual is to set standards for the design and construction to serve new and future development. This manual may be updated periodically and the design engineer shall ensure that they have the latest version.

**Section 2 – Design Plan Format**

- 2.1 Engineering plans and specifications shall be prepared for all public works improvements. Plans shall be clear and legible and show all improvements in sufficient detail to allow for determination of compliance with City standards, and proper field construction. City engineer or City representative may require additional detail if deemed necessary.
- 2.2 Plan shall show the location, stationing, and size of all sewer mains and services including appurtenances such as manholes, clean-outs, tees, and wyes. Stationing shall be called out for specific items to be installed. Matchlines shall be used when continuing to other sheets.
- 2.3 Profile view with stationing and elevation shall be provided for water mains. Profile shall show existing ground, finish grade, backfill class materials, pipe size and slope, and all existing and proposed utilities crossing the profile. Profile shall be generated along the water pipe centerline. Vertical separation shall be shown for crossing utilities.
- 2.4 Detail drawings shall be provided for typical trench sections, manholes, clean-outs, sewer service laterals, and others as required.
- 2.5 Project specifications shall be provided covering materials and workmanship in accordance with this document and standard engineering practice. Specifications not detailed herein shall generally conform to 2002 Oregon Standard Specifications or latest version of. All specifications shall be subject to City approval.
- 2.6 Refer to the city's "Engineering Policy – Guidelines for Development" document for additional requirements and submittal procedures.

**Section 3 – Water System Design Requirements**

- 3.1 Minimum size for new water mains is 6-inches unless otherwise approved. Water pipe sizes shall also conform to the requirements in the latest Water System Master Plan. Hydraulic calculations shall be provided to show that pipe size is adequate for conveying fire flows during peak demand periods for each specific development.
- 3.2 Peak domestic water demand used in calculations shall be at least 10 gpm per single family dwelling or EDU for developments with 1-10 lots, 5 gpm for 10-25 lots, and 3 gpm for larger developments.
- 3.3 Minimum depth of cover is 36-inches over top of pipe barrel. Individual water services shall have at least 30-inches of cover.

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- 3.4 Water piping shall be located 10 feet horizontally away from any sanitary sewer mains or laterals when possible. Vertical separations less than 18-inches shall not be designed into new improvements. All water line and sewer line shall be separated in accordance with OAR 333-061-0050 provisions.
- 3.5 Permanent utility easements shall be provided granting the City access to the public water system improvements for future maintenance and repair. Minimum easement width is 15 feet for a single pipeline at normal depths. Waterlines shall be located at the center of the easement except where the public portion of an individual service terminates at the edge of the easement. Wider easements may be required for deep piping.
- 3.6 Creation of dead-end water mains shall be avoided by looping new piping to connect to existing system piping in at least two locations. If a dead-end is allowed by the City for unusual cases, a fire hydrant shall be provided at the end of the line.
- 3.7 Fire Flow and Hydrant Requirements:
- 3.7.1 A minimum flow of 1,000 gpm is required at hydrants for one- and two-family dwellings not exceeding 3,600 square feet and located greater than 10 feet apart.
- 3.7.2 Other structures or situations will require greater fire flows. Greater flow shall be determined by using the "Guide for Determination of Needed Fire Flow", latest edition published by the Insurance Services Office (ISO) to obtain an optimum public protection classification.
- 3.7.3 Fire flow is the flow rate of water supply available measured at the hydrant with at least a 20 psi residual pressure remaining at all points in the system. Sprinkler systems may require a higher flow rate
- 3.7.4 Fire Hydrants shall be located to provide easy access from streets. Hydrants shall be spaced no less than 500 feet apart. The maximum distance to any point on street or road frontage to a hydrant shall be 250 feet.
- 3.7.5 Fire flows and hydrant locations may be subject to Fire Department approval. The City reserves the right to modify fire flow requirements and hydrant spacing on a case-by-case basis. Final placement locations shall be subject to approval by the Fire Chief.
- 3.8 Provisions for system flushing of all segments of water mains shall be incorporated into the design. Flushing may be accomplished through fire hydrants and/or blow-off assemblies. A velocity of at least 5 feet per second shall be possible in the water main through the operation of the hydrant or blow-off assembly.
- 3.9 Combination air valve (CAV) assemblies shall be placed at all high points in the piping system where air could potentially accumulate. Additional valves may be required on long sections of pipe. Pipelines shall be designed to minimize the number of CAVs required.
- 3.10 Backflow prevention assemblies are required on all domestic lines for commercial buildings, all fire service lines, and all irrigation lines. Backflow prevention assemblies are also required on residential domestic service lines greater than or equal to 2-inches in

diameter, or when internal plumbing is greater than 32 feet above the water main, or when the property has a well connected to the domestic plumbing. Other instances may require backflow prevention devices when required by the City. The type of backflow prevention device required is dependent on the degree of hazard and must be approved by the City and in accordance with OAR. Device must be included in the current "Approved Backflow Prevention Assembly List" published by the Oregon Drinking Water Program. All backflow prevention devices shall be located on the applicant's property and are the property owner's responsibility to test and maintain in accordance with the manufacturer's instructions and Oregon statutes. All devices shall be installed downstream from a water meter or shall include flow detectors as applicable. Devices shall be installed as close to the water meter as possible and as directed.

- 3.10.1 Reduced Pressure Backflow Assemblies generally required for:
- Any tax lot with an auxiliary water supply on or available to it, including above or below ground source (wells are most common)
  - Commercial buildings within industrial zones
  - Medical or veterinary centers
  - Dry cleaners and commercial laundries
  - Any water system which has a pump to supplement pressure
  - Sewage pump stations
  - Irrigation systems designed to use chemical injection
  - Gas stations
  - Mortuaries
  - Other high hazards as determined by the City

- 3.10.2 Double Check Backflow Assemblies generally required for:
- Any fire system or water line to a private fire hydrant (see Section 9)
  - Multi-story buildings with plumbing in excess of 32 feet above the water main
  - Shopping centers or large retail stores
  - Restaurants or fast food establishments
  - Any water service which is larger than 2-inches in diameter
  - Any tax lot served by two water services
  - Irrigation systems with pop-up sprinkler heads

- 3.11 Minimum system operating pressures shall be 20 psi at the property line during peak domestic flow conditions and simultaneous fire flows. This minimum pressure applies to the entire distribution system. All public water system improvements shall be designed to provide pressures not less than 40 psi and not greater than 80 psi during normal peak demand periods without fire flows. If minimum pressures cannot be obtained, developer must provide a high-level water system for the development area subject to The City approval. Individual private pressure reducing valves shall be provided for any service with an excess of 80 psi.

### 3.12 New Water Service and Metering

- 3.12.1 All new water services shall be individually valved and metered. Each tax lot shall have a separate water service. Minimum service line size is  $\frac{3}{4}$ -inch. Commercial and industrial user service line sizing greater as required.

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- 3.12.2 Services shall be perpendicular to the water main with no horizontal direction changes between the connection and the water meter. Service laterals shall be located close together for two adjoining lots to facilitate quick meter reading.
  - 3.12.3 When property is subdivided or partitioned each lot shall be provided its own individual water service assembly (meter, corporation stop, meter box).
  - 3.12.4 It is the responsibility of the owner/developer to provide each lot with an individual water service assembly. There shall be only one meter per box.
  - 3.12.5 New construction shall have the meter box set in the sidewalks if new sidewalks are poured. If sidewalk remains untouched meter box location shall be determined by City public works operators.
  - 3.12.6 There shall be a minimum of (6) inches of meter gravel (3/4 minus) in the meter box up to the underneath side of the meter. The meter gravel shall not cover the meter.
  - 3.12.7 The meter box shall be set over the meter, so the meter is the center of the meter box.
  - 3.12.8 City public works operators will install the customer valves at the time the meter is installed. The City will bill all the costs for parts and labor to the party requesting the installation.
  - 3.12.9 There shall not be any debris (i.e. concrete screenings, wood, or trash) put or left in the meter box.
  - 3.12.10 Do not concrete in the meter box.
  - 3.12.11 The City public works operators will have final say in the meter box final inspection.
- 3.13 Main extensions shall be installed through new development to allow logical extension of the City waterline grid to allow future development of adjacent undeveloped or underdeveloped properties. This will include the extension of water mains in easements across the property to adjoining properties and across street frontages of the property to adjoining properties when the main is located in the street right-of-way. Property with multiple frontages will be required to extend water along all frontages. This will allow future connection without disrupting improvements constructed for the development.
- 3.14 For pipe placed on slopes steeper than 15%, restrained joint pipe or joint restraint devices shall be installed see Standard Detail Drawings.
- 3.15 A temporary connection with an approved backflow device is required for flushing and disinfection procedures. Permanent connection to the existing system shall not be made until passing disinfection results are obtained and approved by the City. See Section 8.8.
- 3.16 All details shall conform to the Standard Detail Drawings. Required items or installations for which no detail drawing exists, applicant's engineer shall submit



sufficient design data and drawings for The City's approval. All such submitted drawings may require modification prior to approval for use.

#### **Section 4 – Water System Materials**

- 4.1 All materials shall be newly manufactured. No rebuilt, reconditioned or used material will be allowed. Materials shall be made in USA unless otherwise approved.
- 4.2 All materials in contact with potable water shall be ANSI/NSF-61 listed.
- 4.3 Oregon Standard Specifications (OSS) – Means the Current edition Oregon Standard Specifications for Construction produced by ODOT and APWA, including latest revisions.
- 4.4 Concrete shall conform to OSS Section 00440, Commercial Grade Concrete. Compressive field strength shall not be less than 3,000 psi at 28 days. Maximum aggregate size shall be 1½-inches. Slump shall be between 2 and 4 inches.
- 4.5 Non-Shrink Grout. Grout shall be Sika 212, Euco N-S, Five Star, or approved equal nonmetallic cementitious commercial grout exhibiting zero shrinkage per ASTM C827. Grout shall not be amended with cement or sand and shall not be reconditioned with water after initial mixing. Nonshrink grout shall be placed and packed only with the use of an approved commercial bonding agent. Unused grout shall be discarded after 20 minutes.
- 4.6 Trench Backfill Materials
  - 4.6.1 Foundation Stabilization: 1½"-0 or 2"-0 aggregate base rock meeting OSS Sections 00641 and 02630. Required when native trench foundation material contains groundwater, or is unsuitable to provide a firm foundation in the opinion of the City Engineer.
  - 4.6.2 Pipe Bedding and Zone: ¾"-0 dense-graded aggregate, uniformly graded from coarse to fine and meeting OSS Section 02630.10.
  - 4.6.3 Class A Backfill: Native or common excavated material, free from organic or other deleterious material, free from rock larger than 3-inches, and which meets the characteristics required for the specific surface loading or other criteria of the backfill zone in the opinion of the City Engineer. If stockpiled material becomes saturated or unsuitable, Class B, C or D Backfill shall be substituted.
  - 4.6.4 Class B Backfill: ¾"-0 or 1"-0 dense-graded aggregate, uniformly graded from coarse to fine and meeting OSS Section 02630.10.
  - 4.6.5 Class C Backfill: Clean sand with no particles larger than ¼-inch.
  - 4.6.6 Class D Backfill: Pit run or bar run material, well graded from coarse to fine, with maximum aggregate size of 3 inches.
  - 4.6.7 Class E Backfill (CLSM or CDF): Controlled Low-Strength Material (cement slurry) conforming to OSS Section 00442.

- 4.6.8 Compaction: Material (except Class E Backfill) shall be compacted in multiple lifts (6-inch maximum lift) to obtain 95% of the maximum dry density as determined by AASHTO T-99.
- 4.6.9 All Backfill within public right-of-ways or within 5 feet of a traveled surface shall be Class B Backfill, except where Class E Backfill is required under pavements by Benton County.
- 4.7 Water Pipe Materials
- 4.7.1 Water mains shall generally be constructed of PVC unless ductile iron pipe is called for. Exposed piping in vaults and vault penetration spools shall be ductile iron. PVC and DI pipe shall be made in the USA.
- 4.7.2 PVC pipe, 4- through 12-inch nominal diameter shall be rigid PVC made from class 12454-A or B compounds as defined in ASTM D1784. Pipe shall be NSF 61 approved for use as water distribution piping. Pipe shall be Class 150 meeting DR18, minimum, conforming to all requirements of AWWA C900. Pipe shall integral wall-thickened bells with bonded-in elastomeric gaskets meeting ASTM F477.
- 4.7.3 PVC pipe, 14- through 30-inch nominal diameter pipe shall meet the requirements of AWWA Standard C905 and shall be NSF 61 approved for use as water distribution piping. Pipe shall integral wall-thickened bells with bonded-in elastomeric gaskets meeting ASTM F477. Joint design shall conform to ASTM D3139. Pipe shall be Class 165 meeting DR25, minimum.
- 4.7.4 Ductile iron pipe shall be Class 52 minimum thickness manufactured in accordance with ANSI/AWWA C151/A21.51 under method of design outlined in ANSI/AWWA C150/A21.50. Pipe interior shall be cement mortar lined in accordance with ANSI/AWWA C104/A21.4. External pipe coating shall be an asphaltic coating in accordance with ANSI/AWWA C151/A21.51.
- 4.7.5 Galvanized steel pipe shall be Schedule 40, hot-dipped galvanized, seamless or electric resistance welded type, standard weight, threaded fitting type, conforming to ASTM A53.
- 4.7.6 Polyethylene pipe,  $\frac{3}{4}$ - through 2-inch nominal diameter shall be high-density polyethylene pressure rated pipe (PE3408) meeting cell classification 345464A and having NSF 14/61 certification. Pipe shall be compatible with IPS fittings. SIDR 7, 200 psi, meeting the requirements of ASTM D2239 and AWWA C901. Pipe shall have a 50-year manufacturer's warranty.
- 4.8 Fittings
- 4.8.1 Gray and ductile iron fittings shall be used for water main piping. Fittings shall conform to ANSI/AWWA C110/A21.10 Standard (full body) or ANSI/AWWA C153/A21.53 (compact), with 250 psi minimum working pressure rating. Fittings shall be made in the USA as manufactured by U.S. Pipe, Clow, Union, American Ductile Iron Pipe, or Tyler.

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- 4.8.2 All gray and ductile iron fittings shall be cement mortar lined and seal coated inside in accordance with ANSI/AWWA C104/A21.4. Interior seal coat shall be NSF-61 certified. Exterior of fittings shall have an asphaltic coating in accordance with ANSI/AWWA C110/A21.10.
  - 4.8.3 Joints and gaskets for mechanical joint fittings shall conform to ANSI/AWWA C111/A21.11 Standard. Gasket material shall be standard SBR rubber, or EPDM.
  - 4.8.4 Bolts and hardware for mechanical joint fittings shall be corrosion resistant "T" head bolts and hexagonal nuts conforming to AWWA C111 and ASTM A325. Bolts and nuts for mechanical joints shall be 300 series stainless steel or Cor-Blue coated. Bolts and nuts for flanged fittings, couplings, and other fittings shall be 300 series stainless steel or Cor-Blue coated.
  - 4.8.5 Flange fittings shall be faced and drilled to standard 125-pound template per ANSI B16.1 Standard unless otherwise indicated or required to connect to other 250-pound fittings. Flange gaskets shall be virgin SBR rubber, 1/8-inch thick. Gasket shall be full-face cut with holes to pass bolts.
  - 4.8.6 Joint restrainers for MJ fittings shall be Megalug by EBAA Iron, or approved equal, specifically designed for the type of pipe material used.
  - 4.8.7 Restrained flange adapters shall be Megaflange by EBAA Iron specifically designed for the type of pipe material used.
  - 4.8.8 Red brass pipe nipples shall be seamless, M.I.P threaded, rated for 150 psi and conforming to ASTM B43 and ASTM B687. Bronze fittings shall meet the requirements of ASTM B62 with NPT threaded ends conforming to ANSI/ASME B16.15.
  - 4.8.9 Galvanized iron fittings shall be 150-lb standard malleable iron fittings with NPT standard threads, conforming to ASTM A53 and ASTM A153.
  - 4.8.10 Tapping Sleeves shall have ASTM A240 Type 304/304L stainless steel shell and lugs and ASTM A536 Grade 65-45-12 ductile iron flange. Bolts shall be ASTM A193 Type 304 stainless steel. Nuts shall be ASTM A194 Type 304 stainless steel, heavy hex, coated. Gaskets shall be SBR per ASTM D2000 MAA 610 compounded for water service. Romac Industries "SST", or approved equal.
  - 4.8.11 Couplings shall have ASTM A536 Grade 65-45-12 ductile iron center sleeves and end rings. Bolts and nuts shall be trackhead, heavy hex, rolled thread, high strength, low alloy, corrosion resistant steel per AWWA C111. Gaskets shall be SBR per ASTM D2000 MBA 710, compounded for water service.
  - 4.8.12 Service brass shall only be as shown in the Standard Details and as otherwise approved.

#### 4.9 Valves

- 4.9.1 Valves shall be placed at logical locations in accordance with the minimum locations shown in the standard details. Valves shall be sized equivalent to the water piping adjacent to the valve. Valves 8-inch and smaller shall be gate valves. Valves 10-inch and larger shall be butterfly valves. Valves shall be approved by the City through submittals.
- 4.9.2 Gate Valves 2-inch through 8-inch shall be iron bodied, resilient wedge, non-rising stem (NRS), O-ring sealed, fusion bonded epoxy lined and coated valves conforming to the latest revision of AWWA C509. Valves shall have a 200 psi working pressure (water, non-shock) rating. Valve ends shall be mechanical joint or flanged joint as applicable. Furnish with standard 2-inch square operating nut when buried and handwheel operator where exposed. Bonnet bolts shall be stainless steel.
- 4.9.3 Butterfly Valves shall be rated for buried service and meet the requirements of the latest revision of Class 150B, AWWA C504. Valves shall have cast iron body, ASTM A126 Class B, resilient Buna-N rubber seat and cast iron disc with stainless steel contacting edge. Shaft shall be 18-8 type 304 stainless steel conforming to ASTM A276. Valve ends shall be mechanical joint or flanged joint as applicable. Furnish with standard 2-inch square operating nut when buried and lever operator where exposed.
- 4.9.4 Bolts and nuts for buried valves shall be 300 series stainless steel or Cor-Blue coated.

