

CHAPTER 2

WATER DISTRIBUTION DESIGN AND CONSTRUCTION STANDARDS AND SPECIFICATIONS

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**City of Marysville
Public Works / Community Development**

CHAPTER 2 - WATER DISTRIBUTION

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CITY OF MARYSVILLE

**DESIGN AND CONSTRUCTION STANDARDS
AND
SPECIFICATIONS**

CHAPTER 2

WATER DISTRIBUTION

2-000 Water

2-010 General Any extension of the City of Marysville Water System must be approved by the Engineering Department. All extensions must conform to Department of Health guidelines, the North Snohomish County Coordinated Water System Plan, City of Marysville Water System Plan, and Fire District No. 12 requirements.

All construction of water mains and related appurtenances shall conform to these Standards, applicable American Water Works Association (AWWA) Specifications and the WSDOT Standard Specifications. The general requirements of AWWA and the WSDOT Standard Specifications shall apply unless they are inconsistent with any of the provisions of this particular section. Should inconsistencies occur, these Standards shall have precedence.

In designing and planning for any development, it is the developer's responsibility to see that adequate water for both domestic use and fire protection is attainable. The developer must show, in all proposed plans, how water will be supplied and whether adequate water pressure will be attained in case of fire.

The fire flow requirements are established by the International Building Code. The Public Works Department will evaluate whether the existing system will meet that requirement or if system improvements are required. Due to seasonal and other variables associated with flow tests, these flow tests will not be used to measure the system's ability to meet the fire flow requirements.

An analysis performed by the City of the system may be required if it appears that the system might be inadequate. The developer shall be assessed any and all applicable fees for the analysis.

Anyone who wishes to extend or connect to the City's water system should contact Engineering Services for a water connection fee estimate. This fee estimate is an estimate of the costs due the City for a waterline connection.

Prior to the activation of any water meters, all Public Works improvements must be completed and approved including granting of right-of-way or easements, and all applicable fees must be paid.

Issuance of building permits for new construction shall not occur until final approval is given. A construction bond, in accordance with Section 14.03.430 Marysville Municipal Code (MMC), will be required for the remaining public works improvements. Certificate of occupancy will not be issued until final approval is given for all improvements.

2-020 Design Standards The design of any water extension/connection shall conform to City Standards and any applicable standards as set forth herein and in Title 14 of the City of Marysville Municipal Code.

Water main extensions will be required when the property does not front on a water main or when the existing water main is not adequate for the increased use proposed.

The layout of extensions shall provide for future continuation and/or "looping" of the existing system as determined by the City. Utility mains shall be extended to and through the extremes of the property being developed. Main extensions shall be extended as required in Section 14.03 MMC .

The minimum size shall be 8 inches in diameter unless otherwise approved by the Public Works Director or designee. Water main extensions and/or new fire hydrant installations may also be required per the requirements of the City Fire Marshal or City Engineer.

The General Notes at the end of this chapter shall be included on any plans dealing with water system design.

2-030 Connection to Existing Water Main The developer's engineer shall be responsible for determining the scope of work for connection to existing water mains.

It shall be the Contractor's responsibility to field verify the location and depth of the existing main and the fittings required to make connections to the existing mains. Connection of a

new main to existing shall only be done through a private double check valve assembly until testing and purity.

The connection to a water main in use shall be made by the Developer and only at such time as the City Engineer or Utilities Superintendent permits. Work required to make the connection shall be continuous, and done in a timely manner with a sufficient number of men employed to insure the least interference with the City's water system. The Developer shall notify the City Inspector and the Utilities Superintendent at least forty-eight (48) hours prior to the scheduled time of the connection. The Marysville Water Department shall open or close all valves for construction, filling, testing, and flushing water mains and submit the bacteriological water sample. Existing valves, fittings, and other items removed to install the new main shall be salvaged by the Developer and delivered to the City's storage yard.

Ends of abandoned water main shall be plugged by filling with Class 3000 or Commercial Concrete for a minimum longitudinal length of twelve (12) inches.

2-040 Service Interruption The Contractor shall give the City a minimum of 48 hours notice of any planned connection to an existing pipeline. This includes all cut-ins and live taps. Notice is required so any disruptions to existing services can be scheduled. The City will notify customers involved or affected of the water service interruption. The Contractor shall make every effort to schedule water main construction with minimum interruption of water service. In certain situations, the City may dictate scheduling of water main shutdowns so as not to impose unnecessary shutdowns during specific periods to existing customers.

2-050 A. Water System Materials All materials shall be new and undamaged. The same manufacturer of each item shall be used throughout the work.

Where reference is made to other specifications, it shall be the latest revision at the time of construction, except as noted on the plans or herein.

All materials not specifically referenced shall comply with applicable sections of ANSI, ASTM, AWWA, or the WSDOT Standard Specifications.

Approved manufacturers and model numbers of various materials are listed in Approved Materials List of this chapter. When specific manufacturers or models are listed, no substitutions will be allowed without prior approval by the City Engineer.

- B. Main Line Water mains shall be sized to provide adequate domestic and fire flow demands at the required residual pressure. Fire flow requirements will be determined by the Fire District; however, the quantity of water required will in no case be less than 20 psi residual pressure under fire flow conditions..

The minimum water main size shall be 8 inches diameter as long as fire flow requirements can be met. Larger size mains are required in specific areas outlined in the Comprehensive Water System Plan. Nothing shall preclude the City from requiring the installation of a larger sized main in areas not addressed in the Comprehensive Water System Plan if the City determines a larger size is needed to meet fire protection requirements for future service.

- C. Dead End Line No dead end line less than 8 inch in diameter shall be longer than 200 lineal feet. Fire protection must be attainable for all lots from main line hydrants and it is apparent that the main will not be extended at any time in the future.
- D. All pipe for water mains shall have flexible gasketed joints and shall comply with the following:

Ductile Iron Pipe:

Ductile iron pipe shall conform to ANSI Specification A21.51, 1976, AWWA C151-76, or the latest revision thereof and shall be of the thickness Class 52, unless otherwise specified by the City Engineer. The pipe shall be furnished with rubber gasketed push-on type joints except where flanged joints are specifically required by the City Engineer. Joint details shall be as specified in ANSI A21.11. Pipe with push-on fitting joints shall be suitable for use with mechanical joint fittings. The pipes shall be coated as specified in ANSI A21.51 and be furnished with cement mortar lining as specified in ANSI A21.4.

The Contractor shall furnish certification from the manufacturer of the pipe and gasket being supplied that the inspection of all the specified tests have been made and the results thereof comply with the requirements of the above-referenced standards.

- E. All fittings for ductile iron pipe shall be ductile iron compact (short body) fittings conforming to AWWA C153 or Class 250 gray iron conforming to AWWA C110 and C111. All fittings shall be cement mortar lined conforming to AWWA C 104. Plain end fittings shall be ductile iron if mechanical joint retainer glands are installed on the plain ends. All fittings shall be connected by flanges or mechanical joints.

Flanges shall be Class 125, drilled in accordance with ANSI A21.10.

Gasket for flanged fittings shall be 1/16-inch thick "Cranite" or approved equal.

Gaskets for push-on type and mechanical joints shall conform to ANSI A21.11.

Rubber gaskets for push-on joints or mechanical joint (M.J.) shall be in accordance with ANSI A21.11, AWWA C111.

Gasket material for flanges shall be neoprene, Buna N, chlorinated butyl, or cloth-inserted rubber.

The type of connections shall be specified on the plans as push-on joint, mechanical joint (M.J.), plain end (P.E.), flanged (FL), the threaded.

- F. Polyethylene encasement when required shall be eight mil. tube or sheet stock and shall be furnished with all D.I. pipe unless otherwise specified. Materials shall comply with AWWA C105.

- G. The minimum cover for all water mains from top of pipe to finish grade shall be 42 inches, and maximum depth of 60 inches, unless otherwise noted.

- H. Couplings Flexible couplings and transition coupling cast components shall be ductile iron. Center rings and end rings shall be ductile iron in accordance with ASTM 536-80, Grade 65-45-12.

Gasket material shall be virgin SBR in accordance with ASTM D2000 3 BA715.

Bolts shall be high strength, low alloy steel trackhead bolts with national course rolled thread and heavy hex nuts. Steel shall meet AWWA/ANSI C11/A21.11 composition specifications.

- I. Adapters All flange by mechanical joint (FL x MJ) adapters and asbestos cement by mechanical joint (AC x MJ or Hub x MJ) adapters shall be ductile iron.
- J. Bolts in Piping Bolts shall be malleable iron Cor-ten, or stainless steel.

T-bolts shall be malleable iron Cor-ten in accordance with AWWA/ANSI C111/A21.11. Stainless steel bolts shall meet the requirements of ASTM A-307, Grade A. Shackle rods, nuts, and washers shall be hot-dipped galvanized in accordance with AASHTO M232 and/or coated thoroughly with coal-tar/asphaltic material.

Stainless steel nuts, bolts, and washers shall be type 304.

2-060 Hydrants

- A. All buildings constructed in the City of Marysville or areas served water by the Marysville water system shall be served by fire hydrants. Such fire hydrants shall be served by the City or by other adequate means as approved by the City Engineer and Fire District 12.
- B. The lead from the service main to the fire hydrant shall be ductile iron cement mortar lined Class 52 no less than 6 inches in diameter, with a maximum length of lead of 50 feet. (MCC 14.03.050). Hydrant leads in excess of 50' shall be 8-inch in diameter. Where leads require more than one length of pipe, field lock gaskets are required.
- C. Fire hydrants shall be installed in accordance with Standard Plan No. 2-060-001, at locations as shown on the approved plans. They shall be painted with 2 coats of high gloss Caterpillar Yellow Preservative 43-616 type paint.

Hydrants shall be the "Traffic Model" type with approved breakaway features. All hydrants shall be brass to brass subseat, minimum valve opening of 5-1/4 inches "O" ring stem seal, 6 inch mechanical shoe connection, 1-1/4 inch pentagonal operating nut.

Fire hydrants shall have two, 2-1/2 inch outlets and one 4-1/2-inch pumper port outlet. All outport threads shall be National Standard thread. The valve opening shall be 5-1/4 inch diameter. The hydrant shall have a positive and automatic barrel drain.

Hydrant shall be M & H, Mueller, Clow Medallion, or approved equal. All hydrants shall be bagged until system is approved.

All hook-ups to fire hydrants for temporary water for whatever purpose shall be approved by the utility division and will require a Hydrant Use Permit.

Hydrant valves installed in unpaved areas shall have a 4-inch thick, 2-foot square concrete pad placed around them.

Hydrant shall have a reflective blue raised pavement marker 4" off centerline.

- D. The Department of Public Works and Fire District 12 work together to ensure that adequate hydrant spacing and installation are achieved.

Unless otherwise required by the governing authority, the following guidelines shall apply for hydrant number and location:

1. At least one hydrant shall be installed at all intersections.
2. All hydrants newly installed in a single family residential area shall be supplied by not less than eight (8) inch circulating mains. Dead end mains supplying fire hydrants must be at least eight (8) inches in diameter, except hydrant leads up to fifty (50) feet long may be six (6) inches in diameter.
3. Hydrant spacing of 600 feet shall be required for single family residential areas.

4. Fire hydrants shall be installed at the ends of dead end lines which are more than three hundred (300) feet in length. Said hydrants may later be moved to conform to standard spacing requirements when the main is again extended, under supervision of the Superintendent.
5. No one shall plant any vegetation, erect any structure, or perform any action which results in obstructing the view of a fire hydrant for a distance of fifty (50) feet. The owner and/or occupant of any area in which a hydrant is located shall be responsible for removing weed and tree growth from around the hydrant for a distance of not less than ten (10) feet. The purpose of this part is to maintain a clear visual area around the hydrant.
6. All fire hydrants installed as required by these standards shall be served by the City of Marysville unless conditions warrant a waiver of this provision.
7. Fire hydrants shall be set as shown in standard detail 2-060-001.
8. Where needed, the Department of Public Works or Fire District 12 may require hydrants to be protected by two or more posts, per standard plan 2-060-002.
9. Fire hydrants must be installed, tested, and accepted prior to final plat acceptance or the issuance of an occupancy permit.
10. Fire hydrants shall be installed with a tee and an auxiliary gate valve between the service main and the hydrant sufficient to permit repair and replacement of the hydrant without disruption of water service. The location of all valves and fire hydrants installed shall be properly and accurately marked on identifiable plans or drawings.
11. Hydrants shall stand plumb, be set to the finished grade with the lowest outlet of the hydrant no less than eighteen (18) inches above grade and no less than thirty-six (36) inches of clear area about the hydrant for clearance of a hydrant wrench on all outlets and on the control valve. The pumper port shall face the street. Where the street cannot be clearly defined or recognized, the port shall

face the most likely route of approach and location of the fire truck while pumping as determined by the City Engineer.

12. When any portion of a proposed building is in excess of 200 feet from a public street right-of-way, on-site hydrants or a building sprinkler system shall be required. Such hydrants shall be located per Fire District 12 and easements for such hydrants, leads, and water mains, shall be granted to the City.
13. The installation of fire hydrants shall be required of the owner and/or developer of any future business, commercial, institutional, or industrial facility as follows:
 - a) Buildings having required fire flows of less than 2500 gpm, may have fire hydrants on one side of the building only.
 - b) When the required fire flow is over 2500 gpm, the fire hydrants shall be served by a main which loops around the building or complex of buildings and reconnects back into the distribution main.
 - c) The number of fire hydrants shall be determined on an average spacing of three hundred (300) feet computed on an imaginary line parallel to and not less than fifty (50) feet from the structure. All hydrants are to be accessible to fire department pumpers over roads capable of supporting such fire apparatus. The City Engineer shall determine the location of the fire hydrants depending on utility, topography, and building location. Hydrants shall be a minimum of fifty (50) feet out from the building, minor deviations may be granted.
 - d) The lead from the service main to the hydrant shall be no less than six (6) inches in diameter. Any hydrant leads over fifty (50) feet in length from service to the hydrant shall be no less than eight (8) inches in diameter. The provisions of this part shall apply without exception and regardless of the size of the service main.
 - e) Fire hydrants shall be set as shown in standard detail 2-060-001.

- f) For requirements regarding use, size, and location of a fire department connection (FDC) and/or post indicator valve, contact Fire District 12. Location of FDC shall be shown on water plans.
- g) Fire hydrants must be installed, tested, and accepted prior to the issuance of an occupancy permit.
- h) All fire hydrants installed as required by these standards shall be served by the City of Marysville unless conditions warrant a waiver of this provision.
- i) The installation of private hydrants as defined herein shall be limited to those cases when the number of public hydrants installed under the distance provision of this section shall be insufficient in number. Private hydrants shall meet City requirements for public hydrants and shall be located as designated by the approving authority. The City of Marysville shall have the right to go upon the premises and to use the private hydrant for public purposes, including testing, flushing, and emergency uses.
- j) Installation shall further conform to the provisions in 2-060 D 4,5,8, 10, and 11.

2-070 Valves All valves and fittings shall be ductile iron with ANSI flanges or mechanical joint ends. All existing valves shall be operated by City employees only.

All valves shall be inspected upon delivery in the field to ensure proper working order and damage to protective coatings before installation and shall be free of all rust and dirt. They shall be set and jointed to the pipe in the manner as set forth in the AWWA Standards for the type of connecting ends furnished. No valves shall be located in such position as to place the valve chamber or box in any roadside ditch, drainage ditch, or channel.

Valves shall be installed in the distribution system at sufficient intervals to facilitate system repair and maintenance but in no case shall be less than one valve every 1000 feet. Generally, valving shall be installed at all intersections and on each end of easements. Specific requirements for valve spacing will be made at the plan review stage.

- A. Gate Valve, 4 inch to 12 inch. The design, materials, and workmanship of all gate valves shall conform to AWWA C515-80 latest revision. Gate valves shall be resilient wedge non-rising stem (NRS) with two internal O-ring stem seals. Gate valves shall be Mueller, M & H, Clow R/W or Waterous Series 500, or approved equal.

Gate valves shall be used on all 4-inch to 12-inch lines.

- B. Butterfly valves shall conform to ANSI/AWWA C504, Class 150, with cast iron short body and "O" ring stem seal. Valves in chambers shall have a manual crank operation. Buried valves shall have a stem extension with AWWA 2-inch operating nut and suitable valve box. Butterfly valves shall be Dresser "450", or approved equal.

Butterfly valves shall be used on all lines 14 inches and larger.

- C. Valve Box. All valves shall have a standard APWA cast iron water valve box set to grade with two-piece, extension type cast iron riser from valve. Valve box shall have a lug type cover, 8" top and 24" bottom. Valve box lids shall have the word "WATER" cast in the upper surface.

If valves are not set in paved area, a 4-inch thick 2 foot square concrete pad shall be set around each valve box at finished grade. In areas where valve box falls in road shoulder, the ditch and shoulder shall be graded before placing asphalt or concrete pad. The valve and valve box shall be set plumb with the valve box centered on the operator nut. Valve boxes shall be set flush in pavement or road shoulder. See standard drawing 2-070-001, and 2-070-004.

- D. Operating Valve Nut Extension. A valve stem extension shall be installed whenever the valves operating nut is more than 48 inches below finished grade. Extensions are to be a minimum of 12 inches with only one extension per valve. The operator nut extension

shall extend into the top section of the valve box and shall clear the bottom of the lid by a minimum of 10 inches.

- E. Valve Marker Post. Marker posts shall be carsonite CUM-375 blue with 2 anchors at bottom of marker. See standard plan 2-070-002.
- F. Check Valve. Check valves for permanent installations other than cross connection control shall be rated for 150 psi working pressure, unless otherwise specified, and shall have adjustable tension lever and spring to provide non-slamming action under all conditions unless otherwise specified.
- G. Air and Vacuum Release Valve. Air and vacuum release valves (ARV) shall be APCO 145C combination air release valve. Installation shall be as shown on standard drawings. The installation shall be set at the high point of the line when required. Where possible pipes are to be graded to limit the number of ARV's needed.

2-080 Pressure Reducing Stations and Pressure Reducing Valves

- A. Unless otherwise noted in Comprehensive Water Plans, a standard pressure reducing station shall have a Cla-Val model 90G-01 BCSY pressure reducing main valve of approved size with flanged ends. Pressure reducing valves shall have flow opening/closing speed controls, epoxy coated body, and valve position indicator. A 2" Cla-Val model 90G-01ABCS pressure reducing valve with threaded ends shall be installed on the bypass side of the larger pressure reducing valve line. Pressure reducing valves, 2" and smaller, shall be equipped with stainless steel trim (seal, stem, and cover bearing). Pilot controls shall be on the side of PRV facing the vault interior. See Standard Plans 2-080-001 and 2-080-002.

Strainers shall be installed on the inlet side of each pressure reducing valve. The bypass shall be fitted with bronze ball valves sized to correspond with the bypass inlet and outlet size.

Strainers shall be iron bodied "Y" type equal in size to corresponding pressure reducing valve. Strainer shall feature bolted cover machined to hold screen securely in place and tapped with iron pipe threads for corporation stop. Screen shall be constructed

from perforated stainless steel. Main-line strainer shall have flanged-ends and bypass strainer shall have threaded ends.

The vault shall be equal to Utility Vault Co. model 687-LA with cover 687-TL-2-322P as specified in the standard detail. Vault exterior shall be coated with coal tar enamel, or equal. See standard drawings.

When pressure reducing stations are required or needed, all pipe, fittings, and equipment shall be supported and blocked against static and dynamic loading in accordance with the equipment manufacturers' recommendations and as approved by Public Works. Drain lines from pumps or other equipment shall be piped to a below grade drainage system connected to the station sump or drain.

- B. Individual Pressure Reducing Valve (Residential). When individual lot pressure exceeds 80 psi, an individual pressure reducing valve shall be installed by the property owner and shall be direct-action piston type with integral strainer and bypass. Valve body shall be bronze with threaded outlet end and integral union on inlet end. Valve shall be line-sized with spring range from 25 to 75 psi. Individual pressure reducing valves shall be Wilkens 600 series, Watts U5, or approved equal. The reducing valve shall be the property of the home owner.

All other appurtenances shall be as shown in the Standard Drawing 2-080-003.

- C. Individual Pressure Reducing Valve (Multi-Family or Commercial). Individual pressure reducing valve (PRV) shall be Mueller Model H-9300 or an approved equal. An individual PRV shall be preceded by a strainer. PRV's shall be direct-acting and diaphragm actuated with a spring mechanism for a range of 25-85 psi. Valve shall be line sized. Valve body shall be cast bronze with inside iron pipe threads on both ends. All other appurtenances shall be as shown in the standard drawing 2-080-003 These appurtenances shall be the property of the landowner.

2-090 Service Connection

- A. All service connections relating to new development shall be single meter services, unless approved by the Director, installed by the developer at the time of mainline construction. After the lines have been constructed, tested, approved, and a letter of acceptance has been issued, the Owner may apply for a water meter. The City will install a water meter after the application has been made and all applicable fees have been paid. Water meters will be set only after system is inspected and approved.
- B. When water is desired to a parcel fronting an existing main but not served by an existing setter, an application must be made to the City. Upon approval of the application and payment of all applicable, fees, the City will allow tapping of the main, and installation of the meter, box, and setter.
- C. Corporation stop shall be all bronze alloy and shall be Ford, Mueller, or approved equal in accordance with AWWA Standard C800 with AWWA tapered thread (CC) inlet by compression fitting for copper outlet.

Corporation stops for 1" tap shall be ball valve type. Corporation stops for 1-1/2" and 2" tap shall be the ball valve type with D.I. service saddles and I.P. thread inlets by compression fitting outlets.

- D. Service connections on 4-inch ductile iron mains or for any service shall be installed with Mueller, Rockwell, Romac or approval equal pipe saddles. Direct taps may be made for 3/4 inch and 1 inch services on thickness Class 52 ductile iron pipe 6 inch I.D. or larger. The minimum acceptable tap size shall be 3/4 inch.

Service saddle shall be all bronze alloy and shall be Romac style 202 with IP thread or approved equal. Saddles used in AC pipe shall have stainless steel straps. All clamps shall have rubber gasket and iron pipe threaded outlets.

- E. Service lines shall be copper pipe only for 1" services. Polyethylene 1-1/2" & 2" water service line shall be copper tube size (cts)- OD ASTM D-2737-SDR9 (PE 3408).

Polyethylene shall:

1. Meet the requirements of AWWA C901.
2. Be high molecular mass with at least 200 psi rating.

3. Have a #10 copper trace wire wrapped along its entire length (one wrap per foot, min.) with one end wrapped around the saddle bolt and secured between 2 nuts. The other end will be exposed in the meter box.

All copper pipe for underground water service less than 1-1/2" shall be seamless conforming to ASTM B88 (ANSI H33.1) Type "K" annealed tubing.

Copper service pipe 1-1/2" or larger shall be Type K hard drawn, 20' lengths. To avoid couplings under a road, Type K annealed tubing shall be used.

- F. Master meters will not be allowed for service to more than one per building. An approved backflow prevention system must be installed in conjunction with any master meter. Deviations to this may be granted by the City Engineer.
- G. Meter Setter. Meter setters (1" and smaller) shall not have double purpose couplings. Meter setters (1" and smaller) shall have angle meter valve with drilled wings for padlock, twelve (12") inches high, unless otherwise specified. The angle copper setter for the size meter to be installed, see Standard Details.

