

**CITY OF MONROE PUBLIC WORKS
DESIGN, CONSTRUCTION AND OPERATIONS STANDARDS**

**SECTION 5
WATER DISTRIBUTION**

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CITY OF MONROE PUBLIC WORKS DESIGN, CONSTRUCTION AND OPERATIONS STANDARDS

SECTION 5 WATER DISTRIBUTION

5.1 GENERAL REQUIREMENTS

5.1.1 General

Design and construction of water mains and appurtenances shall conform to the City of Monroe Water System Plan, these City of Monroe Public Works Design, Construction, and Operations Standards, the American Water Works Association (AWWA) Specifications, International Building Code (IBC) as adopted by Washington State, State of Washington Department of Health (DOH) Water System Design Manual, International Fire Code (IFC) as adopted by the City of Monroe, the Uniform Plumbing Code (UPC) and Section 7-11 of the WSDOT Standard Specifications. If conflicts occur, these Standards and Specifications shall have precedence.

5.1.2 Safety

The developer shall comply with all applicable safety standards and requirements as set forth by WISHA and the Washington State Department of Labor and Industries.

5.1.3 Fire Protection

The Snohomish Regional Fire and Rescue must approve all proposed on-site fire protection improvements. The approval of the fire department connection (FDC) is required prior to construction of the on-site fire protection improvements. Backflow prevention devices may be installed in the interior or exterior of commercial and residential buildings with fire sprinkler systems unless otherwise approved by the Director.

5.1.4 Definitions

Refer to Section 1 for definitions of terms and acronyms used in this chapter.

5-2 DESIGN AND PERFORMANCE STANDARDS

5.2.1 Looped Systems

5.2.1.1 Dead End

New water mains shall be designed in anticipation of future development or redevelopment beyond the boundaries of the proposed project.

Unless otherwise approved by the Director, a water main dead end is not permitted. Whenever possible, all new water mains shall be looped to existing water mains. Where mains cannot be looped, a fire hydrant shall be provided at

the end of the water main for flushing purposes. Dead ends for future mains will require a temporary blowoff assembly.

5.2.1.2 Easement

All water mains on private property that are looped back to the public right-of-way or are connected to the general public system shall be installed in utility easements granted to the city. The minimum easement width shall be 20 feet.

5.2.2 Pipe Dimensions

In general, the minimum water main diameter shall be 8-inches for all looped systems or systems that have the potential to be extended and/or looped in the future. The Director may require a larger diameter main to meet fire protection requirements and future development requirements as outline in the City of Monroe Water System Plan. In non-residential zones, the minimum water main diameter shall be 12-inches or as determined by the Director.

In residential projects a City owned 4-inch diameter main may be allowed if it eliminates the likelihood of excessively long service lines from the water meters to the dwelling units if the following criteria are met:

1. There is no potential or need for future extension or connection of the 4-inch main to another water main.
2. There is no need now or in the future for a fire hydrant on the 4-inch main.
3. There will be a maximum of 12 dwelling units served by the 4-inch main.
4. Where residential fire sprinkler systems are required, the designer shall provide written analysis that demonstrates the fire flow requirements are met with the available pressure.
5. The length of the 4-inch main is 200 feet or less.
6. The 4-inch main ends with a blow-off assembly in an easily accessible location with a convenient method to dispose of the flush water without damage to the surrounding property.

Approval by the Director of ruse of a 4-inch water main will be on a case-by-case basis.

Supply lines for a fire hydrant may be 6-inch diameter if the supply line is not more than 50 feet long and the 6-inch main enables the hydrant to meet the fire flow requirements.

5.2.3 Pipe Cover

The minimum cover for water mains of 12-inch or smaller diameter shall be 36 inches to the top of pipe. The minimum cover for water mains with diameters larger than 12 inches shall be 48 inches to the top of pipe. The maximum depth shall not be greater than 60 inches to the top of pipe.

5.2.4 Utility Clearances

Water mains and sewer mains shall be separated horizontally a minimum of 10 feet, measured from the outside of the pipes. Water mains shall be located above sewer mains at crossings to provide a minimum vertical separation of 18 inches between the bottom of the water pipe and the crown or top of the sewer pipe. Deviation Request if

local conditions prevent the minimum vertical or horizontal separation, refer to Section C1-9 of the DOE Criteria for Sewage Works Design.