#### 4.10 Hydrants

- 4.10.1 Fire hydrants shall meet or exceed AWWA C502, latest revision for dry barrel fire hydrants. Rated working pressure shall be 250 psig. Test pressure shall be 500 psig.
- 4.10.2 Nozzle section, upper and lower standpipes, and hydrant base shall be ductile iron. All exterior fasteners below grade shall be stainless steel.
- 4.10.3 Main valve closure shall be compression type, opening against the pressure and closing with the pressure. Seat diameter shall be 5/4 inches. The seat shall be bronze threaded into bronze mating material for easy field repair.
- 4.10.4 Nozzle section shall be designed for easy 360 degree rotation by the loosening of no more than 4 bolts.
- 4.10.5 Hydrant shall be designed so that removal of all working parts can be accomplished without excavating.
- 4.10.6 The draining system shall be bronze and be positively activated by the main operating rod. Hydrant shall have a sliding bronze drain valve.

- 4.10.7 Hydrant shall have an internal travel stop nut in the top housing. Operating threads shall be factory lubricated and be O-ring sealed from water, moisture, and dirt.
- 4.10.8 Hydrant shall be of the traffic type. A frangible barrel and rod coupling designed to break upon traffic impact will protect the hydrant and connecting piping. Main valve shall remain closed upon impact.
- 4.10.9 Upper operating nut shall be ductile iron, 1½-inch pentagon standard. Opening direction shall be counter-clockwise (CCW).
- 4.10.10 Hydrant shall have two (2) 2½-inch hose nozzles, and one (1) 4½-inch pumper port. 4½-inch threads shall be NST standard. All threads shall conform to NFPA National Standard Fire Hose Coupling Screw Threads.
- 4.10.11 Hydrant bottom connection shall be 6-inch nominal diameter mechanical joint. Flange joint may be approved in some cases due to space constraints.
- 4.10.12 Hydrants shall be painted yellow. Field touch-up will be required if scratched or marred.
- 4.10.13 Hydrants shall be Kennedy Guardian.
- 4.11 Miscellaneous Materials
  - 4.11.1 Tracer wire shall be No. 10 AWG, solid or stranded copper with blue colored insulation. Insulation shall be 30 mil thick HDPE designed for direct bury.
  - 4.11.2 Warning tape shall be 6-inch wide, 4-mil thick, blue color, reading “CAUTION – WATERLINE BURIED BELOW.”
  - 4.11.3 Other materials not covered herein should generally conform to the 2002 Oregon Standard Specifications and are subject to The City’s approval. Service brass shall be as shown in the standard detail drawings.

## **Section 5 – Water System Installation**

- 5.1 Prepare trench in accordance with the standard detail in a safe manner. Place and compact foundation stabilization materials as required. Notify City to allow for inspection of trench bottom.
- 5.2 Place and compact pipe bedding material before placing pipe in the trench. Dig depression for pipe bells to provide uniform bearing along the entire pipe length. Thoroughly compact bedding material.
- 5.3 Prior to lowering pipe into the trench, the Engineer and City’s representative will check for damage to the pipe. The Contractor shall repair or replace, as directed, all damaged or flawed pipe prior to installation.

- 5.4 PVC pipe shall be installed and handled in accordance with the Uni-Bell Plastic Pipe Association standards UNI-B-3, AWWA C605, these specifications and the manufacturer's installation guide. The Contractor shall have on site all proper tools and equipment to properly and safely install the pipe.
- 5.5 Thoroughly clean inside the pipe before laying. Prevent foreign material from entering the pipe while it is being placed in the trench. Remove all foreign material from the inside of the pipe and joint before the next pipe is placed. Keep debris, tools, rags or other materials out of the pipe at all times. When pipe laying is not in progress, cover the exposed end of the pipe using a watertight expanding plug, or by other approved means to prevent entry of trench water or other foreign materials into the pipe.
- 5.6 Lay pipe with bell ends facing the direction of laying. For lines on an appreciable slope, face bells up-grade unless otherwise directed by the City.
- 5.7 Thoroughly clean the ends of the pipe to remove all foreign matter from the pipe joint. Lubricate the bell and spigot ends with NSF approved pipe lubricant, as recommended by the manufacturer. Furnish the gaskets required for the joint being assembled. Install the gasket with uniform tension around the joint groove before placing the pipe in the trench.
- 5.8 Provide concrete thrust blocking at all bends, valves, tees and other fittings in accordance with the Plans, as required to prevent movement due to thrust. Mechanical joint restraints shall also be installed.
- 5.9 At no time shall pipe be deflected, either in the vertical or horizontal plane, in excess of the maximum deflection recommended by the pipe manufacturer. Deflection at any joint shall not exceed  $2\frac{1}{2}^{\circ}$ . Maximum deviation from grade shall not exceed  $\frac{1}{2}$ -inch.
- 5.10 Where new water pipe is installed near existing or new sanitary sewer lines, all provisions of current OAR 333-61-050 (Crossings – Sanitary sewers and waterlines), regarding placement of pipe near, under, or over sanitary sewer lines shall be followed.
- 5.11 Tracer wire shall be brought to the surface and connected at each valve box. All joints and/or splices in the wire shall be made with a designed waterproof splice kit. Wire shall be taped to pipe every 5 feet and shall be run straight with a small amount of slack.
- 5.12 Place materials in the pipe zone in layers not greater than 6 inches thick and in a manner that equalizes the pressure on the pipe and minimizes stress. As required under the haunches of pipe and areas not accessible to mechanical tampers or to testing, compact with hand methods to ensure thorough contact between the material and the pipe. Before placing the pipe zone material, condition, aerate, or wet the material so that the moisture content of each layer is within minus 4% to plus 2% of optimum moisture content.
- 5.13 Provide proper Backfill Class material as required. Backfill the trench above the pipe zone in successive lifts. Do not allow the backfill to free-fall into the trench until at least 3 feet of cover is provided over the top of the pipe. Modify the compaction as necessary to protect the pipe. Compact each lift to not less than 95% of the maximum density.
- 5.14 Warning tape shall be placed over the pipe zone material, approximately 15 to 18 inches below finish grade, in accordance with the Standard Detail Drawings. Lay tape flat and untwisted, centered over the pipe and with wording facing upwards.

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- 5.15 If the specified compaction is not obtained, contractor shall remove material, modify compaction procedures, and/or reduce the thickness of lifts as required. Do not proceed with additional excavation or pipe laying until the backfill can be compacted to the satisfaction of the City.
- 5.16 CLSM. When CLSM Backfill is required, backfill above pipe zone with CLSM material. If the CLSM is to be used as a temporary surfacing, backfill to top of the trench and strike off to provide a smooth surface. If CLSM is not to be used as a temporary surface, backfill to bottom of the proposed resurfacing. Use steel plates to protect the CLSM from traffic a minimum of 24 hours. Comply with Benton County requirements.
- 5.17 Restore all surfaces after backfill is complete. Base rock, asphalt paving and concrete paving methods and materials shall conform to Oregon Standard Specifications as approved by the City and Benton County.
- 5.18 Do not make permanent connections to existing mains until disinfection is completed. A temporary connection with an approved backflow device is required for flushing and disinfection procedures. Permanent connection to the existing system shall not be made until passing disinfection results are obtained and approved by the City.
- 5.19 Filling and Flushing. After installation of water piping, fill pipes slowly with potable water at a maximum rate of 500 gpm while venting all air. Take all required precautions to prevent entrapping of air in the pipes. Flush all sections of pipe to remove any solids or material that may be in the pipe. If no hydrant is installed at the end of the main, provide a tap large enough to develop sufficient flow rates to achieve a velocity of at least 5 feet per second in the main. If sufficient velocity cannot be obtained, pigging is required. Control and dispose flushing water in a proper manner to avoid erosion, flooding, property damage, and discharge of chlorinated water in an unacceptable manner.
- 5.20 Pigging
- 5.20.1 If a flushing velocity rate of 5 fps is not attainable with the available pipe configuration or fittings, the new piping shall be pigged to obtain a cleansing flush of the piping.
- 5.20.2 Pigging shall be accomplished with at least three (3) polyurethane foam pigs designed for cleaning of waterline piping. Pigs shall be as manufactured by Knapp Polly Pig, Inc. or approved equal.
- 5.20.3 The Contractor shall have the option to run a single pig three times or to run three separate pigs at the same time. If the pigs are rammed at the same time, they shall be numbered so as to identify them when they are ejected from the piping.
- 5.20.4 Necessary fittings, ejection ports, and other facilities shall be designed and shown on the plans.
- 5.20.5 Contractor shall provide adequate erosion control means to prevent damage from the flushing or pigging process.

- 5.20.6 The City's inspector shall be given 48 hours notice prior to pigging beginning and shall be on-hand to observe and approve the pigging procedure and process that is utilized.
- 5.20.7 If after pigging the new line the bacteriological test fails, the line shall be re-pigged and retested.
- 5.20.8 Pigging can be used as an option to flushing at the Contractor's discretion.
- 5.21 Testing and Disinfection. After flushing, water system shall be tested for leakage and disinfected according to the following Sections. Provide all temporary taps as required. All items not passing tests shall be repaired or replaced as required.

### Section 6 – Water System Pressure (Hydrostatic) Testing

- 6.1 All waterlines and service lines shall be subjected to hydrostatic pressure testing. Testing shall be conducted by the Contractor in the presence of the Engineer. City must be notified at least 2 working days in advance.
- 6.2 Testing shall not be commenced until all thrust blocking has been in place for not less than **10 days** and sufficient backfill has been placed to prevent pipe movement.
- 6.3 Furnish and operate all pumps, gauges, plugs, saddles, corporation stops, miscellaneous hose and piping, and measuring equipment necessary for performing the test. Provide certifications of accuracy for gauges from an approved laboratory when requested.
- 6.4 Test Procedure
- 6.4.1 The test section shall be filled with water and all air expelled from the pipe prior to testing. City will provide water for testing at a time of day when sufficient quantities of water are available for normal system operation.
- 6.4.2 All valves isolating the test section shall be securely closed and the specified test pressure applied by means of a pump connected near the lower end of the test section.
- 6.4.3 The test pressure shall be **150 psi** and the duration shall be at least **2-hours** at the test pressure. Provide additional pumping during the test period to continuously maintain pressure within 5 psi of that required. Use a clean container of potable water to supply the pump.
- 6.4.4 Accurately determine the quantity of water required to maintain and restore the required pressure at the end of the test by pumping through an approved positive displacement water meter.
- 6.4.5 The allowable leakage rate for the test section shall be determined from the following formula:

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

L = allowable leakage (gph)

S = length of pipe tested

D = nominal diameter of pipe (inches)

p = average test pressure during test (psi)



- 6.4.6 If the amount of water added to the section exceeds the allowable leakage, the Contractor shall, determine the source of leakage, repair or replace the defective elements, and repeat the test until the allowable leakage requirements have been satisfied.
- 6.4.7 All visible leaks on new waterlines shall be repaired, regardless of the amount of leakage.
- 6.4.8 Make all tests with hydrant auxiliary gate valves open and pressure against the hydrant valve. After the pipe test is completed, test each gate valve in turn by closing it and relieving the pressure beyond. This test of the gate valve is acceptable if there is no immediate loss of pressure.

### **Section 7 – Water System Disinfection**

- 7.1 All lines installed or modified under this Contract shall be sterilized prior to connection to the existing system, in accordance with the following procedure, AWWA Standards C651 through C654, and current OAR 333-61-050 (Disinfection of Facilities).
- 7.2 Prior to commencing disinfection procedures, all lines shall be flushed thoroughly to remove dirt, construction debris and other potential contaminants.
- 7.3 The Contractor shall have the option of utilizing either a liquid chlorine gas-water mixture, direct fed chlorine gas, sodium hypochlorite solution, or a calcium hypochlorite and water mixture for disinfection.
- 7.4 Disposal of chlorinated water from the reservoir tank or pipelines shall be performed in conformance with the most recent draft or edition of *Best Management Practices for the Disposal of Chlorinated Water* by the Oregon Department of Environmental Quality. Chlorinated water used for disinfection of waterlines and service lines shall not be directly disposed of into or impair the waters of the State (i.e. lakes, creeks, streams and wetlands).
- 7.5 The Contractor shall provide all equipment, materials, and workmanship required to complete the flushing and disinfection of waterlines and appurtenances.
- 7.6 Disinfection Procedure
  - 7.6.1 The Contractor shall inject chlorine solution into the beginning of the waterline through a corporation stop inserted in the horizontal axis of the pipe. Make no connections between the existing distribution system and the non-disinfected pipelines unless a State Drinking Water Program approved backflow preventer is installed in the connecting line.
  - 7.6.2 The solution shall have a free chlorine residual of at least 25 mg/L, but not more than 100 mg/L. All entrapped air shall be discharged from the line and all surfaces wetted. Chlorinated water shall be retained in the pipe for at least 24-hours. A free residual of not less than 10 mg/L shall be found in all parts of the line after the 24-hour period has elapsed.

7.6.3 After the 24-hour period, all valves in the mainline shall be operated and all hydrants flushed with a residual of at least 10 mg/L being found. If the residual concentration within any part of the chlorinated section is found to be less than 10 mg/L, the Contractor shall flush, rechlorinate, and retest all sections until a 10 mg/L residual is obtained.

7.6.4 Upon obtaining the minimum 10 mg/L residual following the 24-hour disinfection period, the Contractor shall flush the section with potable water until the chlorine residual is equivalent to the residual of the existing system water. A minimum of one sample shall then be taken from the pipe for microbiological analysis.

## 7.7 Microbiological Sampling and Analysis

7.7.1 The Contractor is responsible for collecting and submitting samples to a certified independent testing laboratory for microbiological analysis.

7.7.2 The Engineer or City representative shall be present to witness the collection of the water samples for testing. Chain of custody procedures shall be utilized during the collection and transport of samples to the laboratory.

7.7.3 The Contractor shall bear all costs associated with the required testing, including laboratory fees, materials required, and transportation costs. The Contractor also shall pay for all additional tests required as a result of failing to meet the bacterial limits.

7.7.4 If the results of the microbiological analysis indicate that the water is free of coliform organisms, the waterline may be put into service.

7.7.5 If the results of the microbiological analysis indicate that coliform organisms are present, then the waterline shall be flushed, rechlorinated, and retested until a coliform-free sample is obtained.

7.7.6 A minimum of one sample from each separable structure or pipeline shall be obtained for analysis. The presence of coliform organisms shall be determined using the Colilert 24-hour test, Method MMO-Mug, or other methods approved by the Oregon State Drinking Water Program.

## 7.8 Connections to Existing System

7.8.1 New waterlines shall not be connected to the existing system until passing microbiological testing results have been received. An approved double-check backflow device shall be temporarily installed and shall remain until all tests have passed. Device shall be sufficiently large to provide adequate flushing. Merely leaving a valve closed is not acceptable. After disinfection has been completed satisfactorily, the tie-in may be made. Tie-in fittings and small section of pipe shall be disinfected as specified below.

7.8.2 Where new waterlines connect to existing lines and the tie-in requires a portion of the new construction to be brought into service immediately upon completion of the tie-in, the new piping and appurtenances shall be disinfected by liberally

spraying or brushing on 1% hypochlorite solution (i.e. 1 gallon 5.25% bleach mixed with 4 gallons potable water), waiting 10 minutes, and then thoroughly flushing. This is generally limited to cut-in fittings.

- 7.8.3 The Contractor shall take care not to allow foreign material to enter the pipe and appurtenances during installation.
- 7.8.4 Upon completion of the tie-in, the new piping and appurtenances shall be flushed.

### **Section 8 – Standards for Private Fire Protection Systems**

- 8.1 Fire service backflow prevention assemblies shall be installed at the property line, or edge of the public waterline easement as approved by the City. The fire service line from the public right-of-way or utility easement to the backflow assembly will be privately owned and shall meet all City standards. The delineation between the public and private line shall occur as close to the public main as possible and delineated with an in-line public valve in accordance with City standards. A backflow prevention assembly for a fire service line may be installed inside of a building if it can be done within twenty feet of the tapping valve or tee.
- 8.2 Private fire lines shall include a flow meter and vault located in the public right-of-way or utility easement. Materials and configuration shall be as approved by the City.
- 8.3 Only approved Double Detector Check Backflow Assemblies are to be used for backflow prevention on fire line services.
- 8.4 Only approved resilient seat indicating valves are allowed on fire line assemblies.
- 8.5 Installation must comply with the Oregon Uniform Fire Code as adopted and amended by the State of Oregon Fire Marshal, and City Standards.

### **Section 9 – Standards for Special Projects**

- 9.1 The design of the following are considered special projects and are not covered in detail in this manual.
  - 9.1.1 Water Distribution Pumping Stations
  - 9.1.2 Pressure Regulating Stations
  - 9.1.3 Storage Facilities
- 9.2 Review and approval of special projects will be made on a case by case basis. Developer should coordinate early in the planning stages with the City to determine specific requirements for the site. All aspects of any special project will be designed and constructed as required by the City.
- 9.3 In general, when adequate pressures are not available by gravity through the existing system a suitable pump station is required to serve the development. Pump stations shall be designed and constructed in accordance with City requirements. When possible, pumping stations will convey water to a high level storage tank. When suitable tank elevations are not possible the City may allow hydropneumatic tank type booster pump

stations. When a storage tank cannot be provided, a fire pump will be needed in addition to the normal service pumps. Provisions for fire flows during power outages must be accommodated.

- 9.4 Pump buildings and storage tanks will have adequate site sizing and access.
- 9.5 Pumping stations will normally require 480 volt, 3-phase electrical service. Flow meters, PLC based control systems, flow and level displays, and SCADA system outputs will be required.
- 9.6 Storage tanks will have a volume equal to at least 120,000 gallons plus 600 gallons per lot served. Tanks will be glass fused to steel of a bolt together design unless otherwise approved by the City. Tanks will be designed in conformance with the latest Oregon Structural Specialty Code in effect. Access hatches, exterior aluminum and interior stainless steel ladders, and other appurtenances will be included. Tank water level will be monitored with a submersible pressure transducer. An exterior mechanical tank level device will also be required.