1-1/2" and 2" meter setters shall have vertical inlet and outlet tees with 1" lateral bypass, flanged ball meter valves on inlet and outlet, ball valve on bypass, and padlock wings on all valves, see Standard Details 2-090-002.

- H. Meter Box. The Meter Box shall be constructed of LMDPE (Linear Medium Density Polyethylene) for impact strength and shall have a wall thickness of no less than .500". The Meter Box, with cover installed, shall be able to bear a 20,000lb vertical load when transferred through a one-inch (1") thick nine-inch square (9" x 9") plate. Meter Box shall be able to withstand a 200lb lateral load, applied with a four-inch square (4" x 4") plate positioned one-inch (1") below the top center of the box, maximum deflecting shall not exceed one-inch (1").

The Meter Box shall be black on the exterior to prevent UV degradation, and bright white on the interior to reflect light and ease meter reading and service. The box shall be designed in such a way as to have an integral flange, no more that 3" from the top, to support the box in concrete, paving or soil, and a bottom flange a minimum of 1" wide, to help resist subsidence.

The box may have two removable (pre-cut) pipe entry areas, 3" wide x 4" high, located on the center of each end (short side) of the box. The box shall be designed in such a

way as to be securely stackable. The box shall weigh no more than fifteen pounds (15 lb) for safety and ease of handling, transport and installation. All dimensions shall be in accordance with Company drawing. Meter boxes shall be as specified in the standard plans.

Cover shall provide a slip resistant surface with a coefficient of friction greater than 0.5 when tested for compliance to ASTM C-1028. Marking shall be indent into the cover surface to resist wear.

Cover shall be constructed of polymer concrete reinforced with multiple layers of continuous strand woven borosilicate fiberglass cloth. Reinforcing fabric shall be required along the inner and outer surfaces of the cover and incorporated into the matrix such that the glass fiber is not exposed to moisture intrusion. Compressive strength of the material matrix shall be no less than 11,000 psi. Molded cover shall be capable of withstanding vertical load proof test of 20,000 lbf when tested in the corresponding body. Manufacturer shall be able to document compliance with material strength and unit (cover and body) proof of design testing.

Cover shall have a hinged access door made from the same material as the outer portion of the cover and no less that 8"x9" clear opening as the drawing requires.

The box shall weigh no more than fifty pounds (50 lb) for safety and ease of handling, transport and installation. Covers shall be as specified in the standard plans.

- I. Any plumbing in a residential or nonresidential facility providing water for human consumption which is connected to a public water system shall be lead free. With respect to solders and flux lead free shall mean no more than 0.2% lead, and with respect to pipes and pipe fittings no more than 8% lead.

2-100 Steel Casing

Steel casing shall be black steel pipe conforming to ASTM A53.

Casing wall thickness shall be 0.250 inch for casings 24 inches or less in diameter and 0.375 inch for casings over 24 inches in diameter.

Carrier pipe for water shall be Ductile Iron, Class 52.

Pipe spacers shall be Cascade style CCS with 8-inch runners as available from Cascade Waterworks or equivalent vendor. Casing pipe and spacers shall be sized for pipe being

installed. Install minimum of three spacers per section of pipe. See Standard Drawing 2-100-001.

2-110 Galvanized Iron Pipe

Where galvanized iron pipe is specified, the pipe shall be standard weight, Schedule 40, steel pipe per Standard Specification for black and hot-dipped, zinc-coated (galvanized) welded and seamless steel pipe for ordinary uses (ASTM A-120). Fittings shall be screwed malleable iron galvanized per ANSI B16.3. Galvanized pipe shall be used only for PRV's and dry pipe in pressure relief and vacuum breaker assemblies.

2-120 Blowoff Assembly

If a fire hydrant is not located at the end of a dead end main, a blowoff assembly shall be required. On water mains which will be extended in the future, provide valve and blocking as shown on standard drawings 2-120-001 and 2-120-002.

2-130 Concrete Bedding and Blocking

Bedding, blocking, encasement, or slope anchor concrete shall be mixed from materials acceptable to the Engineer and shall have a 30-day compressive strength of not less than 2,500 psi. The mix shall contain five (5) sacks of cement per cubic yard and shall be of such consistency that the slump is between 1 inch and 5 inches. All concrete shall be mechanically mixed and contain no chloride.

Concrete thrust blocking, as indicated on the Standard Details, shall be placed at bends, tees, dead ends, crosses, and as designated by the Engineer.

Location of thrust blocking shall be shown on plans. Thrust block concrete shall be poured against undisturbed earth. A plastic barrier shall be placed between all thrust blocks and fittings. See standard detail numbers 2-130-001, 2-130-002, and 2-120-003 for thrust block locations and calculations. All blocking as shown on the Standard Details are considered as minimums, and consideration should be given to unusual circumstances such as unstable soil, adjacent pipe lines, and topography.

2-140 Joint Restraint

Joint restraint methods shall be as per the approved materials list and/or the Standard Drawings. Mega Lugs & Field Lock Gaskets are required on watermains greater than or equal to 15% slope, or in any fill section.

2-150 Backflow Prevention

All water system connections to serve buildings or properties with domestic potable water, fire sprinkler systems, or irrigation systems shall comply with the minimum backflow requirements as established by the Department of Health (DOH) and the City of Marysville.

The installation of all backflow devices is required to protect the existing water system and users from possible contamination. To prevent contaminated water from the new main from entering the existing distribution system, a double check valve assembly shall be used on the line supplying the water. A double check valve assembly is sufficient backflow protection only for filling and flushing of the new main. During the hydrostatic pressure test, the temporary connection between the new main and the existing distribution system shall be removed.

For fire and irrigation, the minimum level of backflow prevention required is a double check valve assembly. Fire services shall have a double detector check valve assembly. Air gap and reduced pressure backflow assemblies are required whenever a potential health hazard exists.

All approved Reduced Pressure Backflow Assemblies are listed on the most current copy of the City of Marysville Cross-Connection Control Program. The assembly shall include a tightly closing resilient seated shut-off valve on each end of the body and each assembly shall be fitted with four properly located resilient seated test cocks.

All other appurtenances shall be as shown in the standard detail 2-150-001.

Public Works shall get the certificate of testing of any backflow prevention device before releasing the certificate of occupancy on any building or acceptance of water system. A list of approved testers may be obtained from Washington Environmental Training Resource Center (WETRC) located in Auburn, Washington.

2-151 Reduced Pressure Backflow Assembly with Detector This assembly shall include a line-sized D.O.H. approved (listed on the most current copy of "Accepted Cross-Connection Control Assemblies" published by Washington State Department of Health. Reduced Pressure Backflow Assembly with a parallel 3/4" meter and 3/4" D.O.H. approved Reduced Pressure Backflow Assembly. Each assembly shall be housed in a hot box or approved equivalent and include a tightly closing resilient seated shut-off valve on each end of the body and each assembly shall be fitted with four properly located resilient seated test cocks.

All other appurtenances shall be as shown in standard detail 2-151-001.

2-152 Double Check Valve Assembly All Double Check Valve Assemblies shall be the one listed on the most current copy of "Accepted Cross-Connection Control Assemblies" published by Washington D.O.H. The assembly shall include a tightly closing resilient seated shut-off valve on each end of the body and each assembly shall be fitted with four properly located resilient seated test cocks.

2-153 Double Check Valve Assembly with Detector

This assembly shall include a line sized D.O.H. approved (listed on the most current copy of "Accepted Cross-Connection Control Assemblies" published by Washington Department of Health Double Check Valve Assembly with a parallel 3/4" meter and 3/4" approved double check valve assembly. Each assembly shall include a tightly closing resilient seated shut-off valve on each end of the body and each assembly shall be fitted with four properly located resilient seated test cocks.

All other appurtenances shall be as shown in the standard detail 2-153-001.

2-154 Backflow Device Resilient Seated Shut-off Valves Each valve shall be marked with model number with designation of resilient seat; such as "RS" or "R", which must be cast, molded, or affixed onto the body or bonnet of the valve. All ferrous bodied valves shall be coated with a minimum of 4 mils. of epoxy or equivalent polymerized coating. 2" and smaller R.P.B.A.s and D.C.V.A.s shall use ball valves, and all 2-1/2" and larger R.P.B.A.s and D.C.V.A.s shall use resilient seated gate valves for domestic supply and resilient seated O.S. and Y. valves for firelines.

The minimum requirements for all resilient seated gate valves shall, in design, material, and workmanship, conform to the standards of AWWA C509.

2-160 Existing Utilities

When utility services occupy the same space as the new water main, the contractor shall do all necessary excavation to fully expose such services. The contractor shall protect said services and work around them during excavating and pipe laying operations. The contractor shall be responsible for all damages to the services due to his operation and shall immediately notify the engineer and arrange for replacement of all damaged services.

In the event of conflict, the contractor shall remove and restore existing catch basin connections, inlet connections, drains, side sewers, inlets, and other sewerage and drainage facilities. All restoration shall be constructed to city standards. Water main pipe shall be installed to clear mainline sewers and storm drains.

It is anticipated that the contractor will encounter private water services during work operations. Records of these utilities often are not maintained by the City and will not be field located by the City Water division. It shall be the contractor's responsibility to ascertain the location of and protect these private utilities from damage.

2-170 Water Main/Sanitary Sewer Crossings The Contractor shall maintain a minimum of 18 inches of vertical separation and 10 feet of horizontal separation between sanitary sewers and water mains. The minimum cover for water main of 42 inches may be reduced to 36 inches upon approval by the City Engineer to provide for as much vertical separation as possible.

The longest standard length of water pipe shall be installed so that the joints will fall equidistant from any sewer crossing. In some cases where minimum separation cannot be maintained, it may be necessary to encase the water pipe and/or sewer service in a carrier pipe or concrete. No concrete shall be installed unless specifically directed by the City Engineer.

2-180 Staking All surveying and staking shall be performed by an engineering or surveying firm capable of performing such work. The engineer or surveyor directing such work shall be licensed as a Professional Engineer or Professional Land Surveyor by the State of Washington.

A preconstruction meeting shall be held with the City prior to commencing staking. All construction staking shall be inspected by the City prior to construction.

The minimum staking of waterlines shall be as directed by the City Engineer or as follows:

- A. Stake centerline alignment every 50 feet with cut or fill to invert of pipe maintaining 42 inches of cover over pipe. Cuts are normally not required when road grade has been built to subgrade elevation.
- B. Stake alignment of all fire hydrants, tees, water meters, setters and other fixtures and mark cut or fill to hydrant flange finished grade.

2-190 Trench Excavation

- A. Prior to any pavement cutting or removal, or excavation for pipe laying, the contractor shall verify, in the presence of the City's inspector, the location and depth of the existing water mains at the points where connections are to be made. The contractor shall verify the dimensions, type, and condition of the existing water main. If necessary, the grade shall be adjusted so neither a high spot nor a low spot is created adjacent to the connection to the existing water mains.
- B. Clearing and grubbing where required shall be performed within the easement or public right-of-way as permitted by the City and/or governing agencies. Debris resulting from the clearing and grubbing shall be disposed of by the owner or contractor in accordance with the terms of all applicable permits.
- C. Trenches shall be excavated to the line and depth designated by the Plans to provide a minimum of 42 inches of cover over the pipe and the maximum depth shall not be greater than 60 inches of cover over the pipe. Except for unusual circumstances where approved by the City, the trench sides shall be excavated vertically and the trench width shall be excavated only to such widths as are necessary for adequate working space as allowed by the governing agency. The trench shall be kept free from water

until joining is complete. Surface water shall be diverted so as not to enter the trench. The owner shall maintain sufficient pumping equipment on the job to ensure that these provisions are carried out.

- D. The Contractor shall perform all excavation of every description and whatever substance encountered and boulders, rocks, roots, and other obstructions shall be entirely removed or cut out to the widths of the trench and to a depth 6 inches below water main grade. Where materials are removed from below water main grade, the trench shall be backfilled to grade with pit run sand and gravel and thoroughly compacted.
- E. Trenching and shoring operations shall not proceed more than 100 feet in advance of pipe laying without approval of the City Engineer, and shall be in conformance with Washington Industrial Safety and Health Administration (WISHA) and Office of Safety and Health Administration (OSHA) Safety Standard.
- F. The bottom of the trench shall be finished to grade with hand tools in such a manner that the pipe will have bearing along the entire length of the barrel. The bell holes shall be excavated with hand tools to sufficient size to make up the joint.
- G. Material excavated from trenches and piled adjacent to the trench, or in a roadway or public thoroughfare, shall be piled and maintained so that the toe of the slope of the material is at least 3 feet from the edge of the trench. It shall be piled in such a manner as will cause a minimum of inconvenience to public travel, and provisions shall be made for traffic control as necessary. Free access shall be provided to fire hydrants, water valves, and meters, and clearance shall be left to enable free flow of storm water in gutters, other conduits, and natural watercourses.
- H. The minimum and maximum trench widths for water main installation shall be as follows:

Nominal Pipe Diameter	TRENCH WIDTHS (In Inches)		
	Minimum Earth	Minimum Rock	Maximum
2	18	24	36
3	18	24	36
4	18	24	36
6	21	24	36
8	24	24	36
12	28	28	40

16	30	30	42
18	31	31	43
20	33	33	45
24	36	36	48
30	40	40	52
36	47	47	59
42	54	54	66
48	61	61	73
54	68	68	80
60	75	75	87

2-200 Trench Shoring

Where trench excavation equal or exceeds a depth of 4 feet, the developer/contractor shall provide, construct, maintain and remove, as required, safety systems that meet the requirements of the Washington Industrial Safety and Health Act, RCW 49.17, including WAC 296-155. The trench safety systems shall be designed by a qualified person, and meet accepted engineering requirements (see WAC 296-155-660).

The Contractor shall adequately shore trenches to protect the work, existing property, utilities, pavement, etc., and to provide safe working conditions in the trench. The method of shoring shall be according to the contractor's design. The contractor may elect to use a combination of shoring or overbreak, tunneling, boring, sliding trench shields, or other methods of accomplishing the work, provided the method meets all applicable local, state, and federal safety codes. Damages resulting from improper cribbing or from failure to crib shall be the sole responsibility of the contractor.

2-210 Dewatering of Trench

Where water is encountered in the trench, it shall be removed during pipe-laying operations and the trench so maintained until the ends of the pipe are sealed and provisions are made to prevent floating of the pipe. Trench water or other deleterious materials shall not be allowed to enter the pipe at any time.

The developer/contractor shall furnish, install, and operate all necessary equipment to keep the trench above the foundation level free from water during construction, and shall dewater

and dispose of the water so as not to cause injury to public or private property or nuisance to the public. Sufficient pumping equipment in good working condition shall be available at all times for all emergencies, including power outage, and shall have available at all times competent workers for the operation of the pumping equipment.

2-220 Installation

- A. The installation of all water mains and appurtenances shall be in accordance with the construction plans as approved by the City Engineer for the project. Any deviation or changes are to be approved by Public Works before the changes are incorporated into the work.
- B. Unsuitable Material - Whenever in excavating the trench for water mains and the bottom of the trench exposes peat, soft clay, quicksand, or other unsuitable material, such material shall be removed from the trench and replaced by Foundation Material "Ballast" as specified in the WSDOT Standard Specifications.
- C. Handling of Pipe - Pipe shall be handled in a manner that will prevent damage to the pipe, pipe lining, or coating. Pipe and fittings shall be loaded and unloaded using hoists and slings in a manner to avoid shock or damage, and under no circumstances shall they be dropped, skidded, or rolled against other pipe. Damaged pipe will be rejected, and the contractor shall immediately place all damaged pipe apart from the undamaged and shall remove the damaged pipe from the site within 24 hours.

Dirt or other foreign material shall be prevented from entering the pipe or pipe joint during handling or laying operations, and any pipe or fitting that has been installed with dirt or foreign material in it shall be removed, cleaned, and relaid. When pipe laying is not in progress, the open ends of the pipe shall be closed by a watertight plug or by other means approved by the City Engineer.

Pipe shall be stacked in such a manner as to prevent damage to the pipe, to prevent dirt and debris from entering the pipe, and to prevent any movement of the pipe. The

bottom tiers of the stack shall be kept off the ground on timbers, or other similar supports.

- D. Cutting Pipe - Whenever it becomes necessary to cut a length of pipe, the cut shall be made by abrasive saw or by pipe cutter. All pipe ends shall be square with the longitudinal axis of the pipe and the outside shall be beveled and otherwise smoothed so that good connections can be made without damage to the gasket. Threads shall be cleanly cut. Oxyacetylene torch cutting of ductile iron will not be allowed.

- E. Bedding the Pipe - Bedding material, when specified or required by the Engineer shall be as specified in the WSDOT Standard Specifications. For the type of pipe (rigid or flexible) being bedded, bedding is defined as 6 inches below the pipe, around the pipe, and 12 inches above the pipe. Native material will normally be used for bedding for ductile iron pipe unless judged unsuitable by the Engineer.

2-230 Laying Pipe on Curves

Long radius curves, either horizontal or vertical, may be laid with standard pipe by deflecting the joints. If the pipe is shown curved in the drawings and no special fittings are shown, the contractor can assume that the curves can be made by deflecting the joints with standard lengths of pipe. If shorter lengths are required, the drawings will indicate maximum lengths that can be used. The amount of deflection at each pipe joint when pipe is laid on a horizontal or vertical curve shall not exceed the manufacturer's printed recommended deflections.

Where field conditions require deflection or curves not anticipated in the drawings, the Engineer will determine the methods to be used.

When rubber gasketed pipe is laid on a curve, the pipe shall be jointed in a straight alignment and then deflected to the curved alignment. Trenches shall be made wider on curves for this purpose.

Maximum deflections at point joints and laying radius for various pipe lengths are specified in the following table, or if not, shall conform to the manufacturer's and AWWA for the given type of pipe:

Maximum Permissible Deflection in Laying Mechanical-Joint Pipe

Size of Pipe	Max. Permissible Deflections Per Length - In Inches				Approx. Radius of Curve Produced by Succession of Deflections			
	12-ft. Length	16-ft. Length	18-ft. Length	20-ft. Length	12-ft. Length	16-ft. Length	18-ft. Length	20-ft. Length
3	16	23	25	27	105	130	155	180
4	16	23	25	27	105	130	155	180
6	14	19	22	24	120	160	175	200
8	11	14	16	18	160	220	240	265
10	11	14	16	18	160	220	240	265
12	11	14	16	18	160	220	240	265
14	7	10	11	12	250	310	350	400
16	7	10	11	12	250	310	350	400
18	6	8	9	10	290	380	430	480
20	6	8	9	10	290	380	430	480
24	5	7	7	8	350	440	555	600
30	5	7	7	8	350	440	555	600
36	4	6	6	7	430	510	650	690

Maximum Permissible Deflection in Laying Push-In Joint Pipe

Size of Pipe	Max. Permissible Deflections Per Length - In Inches				Approx. Radius of Curve Produced by Succession of Deflections			
	12-ft. Length	16-ft. Length	18-ft. Length	20-ft. Length	12-ft. Length	16-ft. Length	18-ft. Length	20-ft. Length
3	10	14	15	17	175	220	260	280
4	10	14	15	17	175	220	260	280
6	10	14	15	17	175	220	260	280
8	10	14	15	17	175	220	260	280
10	10	14	15	17	175	220	260	280
12	10	14	15	17	175	220	260	280
14	6	8	9	10	290	380	430	480
16	6	8	9	10	290	380	430	480
18	6	8	9	10	290	380	430	480
20	6	8	9	10	290	380	430	480
24	6	8	9	10	290	380	430	480
30	4	5	6	7	430	615	650	690
36	4	5	6	7	430	615	650	690

2-240 Trench Backfill

Suitable native material excavated during trenching shall be used for trench backfill unless notified by the City Engineer that the native material is unsuitable. The City Engineer or his representative will examine excavated native material at the time of excavation to determine its suitability for use as backfill. Native material will be considered suitable for trench backfill if it is:

- a) Capable of attaining the degree of compaction specified within reasonable tolerance of optimum moisture content.
- b) Reasonably free of organic material, clay, frozen lumps, rocks, or other deleterious matter.

Unsuitable backfill material shall be removed from the site and hauled to an approved disposal site. The City Engineer shall be provided with the location of all disposal sites to be used and also copies of the permits and approvals for such disposal sites.

Imported material shall meet the requirements of Gravel Borrow or Crushed Surfacing Base Course as specified in the WSDOT Standard Specifications. In backfilling the trench, the Contractor shall take all necessary precautions to protect the pipe from any damage or shifting. The contractor shall backfill from the side of the trench to a maximum uniform depth of 1 foot above the crown of the ductile iron pipe before starting mechanical compaction.

During all phases of the backfilling operations and testing as outlined herein, the contractor shall protect the pipe installation, provide for the maintenance of traffic as may be necessary, and provide for the safety of property and persons.

Where governmental agencies other than the City have jurisdiction over roadways, the backfill and compaction shall be done to the satisfaction of the agency having jurisdiction. If suitable backfill material is not available from trenching operations or temporary traffic control and traffic safety issues exist, the City may order the placing of bedding around the water main and gravel base or controlled density fill for backfilling the trench.

2-241 Recycled Concrete

Use of recycled concrete for trench backfill and crushed surfacing base course (1-1/4" minus) material is encouraged; provided that it is not used as a final surface finish. Recycled concrete shall meet the requirements for crushed surfacing base course material set forth in Section 9-03.9(3) "Crushed Surfacing" of the WSDOT Standard Specifications.

Use of recycled concrete for crushed surfacing top course material (5/8" minus) is not allowed. Manufacturer's recovering concrete from sources other than concrete roadways, sidewalks, and slabs shall provide certification that the material supplied is free of contaminants.

2-242 Controlled Density Fill

Controlled density fill (CDF, aka flowable fill) shall be a mixture of portland cement, flyash (optional), aggregates, and water. It shall be proportioned to provide a grouty, non-segregating, free flowing, self-consolidating and excavatable material that will result in a non-settling fill which has measurable unconfined compressive strength. Unless otherwise specified, unit weights shall range from 125 lbs. per cubic foot to 155 lbs. per cubic foot.

Materials testing shall be with unconfined compressive test cylinders. Test data may be either laboratory trial batch data or field test data.

Specific mix designs may be required at the Engineer's discretion.

The unconfined compressive strength at 28 days shall be a minimum of 50 psi and a maximum of 100 psi. Material shall be a sand/grout slurry proportioned to be hand-excavatable after long-term strength gain.

If CDF is used for trench backfill on ductile iron, steel, or copper utility mains or services, the mains and services shall be encased in polyethylene wrap.

2-250 Compaction of Backfill

Trench backfill shall be spread in layers and be compacted by mechanical tampers of the impact type approved by the Engineer. Water settling will not be permitted. After the initial backfill is placed the remaining backfill material shall be placed in successive layers not exceeding 1 foot in loose thickness, and each layer shall be compacted to the density specified below:

- a) Improved areas such as street and sidewalk areas shall be compacted to 95% of maximum dry density modified proctor.
- b) Unimproved areas of landscape areas shall be compacted to 90% of maximum dry density modified proctor.

2-260 Temporary Street Patching

Temporary restoration of trenches shall be accomplished by using 2" Class B Asphalt Concrete Pavement when available, 2" Asphalt Treated Base (ATB), or steel plates.

ATB used for temporary restoration may be dumped directly into the trench, bladed and rolled. After rolling, the trench must be filled flush with the existing asphalt concrete pavement to provide a smooth riding surface.