5.2.5 Pipe Deflection

Maximum Permissible Deflection in Laying Mechanical-Joint Pipe

Pipe Diameter (Inches)	Max. Permissible Deflection (Inches) For Pipe Length				Approx. Curve Radius (Feet) Produced by a Series of Deflections			
	12-ft	16-ft	18-ft	20-ft	12-ft	16-ft	18-ft	20-ft
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

Pipe Diameter (Inches)	Max. Permissible Deflections (Inches) Per Pipe Length				Approx. Radius of Curve Produced by a Series of Deflections			
	12-ft	16-ft	18-ft	20-ft	12-ft	16-ft	18-ft	20-ft
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

5.2.6 Vertical Bends

Vertical bends are only allowed with Director's approval.

5.2.7 System Pressure

The water system shall be designed to maintain a minimum residual pressure of not less than 20 psi at service connections, under maximum instantaneous fire flow demand.

5.2.8 Design Velocity

Design velocities shall be less than or equal to 10 feet per second under peak hour demand conditions.

5.2.9 Thrust Blocks and Pipe Restraint

Ductile iron water main designs shall include concrete thrust blocks. Standard Drawings 514 through 516 should not be used to substitute for professional engineering design, particularly in situations involving large diameter pipelines (greater than 12-inches), high velocity situations (greater than 8 feet/sec), or where soil type or stability may be questionable.

In some situations, mechanically restrained joints or locking gaskets may be required, depending on site conditions (e.g., poor soils or location within soil fill areas). joint restraints shall also be required at valves and bell joints where future extensions may occur.

5.2.10 Valves

5.2.10.1 Location and Spacing

Valves shall be installed on all branches of intersections. The maximum valve spacing shall be 500 feet. The Director may require additional valves in high-density areas.

Air vacuum valves shall be installed at all high points in mainlines.

5.2.10.2 Valve Types

Gate valves shall be provided on 12-inch and smaller diameter water mains.

Gate valves shall be provided at all hydrants and fire protection service line connections at the main.

Butterfly valves are required for water mains larger than 12 inches.

5.2.11 Hydrants

See Standard Drawing 506.

5.2.11.1 Sizing and Main Connections

Hydrant supply lines shall be sized to provide the fire flow required by the currently adopted edition of the International Fire Code as amended by the City of Monroe. Supply lines from the service main to the hydrant that are up to 50 feet long shall be at least 6-inch diameter. Supply lines longer than 50 feet shall be 8-inch diameter. When more than one full length of pipe is used (up to 50 feet), field lock gaskets shall be installed in the bells.

5.2.11.2 Location

The location of fire hydrants, auxiliary gate valves, and supply lines shall conform to Standard Drawing 506. Fire hydrant feed lines shall be oriented at right angles to the supply main in conformance with Standard Drawing 506. Fire hydrants shall be located 3 feet minimum from face of the curb or 2 feet minimum from back edge of a sidewalk or 10 feet minimum from edge of pavement if no curb is present. All hydrants are to be installed within public right-of-way or a City water easement.

5.2.11.3 Clearance

Hydrants shall be positioned with a 3-foot clearance on all sides, in clear view of approaching vehicles for a distance of 50 feet. The approach line-of-sight shall be free of shrubs, trees, fences and other landscaping. Provide for vehicular traffic protection when necessary, per Standard Drawing 506.

5.2.11.4 Spacing and Proximity to Buildings

The fire hydrant spacing shall be determined per the International Fire Code (IFC) Appendix C Table C102.1

Hydrants shall not be closer than 50 feet to the structure served.

The distance shall be measured along the route that fire equipment will travel.

5.2.11.5 Ditch Crossing

Enclose ditch lines with an appropriately sized culvert pipe not less than 12 inches in diameter and 12 feet in length centered on hydrant to provide access to hydrants positioned beyond the ditch line (away from the adjacent roadway).

5.2.11.6 Paint

Fire hydrant body shall be painted with two coats of safety red Sherwin Williams industrial enamel B54R38. Hydrant side port caps shall be painted with Sherwin Williams Corothane (1)-M10-Alluminum B65S14. The fire hydrant bonnet shall be painted with Sherwin Williams paint per NFPA standard 291 as per flow rate and colors as follows:

1500+ GPM	SW 6958	Dynamic Blue
1000-1499 GPM	SW-6739	Eco Green
500-999 GPM	SW-B54E39	Safety Orange
<500GPM	SW B54R38	Safety Red

5.2.12 Water Service Lines

Residential connections shall be a minimum diameter of 1-inch and shall use one section of copper tube size (CTS) Rehau Municipex Pex or City approved equivalent (250 psi), or copper tubing type K from the main to the meter, without any joints.