*Attached Forms: Hydrostatic Pressure Test Data Sheet*

**City of Cave Junction**

222 Lister Street  
 Cave Junction, Oregon 97523  
 (541) 592-2156



Test Date
Inspector

**Hydrostatic Pressure Test Data Sheet**  
**Inspection Report Form**

Project Name: \_\_\_\_\_

Contractor: \_\_\_\_\_

Test Pressure \_\_\_\_\_ (psi)

**Allowable Leakage Rate (L)**

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

L = Allowable leakage (gph)  
 S = Length of pipe tested (feet)  
 D = Nominal diameter of pipe (inches)  
 P = Average test pressure during test (psi)

**Allowable Leakage Rate Calculation**

	Pipe Segment Description	Length of Pipe (S)	Diameter (D) (in)	Allowable Leakage Rate (L) (gal/hr)
1				
2				
3				
4				
5				

Total Allowable Leakage Rate (gal/ hr):

**Hydrostatic Test Data**

Time	Elapsed Time (min)	Pressure (psig)	Water Added (gal)	Pressure After Adding Water (psig)
	---		---	---

Total Elapsed Time:       Total Water Added:

**Actual Leakage Rate:**

$$L_{\text{actual}} = \frac{\text{Total Water Added (gal)}}{(\text{Total Elapsed Time (min)} / 60)} = \frac{\text{(gal)}}{\text{(min)} / 60} = \text{_____ (gal/hr)}$$

Actual Leakage Rate ≤ Allowable Leakage Rate?       Yes       No

Inspector's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

STANDARD DETAIL DRAWINGS INDEX

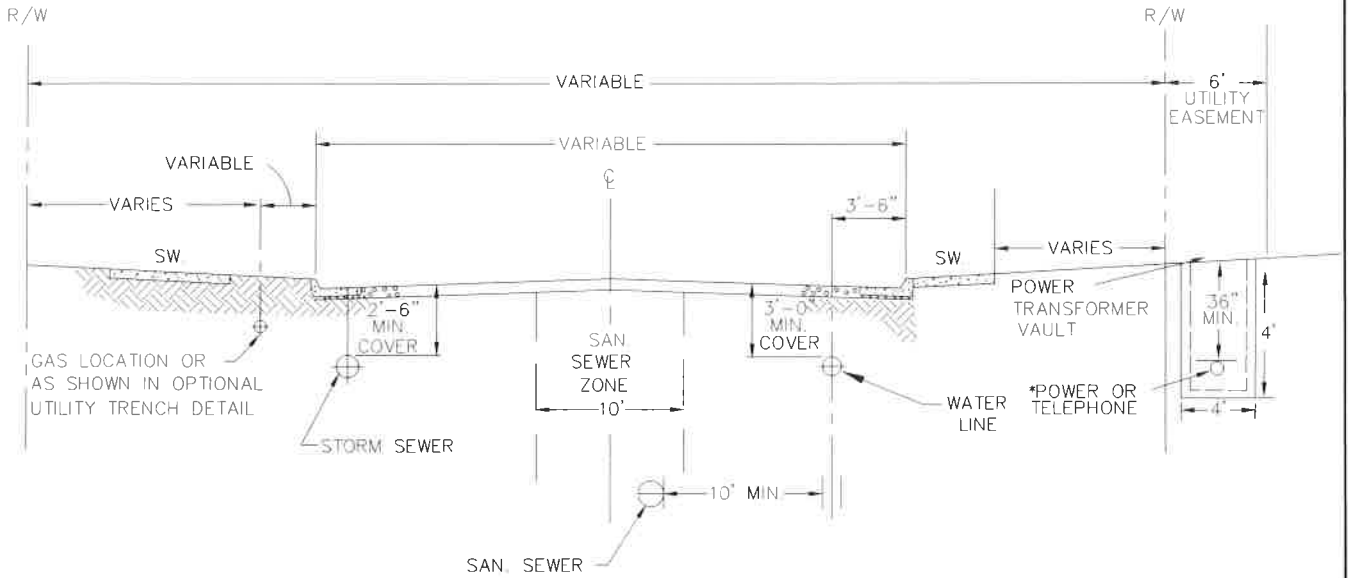
- W-050: STANDARD UTILITY LOCATIONS
- W-100: TYPICAL WATER VALVE LOCATIONS (MINIMUM)
- W-150: TYPICAL WATERLINE TRENCH DETAILS
- W-151: STREET CUT STANDARD DETAIL
- W-170: PIPE ANCHOR / TRENCH CUT-OFF WALL DETAIL
- W-200: STANDARD WATER VALVE SETTING DETAIL
- W-205: VALVE OPERATOR EXTENSION DETAIL
- W-300: STANDARD FIRE HYDRANT ASSEMBLY DETAIL
- W-400: 2" BLOW-OFF ASSEMBLY
- W-401: 2" BLOW-OFF ASSEMBLY W/ BLOW-OFF HYDRANT
- W-405: 4"+ BLOW-OFF ASSEMBLY
- W-500: 2" COMBINATION AIR VALVE ASSEMBLY
- W-600: STANDARD 3/4" WATER SERVICE CONNECTION
- W-605: STANDARD 1" WATER SERVICE CONNECTION
- W-608: STANDARD 2" WATER SERVICE CONNECTION
- W-700: CONCRETE THRUST BLOCKING DETAILS
- W-800: REDUCED PRESSURE BACKFLOW ASSEMBLY (3/4" - 2")
- W-805: REDUCED PRESSURE BACKFLOW ASSEMBLY (2 1/2" UP)
- W-900: DOUBLE CHECK VALVE ASSEMBLY (3/4" - 2")
- W-905: DOUBLE CHECK DETECTOR ASSEMBLY (2 1/2" UP)



City of Cave Junction  
222 W. Lister Street  
Josephine, Oregon 97523  
(541) 592-2156

**STANDARD DETAIL  
DRAWING INDEX**

DETAIL NO.
<b>W-010</b>
03/01/2021



NOTES:

1. WATER LOCATED 3'-6" INSIDE FROM FACE OF CURB OR AS OTHERWISE DIRECTED.
2. 10' HORIZONTAL SEPARATION BETWEEN WATER AND SEWER WHERE POSSIBLE. COMPLY WITH SEPARATION REQUIREMENTS OF OAR 333-061-050.
3. WATER DISTRIBUTION MAINS SHALL HAVE 36" MINIMUM COVER OR AS OTHERWISE DIRECTED.
4. SEWER MAINS SHALL HAVE 5.25' (63") MINIMUM COVER UNLESS OTHERWISE APPROVED TO AVOID CONFLICTS WITH WATER AND OTHER UTILITIES.
5. WATER MAINS SHALL BE LOCATED ON NORTH OR EAST SIDE OF STREET WHEN PRACTICAL.
6. SEWER, STREETS AND DRAINAGE SUBJECT TO CITY STANDARDS.
7. MANHOLE LIDS SHALL NOT BE LOCATED DIRECTLY IN NORMAL WHEEL PATH.
8. ALL LAYOUTS AND LOCATIONS ARE SUBJECT TO CITY APPROVAL.



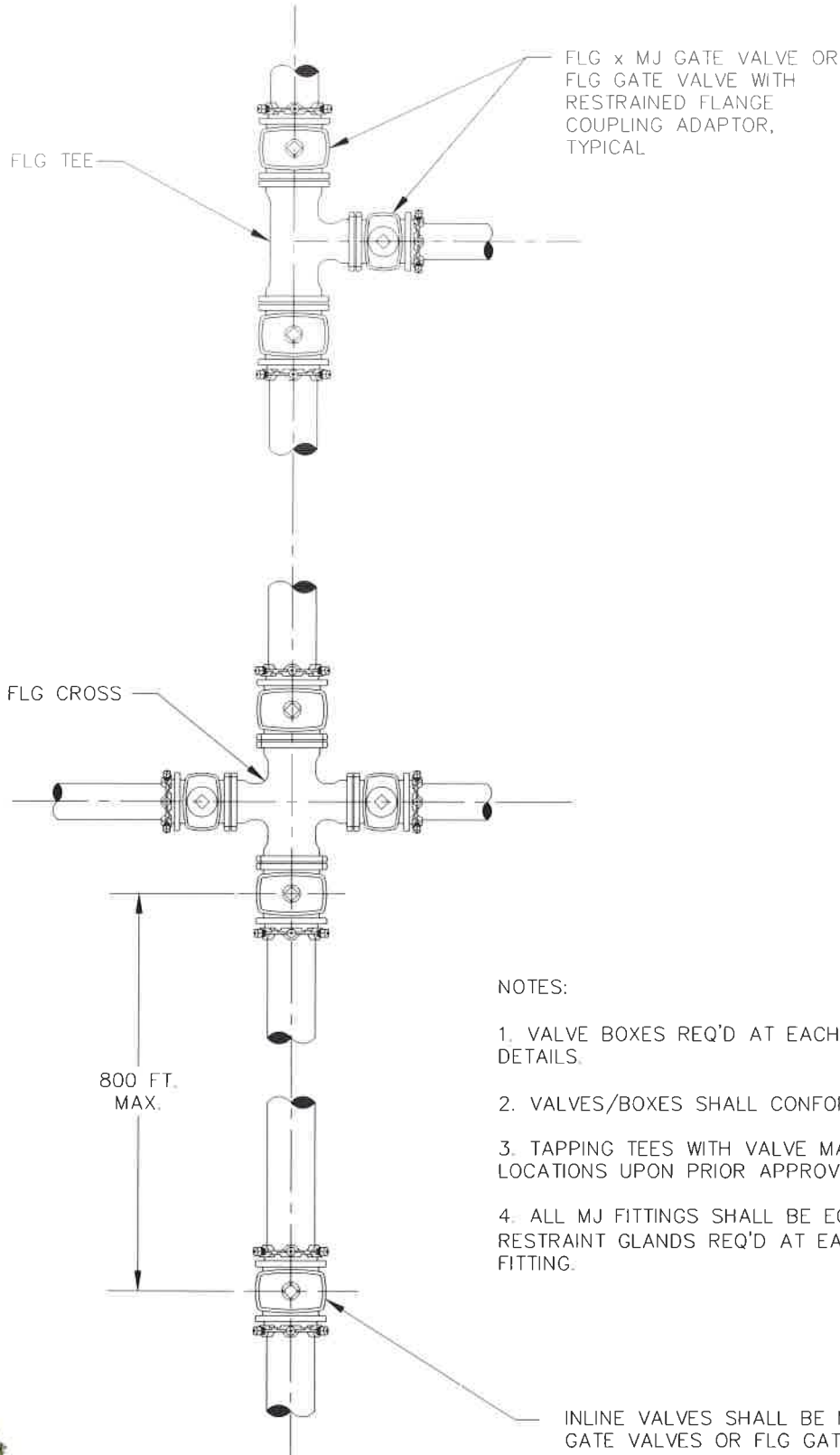
City of Cave Junction  
 222 W. Lister Street  
 Josephine, Oregon 97523  
 (541) 592-2156

**STANDARD UTILITY  
 LOCATIONS**

DETAIL NO.

**W-050**

03/01/2021



NOTES:

1. VALVE BOXES REQ'D AT EACH VALVE. SEE APPROPRIATE DETAILS.
2. VALVES/BOXES SHALL CONFORM TO CITY STANDARDS.
3. TAPPING TEES WITH VALVE MAY BE USED AT SOME LOCATIONS UPON PRIOR APPROVAL.
4. ALL MJ FITTINGS SHALL BE EQUIPPED WITH APPROVED RESTRAINT GLANDS REQ'D AT EACH VALVE AND NEARBY FITTING.



**City of Cave Junction**  
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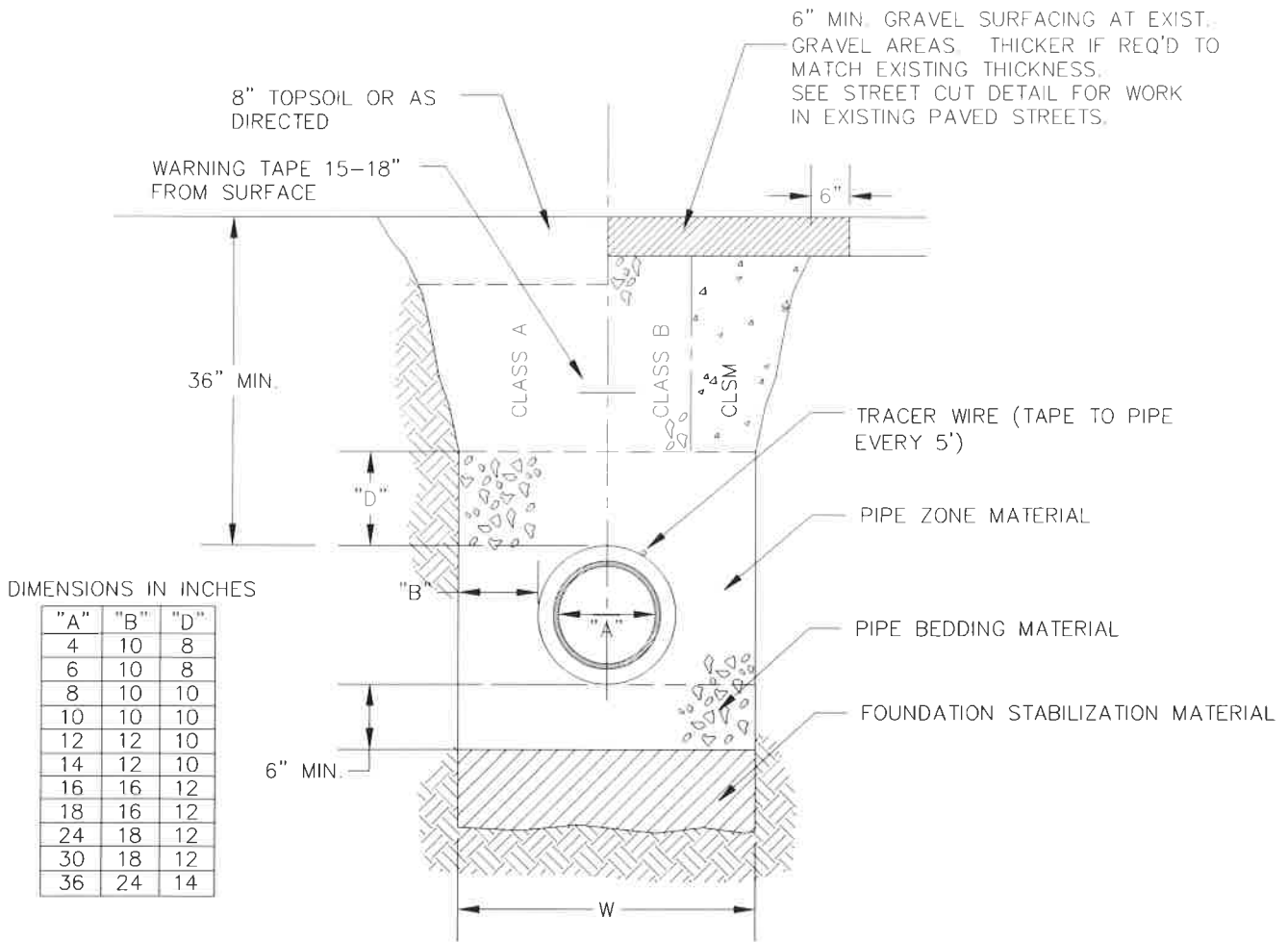
**TYPICAL WATER VALVE  
LOCATIONS (MINIMUM)**

DETAIL NO.

**W-100**

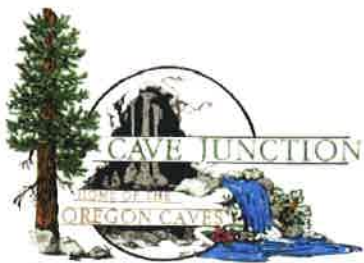
03/01/2021





NOTES:

1. TRENCH EXCAVATION SHALL BE CONDUCTED IN A SAFE MANNER WITH ALL NECESSARY BRACING AND SHORING PROVIDED FOR COMPLIANCE WITH OSHA.
2. FOUNDATION STABILIZATION SHALL BE PROVIDED WHEN MATERIAL AT BOTTOM OF TRENCH IS UNSUITABLE IN THE OPINION OF THE CITY TO PROVIDE A STABLE TRENCH BASE.
3. CONSTRUCTION IN STATE AND COUNTY RIGHT-OF-WAY SHALL COMPLY WITH STATE, COUNTY AND CITY DESIGN STANDARDS.
4. CLASS B BACKFILL REQUIRED IN ALL ROADWAYS AND TRAFFIC PATHS EXCEPT WHERE CDF BACKFILL IS REQUIRED BY COUNTY, STATE, OR CITY.
5. TRACER WIRE REQUIRED AT ALL NON-METALLIC PIPELINES. WIRE SHALL BE 10 GA. MINIMUM SOLID COPPER WIRE WITH BLUE 30 MIL THICK HDPE INSULATION RATED FOR DIRECT BURY. USE APPROVED WATERPROOF SPLICE AT ALL CONNECTIONS.
6. WARNING TAPE SHALL BE 6" WIDE, 4 MIL THICK, APWA BLUE, READING "CAUTION WATER LINE BURIED BELOW".
7. MATERIALS SHALL BE AS SPECIFIED WITHIN THE CITY DESIGN STANDARDS MANUAL.
8. COMPACT ALL FILL TO 95% MDD PER ASTM D698. SUFFICIENT COMPACTION TESTS WILL BE REQUIRED TO PROVE METHODS AND COMPACTION EFFORT IS SUFFICIENT.