All temporary patches shall be maintained by the Contractor until such time as the permanent pavement patch is in place. If the Contractor is unable to maintain a patch for whatever reason, the City will patch it at actual cost plus overhead and materials.

2-270 Trench Pavement Restoration

Trench restoration shall be either by a patch or patch plus overlay as required by the City.

- A. All trench and pavement cuts shall be made by spade sawcuts. All cuts shall be a minimum distance outside the trench width as prescribed by the City Engineer.

- B. Replacement of the asphalt concrete or portland concrete cement shall be of existing depth plus 1 inch or 3 inches, whichever is greater.
- C. Tack shall be applied to the existing pavement and edge of cut and shall be emulsified asphalt grade CSS-1 as specified in the WSDOT Standard Specifications. Tack coat shall be applied as specified in the WSDOT Standard Specifications.
- D. Asphalt concrete Class B shall be placed on the prepared surface by an approved paving machine and shall be in accordance with the applicable requirements of the WSDOT Standard Specifications, except that longitudinal joints between successive layers of asphalt concrete shall be displaced laterally a minimum of 12 inches unless otherwise approved by the City Engineer. Fine and coarse aggregate shall be in accordance with the WSDOT Standard Specifications. Asphalt concrete over 2 inches thick shall be placed in equal lifts not to exceed 2 inches each.

All street surfaces, walks or driveways within the street trenching areas affected by the trenching shall be feathered and leveled to an extent that provides a smooth-riding connection and expedites drainage flow for the newly paved surface. Leveling and feathering as required by the City Engineer shall be accomplished by raking out the oversized aggregates from the Class B mix as appropriate.

Surface smoothness shall be per the WSDOT Standard Specifications.

- E. All joints shall be sealed using paving asphalt AR4000W.
- F. When trenching within the roadway shoulder(s), the shoulder shall be restored to its original or better condition.
- G. The final patch shall be completed as soon as possible and shall be completed within 30 days after first opening the trench. This time frame may be adjusted if delays are due to inclement paving weather, or other adverse conditions that may exist. However, delaying of final patch of overlay work is allowable only subject to the City Engineer's approval.

2-280 Hydrostatic Pressure Tests

The City Engineer or his representative will inspect and observe the hydrostatic test of the pipe within 24 hours after notification by the Contractor that a section is ready for inspection and test. The Contractor shall contact the Engineer at least 24 hours in advance of the completion of sterilization and flushing and his representative shall be present when water samples are taken.

Prior to the acceptance of the work, the installation shall be subjected to a hydrostatic pressure test and any leaks or imperfections developing under said pressure shall be remedied by the Contractor before final acceptance of the work. No air will be allowed in the lines. The mains shall be tested between valves. Insofar as possible, no hydrostatic pressure shall be placed against the opposite side of the valve being tested. Test pressure shall be maintained while the entire installation being tested is inspected. Testing through fire hydrants shall not be permitted unless approved by The Director of Public Works or designee. The Contractor shall provide all necessary equipment and shall perform all work connected with the test. Tests shall be made after all valved connections have been made. At unvalved connection points, a temporary plug (or 2" blow-off assembly on lines without hydrants) shall be installed at the end of the new main. This shall include concrete blocking necessary to withstand pressures encountered during the hydrostatic test.

Once the new line is successfully tested and disinfected, the plug (blow-off) shall be removed and the connection to the existing main completed. The Contractor shall perform a preliminary test to assure that the equipment to be used for the test is adequate and in good operating condition and the air in the lines has been released before requesting the City Engineer witness the test. The City Engineer or his representative shall witness the test; if the test does not pass inspection for any reason, additional trips required to witness the test shall be done at the Contractor's expense.

The Contractor shall provide special plugs and blocking necessary in those locations where it would be necessary to test against butterfly valves to ensure that the pressure rating of these valves is not exceeded during testing.

All water mains and appurtenances shall be hydrostatically tested as specified in Section 7-09.3(23) of the WSDOT/ Standard Specifications.

2-290 Sterilization and Flushing of Water Mains

Sterilization of water mains shall be accomplished by the Contractor in accordance with the requirements of the State Health Department and in a manner satisfactory to the City Engineer. The section to be sterilized shall be thoroughly flushed at maximum flow established by the City Engineer prior to chlorination. Flushing period must be approved by the City. Sections will ordinarily be sterilized between adjacent valves unless, in the opinion of the City Engineer, a longer section may be satisfactorily handled. Chlorine shall be applied by solution feed at one end of the section with a valve or hydrant at the opposite end open sufficiently to permit a flow through during chlorine application. The chlorine solution shall be fed into the pipeline already mixed by an automatically proportioning applicator so as to provide a steady application rate of not less than 50 ppm chlorine. Hydrants along the chlorinated section shall be open during application until the presence of chlorine has definitely been detected in each hydrant run. When a chlorine concentration of not less than 50 ppm has been established throughout the line, the valves shall be closed and the line left undisturbed for 24 hours.

As an alternative, the Contractor may use granulated chlorine. Granulated chlorine (dry calcium hypochlorite at 65% - 70% chlorine) shall be placed in the pipe to yield a dosage of not less than 50 ppm. The number of ounces of 65% test calcium hypochlorite required for a 20-foot length of pipe equals $.00843ld$, in which "d" is the diameter in inches. The line shall then be thoroughly flushed and water samples taken for approval by the local health agency. Flushing period must be approved by the City. The Contractor shall exercise special care in flushing to avoid damage to surrounding property to conform to Water Quality Considerations.

Should the initial treatment result in an unsatisfactory bacteriological test, additional chlorine using the first procedure shall be repeated by the Contractor until satisfactory results are obtained. The Contractor shall be responsible for disposal of treated water flushed from mains and at no time shall chlorinated water from a new main be flushed into a body of fresh water. This is to include lakes, rivers, streams, storm drainage systems and any and all other waters where fish or other natural water life can be expected. Disposal may be made to any available sanitary sewer provided the rate of disposal will not overload the sewer.

Main extensions shall not be connected to the City water system until pressure and bacteriological tests have passed all required standards.

2-291 Chlorine Dosage

References in Section 7-09.3(24) of the WSDOT Standard Specifications to an initial chlorine content of the water of not less than 50 mg/l is as follows.

The amounts of chlorine (Cl₂) required to give 50 mg/l for 100-foot lengths of various diameter of pipe are:

AMOUNTS OF CHLORINE REQUIRED FOR 50 MG/L
DOSAGE

Pipe Size (Inches)	Volume of Water Per 100 ft. Length (gallons)	Household Bleach 5-1/4% (gallons)	Commercial Bleach 12-1/2% (gallons)
4	65.3	0.06	0.03
6	146.5	0.14	0.06
8	261.0	0.26	0.11
10	408.0	0.40	0.16
12	588.7	0.60	0.24
14	799.6	0.80	0.32
16	1044.4	1.0	0.42
20	1631.9	1.6	0.66
24	2349.9	2.2	0.94
30	3671.7	3.6	1.50
36	5287.3	5.0	2.20
42	7196.6	7.0	2.90
48	9399.6	9.2	3.20

GENERAL NOTES FOR CONSTRUCTION PLANS (WATER MAIN INSTALLATION)

1. All workmanship and material shall be in accordance with City of Marysville standards and the most current copy of the WSDOT Standard Specifications for Road, Bridge, and Municipal Construction.
2. A preconstruction meeting shall be held with the City prior to the start of construction.
3. It shall be the responsibility of the Contractor to locate or have located by the appropriate companies all utilities prior to beginning construction.

Call Underground Locate at 1-800-553-4344 a minimum of 48 hours prior to any excavations.

4. Water pipe shall be ductile iron pipe standard thickness Class 52 cement-lined unless otherwise specified and shall conform to ANSI/AWWA C151/A21.51.
5. Gate valves shall be resilient wedge, NRS (Non Rising Stem) with O-rings seals. Valve ends shall be mechanical joint or ANSI flanges. Valves shall conform to AWWA 509-80. Valves shall be Mueller, M & H, Clow R/W or Waterous Series 500.
6. Fittings shall be ductile iron short body compact conforming to AWWA C110, C11 and C153 and shall be cement-mortar lined conforming to AWWA C104. The City will be given 72 hours notice prior to scheduling a shutdown. Where connections require "field verification", connection points will be exposed by Contractor and fittings verified 48 hours prior to distributing shut-down notices.;
7. Fire hydrants shall conform to AWWA C501 and shall be of standard manufacture and of a pattern approved by Marysville, with Stortz 5" quarter turn fitting. Hydrants shall be M & H Reliant Style 929 or Mueller A-423 (MJ). Hydrants shall be bagged until system is approved.
8. All lines shall be disinfected and flushed in conformance with WSDOT standards and specifications. All pipe shall be tested at 250 psi. The Contractor shall furnish all

temporary plugs, testing devices, etc. The City shall be present for all testing. The City will take purity tests, and connection will be authorized following passing of the tests. The Contractor shall not operate any valve or part of the City water system without notification and specific supervision of the City utility superintendent. The Contractor shall make all connections to the system required after making arrangements with the City in advance. Work and procedures shall conform to APWA Sec. 7-09.3(23)

9. Installation of pipe, fittings and valves, hydrants, and appurtenances shall conform to WSDOT standard specifications. Cover shall be 42 inches over the top of pipe unless otherwise noted on plans. In the event grade revision following water main construction results in cover over the water main of less than 3 feet or in excess of 5 feet, the water main shall be reconstructed by the Owner to conform to the specifications of the City of Marysville unless depth has been pre-approved by the City. All added costs of inspecting such water main reconstruction shall be charged to the developer.
10. Prior to construction of any water mains, the lot corners shall be staked and water main locations established by survey, cost of which is to be borne by the developer.
11. To maintain the required alignment, use short lengths and deflect the joints or use necessary bends.
12. Bedding material meeting the requirements for rigid pipe shall be placed to a depth of 6" under and around the pipe and to a depth of at least 12 inches over the top of the pipe. The bedding materials shall be rammed and tamped around the pipe by the use of shovels or other approved hand-held tools so as to provide firm and uniform support over the full length of all pipe, valves, and fittings. Care shall be taken to prevent any damage to the pipe or its protective coating.
13. Separation of water and sewer mains shall conform to W.D.O.E. standards or special construction requirements.
14. Services, blow-offs, and miscellaneous details shall be shown on the drawings or standard plans.

WATER SYSTEM APPROVED MATERIALS LIST

The following manufacturers have been approved for use for water and sewer. Where specific manufacturers are listed no other manufacturer may be used without prior approval by the Utility.

DUCTILE IRON PIPE

All manufacturers that meet the performance requirements specified under the material section of the standards.

DUCTILE IRON FITTINGS

All manufacturers that meet the performance requirements specified under the material section of the standards.

GALVANIZED IRON PIPE

All manufacturers that meet the performance requirements specified under the material section of the standards.

POLYETHYLENE PIPE

All manufacturers that meet the performance requirements specified under the material section of the standards.

JOINT RESTRAINT SYSTEMS

EBAA Iron (MEGALUG Series 1100)
Griffin Pipe Products Company (Snap-Lok, Bolt-Lok)
Romac (Grip Ring)
Star National Products (Shackle Products)
US Pipe (TR FLEX)

COUPLINGS

Romac, Dresser

STAINLESS STEEL REPAIR BANDS

Romac, Ford

CASING INSULATORS

Pipeline Seal and Insulator Co.
8" band Model C8G
12" band Model C12G

Cascade Waterworks Mfg. Co.

Stainless Steel Casing Spacers (catalog number depends on size)

CASING END SEALS

Pipeline Seal and Insulator Co.,

Standard Pull-on (Model S)
Custom Pull-on (Model G)

GATE VALVES

All manufacturers that meet the performance requirements specified under the material section of the standards.

PRV STATION

- PRESSURE REDUCING VALVES

CLA-VAL 90G-01BCSY	}	Approved Size for Main Valve
CLA-VAL 90G-01ACS	}	2" Bypass Valve

- STRAINERS

MUESSCO	751	}	6"
MUESSCO	11-BC	}	2"

(With brass or stainless steel perforated screen, 1/16" diameter, 144 holes per square inch)

- PRESSURE RELIEF VALVES

CLA-VAL 50G-01KC	}	2"
------------------	---	----

INDIVIDUAL PRESSURE REDUCING VALVES (Residential)

Wilkins 600 with built-in bypass.

INDIVIDUAL PRESSURE REDUCING VALVES (Commercial)

- PRESSURE REDUCING VALVES

Mueller H-9300, No. 2 setting

- PRESSURE RELIEF VALVES

CLA-VAL	55F
---------	-----

SERVICE SADDLES

1" tap:	Romac 101S
	Ford FS101 (4" through 8" mains)
1-1/2" &	Romac 202S
2" tap	Ford FS202

CORPORATION STOPS

- 1" size: Ford F1000G, FB 1000G
Mueller No. H-15008
AY McDonald 4701Q Plug Style, 4701BQ Ball Style
- 1-1/2" size: Ford Ballcorp FB1100G MIPX COMP
Mueller H 15023 IPTX110
AY McDonald 4701BQ Ball Style
- 2" size: Ford Ballcorp FB 1100G
Mueller H 15023 IPTX110
AY McDonald 4701BQ Ball Style

ANGLE METER VALVES

- 1-1/2" Irrigation: Ford FV 43666WG
Mueller 1-1/2" B 24276 Angle Ball Valve Flgx110
- 2" Irrigation: Ford FV 43777WG
Mueller 2" B 24276 Angle Ball Valve Flgx110

VALVE BOXES

Rich Manufacturing Co. #940

BUTTERFLY VALVES

All manufacturers that meet the performance requirements specified under the material section of the standards.

CHECK VALVES

Ludlow-Rennselaer List 340

AIR AND VACUUM RELEASE VALVES

APCO No. 143-C, Val-Matic No. 201C, Crispin U10

FIRE HYDRANTS

Mueller Centurion
M&H 129T or 929
Clow Medallion
East Jordon Iron Works

METER SETTERS

5/8" X 3/4": (horizontal):

Ford VBH-92-12W15
Mueller 5/8" x 3/4" (B-24104-2) 5/8 x 3/4 Setter Vertical inlet x 15" horizontal outlet

AY McDonald 62P212WCDD33 (5/8 x 3/4 meter) with 15" horizontal outlet
AY McDonald 62F312WCDD 33 for (full 3/4")
AY McDonald Adaptor from 1" to 3/4" 4753Q MIPXCTS ADP7

1" x 1" (horizontal):

Ford VBH 94 15W15
Mueller 1" (B-24104-2) 1" Setter Vertical Inlet x 15" horizontal outlet

1" x 1" (vertical):

Ford VH-8612B-11-66

1-1/2" Domestic:

Muller H-1423-2 Custom Setter with Bypass and Check
AY McDonald 39 B612WWFF665

2" domestic:

Ford VFH 87 12B-11-77
AY McDonald 39 B712WWFF775

METER BOXES (as listed or approved equal)

5/8" X 3/4" Service: Carson BCF1730-12 sku#17302500
HDPE cover: Carson HD1730sku#17304500
Lid shall be traffic rated if required.

3/4" X 3/4" Service: Carson BCF1730-12 sku#17302500
HDPE cover: Carson HD1730sku#17304500
Lid shall be traffic rated if required.

1" x 1" Service: Carson BCF1730-12 sku#17302500
HDPE cover: Carson HD1730sku#17304500
Lid shall be traffic rated if required.

Dual Meters: Carson BCF1730-12 sku#17302500
HDPE cover: Carson HD1730sku#17304500
Lid shall be traffic rated if required.

1-1/2" and 2": Carson BCF1730-12 sku# 17302500
HDPE cover: Carson HD1730 sku#17304500
Lid shall be traffic rated if required.

REDUCED PRESSURE BACKFLOW ASSEMBLIES

As approved on the most current List of Approved Backflow Prevention Assemblies published by the Washington State DOH.

DOUBLE CHECK VALVE ASSEMBLIES

As approved on the most current List of Approved Backflow Prevention Assemblies published by the Washington State DOH.

RESILIENT SEATED SHUT-OFF VALVES

All manufacturers that meet the performance requirements specified under the material section of the standards.

PVC PIPE (ASTM D3034) 4" - 15"

All manufacturers that meet the performance requirements specified under the material section of the standards.

PVC PIPE (ASTM F679) 18" - 27"

All manufacturers that meet the performance requirements specified under the material section of the standards.

PVC PIPE (AWWA C900) 4" - 12"

All manufacturers that meet the performance requirements specified under the material section of the standards.

AWWA C900 FITTINGS AND MANHOLE ADAPTERS

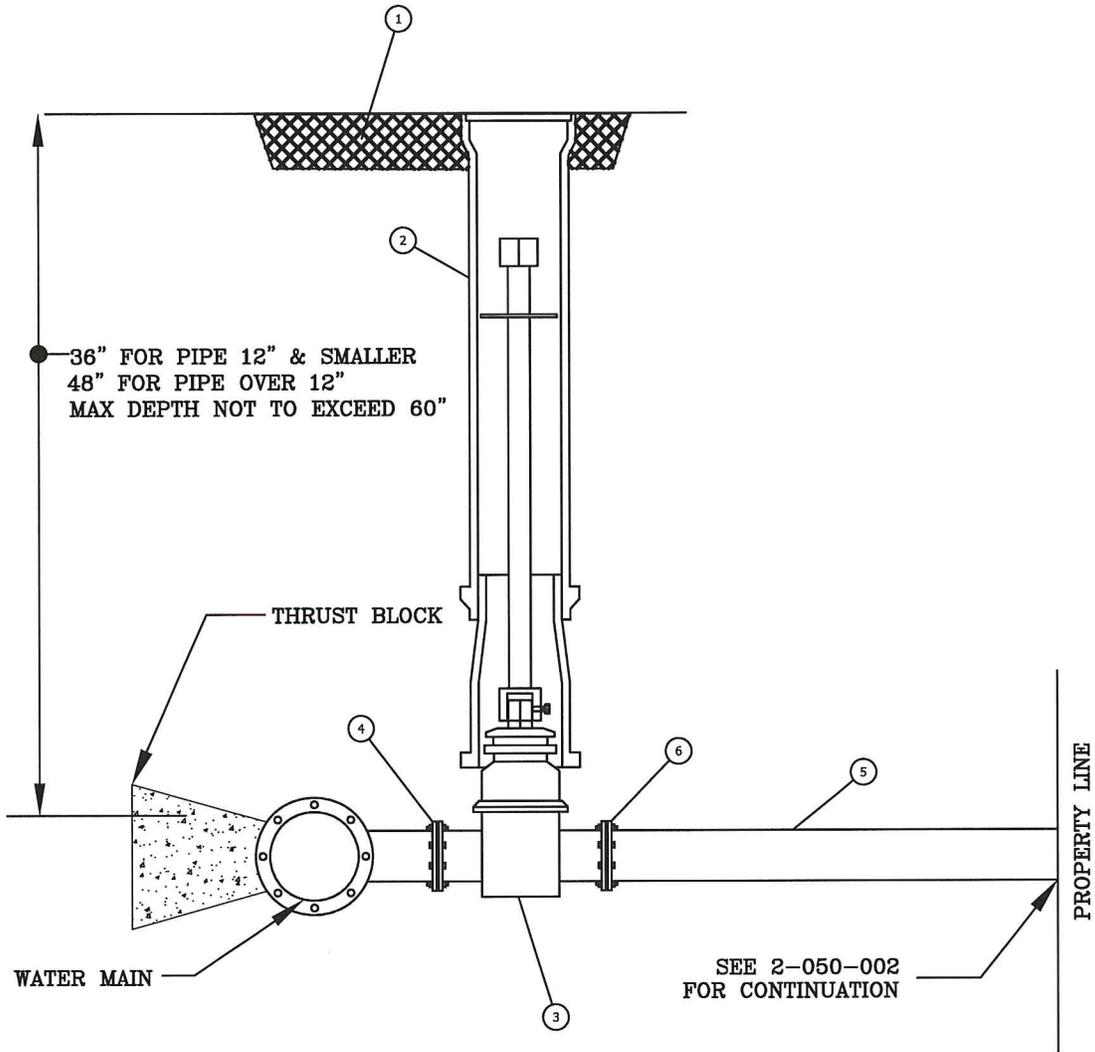
Head Manufacturing (Idaho)
Vassallo (Florida)

CONTROLLED DENSITY (FLOWABLE) FILL

Stoneway, CADMAN

RECYCLED CONCRETE (FOR USE AS CRUSHED SURFACING BASE COURSE MATERIAL)

Stoneway Recycling
Renton Recycling (with certification that the material is free of contaminants)



MATERIAL LIST

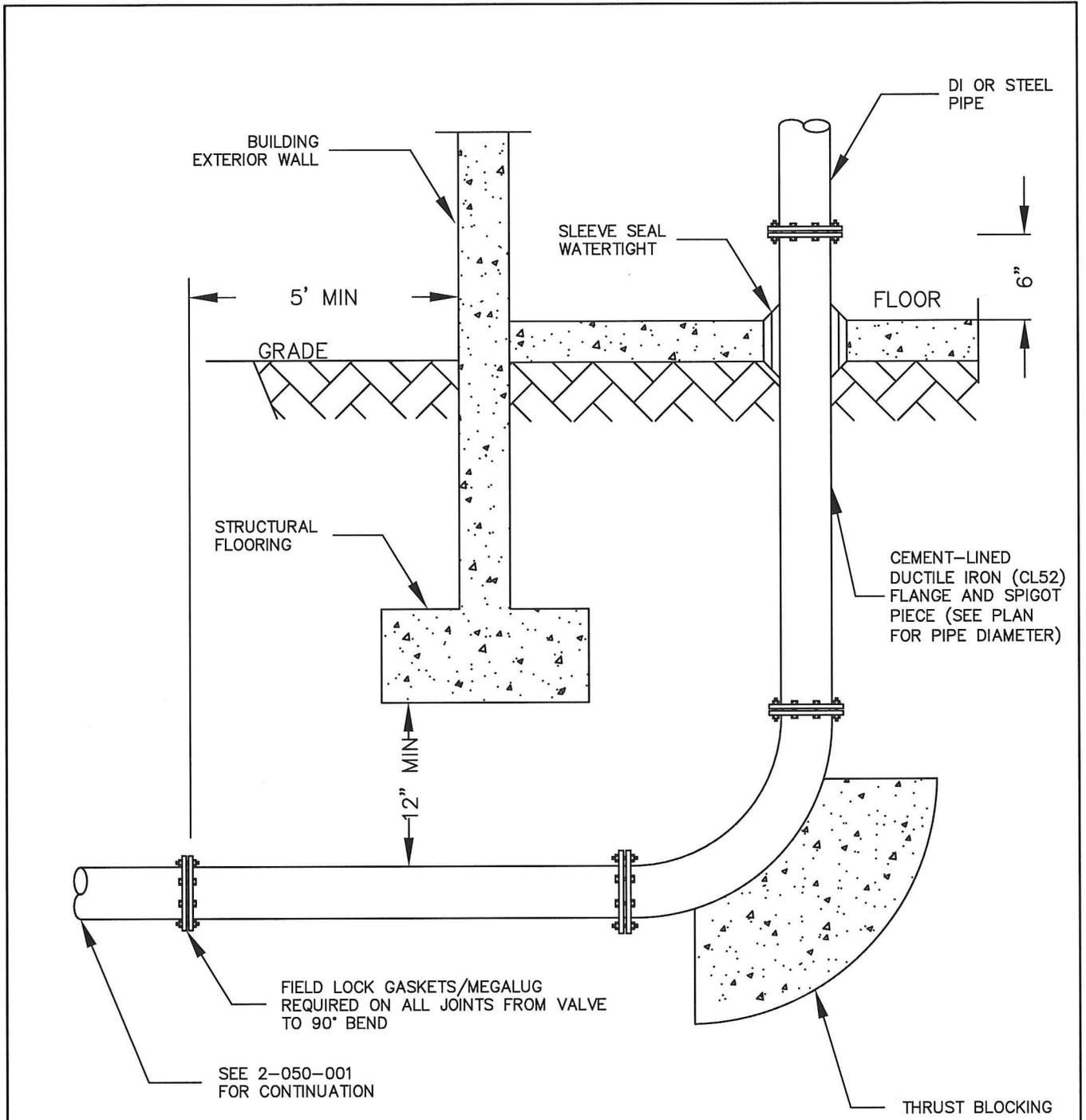
- ① 24"X24"X4" CONCRETE PAD IN UNPAVED AREA.
- ② CAST IRON VALVE BOX AND EXTENSION PER STANDARD DETAIL 2-XXX-XXX
- ③ 6" GATE VALVE WITH RESILIENT SEAT (MUELLER, M&H OR APPROVED EQUAL)
- ④ MAINLINE SIZE TEE WITH FLANGE
- ⑤ 6" D.I.P.
- ⑥ MEGALUG