Non-residential connections shall have a minimum diameter of 1 ½-inch and shall use one section of CTS Rehau Municipex Pex or City approved equivalent, continuous from the main to the meter, without any joints. Pipe and fittings shall be rated for 250 psi.

5.2.13 Water Meters

5.2.13.1 Location

Water meters shall be located as close to the right of way line as possible. In residential plats, water meters shall be located in the right-of-way in the planter area between curb and gutter and sidewalk. Water meters and boxes are to be shown on the construction drawings a minimum of 10' away from street or planter trees. In commercial developments, water meters shall be located within right-of-way planter or as approved by the Director. Water meters shall be located within the public right-of-way when available, or designated water utility easement.

5.2.14 Backflow Prevention

Cross Connection Control shall be based on WAC 246-290-490 and Monroe Municipal Code Chapter 13.06 and the City of Monroe's Cross Connection Control Program.

A temporary double check valve assembly (DCVA) shall be used to prevent contaminated water of a new mainline connection from entering the existing distribution system during construction. The DCVA shall be positioned at the point of the connection (tap) between the new main and the existing main. Main line connections are considered 4-inch pipe size or larger. The minimum size of the temporary DCVA shall be 4-inch. All backflow assemblies shall be tested and approved by a certified backflow assembly tester prior to water being allowed to enter the new main for flush and test purposes. Temporary back flow assemblies for new fire lines must be sized for appropriate full flow GPM as per NFPA requirements of which will be determined by the NICET Level 3 fire system designer.

The minimum level of backflow prevention required for irrigation is a double check valve assembly.

Fire services shall require a double detector check valve assembly within the building structure as per approval by the Director.

Air gaps and/or reduced pressure backflow assemblies are required for potential high health hazard situations.

5.2.15 Backflow Prevention Assemblies

5.2.15.1 General

Backflow prevention assemblies are regulated under MMC 13.06 Cross-Connection Control. When required, these assemblies shall meet the requirements of the MMC and these Standards. Plans shall be submitted to the City of Monroe for review by the Cross Connection Control Specialist (CCS) and the Building Department. A City of Monroe plumbing permit is required for all backflow prevention assembly installations.

When trap primers are required in buildings, a proper air gap (a minimum of two times the supply pipe diameter or minimum of 1-inch) shall be provided between the potable water supply and the sewer connection.

Drains shall be sized to carry the full-rated flow of the discharging backflow assembly and shall be double screened and double banded on both ends.

5.2.15.2 Required Installations

A backflow prevention assembly shall be provided at any premise where installation is deemed necessary to accomplish the purpose of these regulations in the judgment of a certified cross connection specialist or the Public Works Director. Situations where a backflow assembly will be required include, but are not limited to the following:

- If the nature and extent of any activity on a premises, or the materials used in connection with any activity on a premises, or materials stored on the premises, could contaminate or pollute the potable water supply.
- On a premises having one or more cross connections.
- When existing internal cross connections are not correctable, or intricate plumbing arrangements make it impractical to ascertain whether or not a cross connection exists.
- When a repeated history of cross connections is established or reestablished.
- If unduly restricted entry is determined so that inspections for cross connections cannot be made with sufficient frequency or with sufficient notice.
- If materials of toxic, objectionable, or hazardous nature, either liquids, solids, or gases are being used such that, if back siphoning occurs, a health hazard could result.

- On any mobile apparatus that connects to or takes water from the City's water system.
- On any premises where a cross connection report form has not been filed with the City of Monroe Public Works Department.
- Private wells or auxiliary water supplies on the same premises where the City of Monroe metered supply is delivered are required to have an RPBA installed at the meter or location acceptable to the City of Monroe.
- At irrigation system connections and fire service connections.

5.2.15.3 Backflow Prevention Device Installation Requirements

All backflow prevention devices shall be suitably supported and braced to assure stability and prevent movement.