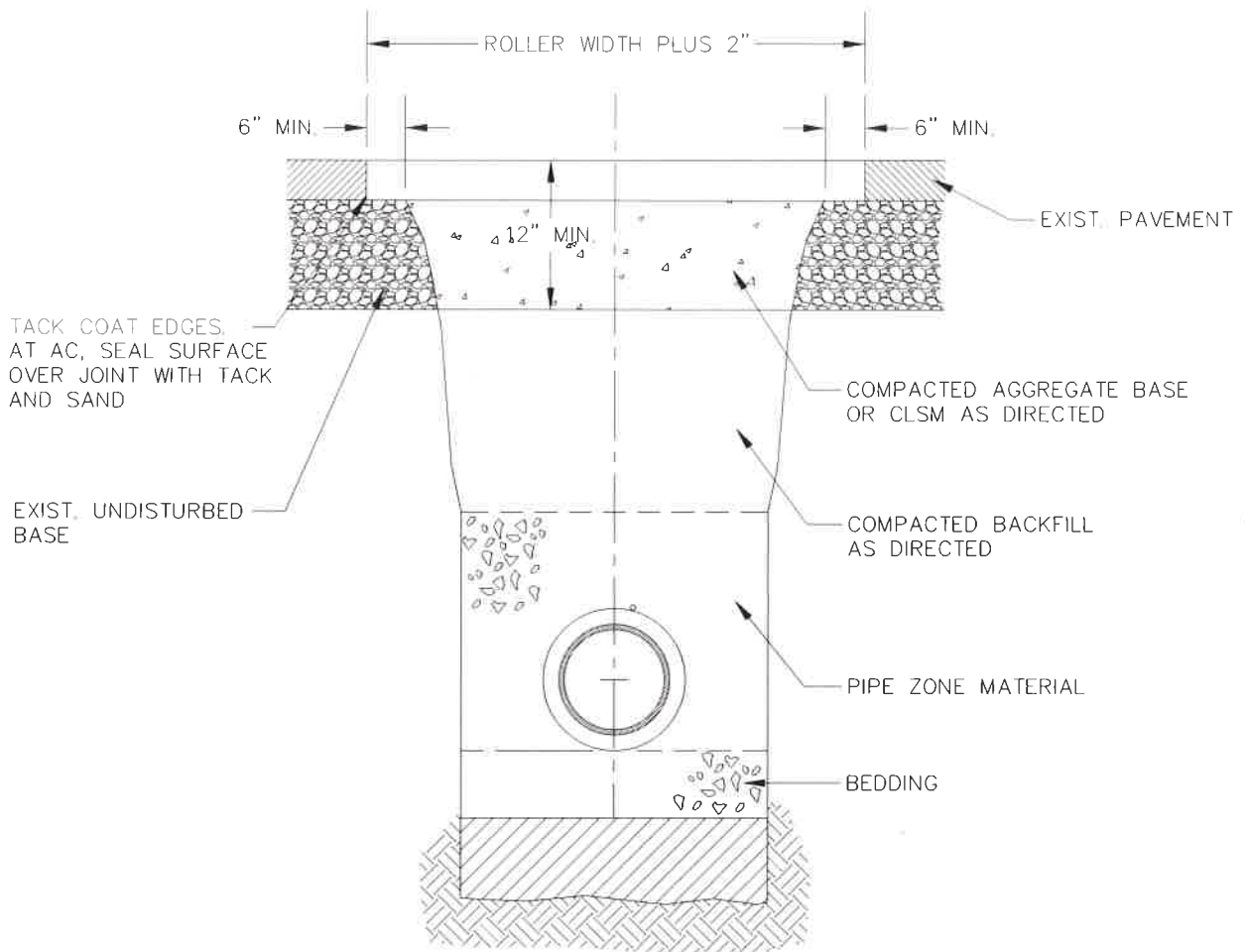
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TYPICAL WATERLINE  
 TRENCH DETAILS

DETAIL NO.

W-150

03/01/2021



NOTES:

1. ALL EXISTING AC OR PCC PAVEMENT SHALL BE SAWCUT IMMEDIATELY PRIOR TO REPAVING.
2. CONCRETE PAVEMENT SHALL BE REPLACED WITH CONCRETE TO A MINIMUM THICKNESS OF 6 INCHES OR TO THE THICKNESS OF REMOVED PAVEMENT, WHICHEVER IS GREATER.
3. PLACE AC MIX TO A MINIMUM THICKNESS OF 4 INCHES OR THE THICKNESS OF REMOVED PAVEMENT, WHICHEVER IS GREATER. COMPACT AS DIRECTED.
4. COMPLY WITH THE REQUIREMENTS OF THE AGENCY HAVING JURISDICTION OVER THE ROAD IN WHICH THE STREET CUT OCCURS.



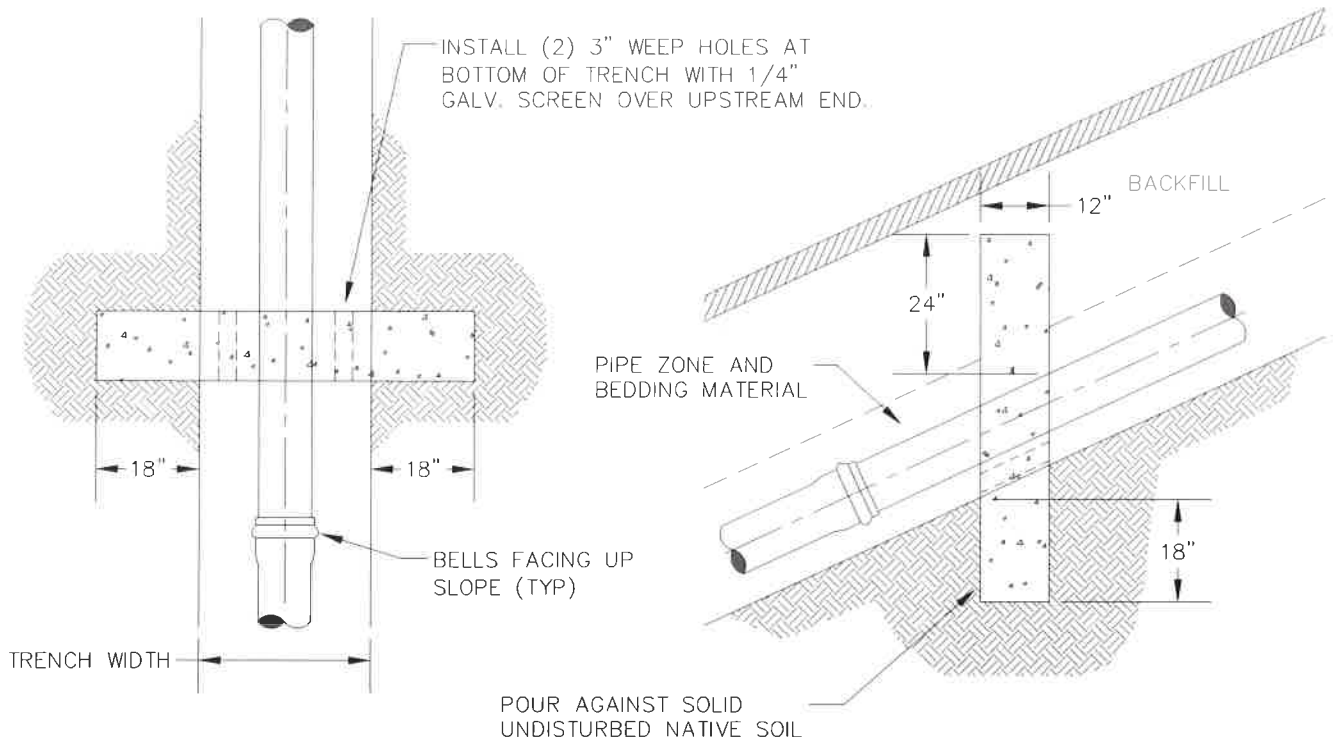
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**STREET CUT  
 STANDARD DETAIL**

DETAIL NO.

**W-151**

03/01/2021



NOTES:

1. CUT-OFF WALLS REQ'D AT ALL PIPELINES WHERE SLOPE EXCEEDS 20%.
2. RESTRAINED JOINT PIPE REQUIRED AT SLOPES BETWEEN 15% AND 20%.
3. WALLS SHALL BE FORMED WITHIN TRENCH. REMOVE FORMS PRIOR TO BACKFILLING.
4. CONCRETE SHALL HAVE 3000 PSI COMPRESSIVE STRENGTH MIN. (CLASS 3000).

5. SPACING OF WALLS SHALL BE:	<u>SLOPE</u>	<u>SPACING</u>
	20-34%	35 FEET
	35-50%	25 FEET
	51+ %	15 FEET



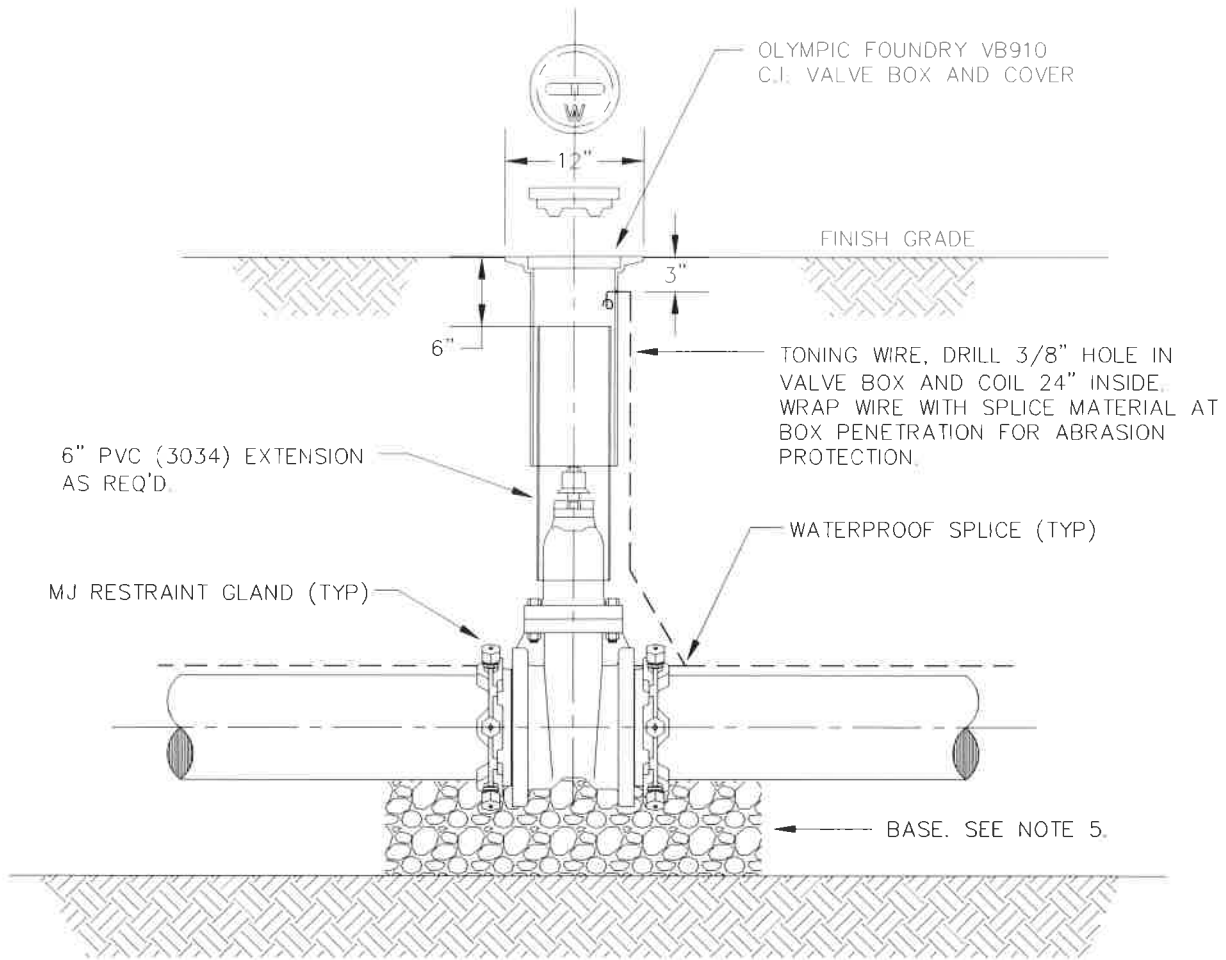
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**PIPE ANCHOR / TRENCH  
 CUT-OFF WALL DETAIL**

DETAIL NO.

**W-170**

03/01/2021



NOTES:

1. VALVE BOX SHALL BE CENTERED OVER VALVE OPERATING NUT.
2. PVC EXTENSION SHALL BEGIN AS CLOSE TO VALVE AS POSSIBLE AND SHALL EXTEND TO WITHIN 6" OF GROUND SURFACE.
3. TOP OF VALVE BOX SHALL BE FLUSH WITH FINISH GRADE.
4. VALVE EQUIPPED WITH 2" SQUARE OPERATING NUT LOCATED WITHIN 24" FROM GROUND SURFACE. SEE VALVE OPERATOR EXTENSION DETAIL WHERE REQUIRED.
5. VALVES 12" AND SMALLER SHALL BE PROVIDED WITH CLASS B BASE. VALVES LARGER THAN 12" SHALL BE INSTALLED ON PRECAST CONCRETE PIER BLOCK.
6. NO PIPE JOINTS ALLOWED WITHIN 10' OF IN-LINE VALVES UNLESS JOINT RESTRAINT DEVICE PROVIDED.



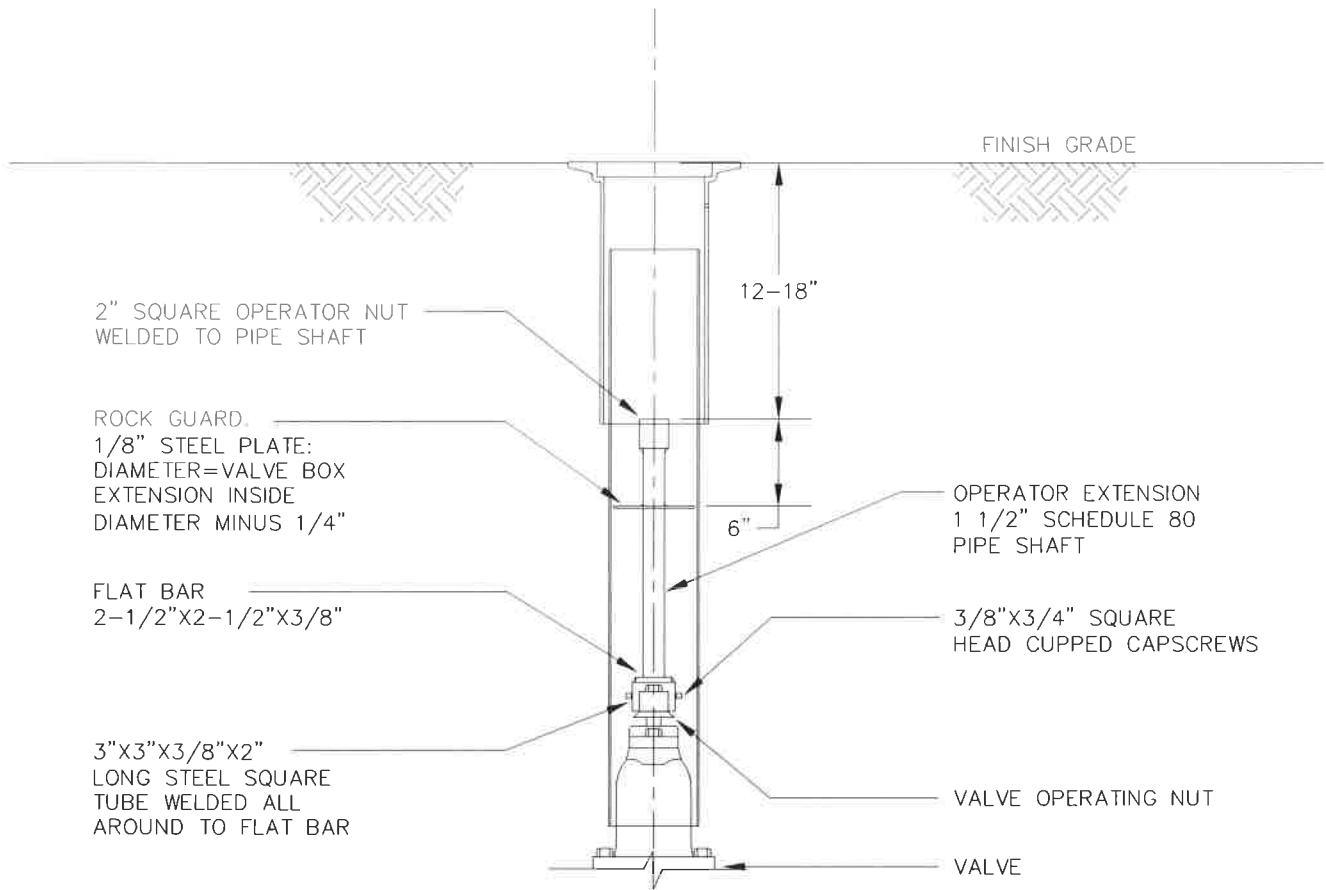
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**STANDARD WATER VALVE  
 SETTING DETAIL**

DETAIL NO.