[Signature]
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5/15/15
DATE



FIRE LINE
CONNECTION

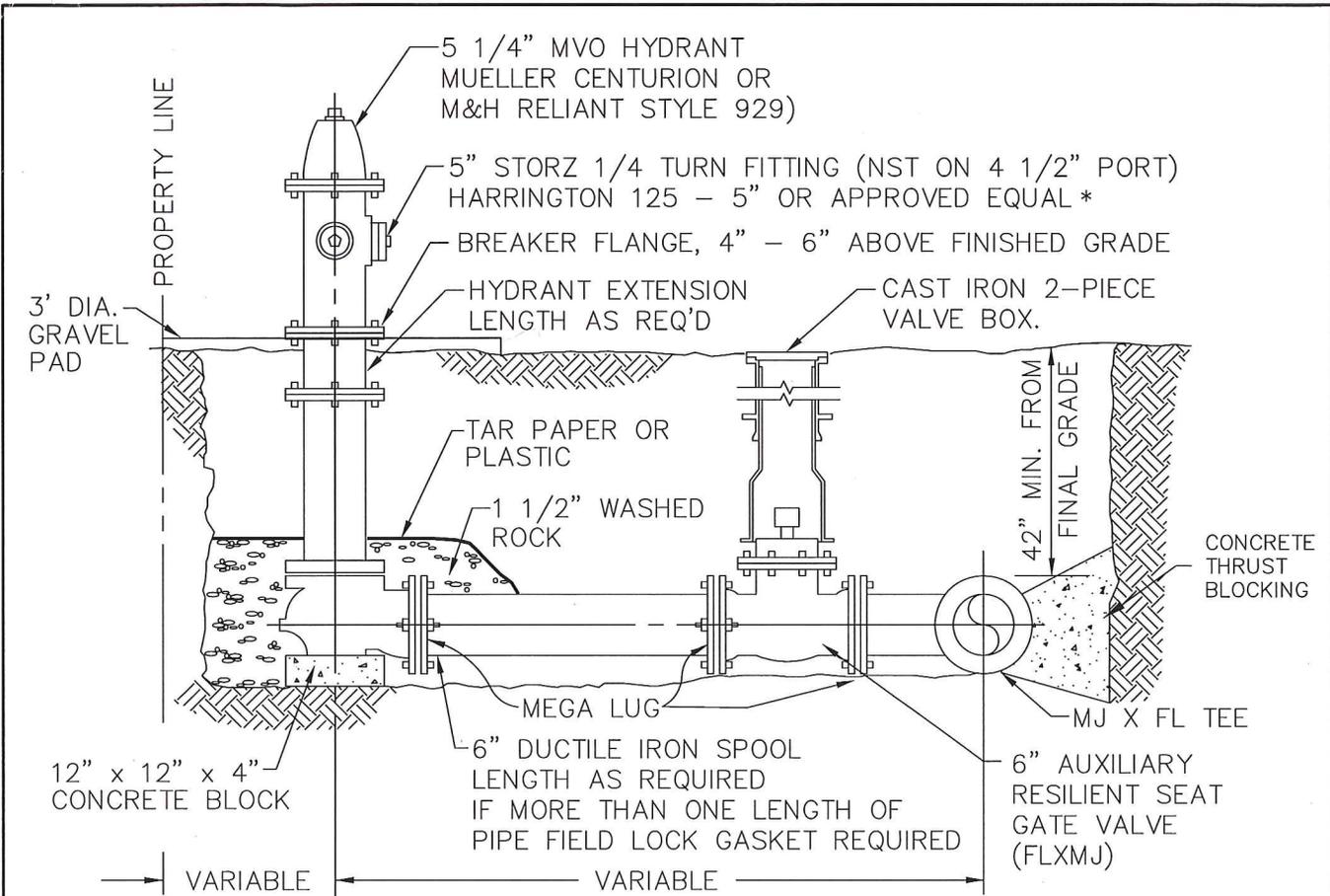



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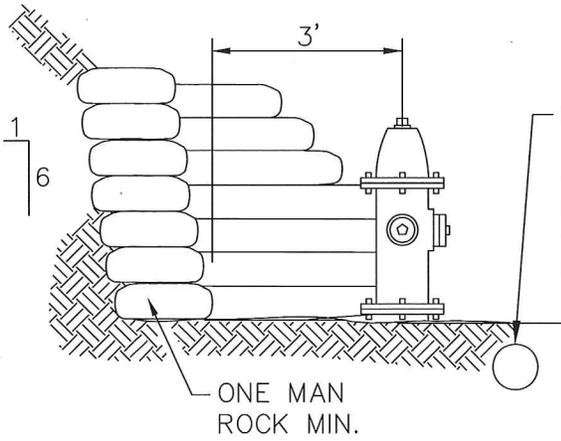
**FIRE LINE UNDERGROUND
 FLOOR FLANGE
 DETAIL**





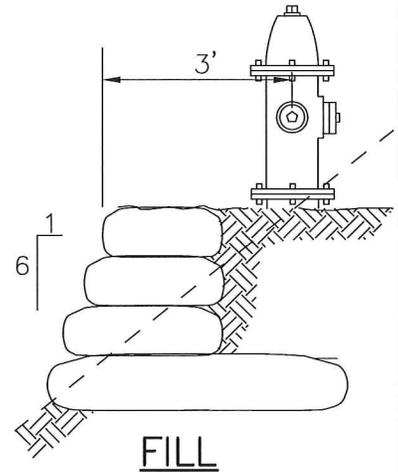
NOTE: PAINT HYDRANT WITH CATERPILLAR YELLOW. BAG HYDRANT UNTIL SYSTEM IS APPROVED. REMOVE ALL CHAINS & CONNECTORS FROM ALL PORTS. NO LOCKING DEVICES ON STORZ FITTINGS.

3' MINIMUM CLEARANCE AROUND FIRE HYDRANT

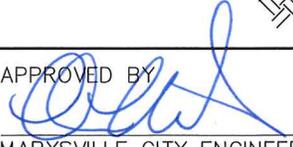


CUT

INSTALL CULVERT W/ 4 TO 1 TAPERED ENDS (SIZE & TYPE EQUAL TO NEAREST DOWNSTREAM CULVERT) WHEN HYDRANT IS BEHIND DITCH.



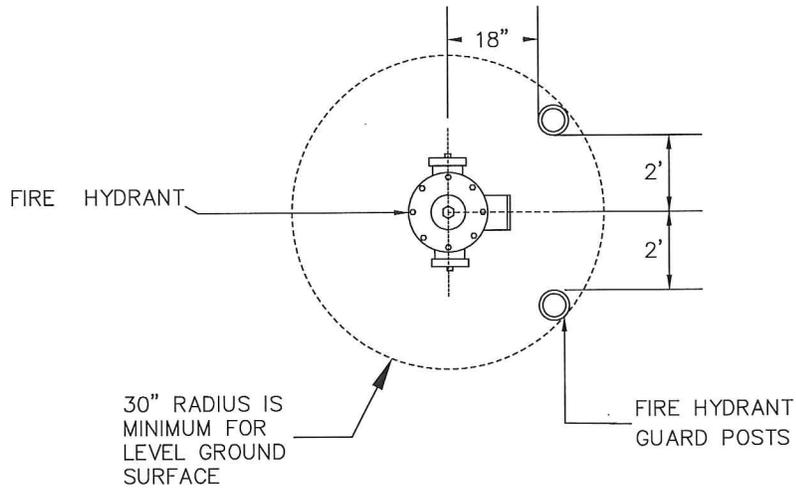
FILL

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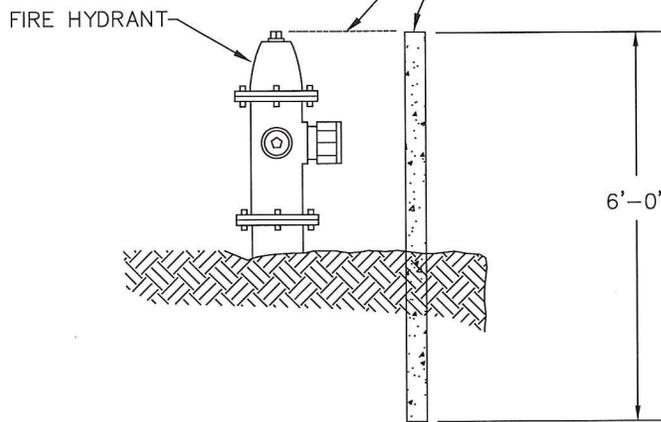
5/9/07
DATE



HYDRANT
INSTALLATION



INSTALL GUARD POSTS EVEN WITH HYDRANT PORT



GUARD POST 9" ROUND REINFORCED CONCRETE 6'-0" LG. EQUAL TO UTILITY VAULT CO. TO BE INSTALLED WHERE DIRECTED.

APPROVED BY

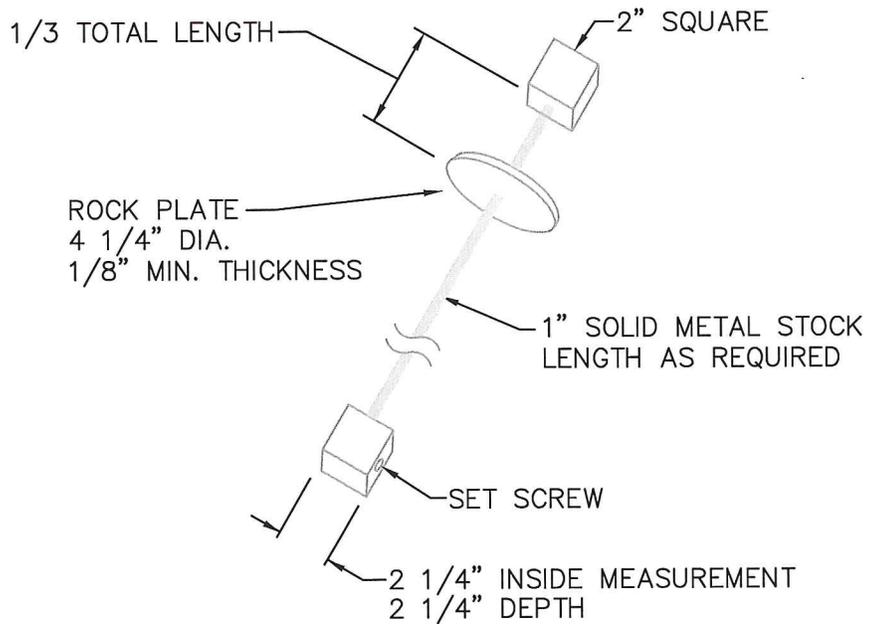
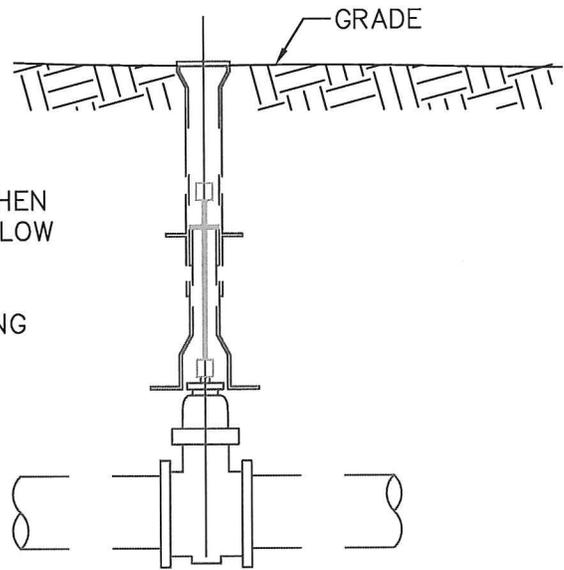
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DATE



FIRE HYDRANT
GUARD POST

EXTENSIONS W/ ROCK PLATE ARE REQUIRED WHEN THE VALVE NUT IS MORE THAN 48" INCHES BELOW FINISHED GRADE. EXTENSIONS ARE TO BE A MINIMUM OF ONE (1) FOOT LONG. ONLY ONE EXTENSION TO BE USED PER VALVE. OPERATING NUT TO BE WITHIN 24" OF FINISHED GRADE.



NOTES

1. ALL EXTENSIONS ARE TO BE MADE OF STEEL SIZED AS NOTED.
2. PAINT ENTIRE EXTENSION ASSEMBLY WITH TWO COATS OF CARBON ELASTIC (ATCO #222) OR APPROVED EQUAL.
3. EXTENSION TO BE INSTALLED PRIOR TO SETTING VALVE BOX.

APPROVED BY

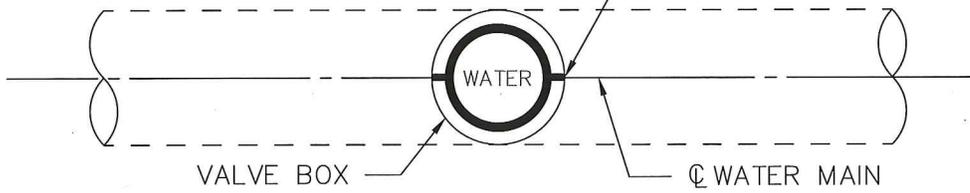
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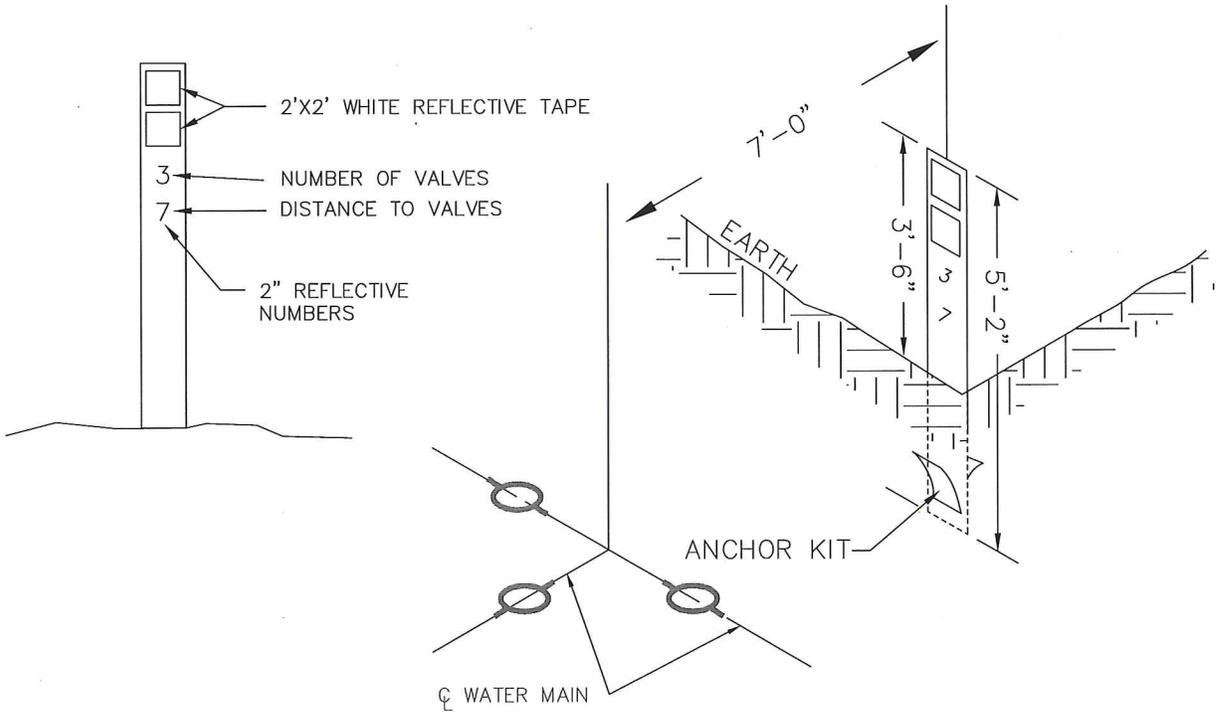


VALVE OPERATING
NUT EXTENSION DETAIL

ALIGN VALVE BOX EARS IN THE DIRECTION
OF THE WATER MAIN (AS SHOWN)



VALVE BOX EAR DETAIL



NOTE: VALVE MARKER SHALL BE CARSONITE CUM-375 BLUE WITH 2-ANCHORS (ANCHOR BARB KIT) AT BOTTOM OF MARKER. MARKER SHALL BE SITUATED IN A SAFE AND LOGICAL LOCATION. THE POST SHALL BE SET AT RIGHT ANGLES TO THE ROADWAY FROM THE VALVE. USE APPROPRIATE INSTALLATION TOOLS AND METHODS.

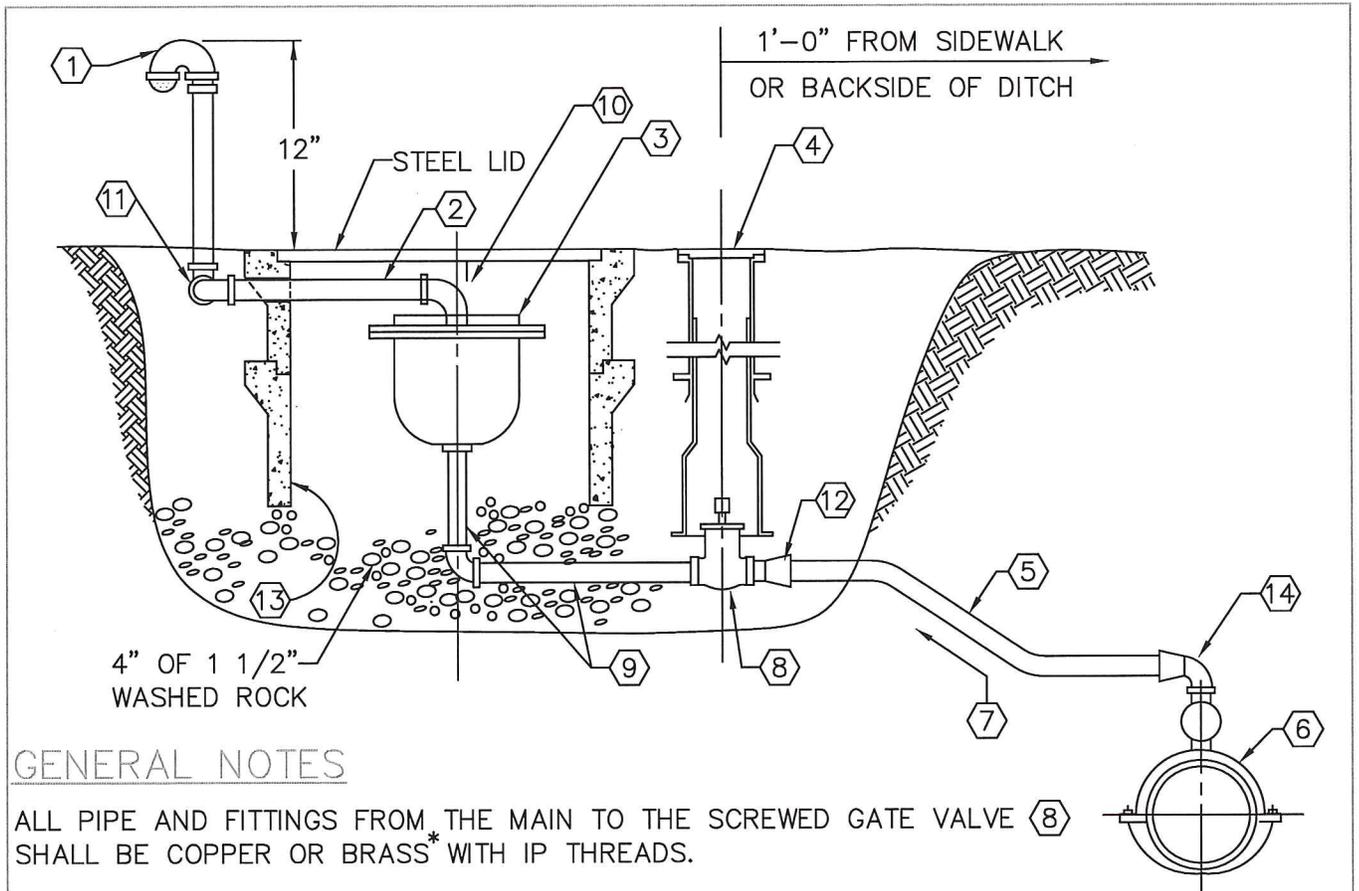
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DATE



VALVE MARKER
POST DETAIL



GENERAL NOTES

ALL PIPE AND FITTINGS FROM THE MAIN TO THE SCREWED GATE VALVE (8) SHALL BE COPPER OR BRASS* WITH IP THREADS.

AIR AND VACUUM VALVE ASSEMBLY MUST BE INSTALLED AT HIGHEST POINT IN LINE. IF HIGH POINT FALLS IN LOCATION WHERE ASSEMBLY CANNOT BE INSTALLED, PROVIDE ADDITIONAL DEPTH OF LINE TO CREATE HIGH POINT AT A LOCATION WHERE ASSEMBLY CAN BE INSTALLED.

INSTALL VALVE BOX PERPENDICULAR TO PAVING. INSULATE W/ FIBERGLASS INSULATION TO TOP OF AIR/VACUUM VALVE.