When a RPBA is located inside a building or structure, it shall be installed in a location where the occasional relief valve spitting and the possible constant discharge in the event of a fouled check valve will not be cause damage. An approved air gap funnel assembly, provided by the manufacturer or fabricated for the specific installation, may be installed to handle the occasional relief valve spitting. A drain line from the funnel assembly may be extended to an adequately sized floor drain of equal or greater size. The developer shall check with the manufacturer for the relief valve discharge rate to properly size the drain.

The maximum height for backflow devices is 5 feet unless an OSHA approved platform is provided.

Backflow prevention devices shall not be installed above electrical panels or motors.

When installation is complete, the City's Cross Connection Control Specialist (CCS) will inspect each backflow assembly to see that it was installed properly. A City or City approved Backflow Assembly Tester (BAT) will test each new assembly to see that the assembly is functioning properly. All backflow assemblies must pass inspection and testing before occupancy may be released for any building. It is the building owner's/manager's responsibility to ensure that all backflow assemblies are tested annually by a tester of their choice. Test reports must be turned into the City of Monroe Water Department annually.

5.2.15.4 Location and Clearance

Backflow prevention assemblies shall be provided at the service connection and/or within the premises. Assemblies shall be located at the point of delivery of the water supply, before any branch in the line, downstream of any pressure-reducing valve on private property, in a location approved by the Public Works Director or Cross Connection Control Specialist (CCS).

Assemblies shall be located to provide protection from freezing, flooding, and other severe weather conditions.

Backflow prevention devices shall not be located in any area subject to flooding, with the exception of irrigation DCVA assemblies. An assembly that is located in a vault or basement shall have adequate drainage.

The access to a device located inside a building or structure shall have minimum dimensions of 3-feet wide by 5-feet high. There shall be no obstacles or structures interfering with these dimensions that may prevent access to the device.

Provide a minimum clearance around assemblies for removal of internal parts. Devices 2 inches and smaller shall have at least 6 inches clearance on all sides of the device. All devices larger than 2 inches shall have a minimum clearance of 12 inches on the backside, 24 inches on the test-cock side, and 12 inches below the device.

5.2.16 Pressure Reducing Station

Vaults or other equipment shall have a subgrade drainage system connected to the station sump or drain.

Install pressure reducing stations at locations as directed by the Director. The station shall be adjusted to control downstream pressure as determined by the Director or designee.

5.2.17 Fire Sprinkler System

5.2.17.1 System Designer Requirements

A licensed fire sprinkler system designer (Level III certificate of competency holder (NICET)) or licensed professional engineer for Washington State shall prepare, stamp, sign and date the building fire sprinkler system design for the fire protection supply line and fire department connection line for all types of buildings, commercial and residential, as applicable.

The International Fire Code (IFC), as adopted by the City of Monroe, defines the minimum fire flow requirements. The design engineer shall submit design calculations for review.

5.2.17.2 Design Requirements

The fire sprinkler system supply line diameter shall be a minimum of 4-inches. The pipe material shall be Class 52 Ductile Iron. The remote fire department connection shall be within 4 to 50 feet of a hydrant and at least 50 feet away from the building to be protected. The Fire Marshal shall determine the location of the fire department connection.

No domestic or irrigation service connections may be installed on the fire protection supply lines or on fire hydrant supply lines between the hydrant valve and the fire hydrant.

The gate valve controlling the fire sprinkler supply line shall be marked with a 2-inch diameter schedule 40 PVC pipe and cap in a dedicated fire gate-valve box. Cap shall be labeled in permanent marker with "Fire Valve."

5.3 CONSTRUCTION DRAWINGS

5.3.1 Review and Approval

All water system improvement designs shall be submitted to the Director for review and approval.

5.3.2 Drawing Requirements

The following items shall be included on water system drawings:

- Existing utilities within the street right-of-way of water system improvements.
- Existing utilities within 25 feet of water main within tracts or easements.
- All proposed and existing easements showing all water mains, hydrants, meters, and other appurtenances on private property located within a minimum 20-foot wide easement.
- A maintenance access to the easement.
- Plan and profile of the water main showing elevations and clearances of sewer mains, water mains, and storm drains where they cross each other.
- Crossing clearances shall be shown either at each crossing on the plan or in a crossing table.
- All pertinent water detail drawings.
- Standard Water Notes. See Appendix A of this Section.

5.4 MATERIALS

5.4.1 General

All pipes, fittings, valves, hydrants, joints, and other components shall conform to AWWA, APWA/WSDOT standards, and be acceptable for use by the City of Monroe.