**W-200**

03/01/2021



NOTES:

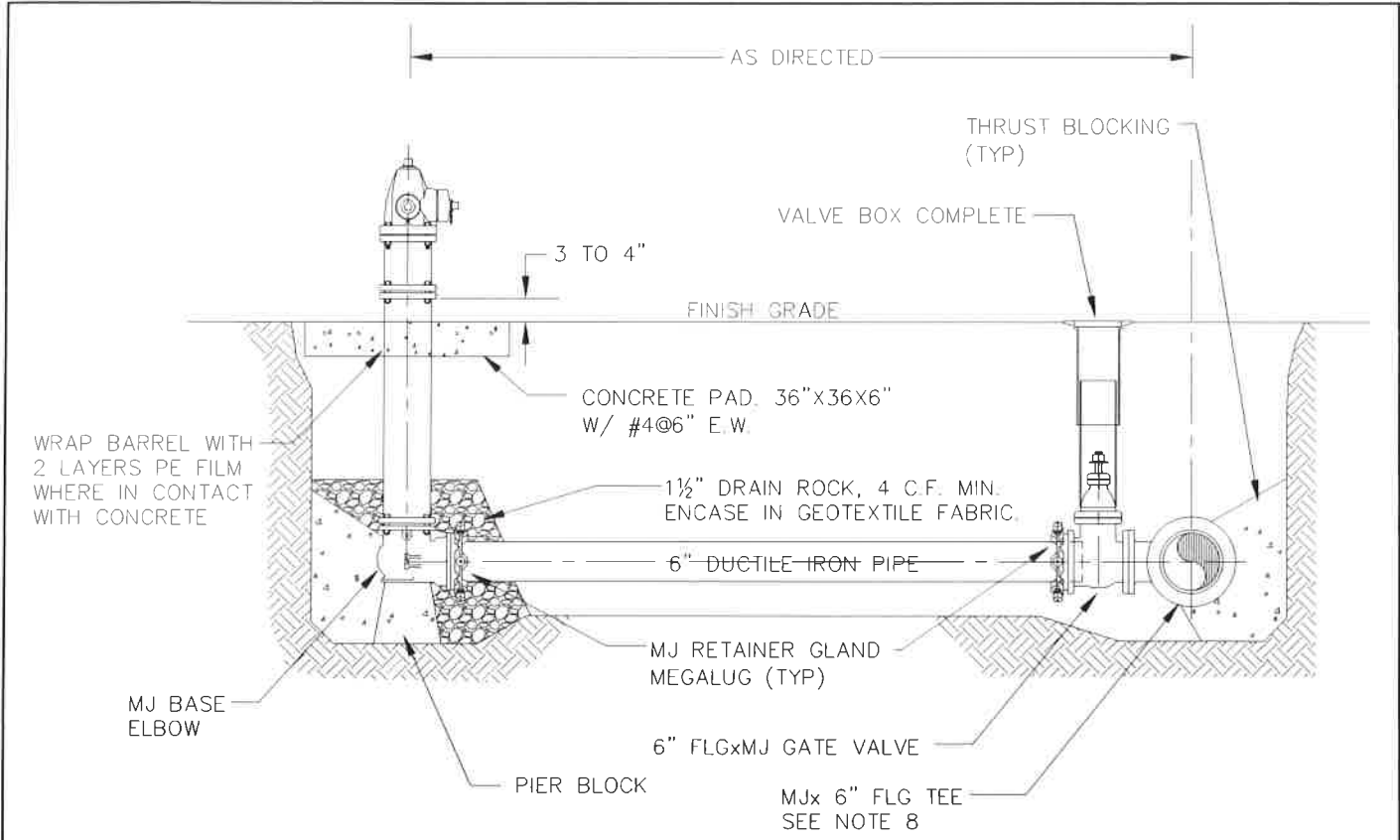
1. WHERE DEPTH IS OVER 6 FEET, A SECOND ROCK GUARD PLATE IS REQUIRED EQUALLY SPACED BETWEEN THE TOP ROCK GUARD AND THE VALVE NUT.
2. EXTENSION IS REQUIRED WHEN VALVE OPERATING NUT IS GREATER THAN 24 INCHES FROM FINISHED GROUND SURFACE.



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**VALVE OPERATOR  
 EXTENSION DETAIL**

DETAIL NO.
<b>W-205</b>
03/01/2021



NOTES:

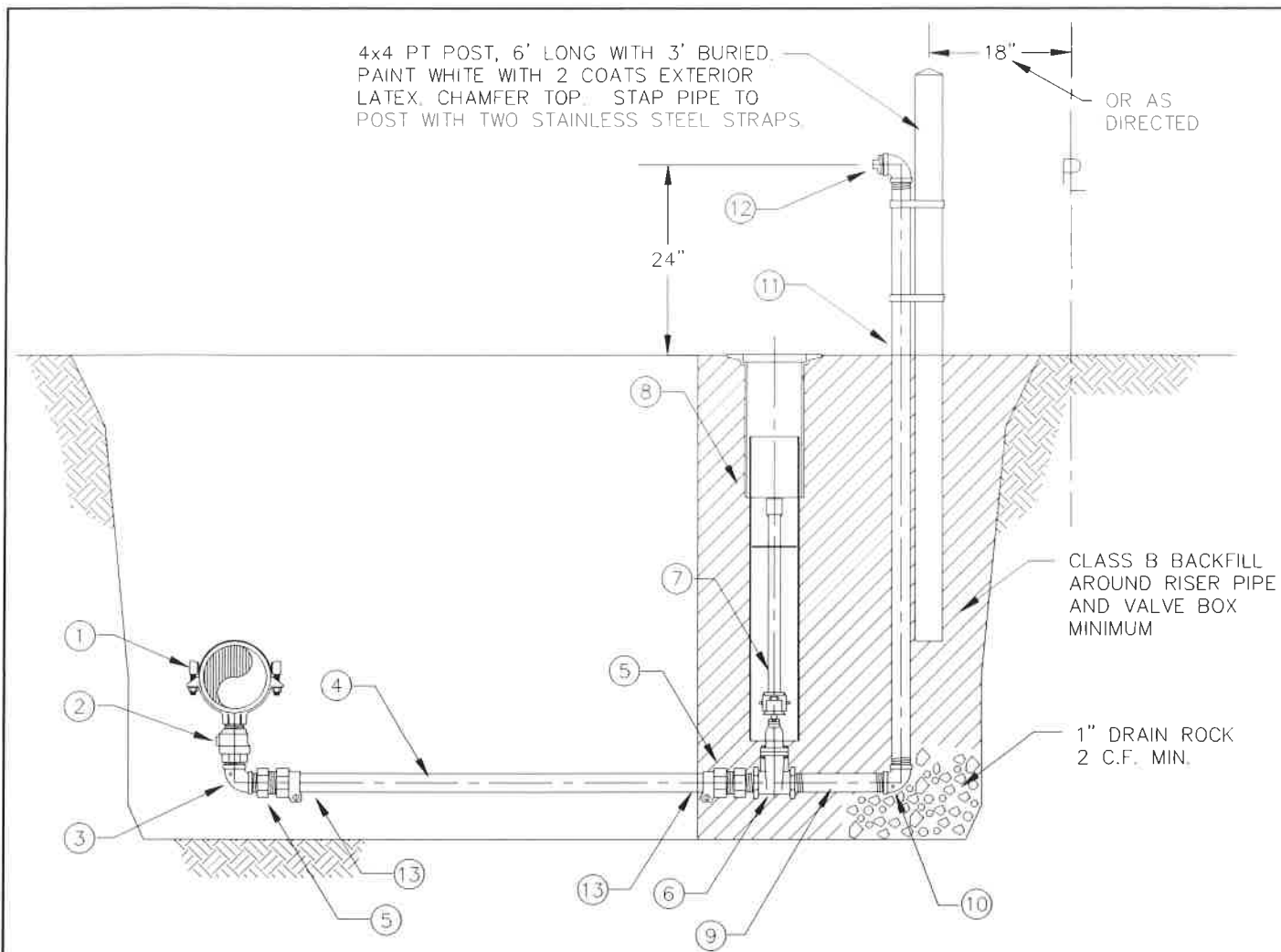
1. FIELD VERIFY SPOOL LENGTHS AND HYDRANT BARREL LENGTH REQUIRED AT EACH HYDRANT. NO JOINTS ALLOWED WHERE SPOOL LENGTH IS LESS THAN 18 FEET.
2. HYDRANT SHALL BE INSTALLED PLUMB.
3. KEEP DRAIN HOLES CLEAR AND FREE TO DRAIN.
4. SEE DETAILS FOR VALVE SETTING, THRUST BLOCKING, AND TRENCH.
5. HYDRANTS, VALVES AND OTHER MATERIALS SHALL BE AS SPECIFIED IN THE STANDARDS MANUAL.
6. A MINIMUM OF 36" OF CLEAR SPACE AROUND HYDRANTS IS REQUIRED PER UFC (NO POSTS, WALLS, SIGNS, ETC.). 5 FOOT MIN. DESIRED. THERE SHALL BE NO OBSTRUCTIONS DIRECTLY IN LINE WITH ANY OF THE PORTS OF A HYDRANT.
7. HYDRANT PUMPER PORT SHALL FACE DIRECTION OF ACCESS.
8. WHERE WATERMAIN IS LOCATED ON A SIGNIFICANT SLOPE, TEE AND VALVE SHALL BE MJxMJ WITH RESTRAINTS SO THAT VALVE MAY BE INSTALLED PLUMB.



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**STANDARD FIRE HYDRANT  
 ASSEMBLY DETAIL**

DETAIL NO.
<b>W-300</b>
03/01/2021



ITEM	SIZE	DESCRIPTION	SPECIFICATION
1	AS REQ'D	SADDLE	FORD 202BS, ROMAC 202BS; 2" FIP TAP
2	2"	BALL CORP. STOP	MIP IN x MIP OUT; FORD FB500-7, MUELLER B-2969, McDONALD 3131B
3	2"	ELBOW	304 SS OR BRASS 90° ELBOW
4	2"	PIPE	HDPE (PE 3408), SIDR 7, 200 PSI, IPS FITTING COMPATIBLE, NSF 61
5	2"	PE PJ COUPLING	PEP PJ x MIP; FORD C86-77-IDR7, MUELLER E-15429, McDONALD 4753-33
6	2"	GATE VALVE	AWWA C509 RESILIENT WEDGE GATE VALVE, THRD. ENDS, 2" NUT
7	AS REQ'D	EXTENSION	VALVE OPERATOR EXTENSION
8	N/A	VALVE BOX	VALVE BOX AND COVER
9	2"	NIPPLE	SCH. 40 304 SS OR BRASS THRD. NIPPLE, 12" LONG
10	2"	ELBOW	304 SS OR BRASS 90° ELBOW, DRILL 1/8" HOLE FOR DRAIN
11	2"	PIPE	SCH. 40 304 SS OR BRASS PIPE AS REQ'D
12	2"	ELBOW/PLUG	304 SS OR BRASS ELBOW WITH MIP THRD. PLUG
13	2"	STIFFENER	304 STAINLESS STEEL INSERT STIFFENER

NOTES:

USE ONLY WHERE APPROVED. GENERALLY LOCATED AT LOCAL LOW POINTS IN THE PIPING SYSTEM WHERE HYDRANT IS NOT PRACTICAL. HYDRANTS OR LARGER BLOW-OFF MUST ALSO BE LOCATED NEARBY TO ALLOW PROPER FLUSHING. MAY BE ALLOWED ON 6" AND SMALLER MAINS WHERE LINE PRESSURE EXCEEDS 75 PSI.



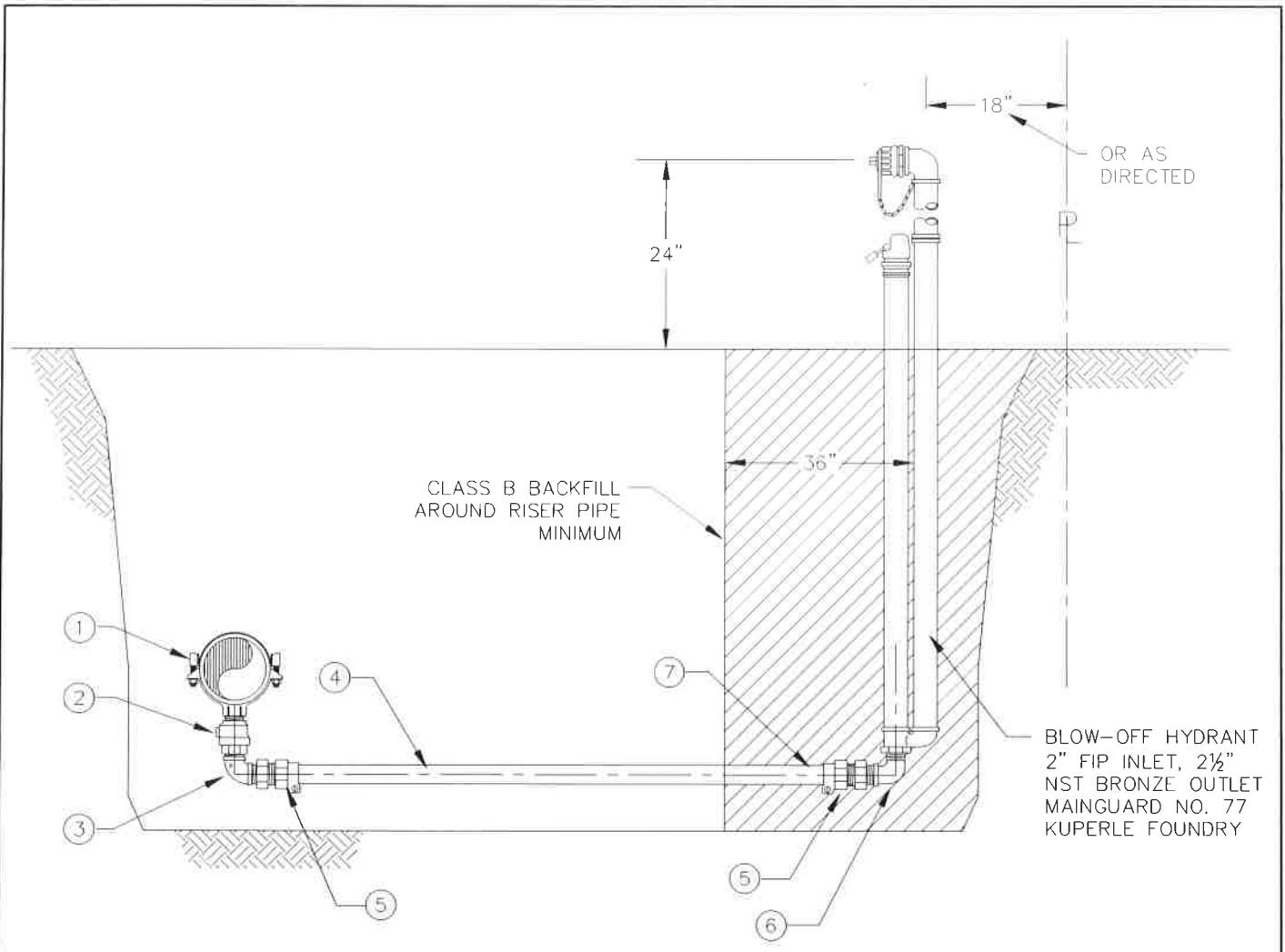
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 222 W. Lister Street  
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**2" BLOW-OFF ASSEMBLY**

DETAIL NO.

**W-400**

03/01/2021



ITEM	SIZE	DESCRIPTION	SPECIFICATION
1	AS REQ'D	SADDLE	FORD/ROMAC 202BS; 2" FIP TAP
2	2"	BALL CORP. STOP	MIP IN x MIP OUT; FORD FB500-7, MUELLER B-2969, McDONALD 3131B
3	2"	ELBOW	304 SS OR BRASS ELBOW
4	2"	PIPE	HDPE (PE 3408), SIDR 7, 200 PSI, IPS FITTING COMPATIBLE, NSF 61
5	2"	PJ COUPLING	PEP PJ x MIP; FORD C86-77-IDR7, MUELLER E-15429, McDONALD 4753-33
6	2"	STREET ELBOW	304 SS OR BRASS STREET ELBOW
7	2"	STIFFENER	304 STAINLESS STEEL INSERT STIFFENER

NOTES:  
 USE ONLY WHERE APPROVED. GENERALLY LOCATED AT LOCAL LOW POINTS IN THE PIPING SYSTEM WHERE HYDRANT IS NOT PRACTICAL. HYDRANTS OR LARGER BLOW-OFF MUST ALSO BE LOCATED NEARBY TO ALLOW PROPER FLUSHING. MAY BE ALLOWED ON 6" MAINS WHERE LINE PRESSURE EXCEEDS 75 PSI.