KEYED NOTES

- ① 2" BRONZE BEEHIVE STRAINER, 2" RETURN BEND, PAINTED SAFETY YELLOW
- ② EXTEND 2" PIPE HORIZONTALLY THROUGH BACK OF BOX
- ③ 2" AIR RELEASE OR COMBINATION AIR/VACUUM VALVE, APCO 145C OR EQUAL.
- ④ CAST IRON 2 PIECE VALVE BOX W/ LID & LIFTING HANDLE, SEATTLE STYLE 045
- ⑤ 2" TYPE K SOFT COPPER TUBING
- ⑥ 2" DOUBLE STRAP SADDLE WITH IP BALL CORP STOP
- ⑦ MAINTAIN POSITIVE SLOPE FROM MAIN TO AIR RELEASE VALVE
- ⑧ 2" MUELLER 110 OR FORD QUICK JOINT BALL VALVE CURB STOP
- ⑨ 2" BRASS PIPE WITH 90° ELBOW AND SHORT NIPPLE
- ⑩ 2" 90° BEND & STREET ELL
- ⑪ 2" 90° BEND, 2" CLOSE NIPPLE & 2" 90° BEND
- ⑫ 2" MIPTx110 COMPRESSION COUPLING
- ⑬ 2-#2 FOGTITE CONCRETE BOXES W/ ONE STEEL TRAFFIC BEARING LID
- ⑭ 90° 2" ELL, BRASS - FIPTx110 COMPRESSION COUPLING

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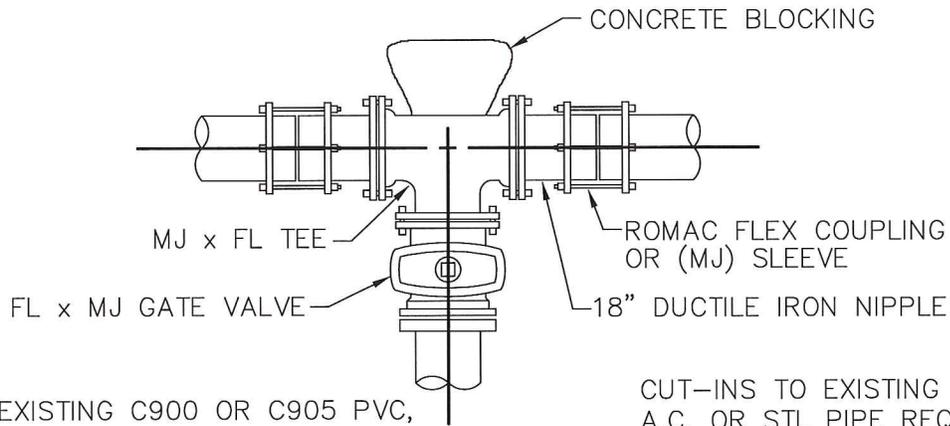
MARYSVILLE CITY ENGINEER

5/15/15

DATE



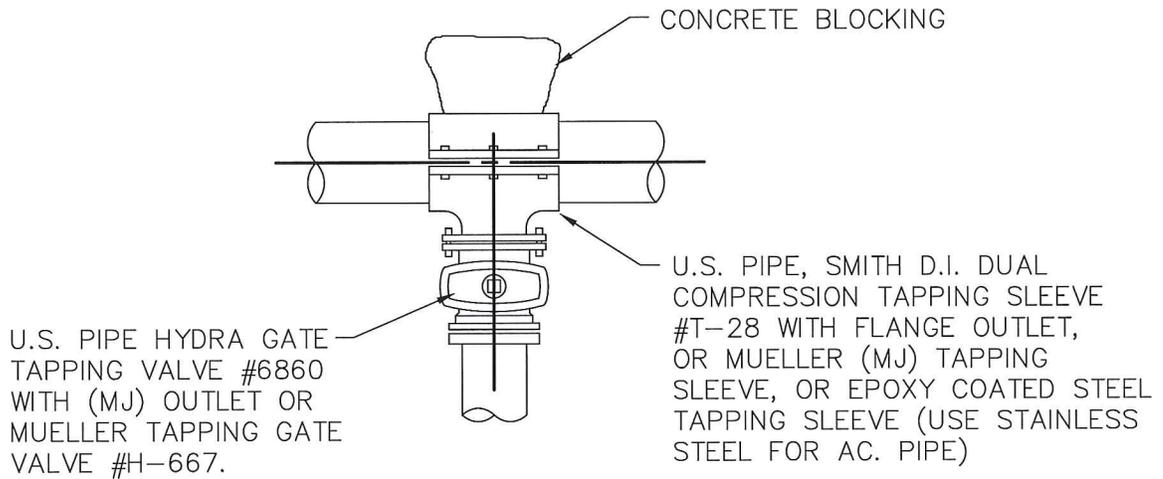
2" AIR RELEASE OR COMBINATION AIR/VACUUM VALVE



CUT-INS TO EXISTING C900 OR C905 PVC,
C.I., OR D.I. PIPE REQUIRE
1-18" D.I. NIPPLE
1-(MJ) SLEEVE (LONG)

CUT-INS TO EXISTING
A.C. OR STL PIPE REQUIRE
2-18" D.I. NIPPLES
2-ROMAC FLEX COUPLINGS

CUT-IN TO MAINS



WET TAP MAINS

NOTE:

ALL CONNECTIONS TO EXISTING MAINS WILL BE MADE WITH CITY OF MARYSVILLE PERSONNEL PRESENT.

ALL FITTINGS TO BE SWABBED W/CL2 SOLUTION (50 PPM)

STEEL PIPES SHALL BE RECOATED WHERE WRAPPING HAS BEEN DISTURBED.

SIZE ON SIZE REQUIRES MJ TAPPING TEE

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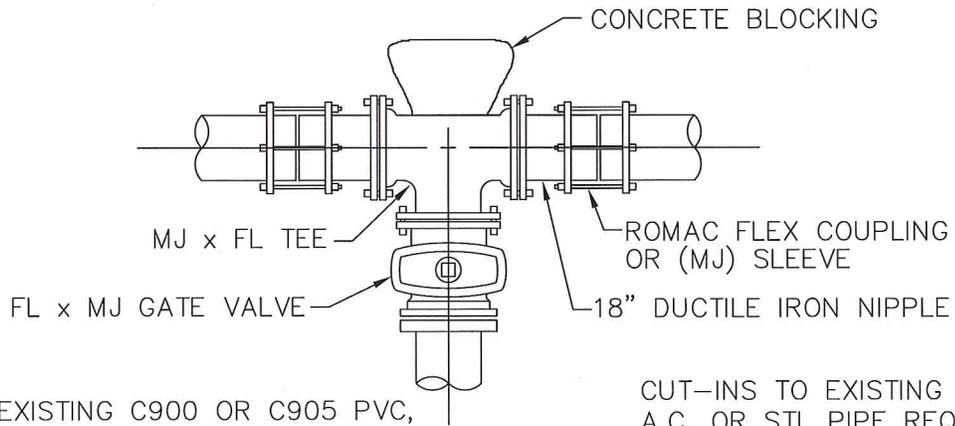
MARYSVILLE CITY ENGINEER

5/15/15

DATE



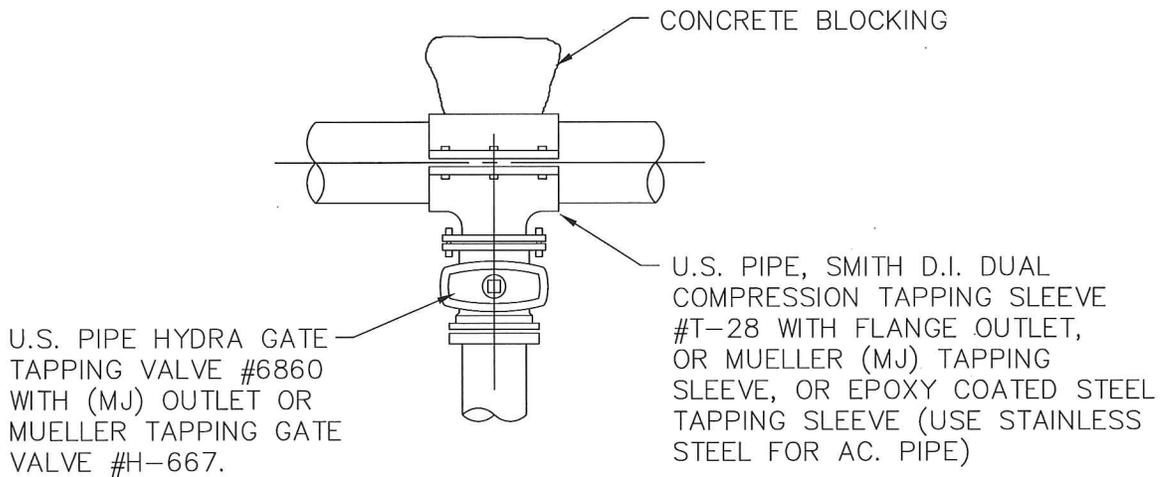
CUT-INS AND
LIVE TAPS



CUT-INS TO EXISTING C900 OR C905 PVC,
C.I., OR D.I. PIPE REQUIRE
1-18" D.I. NIPPLE
1-(MJ) SLEEVE (LONG)

CUT-INS TO EXISTING
A.C. OR STL PIPE REQUIRE
2-18" D.I. NIPPLES
2-ROMAC FLEX COUPLINGS

CUT-IN TO MAINS 8" AND SMALLER



U.S. PIPE HYDRA GATE
TAPPING VALVE #6860
WITH (MJ) OUTLET OR
MUELLER TAPPING GATE
VALVE #H-667.

U.S. PIPE, SMITH D.I. DUAL
COMPRESSION TAPPING SLEEVE
#T-28 WITH FLANGE OUTLET,
OR MUELLER (MJ) TAPPING
SLEEVE, OR EPOXY COATED STEEL
TAPPING SLEEVE (USE STAINLESS
STEEL FOR AC. PIPE)

WET TAP MAINS 10" AND LARGER

NOTE:

ALL CONNECTIONS TO EXISTING MAINS WILL BE MADE WITH CITY OF MARYSVILLE PERSONNEL PRESENT.

ALL FITTINGS TO BE SWABBED W/CL2 SOLUTION (50 PPM)

STEEL PIPES SHALL BE RECOATED WHERE WRAPPING HAS BEEN DISTURBED.

SIZE ON SIZE REQUIRES CAST IRON MJ SLEEVE

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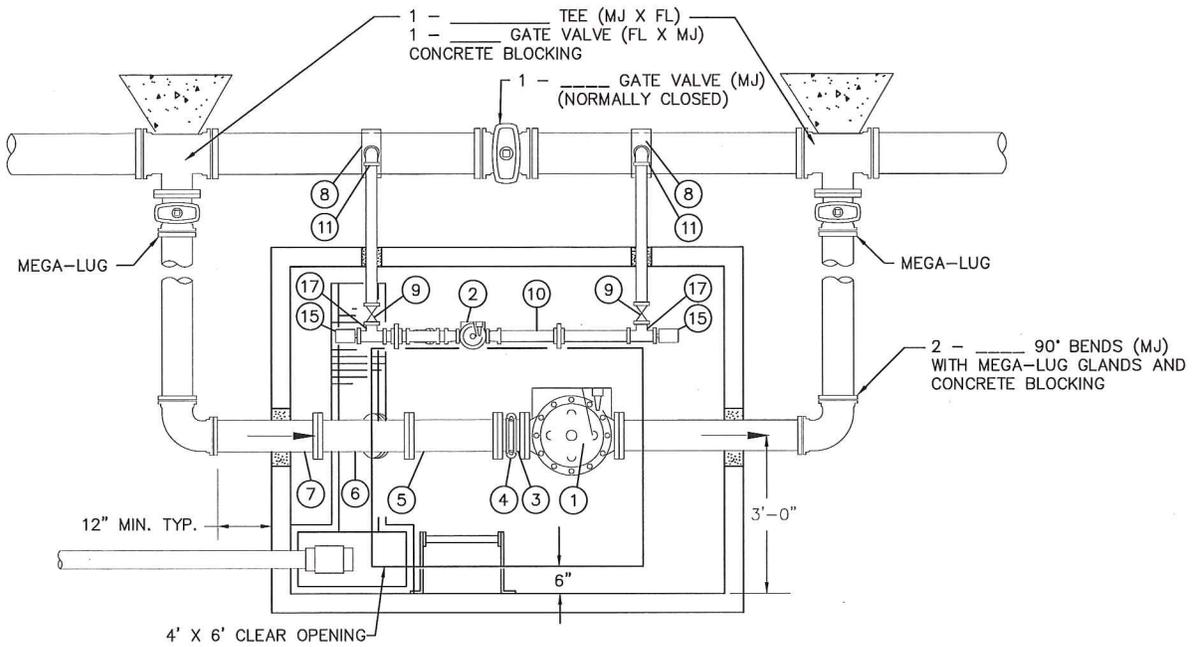
MARYSVILLE CITY ENGINEER

DATE



CUT-INS AND
LIVE TAPS

STANDARD PLAN 2-070-004

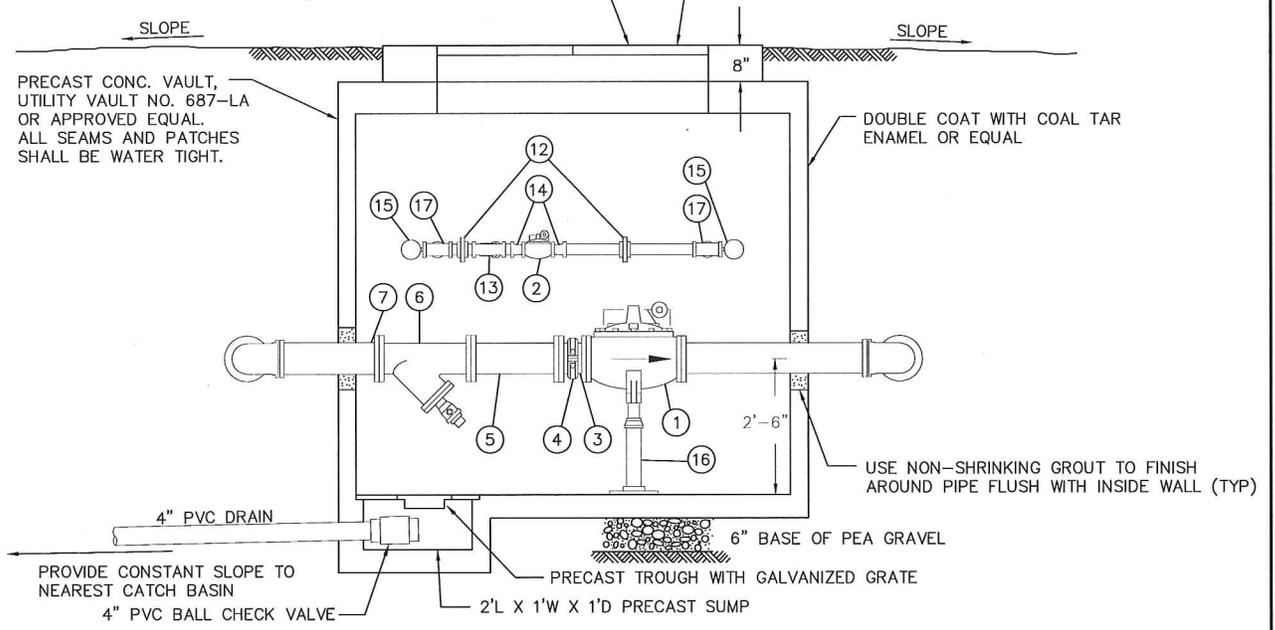


PLAN

NTS

GALVANIZED STEEL ACCESS HATCH SHALL BE PROVIDED TO WITHSTAND H-20 WHEEL LOADS. UTILITY VAULT #687-TL-2-322P

SET ACCESS HATCH 0.2' ABOVE FINISHED GRADE



ELEVATION

NTS

APPROVED BY

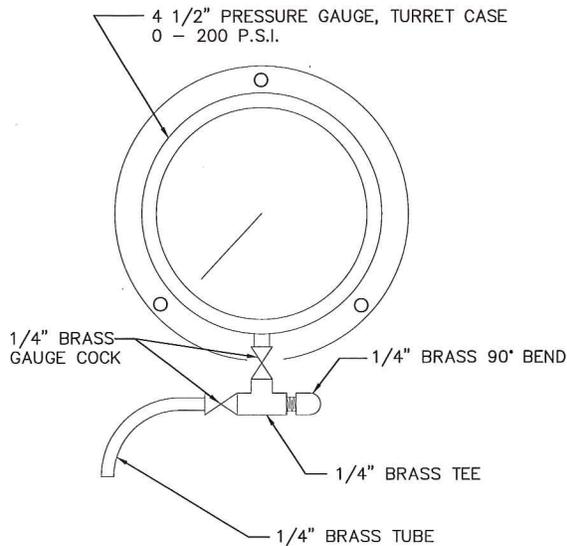
MARYSVILLE CITY ENGINEER

5/9/07

DATE



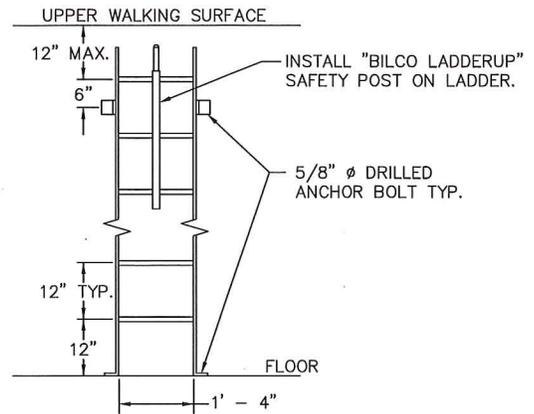
**PRESSURE
REDUCING STATION**



DRILL AND TAP A 1/4" HOLE IN ___ D.I. PIPE FOR INSTALLATION.

GAUGE ASSEMBLY

N.T.S.



LADDER AND MOUNTING BOLTS SHALL BE CONSTRUCTED OF HOT DIPPED GALVANIZED STEEL.

LADDER DETAIL

N.T.S.

MATERIALS LIST

1. ___ PRESSURE REDUCING VALVE (CLAYTON 90G-01 ABCSY)
2. ___ PRESSURE REDUCING VALVE (CLAYTON 90G-01 ABCS)
3. 8" OF ___ D.I. (FL X GROOVE)
4. VICTUALIC COUPLING OR EQUAL
5. 16" OF ___ D.I. (FL)
6. ___ WYE STRAINER (FL), 1/8" DIAM. SCREEN, WITH 2" CORP STOP ON DRAIN
7. ___ D.I. PIPE (FL X PE)
8. ___ I.P. SERVICE SADDLE WITH DOUBLE STAINLESS STEEL STRAPS
9. ___ BRASS GATE VALVE
10. ___ PIPE
11. ___ 90° BEND
12. ___ UNION
13. ___ WYE STRAINER WITH 20 MESH SCREEN
14. ___ REDUCER
15. ___ 1/4" GAUGE COCK AND PRESSURE GAUGE
16. ADJUSTABLE PIPE SUPPORT
17. ___ TEE

ALL PIPE AND FITTINGS 3" DIA. AND SMALLER SHALL BE GALVANIZED UNLESS NOTED OTHERWISE.

PRV DESCRIPTIONS

1. PRESSURE REDUCING VALVE

- A) ___ GLOBE
- B) FLANGED
- C) CLASS 125
- D) APPROXIMATE DOWNSTREAM PRESSURE SETTING - ___ P.S.I.
- E) WYE STRAINER ON PILOT LINE
- F) FLOW CLOSING SPEED CONTROL
- G) VALVE POSITION INDICATOR
- H) STAINLESS STEEL TRIM ON MAIN AND PILOT VALVE

2. PRESSURE REDUCING VALVE

- A) ___ GLOBE
- B) THREADED
- C) CLASS 125
- D) APPROXIMATE DOWNSTREAM PRESSURE SETTING - ___ P.S.I.
- E) WYE STRAINER ON PILOT LINE
- F) FLOW OPENING SPEED CONTROL
- G) VALVE POSITION INDICATOR
- H) STAINLESS STEEL TRIM ON MAIN AND PILOT VALVE

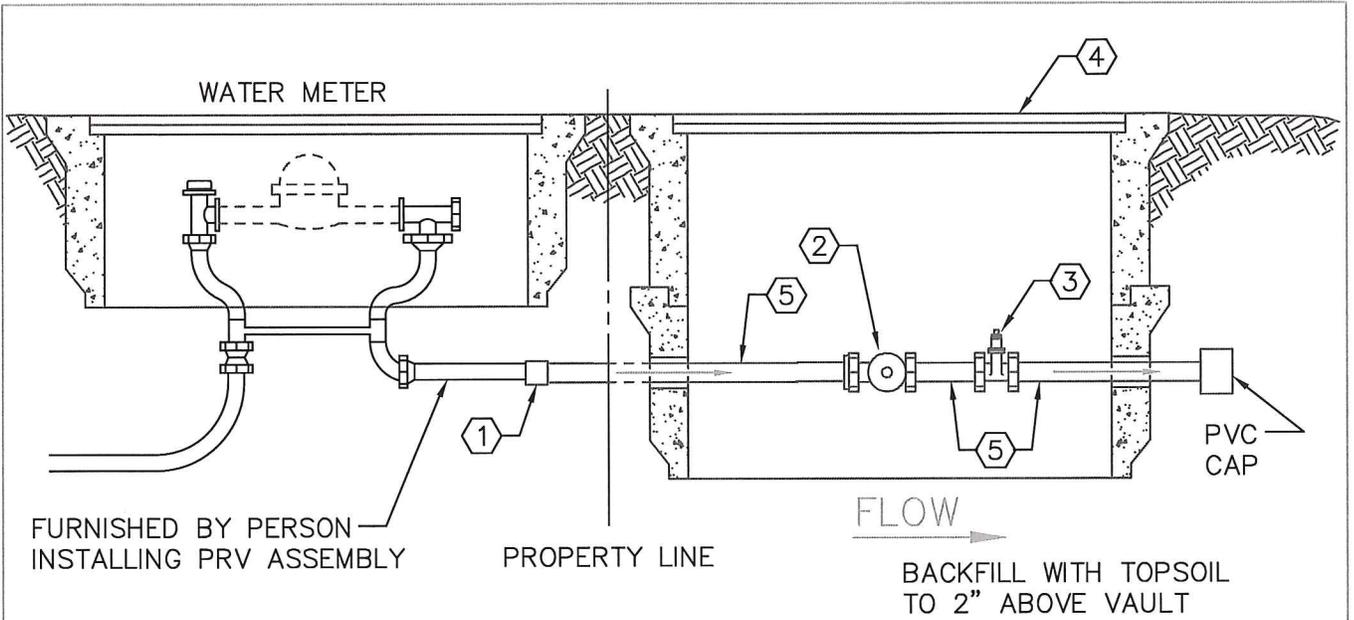
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MARYSVILLE CITY ENGINEER

DATE

PRESSURE REDUCING STATION NOTES



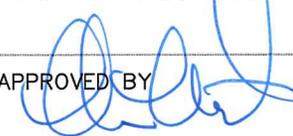


KEYED NOTES FOR PRV

- ① 3/4" COMBINATION TAIL PIECE END CONNECTION
- ② PRESSURE REDUCING VALVE W/ STRAINER – 3/4" WITH UNION COUPLING ON THE INLET; EQUAL TO: WILKINS #600, WATTS #U5B. INSTALL SIDWAYS TO ALLOW ACCESS TO STRAINER AND ADJUSTING SCREW.
- ③ 3/4" BRASS GATE VALVE
- ④ CARSON BCF1118-12 SKU #11182500 (OR APPROVED EQUAL)
- ⑤ 3/4" BRASS PIPE