Metal thickness and manufacturing process shall conform to applicable portions of ASTM Standards A21.10, A21.11, B16.2, and B16.4.

5.4.2 Pipe

All water main distribution pipe shall be Class 52 ductile iron pipe, cement lined, standard class rating of 350 psi conforming to ANSI A21.51 and AWWA C151.

Pipe extending from the water main to the meter for all services up to 2-inch diameter shall be Rehau Municipex Pex a, or type K copper tubing. Service lines larger than 2-inch diameter shall be HDPE polyethylene or Class 52 Ductile Iron.

The pipe shall be furnished with mechanical joint or push-on joint, conforming to ANSI/AWWA C111/A21.11-85 standards, except where flanged joints are specified.

Brass Piping shall conform to ASTM B43.

Ductile Iron Pipe shall be Class 52 Ductile Iron Pipe, cement lined, standard thickness Class 52, unless otherwise specified and shall conform to the standards of USA Standard A21.51 (AWWA C151), and be installed in accordance with the manufacturer's recommendations. Grade of iron shall be 60-42-10 and the exterior shall be coated with an asphaltic coating. Each length shall be plainly marked with the manufacturer's identification, year cast or casting period, thickness and class of pipe. The pipe shall be furnished with mechanical joint or push-on joint, conforming to ANSI/AWWA C111/A21.11-85 Standards, except where flanged joints are specified.

5.4.3 Joints and Fittings

Connection types shall be specified as push-on-joint (Tyton), mechanical joint (MJ), or flanged as indicated on the drawings.

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 C104. 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.

Rubber gaskets for push-on-joint (Tyton) or mechanical joint (MJ) shall conform to AWWA C110, C111 or C153.

Where shackle restraint is required, tie rods shall be ¾-inch diameter; tie bolts shall be ¾-inch conforming to Star National Products No. SST7 or approved equal.

Restrained joint assemblies shall be Star National No. S11 or approved equal. All parts shall be cadmium plated.

5.4.4 Pipe Bedding

Native material may normally be used for bedding of ductile iron pipe unless determined unsuitable as per WSDOT 7-09.3(9). Bedding material, when specified or required by

the Director, shall be washed sand per Section 5-4.20 of these standards and as per Standard Detail 102. Bedding is defined as 6 inches below the pipe, around the pipe and 12-inches above the pipe.

5.4.5 Backflow Prevention Assemblies

The following types of assemblies on the approved Washington State Department of Health list may be used on water distribution systems as required:

- Reduced Pressure Detector Assembly (RPDA)
- Reduced Pressure Backflow Assembly (RPBA)
- Double Check Detector Assembly (DCDA)
- Double Check Valve Assembly (DCVA)
- Air Gap

If assemblies are to be vertically oriented, use a type and model approved by the DOH for vertical installation.

Backflow assemblies for fire protection supply lines shall have approved integrated shut-off valves as part of the assembly.

5.4.6 Valves

5.4.6.1 General

Resilient seat, opening counter-clockwise, non-rising stem type, with double O-ring seal equipped with standard 2-inch square stem nuts.

Valves shall be flanged or mechanical joint, suitable for installation with the type and class of pipe being used.

5.4.6.2 Air and Vacuum Release Valves

Air and vacuum release valves shall be Crispin CRVL-10 or 20 or approved equal. See Standard Drawing 511.

5.4.6.3 Butterfly Valves

Butterfly valves shall conform to AWWA Standard C504-94 Class 150-B, with cast-iron short-body and O-ring stem seal. Butterfly valves in chambers shall have a manual crank operation. Buried butterfly valves shall have a standard 2-inch operating nut and valve box. Direct-buried valves shall be ground rated.

Only the following listed butterfly valves, or an approved equal, will be accepted:

- Pratt "Groundhog"
- M & H "450" or "4500"
- Mueller "Linesal 111"

5.4.6.4 Check Valves

Check valves for permanent installations other than for cross-connection control shall be rated to match the source pressure, unless otherwise specified, and shall have an adjustable tension lever and spring to provide non-slamming action under all conditions unless otherwise specified. For backflow prevention see Section 5.4.5.

5.4.6.5 Gate Valves

Gate valve materials shall conform to AWWA C509-80 latest revision.