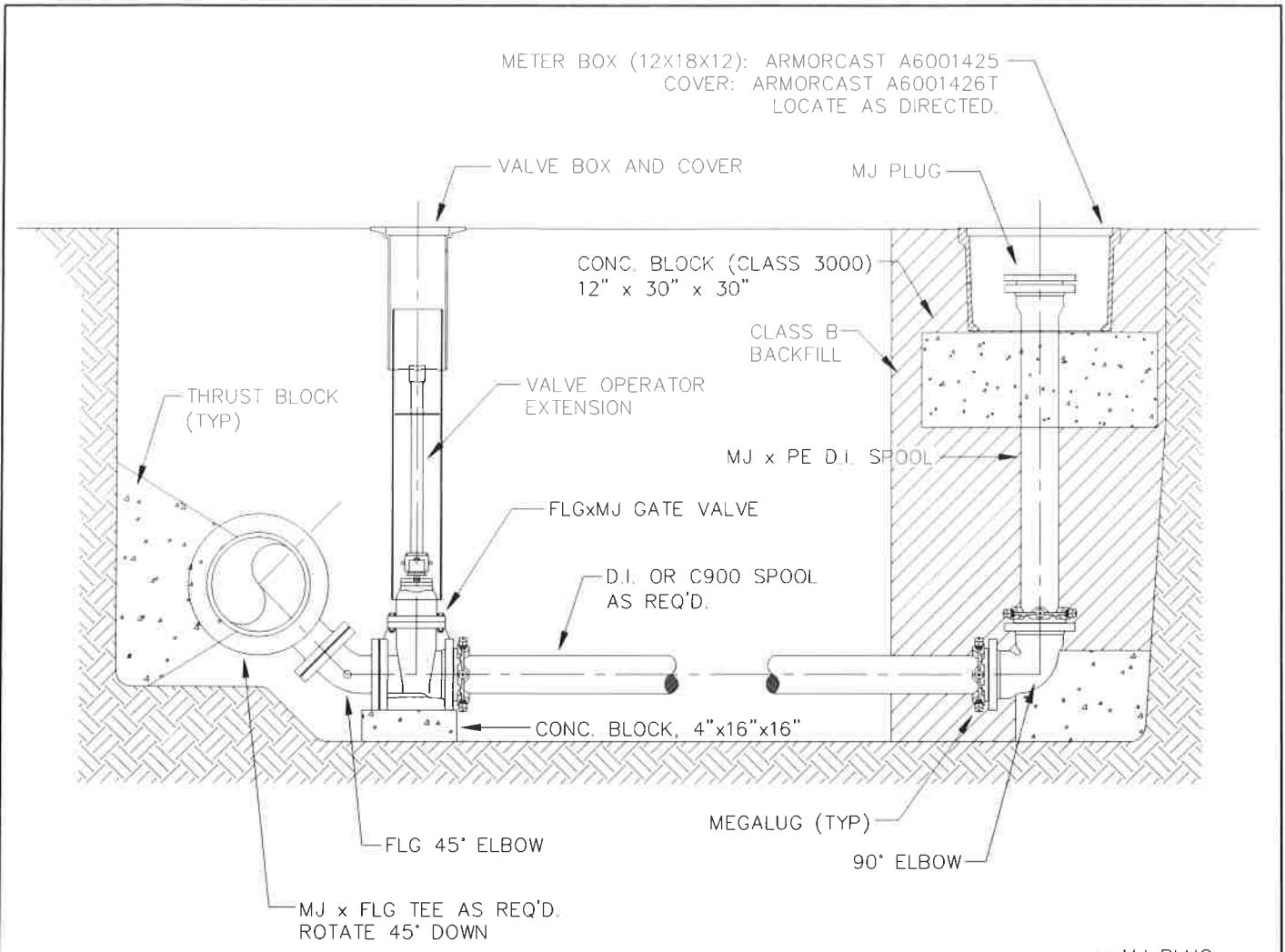


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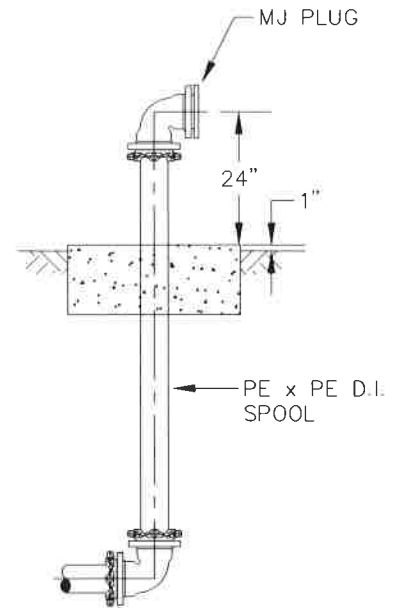
**2" BLOW-OFF ASSEMBLY  
 W/ BLOW-OFF HYDRANT**

DETAIL NO.  
**W-401**  
 03/01/2021





MAIN SIZE	BLOW-OFF SIZE
6"	4"
8"	4"
10"	6"
12"	6"
14"	8"
16"	8"
18"	10"
20"	10"
24"	12"



ALTERNATE EXPOSED END DISCHARGE AS DIRECTED

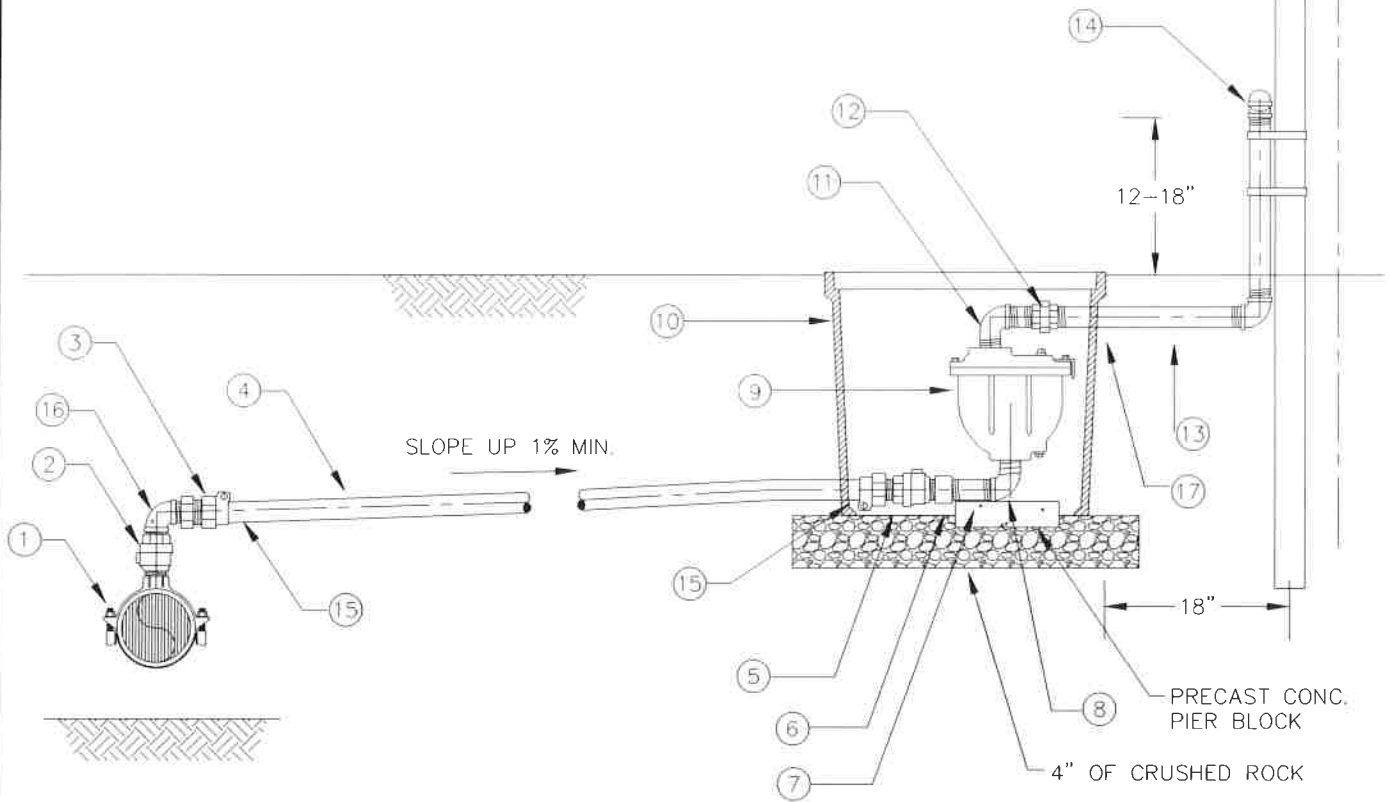


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**4"+ BLOW-OFF ASSEMBLY**

DETAIL NO.  
**W-405**  
03/01/2021

4x4 PT POST, 6' LONG WITH 3' BURIED.  
 PAINT WHITE WITH 2 COATS EXTERIOR  
 LATEX. CHAMFER TOP. STAP PIPE TO  
 POST WITH TWO STAINLESS STEEL STRAPS.



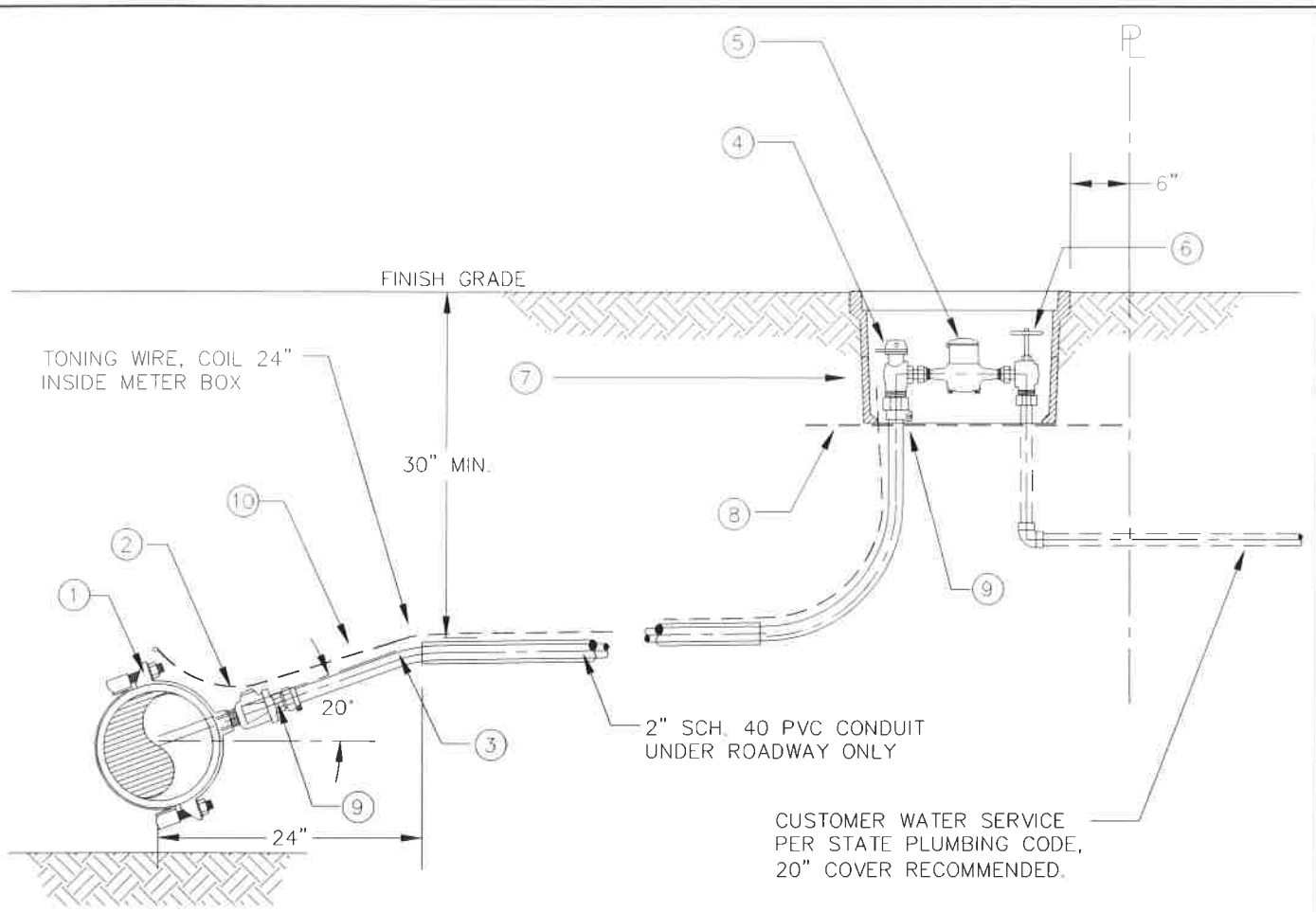
ITEM	SIZE	DESCRIPTION	SPECIFICATION
1	AS REQ'D	SADDLE	FORD/ROMAC 202BS; 2" FIP TAP
2	2"	BALL CORP. STOP	MIP IN x MIP OUT; FORD FB500-7, MUELLER B-2969, McDONALD 3131B
3	2"	PJ COUPLING	MIP x PEP PJ; FORD C86-77-IDR7, MUELLER E-15429, McDONALD 4753-33
4	2"	PIPE	HDPE (PE 3408), SIDR 7, 200 PSI, IPS FITTING COMPATIBLE, NSF 61
5	2"	BALL CORP. STOP	PEP PACK JOINT x MIP; FORD FB1101-7, MUELLER E-25029, McDONALD 4704B-33
6	2"	COUPLING	THREADED 304 SS OR BRASS COUPLING, SHORT
7	2"	NIPPLE	THREADED 304 SCH. 40 SS OR BRASS NIPPLE, 6" LONG
8	2"	STREET ELBOW	304 SS OR BRASS 90° STREET ELBOW
9	2"	CAV	COMBINATION AIR VALVE; VAL-MATIC 202C, APCO 145C
10	17"X30"X28"	VAULT	ARMORCAST A6001640TAPCX28 WITH COVER A6001947T
11	2"	STREET ELBOW	304 SS OR BRASS 90° STREET ELBOW AND SHORT SS OR BRASS NIPPLE
12	2"	UNION	STAINLESS STEEL OR BRASS UNION
13	2"	VENT PIPE	SS OR BRASS PIPE AND FITTINGS AS SHOWN
14	2"	TEE VENT	ALUMINUM T-VENT, 20 MESH SS SCREEN, MORRISON BROS. FIG 155
15	2"	STIFFENER	304 STAINLESS STEEL INSERT STIFFENER
16	2"	ELBOW	304 STAINLESS STEEL OR BRASS ELBOW
17	2"	HOLE	CORE DRILL HOLE IN BOX FOR TIGHT FIT AT PIPE USE LINK-SEAL IF NECESSARY TO PREVENT MOVEMENT AND DIRT



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**2" COMBINATION AIR  
 VALVE ASSEMBLY**

DETAIL NO.  
**W-500**  
 03/01/2021



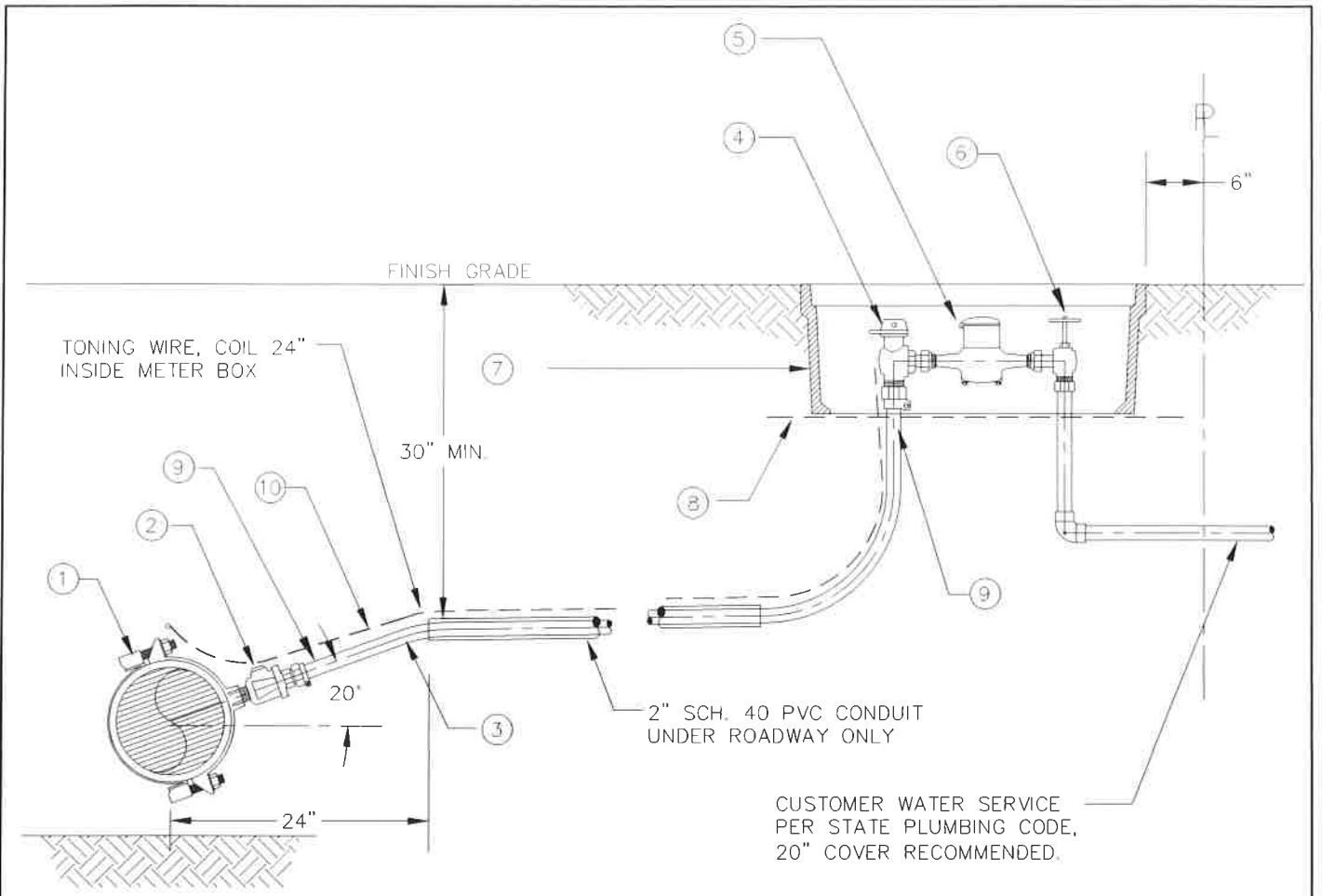
ITEM	SIZE	DESCRIPTION	SPECIFICATION
1	AS REQ'D	SADDLE	FORD/ROMAC 202BS; 1" FIP TAP
2	1"	BALL CORP. STOP	MIP x PEP PJ; FORD FB1101-4, MUELLER E-25029, McDONALD 4704B-33
3	1"	SERVICE PIPE	HDPE (PE 3408), SIDR 7, 200 PSI, IPS FITTING COMPATIBLE, NSF 61
4	1"	ANGLE BALL METER VALVE	1" PEP PACK JOINT INLET x 3/4" METER SWIVEL NUT OUTLET FORD BA63-342W, McDONALD 4602B-33
5	5/8"x3/4"	WATER METER	NEPTUNE E-CODER R900i, GALLON READ
6	3/4"	SERVICE VALVE ANGLE GLOBE	METER SWIVEL NUT INLET X FIP OUTLET FORD GA13-444 (NRWD SUPPLIES)
7	12"x20"x12"	METER BOX	ARMORCAST A6001640PCX12, A6001947TDZ (COVER), A6000482T (DROP-IN)
8	16" x 24"	FELT PAPER	90-LB FELT PAPER, ASPHALT SATURATED
9	3/4"	STIFFENER	304 STAINLESS STEEL INSERT STIFFENER
10	10 GA.	TRACER WIRE	10 GA. COPPER WIRE WITH BLUE 30 MIL THICK HDPE INSULATION
			METER BOX/COVER: POLYMER CONCRETE, DROP-IN LID: DUCTILE IRON
			SEE W-150 FOR TRENCH DETAILS