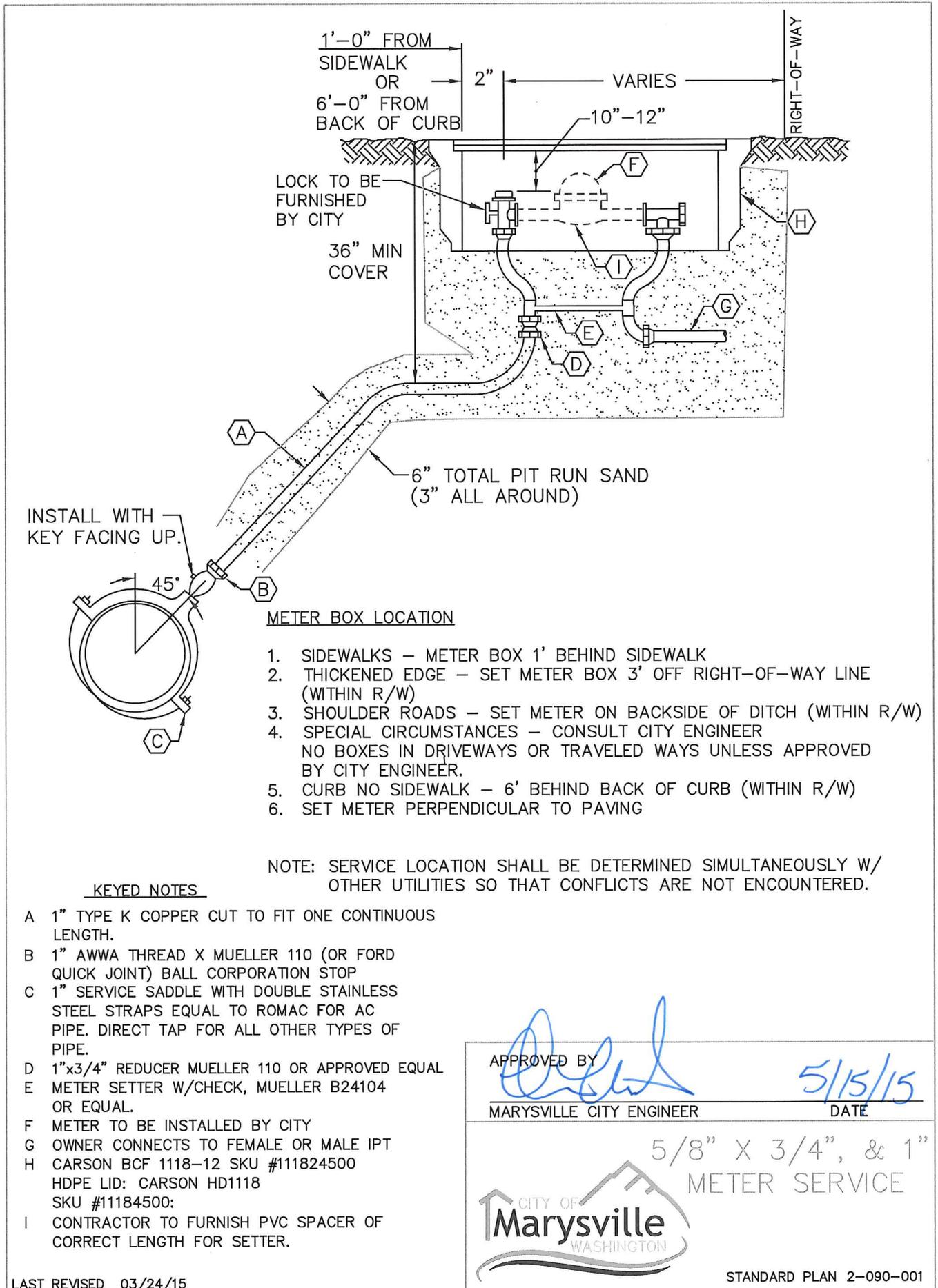
INSTALLATION

THE PRESSURE REDUCING VALVE SHALL BE LOCATED "DOWNSTREAM" OF THE METER. RESPONSIBILITY FOR PROPER INSTALLATION, AND OPERATION OF THE VALVE SHALL BE THAT OF THE CONTRACTOR.

APPROVED BY  5/15/15
 MARYSVILLE CITY ENGINEER DATE

5/8"x3/4" SINGLE METER SERVICE WITH PRESSURE REDUCING VALVE

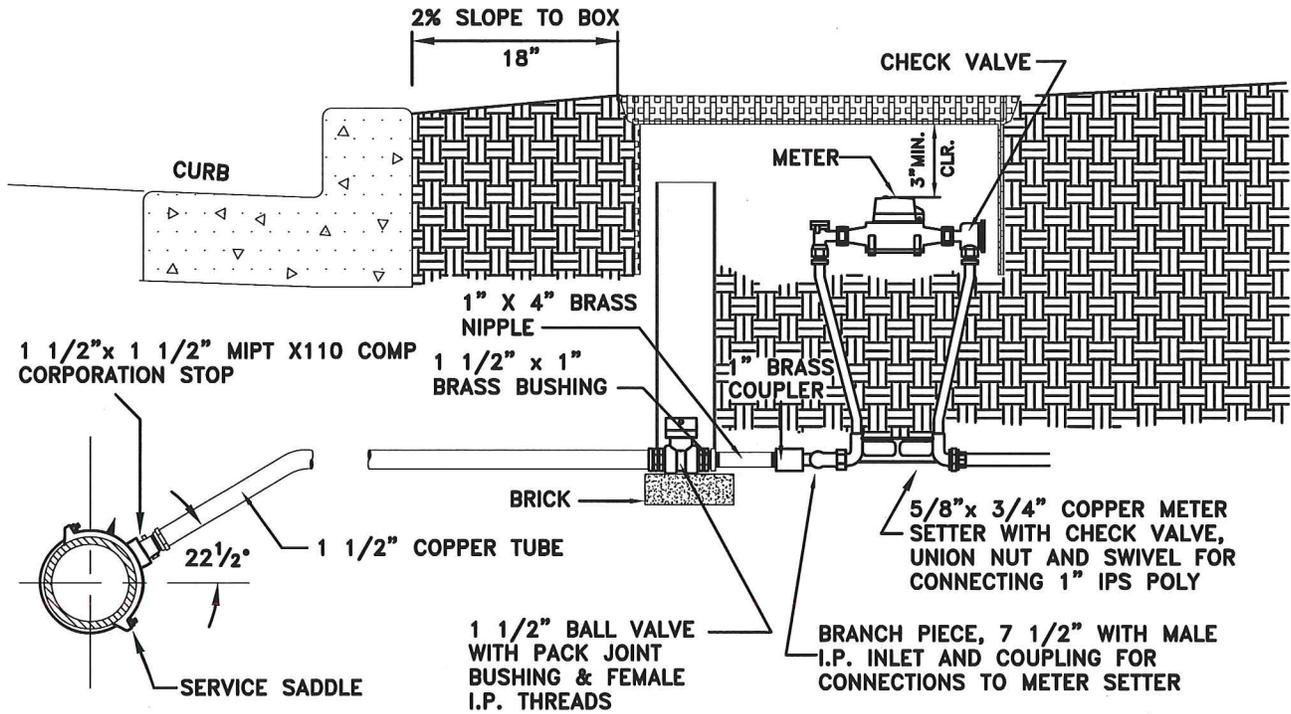
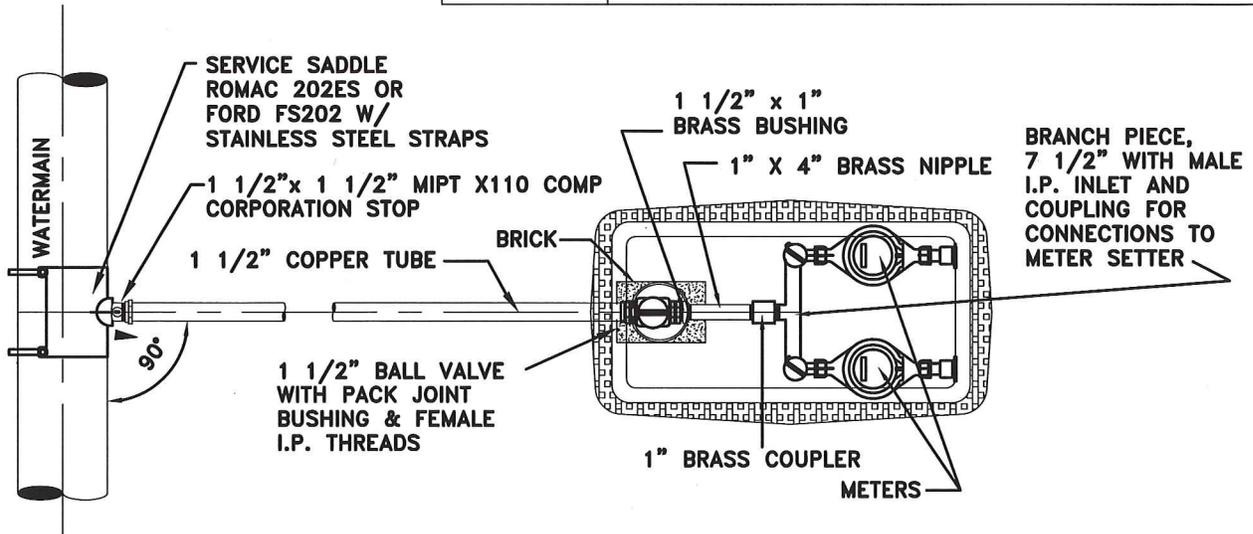




THE WATER MAIN IS LOCATED 6' FROM THE CENTERLINE OF THE ROAD ON THE NORTH OR EAST SIDES

ENVIRONMENT TO BE USED IN ALL APPLICATIONS

5/8" DOUBLE METER BOX
 CARSON BCF1527-18XL SKU#15272002 WITH POLYMER/CONCRETE LID AND LARGE POLYMER/CONCRETE READER LID: CARSON PC1527R SKU#15274018. LID SHALL BE TRAFFIC RATED IF REQUIRED.



GENERAL NOTES:

1. ALL SERVICE SADDLES SHALL HAVE RUBBER GASKET AND I.P. THREADS.
2. METER SETTERS: FORD VH 72-15W, AYMCDONALD 20-215WCDD44 OR MUELLER B2404-2X12.
3. BALL VALVE: FORD B61-666G, AYMCDONALD M6102-33 OR MUELLER E25171.
4. BRANCH PIECE: FORD U-88-43, AYMCDONALD 08UMM OR MUELLER H15364.

APPROVED BY

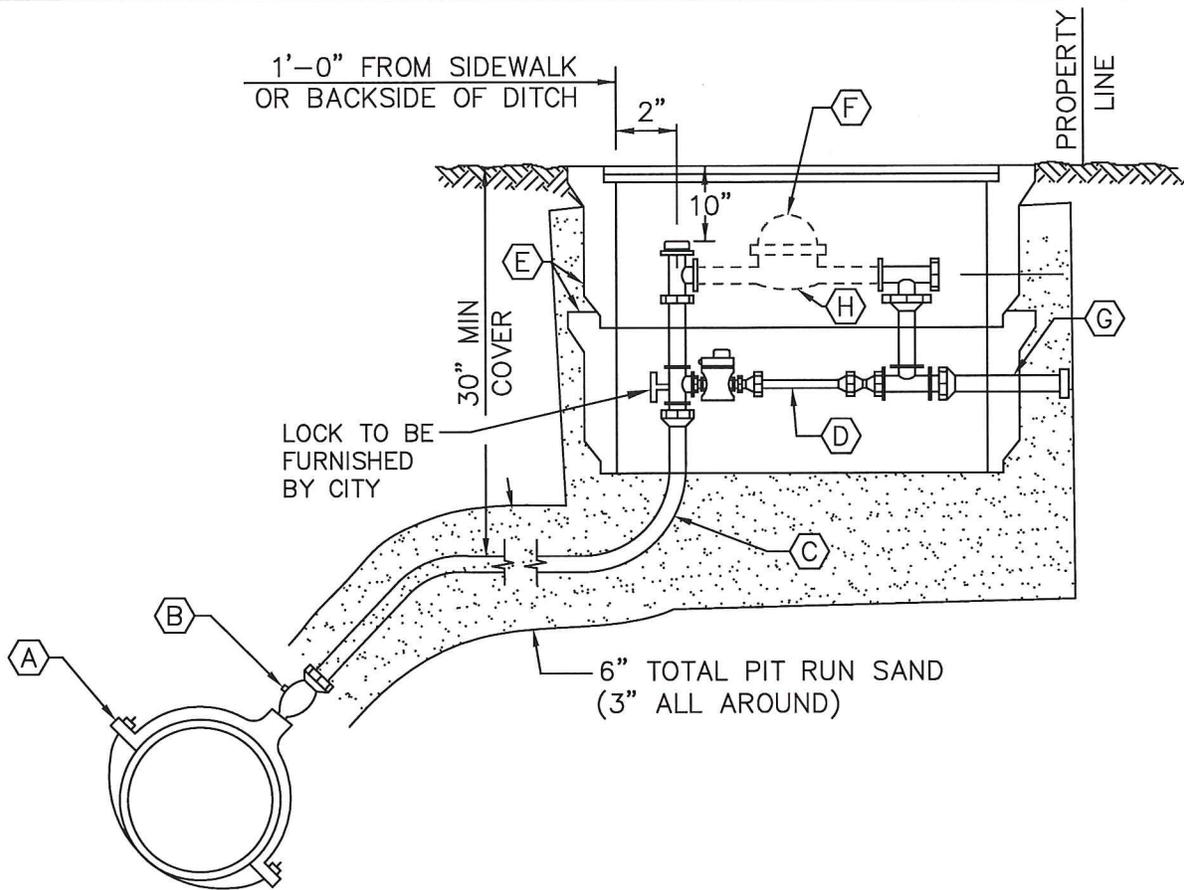
MARYSVILLE CITY ENGINEER

5/9/07
 DATE



5/8" DOUBLE METER SERVICE

STANDARD PLAN 2-090-001A



- (A) 1 1/2" OR 2" I.P. SERVICE SADDLE W/ DI DOUBLE STRAPS EQUAL TO ROMAC OR SMITH BLAIR. (STAINLESS DOUBLE STRAP FOR AC PIPE).
- (B) 1 1/2" OR 2" I.P. TX110 BALL VALVE CORPORATION STOP. FOR TYPE K COPPER SERVICE EQUAL TO MUELLER, FORD BALLCORP, INSTALLED @ A 45° ANGLE WITH KEY FACING UP.
- (C) 1 1/2" OR 2" K COPPER OR 250 PSI CTS POLY HARD DRAWN OR COIL. CUT TO FIT, ONE CONTINUOUS LENGTH WITH TRACER WIRE ATTACHED TO SADDLE WITH EXTRA NUT.
- (D) METER SETTER W/ BYPASS, MUELLER, FORD, OR APPROVED EQUAL. SPACE BETWEEN ANGLE STOP AND CHECK ANGLE SHALL BE 13 1/2" FOR 1 1/2" SERVICE OR 17 1/2" FOR 2" SERVICE. SETTER SHALL HAVE THE FOLLOWING FEATURES:
 PADLOCK WINGS ON KEY VALVE
 ANGLE CHECK ON METER OUTLET
 IRON PIPE CONNECTIONS ON SETTER INLET AND OUTLET
 COMPRESSION ADAPTOR ON SETTER INLET
 1" BY-PASS W/PADLOCK WINGS ON CURB STOP

(E) CARSON BCF 1730-12 SKU #17302500
 HDPE LID: CARSON HD1750 SKU #17304500.

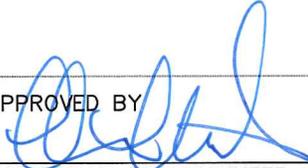
(F) METER IS TO BE INSTALLED BY CITY.

(G) 1 1/2" OR 2" DIA 15" LONG BRASS OR COPPER NIPPLE W/ PVC CAP.

(H) SPACER TO BE FURNISHED BY THE CITY AND INSTALLED BY THE CONTRACTOR

SIZE METER	LENGTH
1 1/2"	13 1/4"
2"	17 1/4"

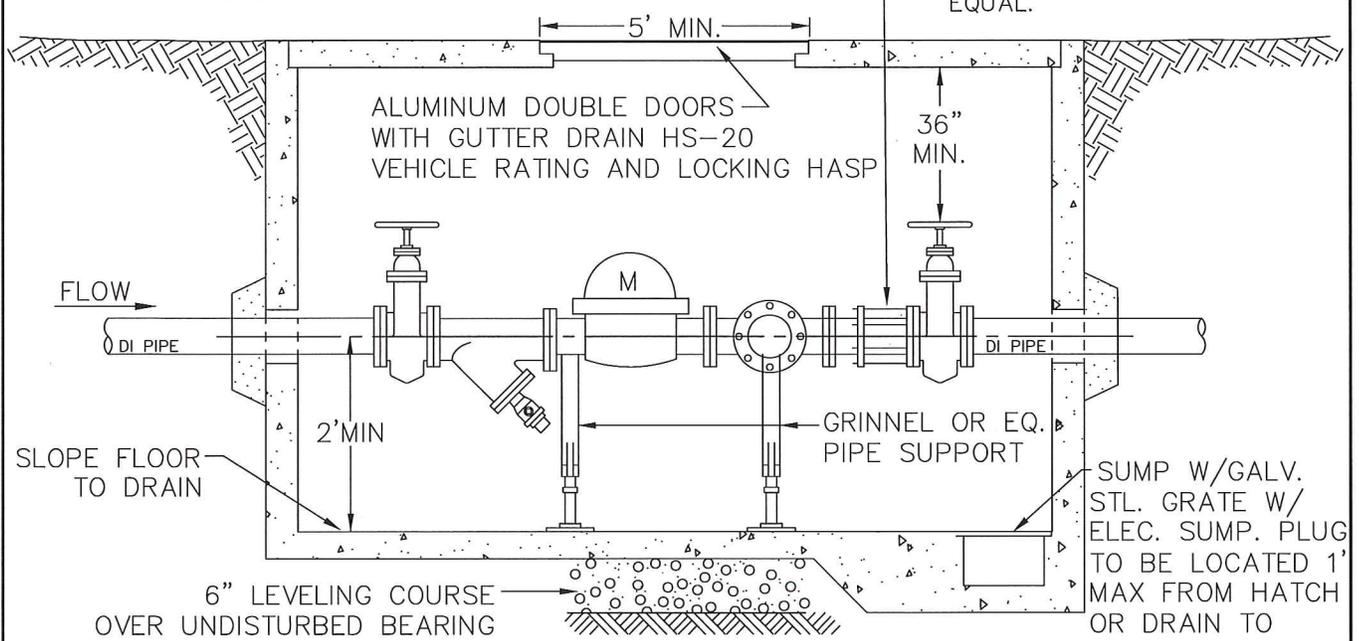
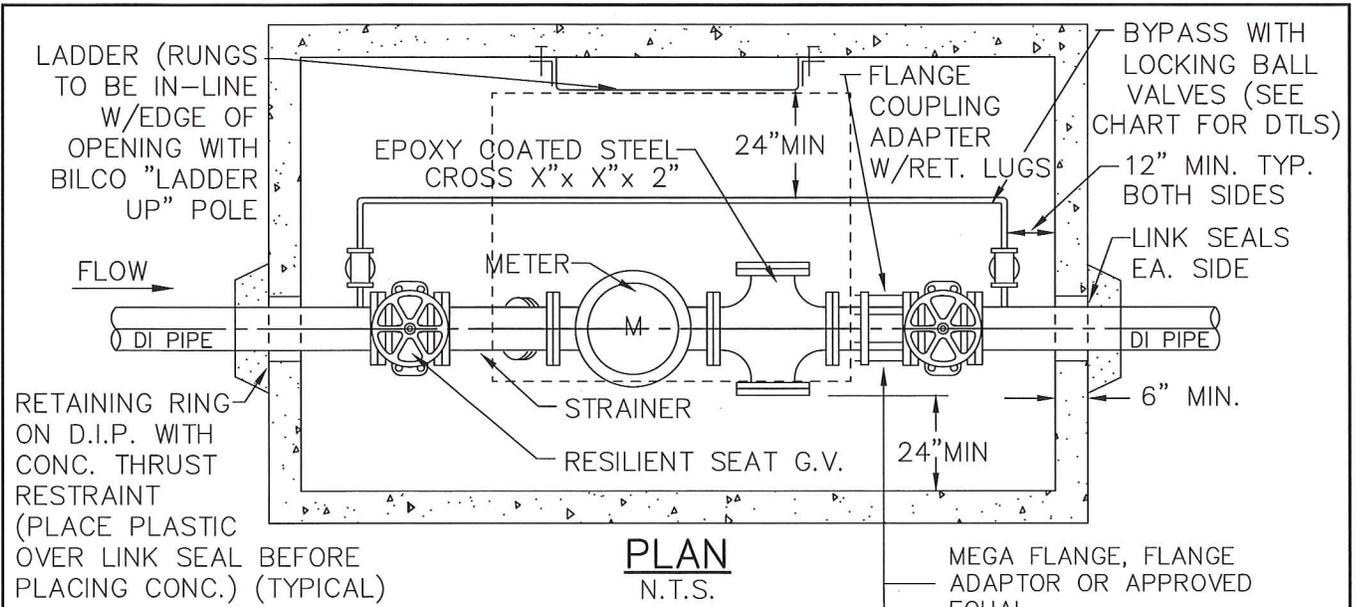
NO GASKETS TO BE INSTALLED WITH SPACERS

APPROVED BY  DATE 5/15/15

MARYSVILLE CITY ENGINEER

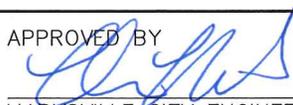
CITY OF  MARYSVILLE WASHINGTON

1 1/2" AND 2" SINGLE SERVICES



METER SIZE	RECOMMENDED BYPASS SIZE
3	1 1/2" COPPER
4	1 1/2" COPPER
6	2" COPPER
8	4" D.I.P.

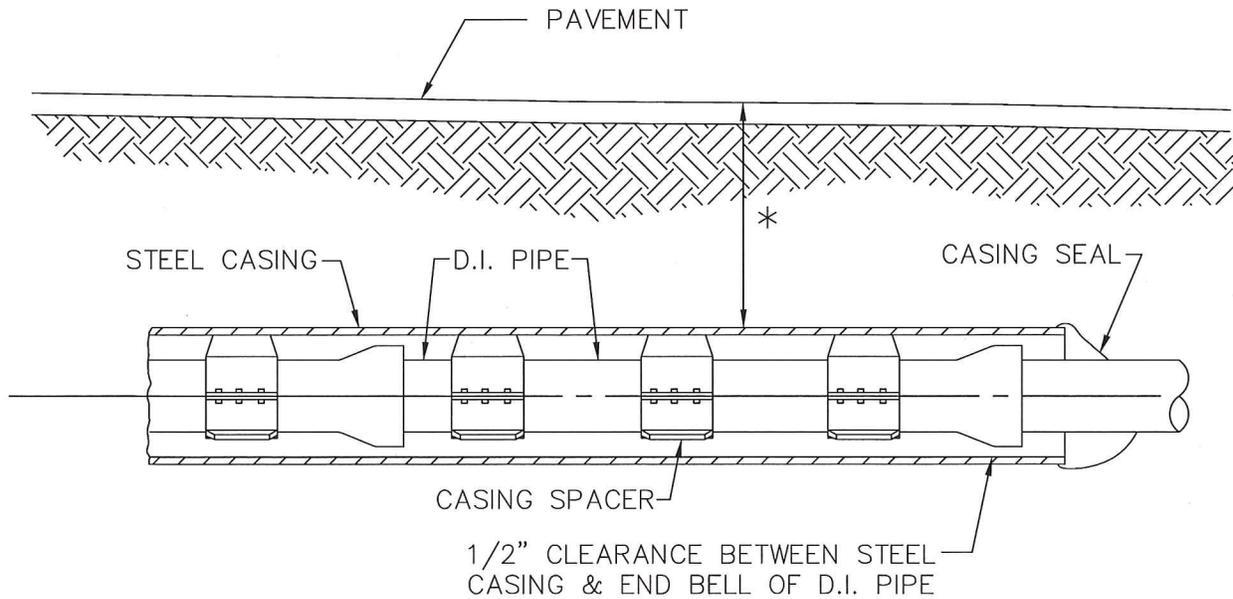
- NOTES:**
- COVER SHALL EXTEND 6" ABOVE GRADE WHEN VAULT IS NOT IN TRAFFIC AREA AND SHALL BE FLUSH IN TRAFFIC AREA.
 - SLOPE PAVEMENT AWAY FROM VAULT WHEN VAULT IS IN TRAFFIC AREA.
 - VAULT TO BE RATED FOR HIGHWAY USE (HS-20 VEHICLE RATING MINIMUM).
 - DOUBLE DETECTOR CHECK VALVE ASSEMBLY MUST BE INSTALLED BETWEEN METER AND POINT OF USE (BUILDING).
 - ALL BYPASSES SMALLER THAN 4" SHALL BE SADDLED.