Gate valves shall conform to ANSI/AWWA C509 standards for resilient-seated disc gate valves. The valve seating shall be of the Mueller A2361 or A2362 DI Body Valves type, or approved equal. The valves shall be iron-bodied, iron disk encapsulated with rubber and bronze or epoxy coated, non-rising stem with "o" ring seals. The sealing rubber shall be permanently bonded to the disk to meet ASTM D429 tests for rubber to metal bond. All valves shall be rated for an operating pressure of at least 200 psi. The valves shall open counter-clockwise and be furnished with a 2-inch square operating nut. All interior and exterior valve surfaces shall be fusion-bonded epoxy coated, acceptable for potable water. All valves shall be vertical mounted and without gearings.

5.4.7 Valve Assemblies

The piping on the inlet side of the assembly shall be rigid brass or copper. Galvanized pipe is not allowed.

5.4.8 Valve Boxes

Valve boxes in paved areas shall be cast iron, two-piece units designed with tabs (lugs) on the cover. Direction of tabs shall be aligned with the pipe line it serves. The valve box shall be an (EJ) East Jordan valve box bottom project number (85556024U), a valve box top number (85557016U), and a valve box cover number (06800001U), or approved equal.

5.4.9 Valve Marker Posts

Valve marker posts shall be set as directed by the Director. Carsonite markers shall be blue, 5-feet long, with water decal and anchor. See Standard Drawing 507.

5.4.10 Hydrants

Hydrants shall conform to AWWA C502-85 standards. Fire hydrants shall have two 2-1/2-inch hose ports, one 4-1/2-inch pumper port (National Standard threads), 4-inch Storz Quick Connect and a 5-1/4-inch valve opening; 1-1/4-inch pentagon operating nut, counter-clockwise direction of opening; and positive and automatic barrel drain. Hydrants shall be provided with mechanical joint bottoms and breaking flange or lugs. Only the following hydrants will be accepted:

Mueller Centurion
Waterous Pacer WB-67-250
East Jordon 5CD250 Northwest Edition with 5-1/4 Valve

5.4.11 Hydrant Guard Posts

Hydrant guard posts, when required, shall be either reinforced concrete posts 8-inch by 8-inch by 6-feet long, or 6-inch diameter by 6-feet long Schedule 40 steel pipe, concrete-filled per Standard Drawing 507.

5.4.12 Thrust Blocking

Cement concrete blocking shall be comprised of Class 3000 cement concrete mix with plastic sheet protection between concrete and ductile iron, leaving all fitting bolts and nuts exposed.

5.4.13 Service Lines From Meter To The Building

Polyethylene tubing shall conform to the requirements of ASTM D2737 CTS for 1-inch, 1 ½-inch and 2-inch sizes. The pipe shall be copper tube size (CTS) and bear the seal of the National Sanitation Foundation for potable water pipe. Minimum working pressure shall be 250 psi. Solvent welded pipe joints will not be permitted.

Ductile iron pipe shall conform to the requirements in Section 5-4.02 Pipe for sizes 3-inch and larger.

5.4.13.1 Small Meter Services (3/4-inch x 5/8-inch, 1-inch, 1 ½-inch, 2-inch)

See Standard Drawings 501 and 502.

5.4.13.2 Large Services (3-inch, 4-inch, and 6-inch)

See Standard Drawing 505.

Tapping valve shall be cast iron with cast iron gate valve box and 18-inch cast iron valve box top section.

All valves in vaults shall be gate valves with hand wheel.

Pipe shall be ductile iron, Class 52.

Use of restrained mechanical joints and/or flange fittings at restrained joint locations.

Pipe assembly shall be sized according to meter size. See vault fitting and pipe size requirements on Standard Drawing 505.

Meter vault shall be a Utility Vault Co. Precast Vault or equal. The lid shall be Utility Vault Co. Spring Assisted Lid with traffic loaded locking steel covers or equal.

5.4.14 Pressure Reducing Stations

5.4.14.1 Pressure Reducing Valve

Valves 4-inch and larger shall be Clayton series 91-01 pressure reducing and sustaining valve.