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## STANDARD 3/4" WATER SERVICE CONNECTION

DETAIL NO.  
**W-600**  
 03/01/2021



ITEM	SIZE	DESCRIPTION	SPECIFICATION
1	AS REQ'D	SADDLE	FORD/ROMAC 202BS; 1" FIP TAP
2	1"	BALL CORP. STOP	MIP x PEP PJ; FORD FB1101-4, MUELLER E-25029, McDONALD 4704B-33
3	1"	SERVICE PIPE	HDPE (PE 3408), SIDR 7, 200 PSI, IPS FITTING COMPATIBLE, NSF 61
4	1"	ANGLE BALL METER VALVE	PEP PACK JOINT INLET x METER SWIVEL NUT OUTLET FORD BA63-444W, MUELLER E-24259, McDONALD 4602B-33
5	1"	WATER METER	NEPTUNE E-CODER R900i, GALLON READ
6	1"	SERVICE VALVE ANGLE GLOBE	METER SWIVEL NUT INLET X FIP OUTLET FORD GA13-444 (NRWD SUPPLIES)
7	17"x30"x12"	METER BOX	ARMORCAST A6001640PCX12, A6001947TDZ (COVER), A6000482T (DROP-IN)
8	24" x 36"	FELT PAPER	90-LB FELT PAPER, ASPHALT SATURATED
9	1"	STIFFENER	304 STAINLESS STEEL INSERT STIFFENER
10	10 GA.	TRACER WIRE	10 GA. COPPER WIRE WITH BLUE 30 MIL THICK HDPE INSULATION
			METER BOX/COVER: POLYMER CONCRETE, DROP-IN LID: DUCTILE IRON
			SEE W-150 FOR TRENCH DETAILS



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## STANDARD 1" WATER SERVICE CONNECTION

DETAIL NO.  
**W-605**  
 03/01/2021

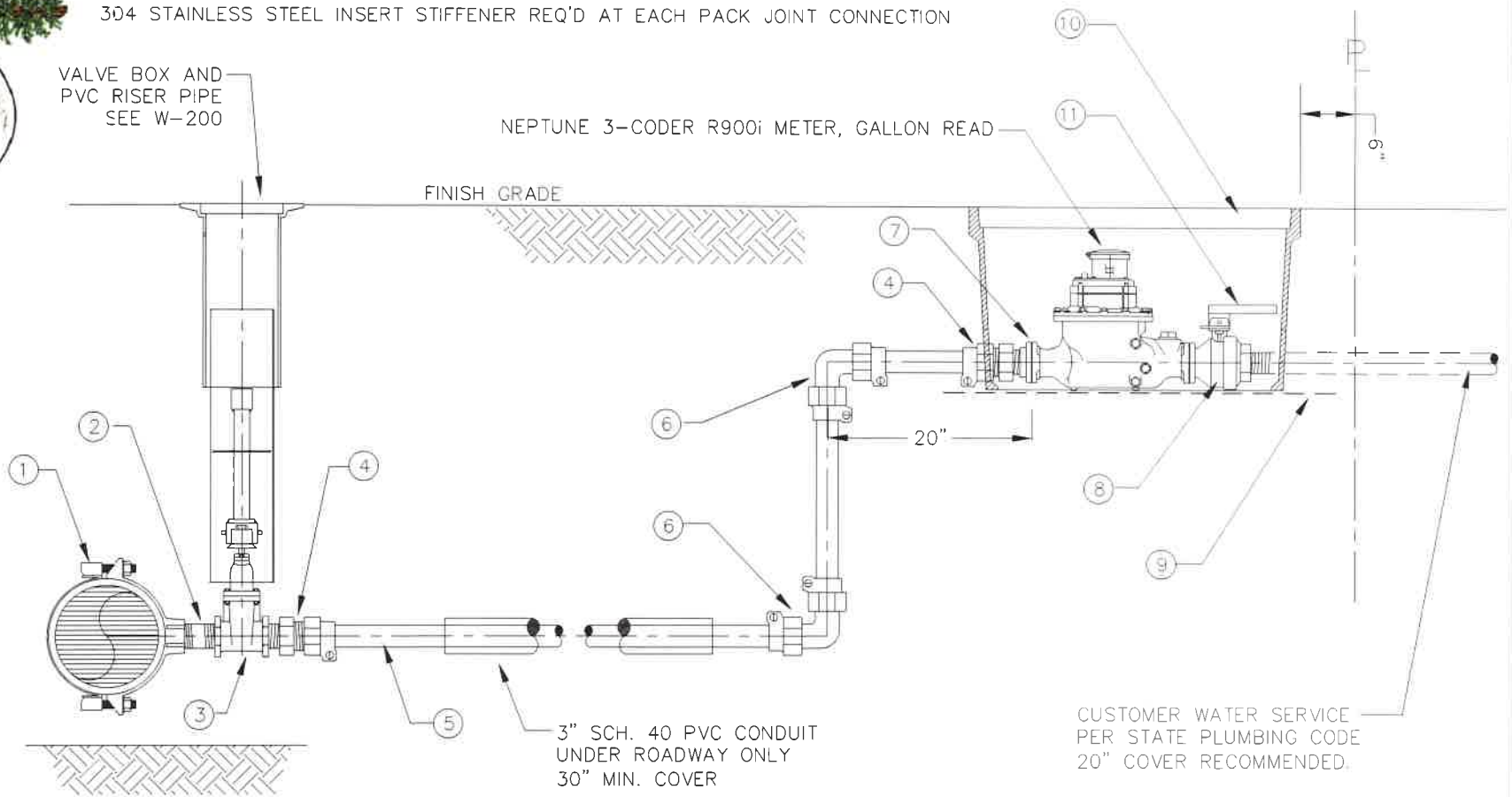


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**STANDARD 2" WATER  
 SERVICE CONNECTION**

DETAIL NO.  
**W-608**  
 03/01/2021

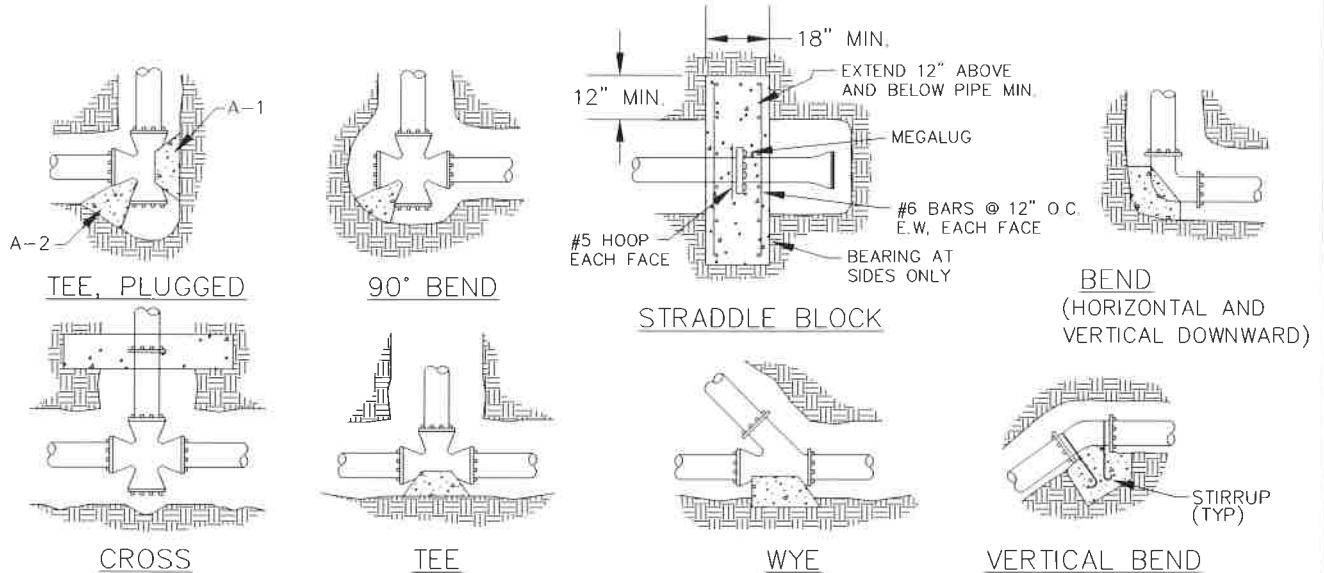
SEE W-150 FOR TRENCH DETAILS  
 304 STAINLESS STEEL INSERT STIFFENER REQ'D AT EACH PACK JOINT CONNECTION



ITEM	SIZE	DESCRIPTION	SPECIFICATION
1	AS REQ'D	SADDLE	FORD/ROMAC 202BS; 2" FIP TAP
2	2"	NIPPLE	BRASS OR 304 SS NIPPLE, MIPxMIP, 4" LONG
3	2"	GATE VALVE	AWWA C509 RESILIENT WEDGE GATE VALVE, THRD. ENDS, 2" NUT
4	2"	PJ COUPLING	MIP x PEP PJ; FORD C86-77-IDR7, MUELLER E-15429, McDONALD 4753B-33
5	2"	SERVICE PIPE	HDPE (PE 3408), SIDR 7, 200 PSI, IPS FITTING COMPATIBLE, NSF 61
6	2"	PJ ELBOW	PEP PACK JOINT ELBOW; FORD L66-77-IDR7, McDONALD 4761-33
7	2"	ADAPTER	METER FLANGE x 2" FIP OUTLET; FORD CF31-77, McDONALD 610F
8	2"	BALL METER VALVE	METER FLG x FIP; FORD BF13-777W; MUELLER B-24337, McDONALD 6101M
9	24"x36"	FELT PAPER	90-LB FELT PAPER, ASPHALT SATURATED
10	17"x30"x18"	METER BOX	ARMORCAST A6001640PCX18, A6001947TDZ (COVER), A6000482T (DROP-IN)
11	N/A	HANDLE	BALL VALVE HANDLE; FORD HB-67S, McDONALD 6120BS

(HORIZONTAL) BEARING AREA OF THRUST BLOCKS IN SQUARE FEET						(VERTICAL UP) VOLUME OF THRUST BLOCK IN CUBIC YARDS						
FITTING SIZE	TEE, WYE, DEAD END, AND HYDRANT	STRADDLE BLOCK	90° BEND	TEE PLUGGED ON RUN		45° BEND	22-1/2° BEND	11-1/4° BEND	90° BEND	45° BEND	22-1/2° BEND	11-1/4° BEND
				A-1	A-2							
4	1.0	1.0	1.4	1.0	1.4	0.8	0.4	0.2	0.82	0.45	0.23	0.11
6	2.1	2.1	3.0	2.1	3.0	1.6	0.9	0.5	1.85	1.00	0.51	0.26
8	3.8	3.8	5.4	3.8	5.4	2.9	1.5	0.8	3.29	1.78	0.91	0.46
10	5.9	5.9	8.4	5.9	8.4	4.5	2.3	1.2	5.14	2.78	1.42	0.71
12	8.5	8.5	12.0	8.5	12.0	6.5	3.3	1.7	7.40	4.01	2.04	1.03
14	11.6	11.6	16.4	11.6	16.3	8.9	4.5	2.3	10.08	5.45	2.78	1.40
16	15.1	15.1	21.4	15.1	21.3	11.6	5.9	3.0	13.16	7.12	3.63	1.82
18	19.1	19.1	27.0	19.1	27.0	14.6	7.5	3.8	16.66	9.02	4.60	2.31
20	23.6	23.6	33.3	23.6	33.3	18.1	9.2	4.7	20.57	11.13	5.67	2.85
24	34.0	34.0	48.0	34.0	48.0	26.0	13.3	6.7	29.62	16.03	8.17	4.11

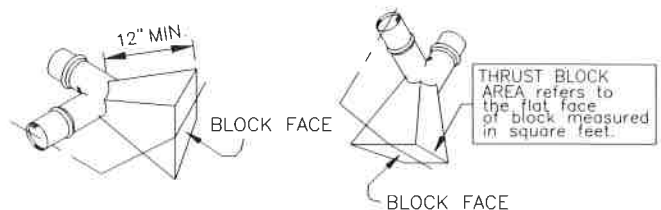
ABOVE BEARING AREAS BASED ON TEST PRESSURE OF 150 PSI AND AN ALLOWABLE SOIL BEARING STRESS OF 2000 POUNDS PER SQUARE FOOT. DESIGNER IS CAUTIONED TO ENSURE THAT 2000 PSF BEARING IS AVAILABLE.



**NOTES:**

1. CONCRETE BLOCKING TO BE POURED AGAINST UNDISTURBED EARTH.
2. ALL CONCRETE TO BE CLASS 3000 MINIMUM.
3. INSTALL 6 MIL PLASTIC BETWEEN PIPE AND/OR FITTINGS BEFORE POURING CONCRETE BLOCKING.
4. CONCRETE SHALL BE KEPT CLEAR OF ALL JOINTS AND ACCESSORIES.
5. TIE RODS SHALL BE DEFORMED GALVANIZED COLD ROLLED STEEL, 40000 PSI TENSILE STRENGTH (ASTM A615) COAT WITH COAL TAR EPOXY AFTER INSTALLATION.
6. BEARING AREA REQ'D AT REDUCERS IS THE DIFFERENCE BETWEEN VALUES FOR DEAD END FOR EACH END SIZE (IE 6x8 = 3.8-2.1 = 1.7 S.F.)

RODS FOR VERTICAL BENDS		
FITTING SIZE	ROD SIZE	EMBEDMENT
10" AND LESS	#5	17"
12"-16" (11.25')	#5	17"
12"-16" (22.5')	#7	24"
12" (45')	#7	24"
14"-16" (45')	#9	30"



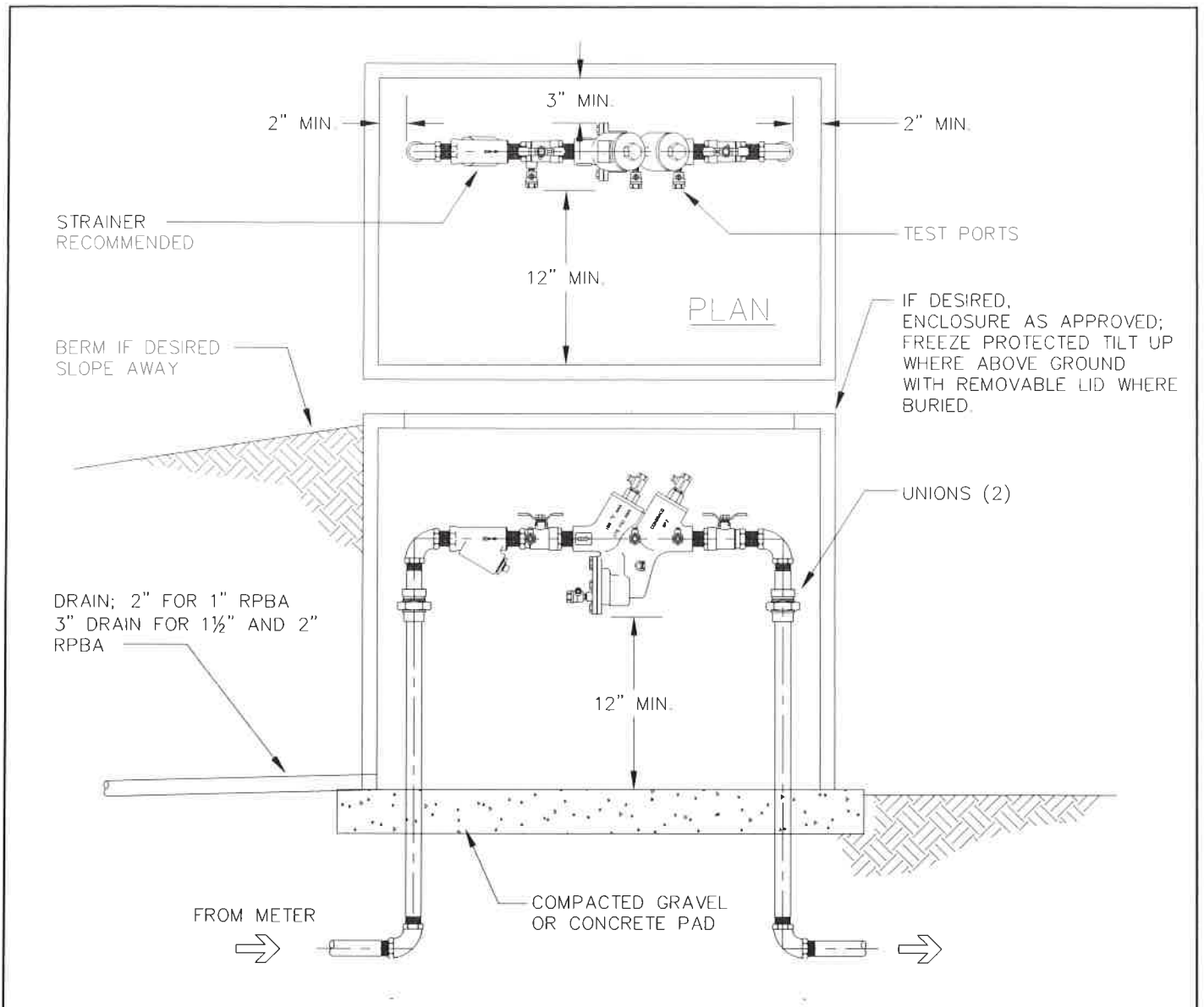
**City of Cave Junction**  
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**CONCRETE THRUST BLOCKING  
 STANDARD DETAILS**

DETAIL NO.