APPROVED BY  5/9/07
 MARYSVILLE CITY ENGINEER DATE

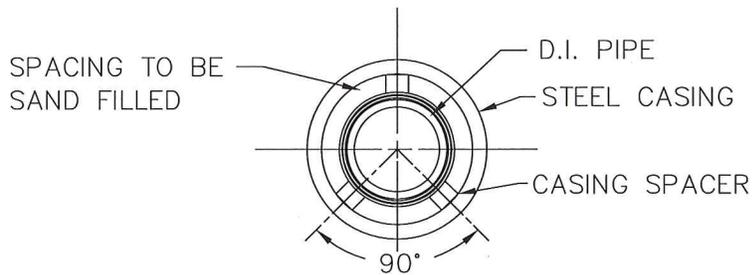
**METER VAULT ASSEMBLY
(METERS 2" & LARGER)**



CITY OF
Marysville
WASHINGTON



* DEPTH PER APPLICABLE COUNTY/STATE REQUIREMENTS



NOTES:

CASING

SIZE AND MINIMUM THICKNESS OF CASING SHALL BE AS SHOWN ON THE CONTRACT DRAWINGS. HOWEVER, THE CONTRACTOR SHALL BE RESPONSIBLE FOR SELECTING THE THICKNESS CONSISTENT WITH HIS OPERATION.

CASING SEAL

MINIMUM 3/16" THICK, SHEET TYPE SYNTHETIC RUBBER WITH STAINLESS STEEL BANDS.

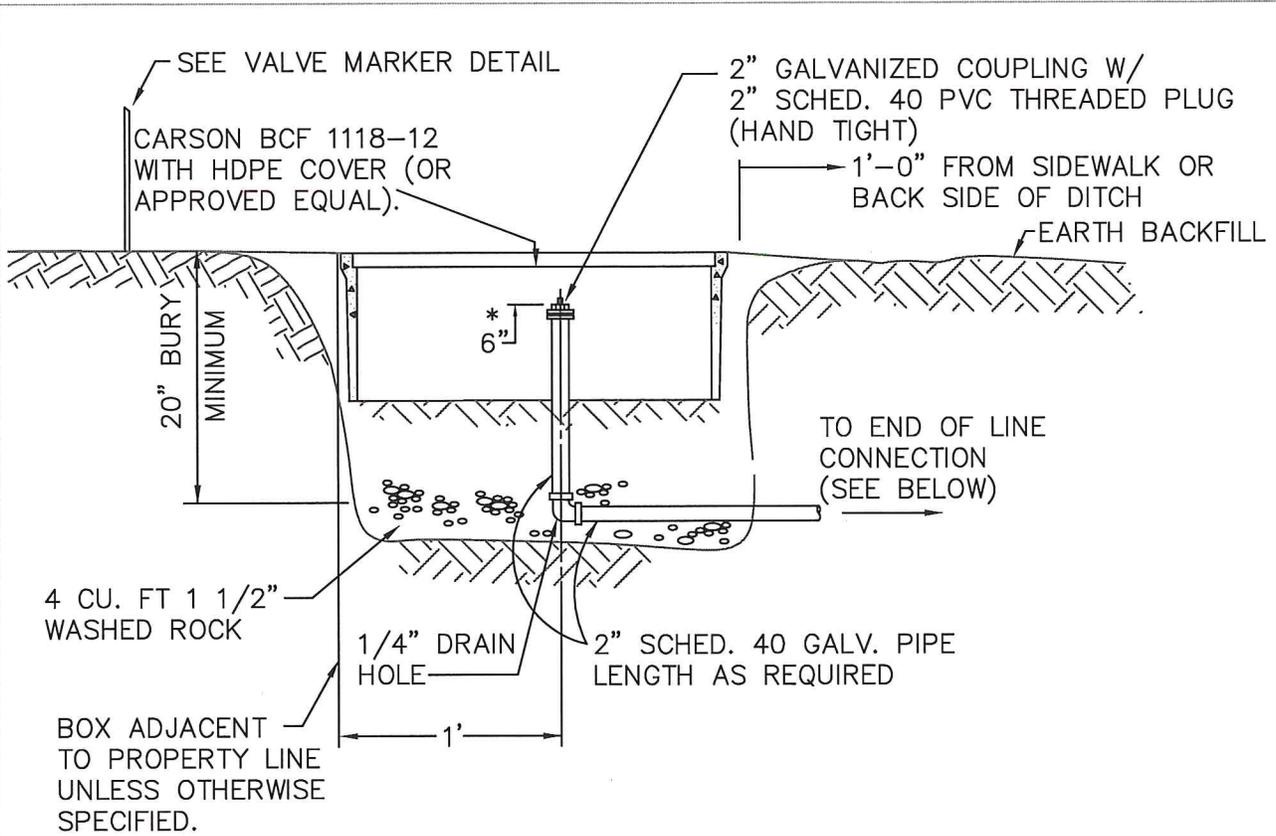
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MARYSVILLE CITY ENGINEER

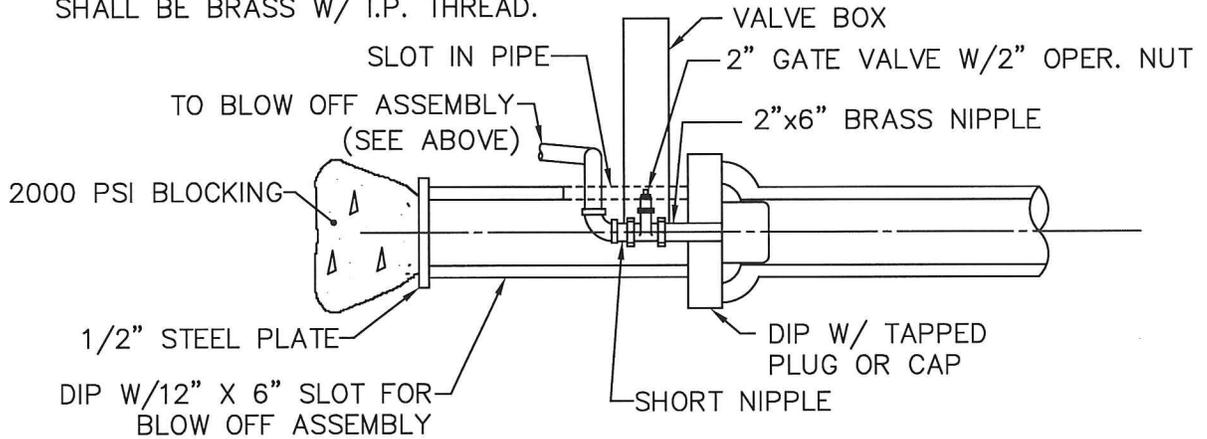
5/9/07
DATE



PIPE CASING



NOTES:
 ALL PIPE AND FITTINGS FROM THE MAIN TO THE GATE VALVE SHALL BE BRASS W/ I.P. THREAD.



END OF LINE CONNECTION

APPROVED BY

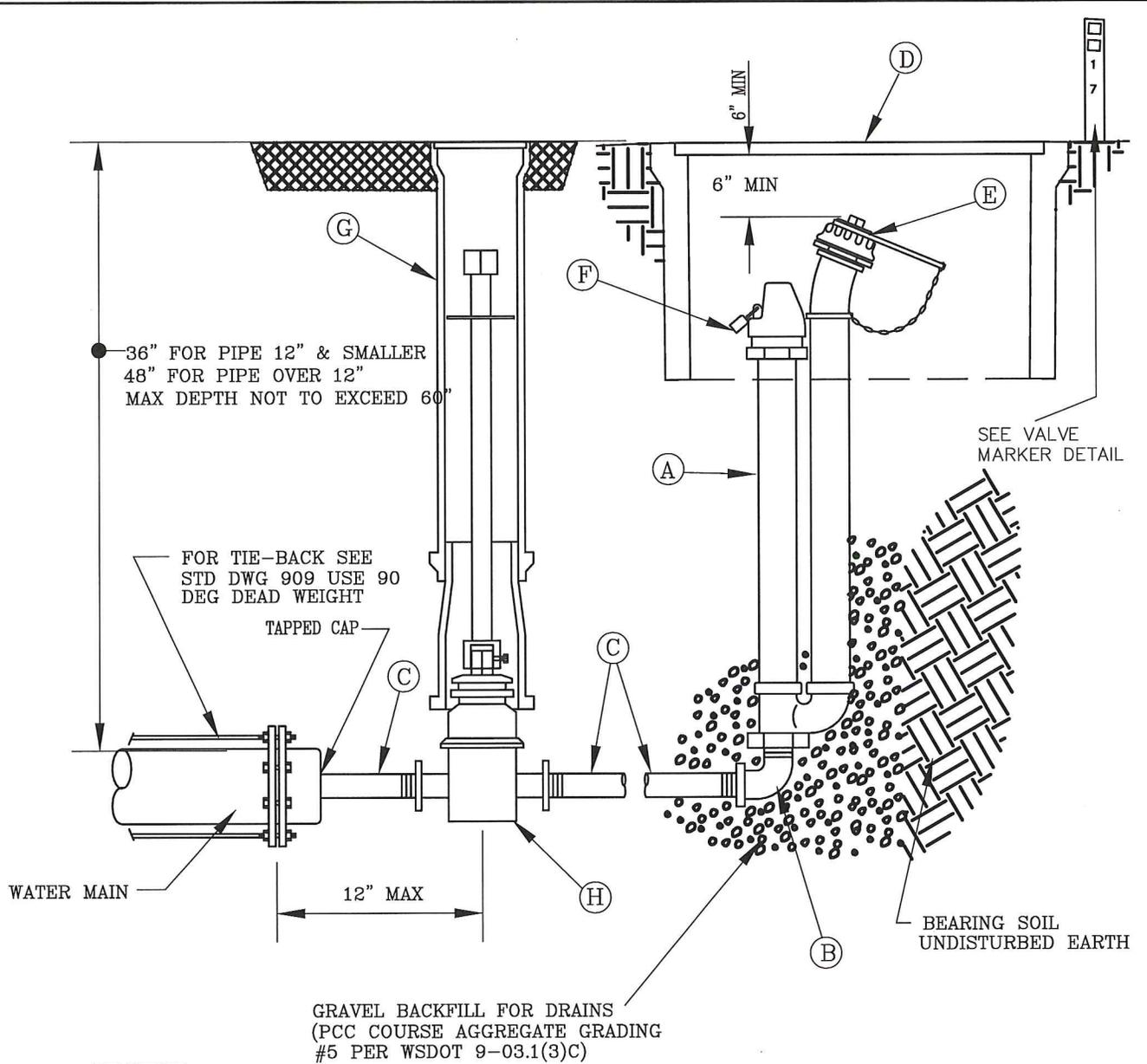
MARYSVILLE CITY ENGINEER

5/15/15

DATE



TEMPORARY
 2" BLOW OFF
 ASSEMBLY

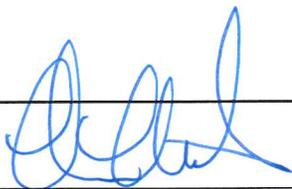


LEGEND:

- A. GIL #101GHS BLOW-OFF
- B. 2" BRASS STREET "L"
- C. 8"X8"X4" TEE
- D. CARSON BCF 1118-12 WITH HDPE COVER OR APPROVED EQUAL. LOCATED BEHIND SIDEWALK
- E. 2" CAP NATIONAL STANDARD THREAD
- F. LOCK TO BE SUPPLIED BY CITY OF MARYSVILLE.
- G. VALVE BOX AND EXTENSION PER STD DWG 504
- H. 4" GATE VALVE WITH RESILIENT SEAT (WATEROUS SERIES 500 OR M&H 3067 OR APPROVED EQUAL.

APPROVED BY

LAST REVISED 03/24/15



MARYSVILLE CITY ENGINEER

5/15/15

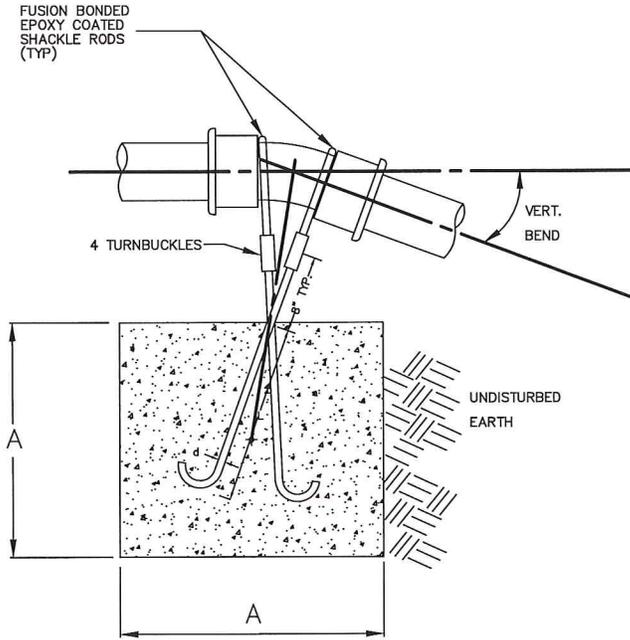
DATE



CITY OF
Marysville
WASHINGTON

PERMANENT
2" BLOWOFF
ASSEMBLY

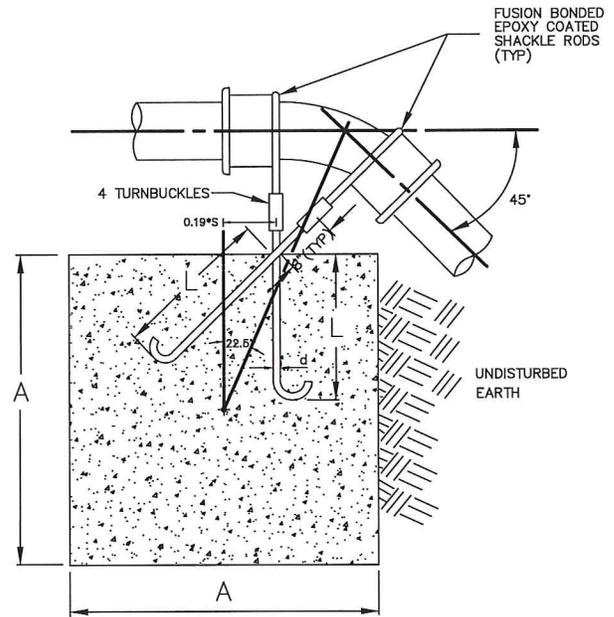
STANDARD PLAN 2-120-002



TYPE A

TYPE A BLOCKING FOR 11 1/4" & 22 1/2" VERTICAL BENDS						
PIPE SIZE NOM. DIA. INCHES	TEST PRESSURE PSI	VB VERTICAL BEND DEGREES	NO OF CU FT OF CONC BLOCKING	A SIDE OF CUBE FEET	d DIA A SHACKLE RODS (2) INCHES	L DEPTH OF RODS IN CONCRETE INCHES
4"	300	11 1/4"	8	2	3/4	18
		22 1/2"	12	2 1/4	3/4	24
6"	300	11 1/4"	12	2 1/4	3/4	24
		22 1/2"	27	3	3/4	24
8"	300	11 1/4"	16	2 1/2	3/4	24
		22 1/2"	43	3 1/2	3/4	24
12"	300	11 1/4"	64	4	1	36
		22 1/2"	125	5	1	36

TYPE B BLOCKING FOR 45° VERTICAL BENDS						
PIPE SIZE NOM. DIA. INCHES	TEST PRESSURE PSI	VB VERTICAL BEND DEGREES	NO OF CU FT OF CONC BLOCKING	A SIDE OF CUBE FEET	d DIA A SHACKLE RODS (2) INCHES	L DEPTH OF RODS IN CONCRETE INCHES
4"	300	45	27	3	3/4	20
6"			64	4		
8"			125	5		
12"			216	6	1	



TYPE B

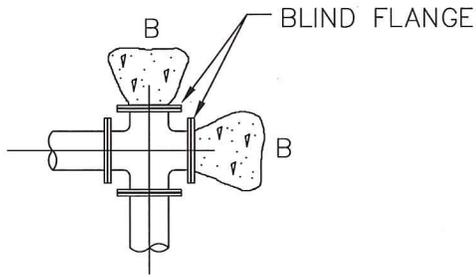
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MARYSVILLE CITY ENGINEER

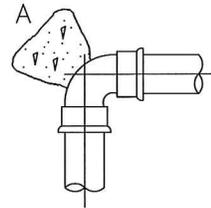
5/15/15
DATE



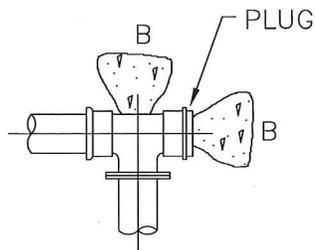
VERTICAL THRUST
BLOCKING DETAIL



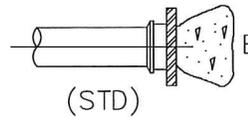
CAPPED CROSS



90° BEND

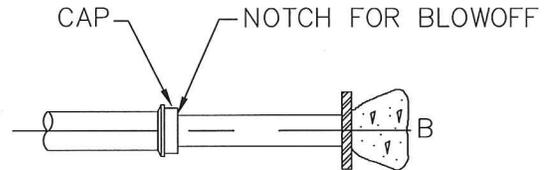


TEE

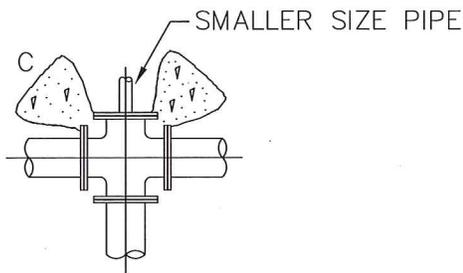


(STD)

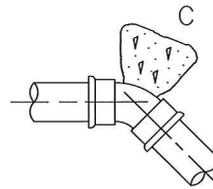
OR



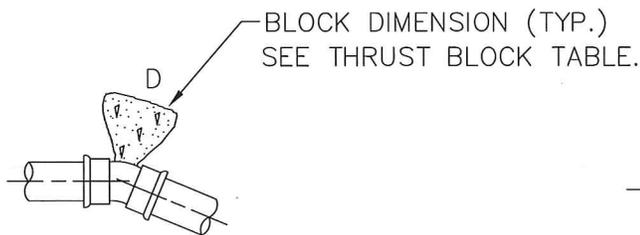
ONE PIPE SIZE SMALLER THAN DEAD ENDING PIPE



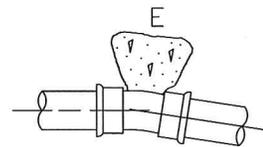
CROSS



45° BEND



22 1/2° BEND



11 1/4° BEND

NOTES:

SEE THRUST BLOCK TABLE FOR ALL NOTES.
 PROVIDE POLYETHYLENE SHEETING TO COVER BOLTS AND JOINTS FOR DISMANTLING.

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5/9/07
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CONCRETE BLOCKING

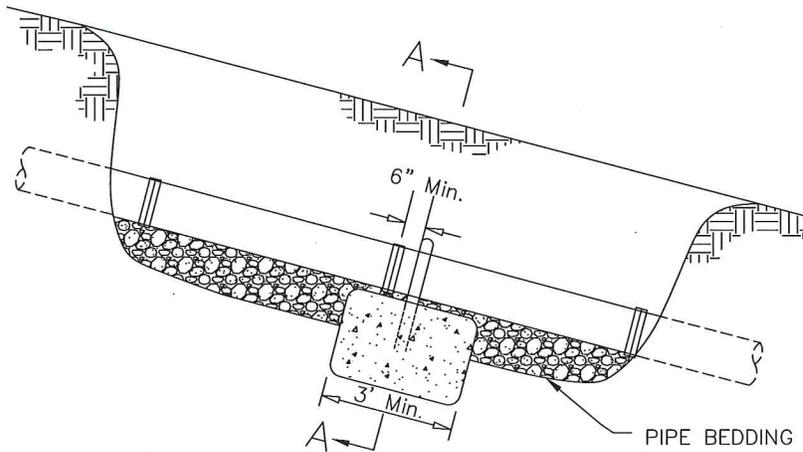
THRUST BLOCK – TABLE
 MIN. BEARING AREA AGAINST UNDISTURBED SOIL
 SQUARE FEET

PIPE SIZE	A (FT. ²)	B (FT. ²)	C (FT. ²)	D (FT. ²)	E (FT. ²)
3"	3	2	2	2	2
6"	4	4	2	2	2
8"	7	6	4	2	2
10"	11	10	6	3	2
12"	16	14	9	5	3
14"	22	19	12	6	3
16"	29	25	16	8	4
18"	36	31	20	10	5
20"	45	39	24	13	6
22"	54	47	29	15	8
24"	64	56	35	18	9
28"	87	76	48	24	12
30"	101	87	55	28	14
36"	145	125	78	40	20
42"	197	171	107	55	27
48"	257	223	140	71	36

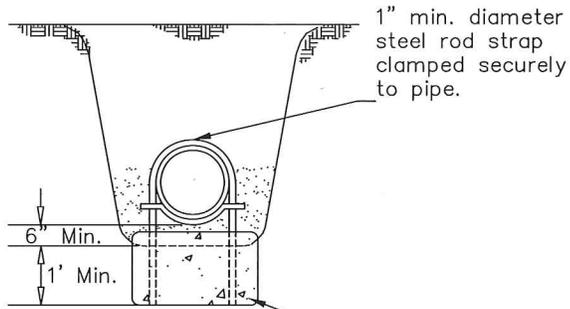
NOTES:

1. BEARING AREA OF CONC. THRUST BLOCK BASED ON 200 PSI PRESSURE AND SAFE SOIL BEARING LOAD OF 2,000 POUNDS PER SQUARE FOOT.
2. AREAS MUST BE ADJUSTED FOR OTHER PIPE SIZES, PRESSURES AND SOIL CONDITIONS.
3. CONCRETE BLOCKING SHALL BE CAST IN PLACE AND HAVE A MINIMUM BEARING SURFACE OF 6" X 6" SQUARE AGAINST THE FITTING.
4. BLOCK SHALL BEAR AGAINST FITTINGS ONLY AND SHALL BE CLEAR OF JOINTS TO PERMIT TAKING UP OR DISMANTLING OF JOINT.
5. CONTRACTOR SHALL INSTALL BLOCKING ADEQUATE TO WITHSTAND FULL TEST PRESSURE AS WELL AS TO CONTINUOUSLY WITHSTAND OPERATION PRESSURE UNDER ALL CONDITIONS OF SERVICE.
6. ALL BOLTS AND NUTS SHALL BE POLYWRAPPED PRIOR TO POURING CONCRETE.