**W-700**

03/01/2021



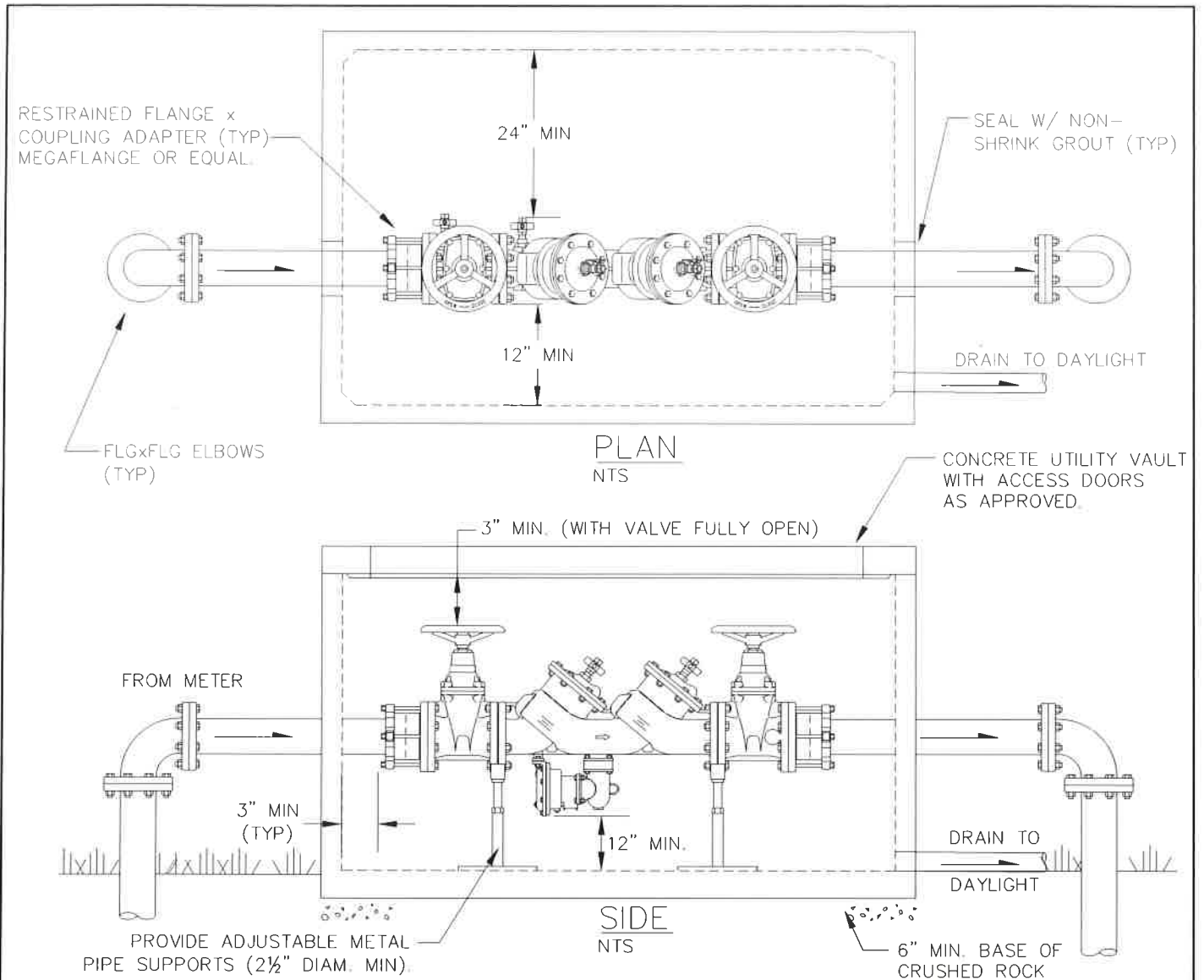
1. RPBA MUST BE INSTALLED ABOVE NATURAL GROUND, BUT MAY HAVE A BERM AROUND ENCLOSURE.
2. BOTTOM AND SIDE CLEARANCES ALSO APPLY WHEN ASSEMBLIES ARE INSTALLED INSIDE BUILDING.
3. RPBAs SHALL ALWAYS BE INSTALLED IN HORIZONTAL ORIENTATION UNLESS DEVICE SPECIFICALLY APPROVED FOR VERTICAL INSTALLATION.
4. RPBAs SHALL ALWAYS BE INSTALLED ABOVE THE 100 YEAR FLOOD LEVEL UNLESS OTHERWISE APPROVED.
5. RELIEF VALVES SHALL NOT BE PLUGGED OR EXTENDED.
6. PROVIDE PROTECTION FROM FREEZING.
7. RPBAs SHALL NOT BE INSTALLED IN AN ENCLOSURE UNLESS AN AIR-GAPPED DRAIN TO DAYLIGHT IS PROVIDED AND BRASS OR PLASTIC PLUGS ARE PROVIDED IN ALL TEST PORTS. DRAIN SHALL BE BORE SIGHTED SLOPING 1/8" PER FOOT MIN.
8. MAXIMUM HEIGHT OF INSTALLATION SHALL NOT EXCEED 5 FEET FOR ASSEMBLY UNLESS THERE IS A PERMANENT PLATFORM INSTALLED IN ACCORDANCE WITH OCCUPATIONAL SAFETY AND HEALTH (OSHA) STANDARDS TO FACILITATE SERVICING THE ASSEMBLY.
9. LOCATION OF DEVICE SHALL BE AS DIRECTED BY THE CITY. GENERALLY LOCATED AS CLOSE TO MAIN CONNECTION AS POSSIBLE, IMMEDIATELY AFTER WATER METER.
10. INSTALLATION MAY CREATE CLOSED SYSTEM. CONSULT LOCAL PLUMBING CODES.



City of Cave Junction  
 222 W. Lister Street  
 Josephine, Oregon 97523  
 (541) 592-2156

**REDUCED PRESSURE  
 BACKFLOW ASSEMBLY  
 (3/4" - 2")**

DETAIL NO.
<b>W-800</b>
03/01/2021



1. ASSEMBLY SHALL NOT BE SUBJECT TO FLOODING.
2. RPBA SHALL BE INSTALLED ABOVE THE 100 YEAR FLOOD LEVEL, UNLESS OTHERWISE APPROVED.
3. RPBA<sub>s</sub> ARE TYPICALLY INSTALLED ABOVE-GRADE IN WELL-DRAINED AREAS, BUT MAY BE INSTALLED BELOW-GRADE IN VAULT IF AN ADEQUATE AIR-GAPPED, BORE-SIGHTED DRAIN (SLOPE 1/8"/FT.) TO DAYLIGHT IS PROVIDED.
4. DRAIN LINES SHALL BE SIZED TO ACCOMMODATE FULL RELIEF VALVE DISCHARGE FLOW.
5. CLEARANCES ALSO APPLY WHEN ASSEMBLIES ARE INSTALLED INSIDE BUILDING.
6. BRASS OR PLASTIC TEST PORT PLUGS ARE REQUIRED FOR ALL VAULT INSTALLATIONS.
7. ALL EXPOSED PIPE AND FITTINGS SHALL BE DUCTILE IRON.
8. RPBA SHALL BE INSTALLED HORIZONTALLY UNLESS DEVICE IS SPECIFICALLY APPROVED FOR VERTICAL INSTALLATION.
9. PROVIDE PROTECTION FROM FREEZING.
10. DO NOT PLUG OR EXTEND RELIEF VALVES.
11. MAXIMUM HEIGHT OF INSTALLATION SHALL NOT EXCEED 5 FEET UNLESS THERE IS A PERMANENTLY INSTALLED PLATFORM MEETING OSHA STANDARDS TO FACILITATE SERVICING THE ASSEMBLY.
12. LOCATION OF DEVICE SHALL BE AS DIRECTED BY THE CITY. GENERALLY LOCATED AS CLOSE TO MAIN CONNECTION AS POSSIBLE, IMMEDIATELY AFTER WATER METER.

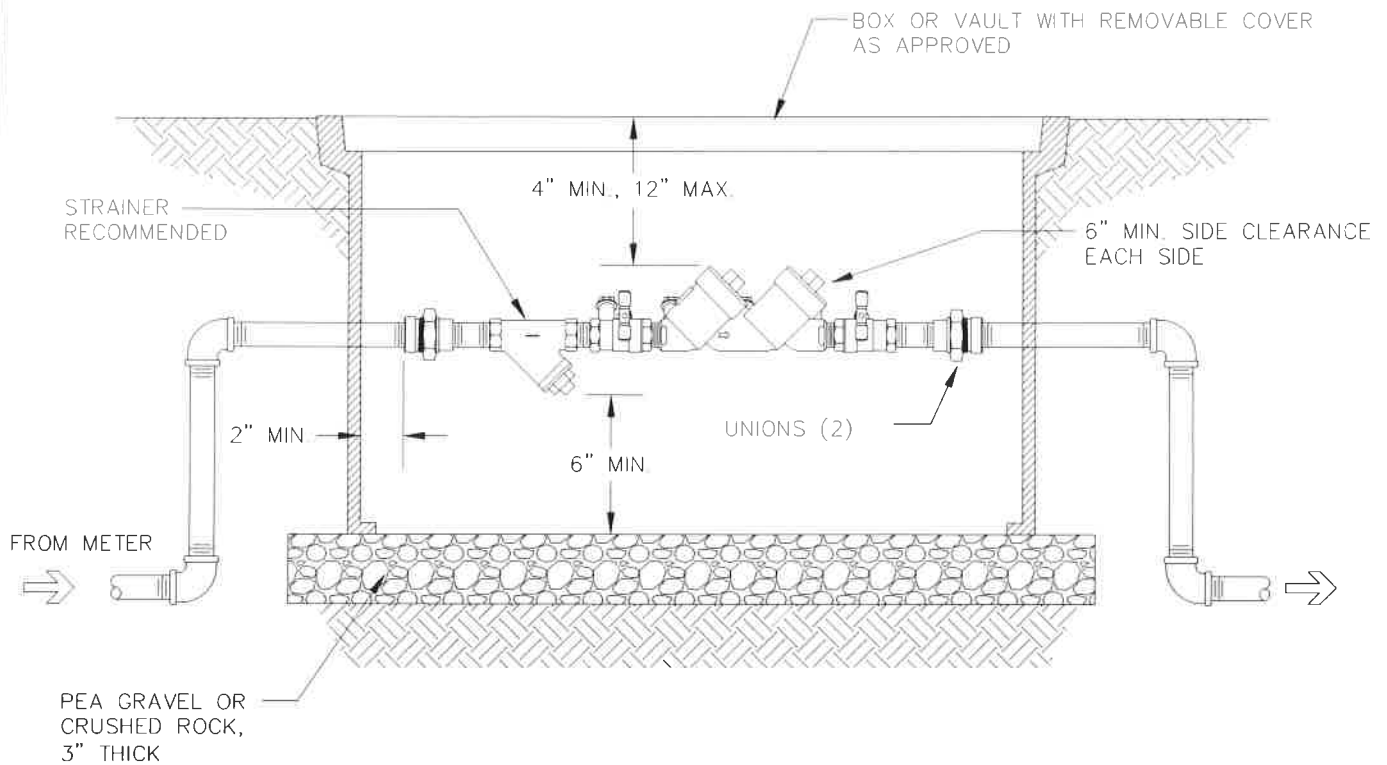


City of Cave Junction  
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**REDUCED PRESSURE  
 BACKFLOW ASSEMBLY  
 (2 1/2" UP)**

DETAIL NO.
<b>W-805</b>
03/01/2021





1. PROTECTION FROM FREEZING SHALL BE PROVIDED.
2. DCVAs MAY BE INSTALLED BELOW GRADE IN A BOX OR VAULT WITH BRASS OR PLASTIC PLUGS PROVIDED IN ALL TEST PORTS AND ASSEMBLY IS NOT TO BE SUBJECT TO CONTINUOUS IMMERSION.
3. DCVAs SHALL BE PROVIDED WITH ADEQUATE AIR-GAPPED DRAINAGE. DRAIN SHALL NOT BE CONNECTED TO SANITARY OR STORM DRAIN SYSTEMS.
4. LOCATE AS DIRECTED AS CLOSE TO MAINLINE CONNECTION AS POSSIBLE. GENERALLY LOCATED IMMEDIATELY AFTER WATER METER.
5. MAY BE INSTALLED VERTICALLY IF INTERNALLY SPRING LOADED, HAS NORMAL FLOW UPWARD, AND IS RECOMMENDED BY MANUFACTURER FOR VERTICAL INSTALLATION.
6. CLEARANCES SHALL ALSO APPLY WHEN INSTALLED INSIDE BUILDING.
7. SHALL NOT BE INSTALLED AT A HEIGHT GREATER THAN 5 FEET UNLESS THERE IS A PERMANENTLY INSTALLED PLATFORM MEETING OSHA STANDARDS TO FACILITATE SERVICING THE ASSEMBLY.
8. INSTALLATION OF A BACKFLOW ASSEMBLY MAY CREATE A CLOSED SYSTEM. CONSULT LOCAL PLUMBING CODES FOR PRESSURE RELIEF VALVE AND THERMAL EXPANSION REQUIREMENTS.
9. USE ONLY DEVICES LISTED ON CURRENT LIST OF STATE APPROVED DEVICES.



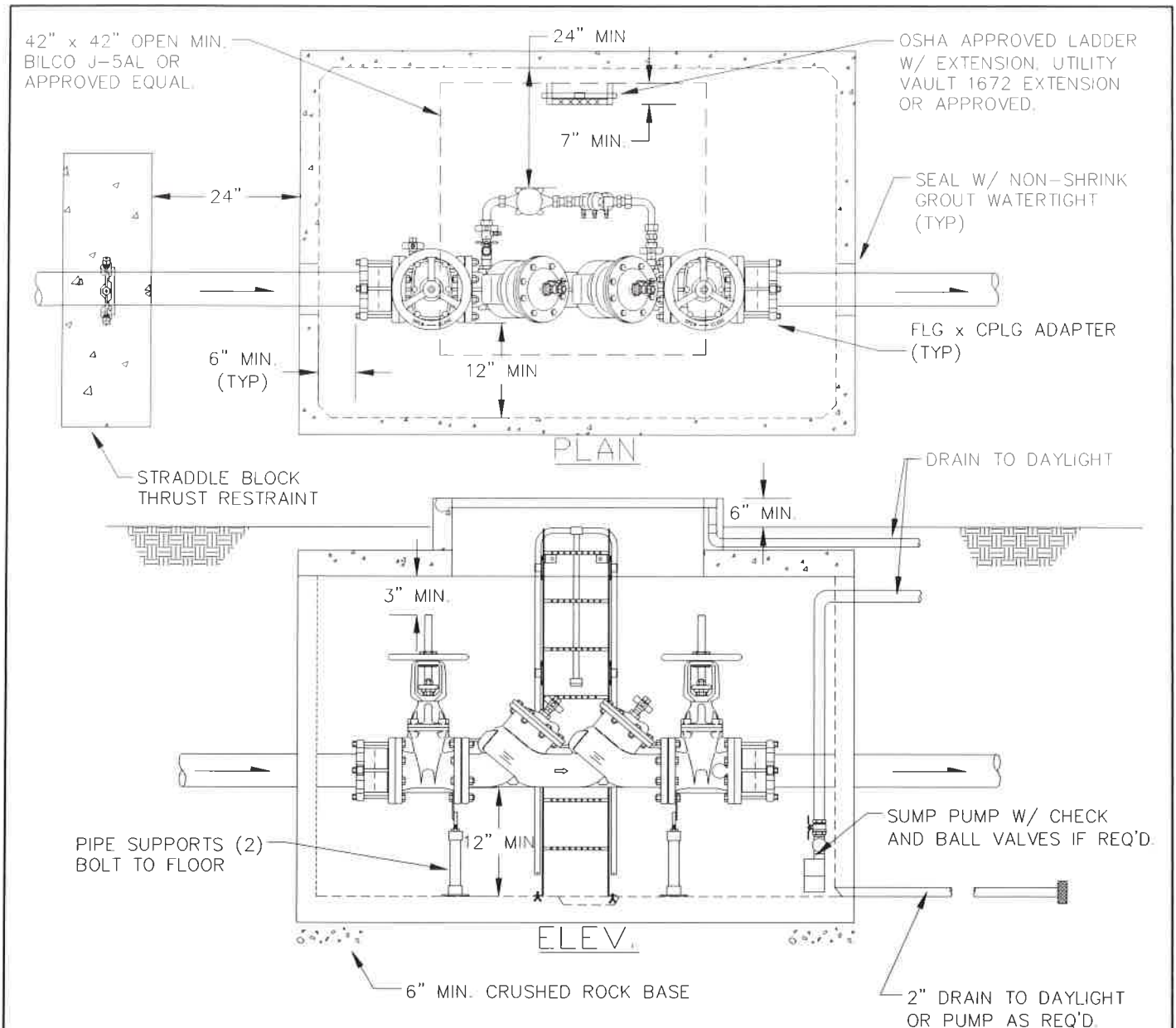
**City of Cave Junction**  
 222 W. Lister Street  
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**DOUBLE CHECK VALVE  
 ASSEMBLY (3/4" - 2")**

DETAIL NO.

**W-900**

03/01/2021



**NOTE:**

1. FOR FIRE LINE INSTALLATIONS. SUBMIT DETAIL DRAWING AND SPECS FOR APPROVAL.
2. ASSEMBLY SHALL NOT BE SUBJECT TO FLOODING.
3. DCDA's ARE TYPICALLY INSTALLED BELOW-GRADE. DRAIN TO DAYLIGHT OR PUMP AS REQUIRED.
4. PUMP SHALL HAVE MIN. CAPACITY OF 5 GPM. DRAIN SHALL HAVE BACKWATER VALVE AND RODENT SCREEN.
5. BRASS OR PLASTIC PLUGS ARE REQUIRED FOR ALL TESTING PORTS.
6. DOMESTIC SERVICE SHALL NOT BE INSTALLED OFF THE FIRE SERVICE UNLESS APPROVED.
7. VAULTS SHALL BE PRECAST CONCRETE AS REQUIRED.
8. ALL EXPOSED PIPE AND FITTINGS SHALL BE DUCTILE IRON.
9. LOCATE AS DIRECTED BY THE CITY. GENERALLY LOCATED AS CLOSE TO MAIN CONNECTION AS POSSIBLE, IMMEDIATELY AFTER WATER METER.



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**DOUBLE CHECK DETECTOR  
 ASSEMBLY (2 1/2" UP)**

DETAIL NO.

**W-905**

03/01/2021