APPROVED BY  MARYSVILLE CITY ENGINEER	5/9/07 DATE
 <div style="display: inline-block; vertical-align: middle; margin-left: 20px;"> <p style="margin: 0;">THRUST BLOCK TABLE</p> </div>	



Step Footing
Anchor



Concrete footing keyed into
undisturbed soil as shown.

Section A-A
NTS

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5/9/07
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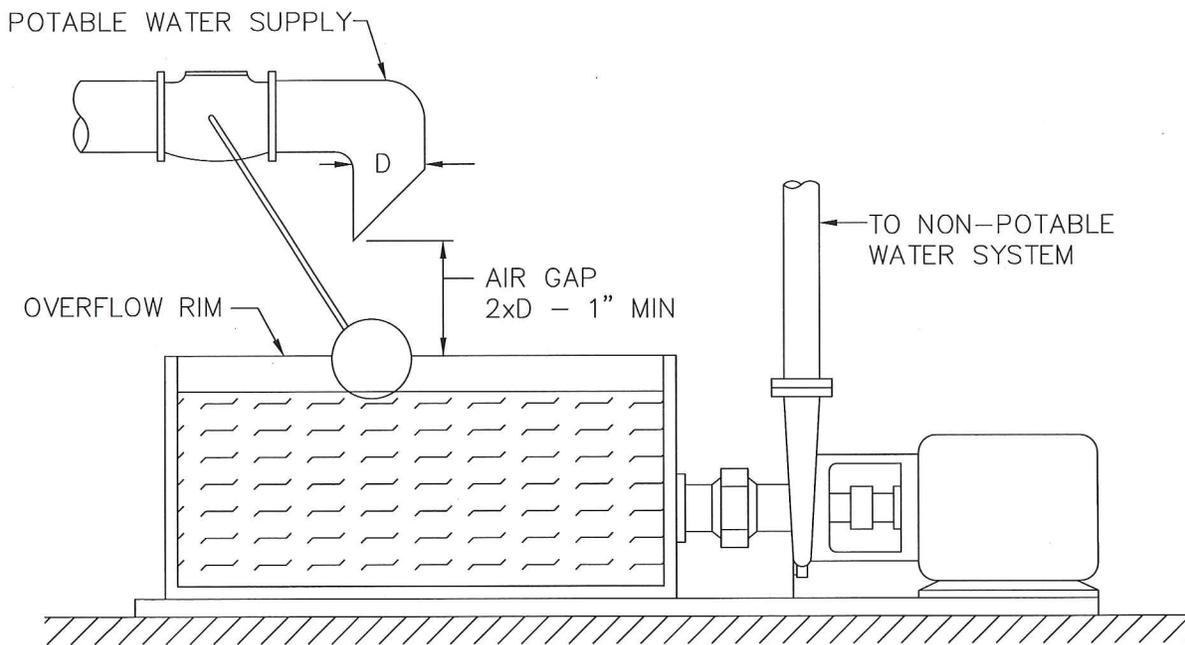
PIPE ANCHOR DETAIL
FOR SLOPES



STANDARD PLAN 2-140-001

APPROVED AIR GAP SEPARATION

AN APPROVED AIR GAP IS A PHYSICAL SEPARATION BETWEEN THE FREE FLOWING DISCHARGE END OF A POTABLE WATER SUPPLY PIPELINE AND THE OVERFLOW RIM OF AN OPEN OR NON-PRESSURE RECEIVING VESSEL. THESE VERTICAL, PHYSICAL SEPERATIONS MUST BE AT LEAST TWICE THE DIAMETER OF THE INLET PIPE BUT NEVER LESS THAN ONE INCH. IF SPLASHING IS A PROBLEM, TUBULAR SCREENS MAY BE ATTACHED OR THE SUPPLY LINE OUTLET MAY BE CUT AT A 45 DEGREE ANGLE. IF THE SUPPLY LINE IS CUT AT A 45 DEGREE ANGLE, THE AIR GAP DISTANCE IS MEASURED FROM THE CENTER OF THE ANGLE. HOSES ARE NOT ALLOWED. BYPASSES ARE NOT ALLOWED. THE INSPECTION OF AIR GAPS SHALL BE INCLUDED IN THE YEARLY TESTING PROGRAM FOR BACKFLOW ASSEMBLIES.



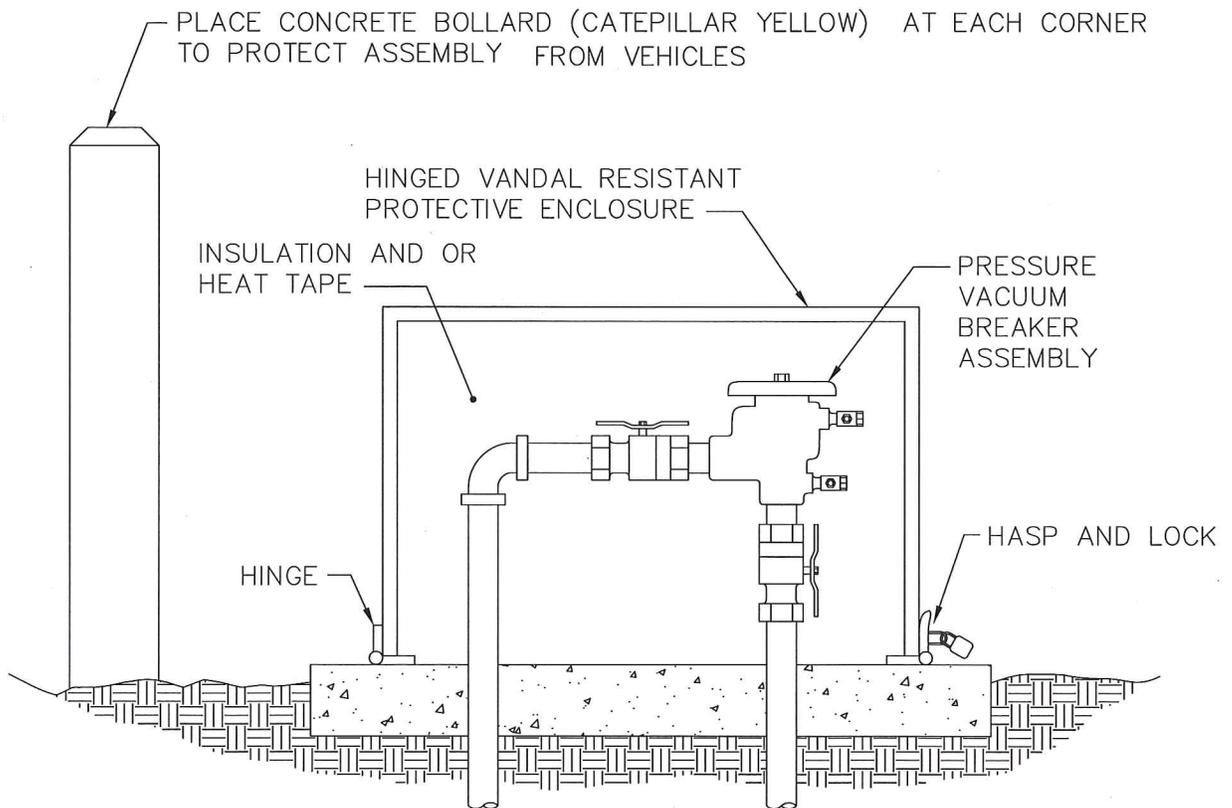
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MARYSVILLE CITY ENGINEER

DATE



AIR GAP FOR
MAKEUP TANK



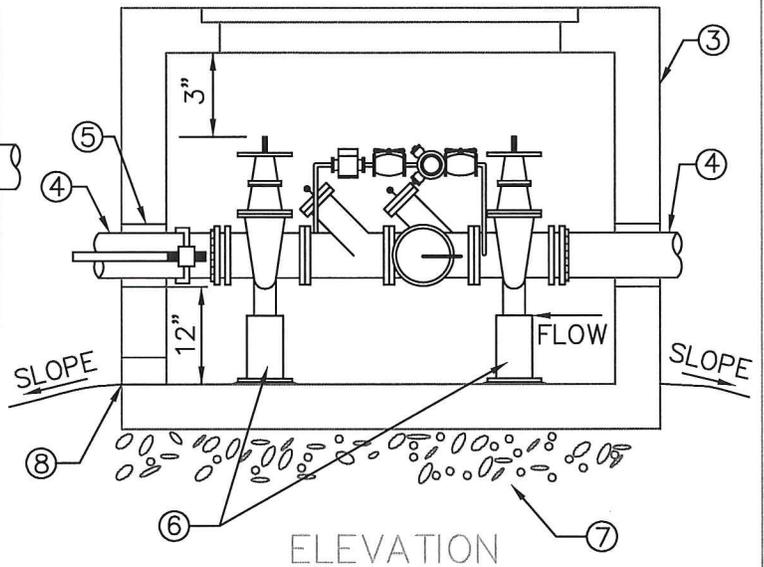
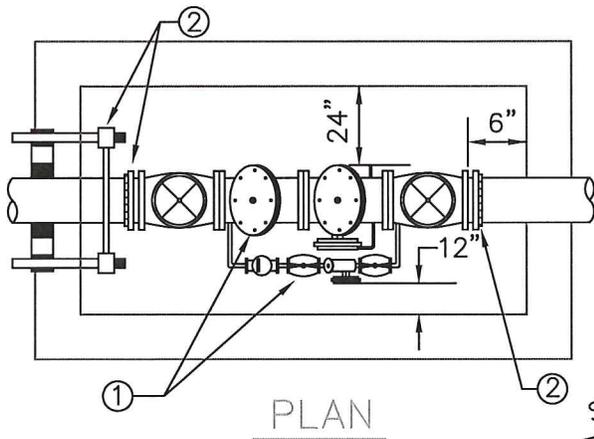
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5/9/07
DATE



PRESSURE VACUUM
BREAKER ASSEMBLY

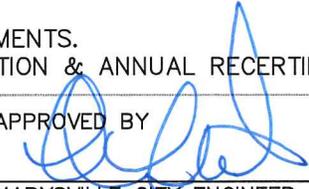


LEGEND

- ① WASHINGTON STATE DEPT. OF HEALTH APPROVED REDUCED PRESSURE DETECTOR ASSEMBLY, 5/8" METER (METER TO READ IN GALLONS), AND A 3/4" REDUCED PRESSURE BACKFLOW ASSEMBLY.
- ② UNI-FLANGE WITH SET SCREWS OF MJ x FL ADAPTOR WITH MEGALUG OR GALVANIZED SHACKLE TO MAIN WITH 2-3/4" RODS, OR MJ RETAINER GLANDS.
- ③ PRECAST CONCRETE VAULT WITH STEEL ACCESS HATCH (AS MANUFACTURED BY UTILITY VAULT CO. OR AN APPROVED EQUAL). ABOVE GROUND INSTALLATIONS WILL: BE PROVIDED WITH 6'-6"x36" STEEL DOOR FOR ACCESS. THE EXTERIOR WILL BE PAINTED WITH AN APPROVED PAINT, PROVIDED WITH SUFFICIENT INSULATION TO PREVENT FREEZING, AND SITE WILL BE PROVIDED WITH A 6' HIGH SECURITY FENCE WITH PEDESTRIAN AND VEHICLE GATES.
- ④ DUCTILE IRON PIPE (SIZED AS REQUIRED) CLASS 52.
- ⑤ WATER TIGHT GROUT SHALL BE USED IN ALL VAULT PENETRATIONS.
- ⑥ 2 - GALVANIZED ADJUSTIBLE PIPE SUPPORTS FOR 2 1/2" DIAMETER AND LARGER PIPE.
- ⑦ GRAVEL FOUNDATION AS REQUIRED.
- ⑧ DRAIN SHALL BE INSTALLED WITH APPROVED AIR GAP (SEE SP 2-153-004), BE ABLE TO BE BORE SIGHTED TO DAYLIGHT WHICH MUST BE ABOVE 100 YEAR FLOOD LEVEL. DRAIN WILL BE SIZED SO AS TO PROVIDE FREE GRAVITY DRAINAGE OF MAX DISCHARGE OF RELIEF VALVE PORT.

NOTES

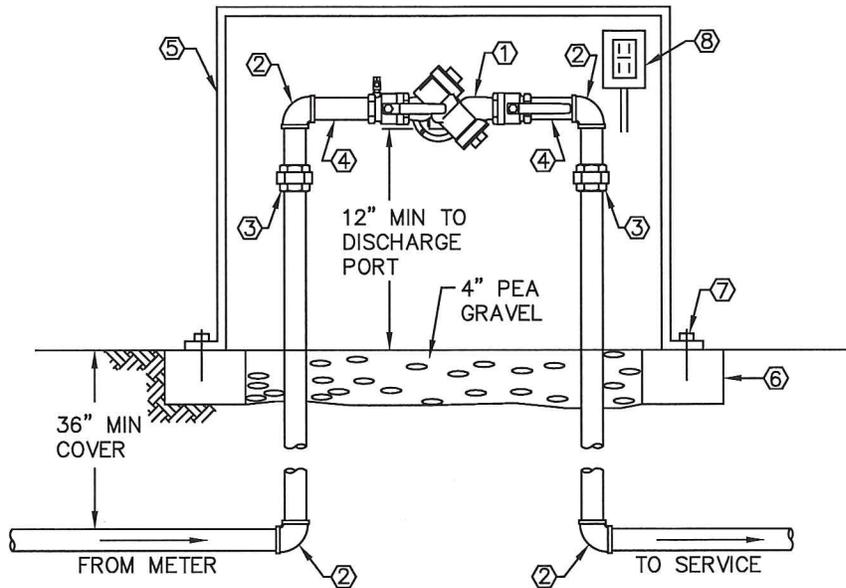
- 1. TEE AND GATE VALVE REQUIRED ON MAIN.
- 2. MAXIMUM HEIGHT OF ASSEMBLY IS 5' UNLESS AN OSHA APPROVED PLATFORM IS PROVIDED.
- 3. MINIMUM INSIDE VAULT HEIGHT IS 78" FOR 3" SERVICE AND LARGER.
- 4. METER SHALL BE INSTALLED IN SUCH A WAY THAT IT CAN BE READ WITHOUT ENTERING VAULT WITH ACCESS HATCH OPEN.
- 5. ALL DIMENSIONS ARE MINIMUM CLEARANCE REQUIREMENTS.
- 6. ASSEMBLY REQUIRES CERTIFICATION UPON INSTALLATION & ANNUAL RECERTIFICATION.

APPROVED BY  DATE 5/15/15

MARYSVILLE CITY ENGINEER

REDUCED PRESSURE DETECTOR ASSEMBLY





1", 1-1/2", & 2" REDUCED PRESSURE ASSEMBLY

LEGEND

- ① WA. STATE DOH LISTED REDUCED PRESSURE PRINCIPLE ASSEMBLY WITH ISOLATION VALVES AND TEST COCKS. FEBCO MODEL 825Y OR EQUAL. ASSEMBLY MUST BE ON LIST OF APPROVED BACKFLOW PREVENTION ASSEMBLIES PREPARED BY THE WASHINGTON STATE DEPARTMENT OF HEALTH DRINKING WATER PROGRAM.
- ② 90° BEND, THREADED BRASS
- ③ UNION, THREADED BRASS
- ④ SCHEDULE 80 RIGID BRASS PIPE

IF INSTALLED OUTDOORS:

- ⑤ HEATED AND INSULATED FIBERGLASS ENCLOSURE WITH HINGED LOCKABLE LID WHICH EXPOSES TOP AND FRONT OF RPBA. SHALL BE EQUIPPED WITH A SCREENED DRAINAGE PORT AT THE BASE AND FLEXIBLE FLAPS TO PREVENT DRAFTS.
FOR 1" ASSEMBLY: HOT-BOX MODEL #1 - 27"W x 13"D x 23"H MINIMUM INSIDE DIMENSIONS.
FOR 1-1/2" ASSEMBLY: HOT-BOX MODEL #1.5 - 33"W x 21"D x 23"H MIN. INSIDE DIMENSIONS.
FOR 2" ASSEMBLY: HOT-BOX MODEL #2 - 39"W x 13"D x 35"H MINIMUM INSIDE DIMENSIONS.
AS MANUFACTURED BY NORTHEAST FLORIDA ENTERPRISES, INC.
- ⑥ 6" WIDE X 4" HIGH CAST-IN-PLACE CONCRETE FOOTING AROUND BASE OF ENCLOSURE.
- ⑦ STAINLESS STEEL ANCHOR BOLTS, SIZE AND NUMBER AS RECOMMENDED BY ENCLOSURE MANUFACTURER.
- ⑧ 120 VOLT, SINGLE PHASE, 15 AMP GROUND FAULT INTERRUPTING RECEPTACLE, U.L. STANDARD 943, N.E.M.A. 3R. POWER SERVICE SHALL BE INSTALLED IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE AND CITY OF MARYSVILLE ORDINANCES. MOUNT RECEPTACLE AT TOP OF THE BACK WALL OF ENCLOSURE.

NOTES:

1. ALL PIPE AND FITTINGS SHALL BE SAME SIZE AS RPBA.
2. RPBA SHALL BE INSTALLED WITH TEST COCKS TOWARDS FRONT OF ENCLOSURE (FOR OUTDOOR INSTALLATIONS).
3. RPBA MAY BE INSTALLED INDOORS FOR FREEZE PROTECTION ONLY WITH PRIOR APPROVAL CITY. INDOOR INSTALLATIONS SHALL MEET CITY OF MARYSVILLE PLUMBING CODES AND BE ACCESSIBLE AND AVAILABLE TO CITY STAFF FOR INSPECTIONS.
4. RPBA SHALL BE CERTIFIED UPON INSTALLATION AND RECEIVE ANNUAL RECERTIFICATIONS.

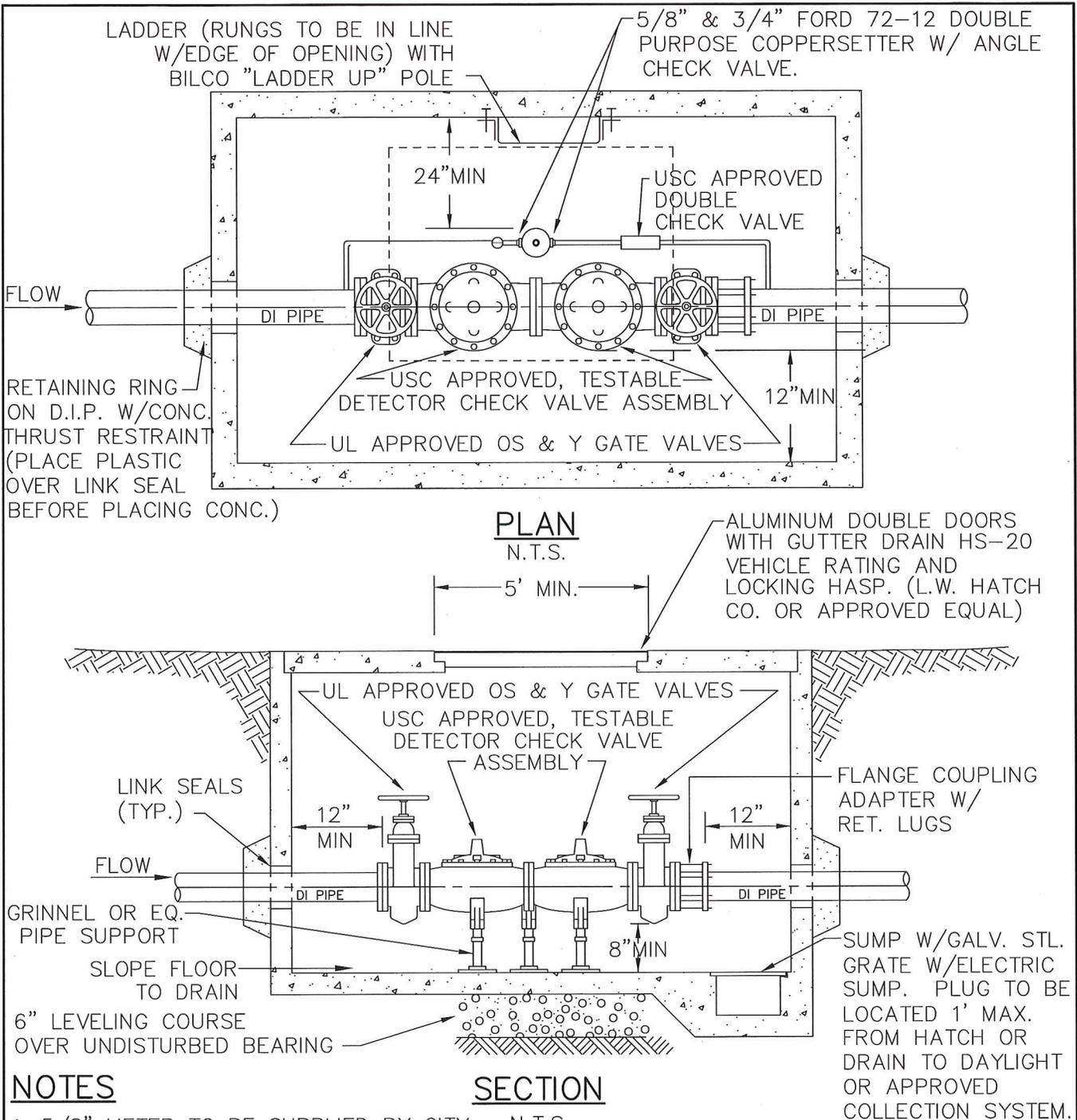
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5/15/15
DATE

1", 1 1/2" & 2" REDUCED PRESSURE
BACKFLOW PREVENTER ASSEMBLY





NOTES

1. 5/8" METER TO BE SUPPLIED BY CITY. N.T.S.
2. COVER SHALL EXTEND 6" ABOVE GRADE WHEN VAULT IS NOT IN TRAFFIC AREA AND SHALL BE FLUSH IN TRAFFIC AREA.
3. SLOPE PAVEMENT AWAY FROM COVER WHEN VAULT IS IN TRAFFIC AREA.
4. ALL BYPASSES TO BE SADDLED AND NOT DIRECT-TAPPED.
5. ALTERNATE LOCATION FOR FIRE SYSTEM; INSIDE BUILDING W/EXTERIOR DOOR FOR IMMEDIATE ACCESS.
6. ALL VALVES TO INCLUDE TAMPER SWITCH FOR FIRE SYSTEMS.

SECTION

APPROVED BY *[Signature]*
 MARYSVILLE CITY ENGINEER
 DATE 5/9/07



DOUBLE CHECK DETECTOR VALVE