Valves shall be equipped with the following:

- Main Valve Body and Cover: Ductile Iron ASTM A536
- Main Valve Trim (Disc Guide, Seat & Cover Bearing): Stainless Steel
- Disc: Buna-N Synthetic Rubber
- Diaphragm: Nylon Reinforced Buna-N Rubber
- Stem, Nut and Spring: Stainless Steel
- Pilots and Solenoids: CRD & CRL
- Pilot Control: Bronze ASTM B62
- Pilot Control Tubing and Fittings: Copper and Brass
- Pilot System: Shutoff Cocks on the Pilot Control System, plugs in other valve body taps
- Flow Clean Strainer
- Valve Position Indicator
- Speed Controls: Opening and closing
- Epoxy Coating: 4 mil fusion bonded both inside and out
- End Details Flanged: Ductile iron ANSI B16.42 150A

Valves, 3-inch and smaller, shall be Clayton 90-01 pressure reducing valve and shall be equipped with the same accessories as a 4-inch and larger valve, with the following exception: End Details Screwed: 250 & 300 ANSI B2.1.

Adjustment ranges shall be determined for each valve and shall be designated on the plans.

Valves shall be CLA-Val Company. No other manufacturers will be allowed.

5.4.14.2 Pressure Relief Valve

Pressure relief valves shall be Clayton Series 50-01 pressure relief valve.

Valves shall be equipped with the following:

- Main Valve Body and Cover: Ductile Iron ASTM A536
- Main Valve Trim (Disc Guide, Seat and Cover Bearing): Stainless Steel
- Disc: Buna-N Synthetic Rubber
- Diaphragm: Nylon Reinforced Buna-N Rubber
- Stem, Nut and Spring: Stainless Steel
- Pilots and solenoids: CRD
- Pilot Control: Bronze ASTM B62
- Pilot Control: Bronze ASTM B62
- Pilot Control Tubing and Fittings: Stainless Steel Type 303
- Pilot System: Shutoff Cocks on the Pilot Control System, plugs in other valve body taps

Valve Position Indicator
Epoxy Coating 4 mil fusion bonded both inside and out
End Details Flanged: Ductile iron ANSI B16.42 150A

Adjustment ranges shall be determined for each valve and shall be designated on the plans.

Valves shall be CLA-Val Company. No other manufacturers will be allowed.

5.4.14.3 Pressure Gauge Assembly

Pressure gauge shall be 2 ½ inch No Shok 25.300-200 psi or equal. Pressure gauge ranges shall be determined for each gauge and designated on the plans. The pressure gauge assembly shall include a brass ¼ inch shut-off cock and brass needle valve. All assembly pipe shall be brass. Pressure gauge assemblies shall be mounted on tapping bosses on fittings or with pipe saddles. Tapping size shall be ½ inch minimum and tap shall be equipped with a ball valve.

5.4.14.4 Precast Concrete Vault

Vault shall have minimum inside dimensions of 11-feet 5-inches in length, 6-feet 2-inches in width, and 6-feet 8-inches in height.

5.4.14.5 Precast Concrete Catch Basin

Precast Concrete Catch Basin shall conform to Section 9-12.5 WSDOT/APWA Standard Specifications

5.4.14.6 Wye Type Strainer

Wye type strainers shall be Muessco #751 or equal with stainless steel screen.

5.4.14.7 Anchor Bolts

Anchor bolts shall be in accordance with ASTM A307. All anchor bolts, nuts and washers shall be stainless steel in all locations. Anchor bolts shall be Hilti Kwik bolt anchor or equal.

5.4.14.8 Expansion Bolts

Bolts, nuts and washers shall be 303 or 304 stainless steel; wedges shall be double plated spring steel.

5.4.14.9 Pipe Supports and Brackets

Pipe supports and brackets shall be equal to Fee and Mason. Adjustable pipe supports shall be equal to #291. Pipe brackets shall be equal to #155, heavy welded steel bracket with #1590 anchor chair. ¾ inch tubing brackets shall be

equal to #327B, one hole clamp. Drainpipe supports shall be uni-strut. All supports and brackets shall be galvanized.

5.4.14.10 Painted Surfaces

All exposed piping, fittings, valves and appurtenance surfaces shall be painted except non-ferrous, corrosion-resistant ferrous alloys, and non-metallic materials. The painting system shall be a 2-component epoxy polyamide primer with an aliphatic polyurethane finish coat. Prime and finish coats shall each be a minimum 3 mils dry film thickness. Primer shall be Far West Paint X6390 and Finish coat shall be Skythane. Tnemec Series High Build Epoxoline and Series 73 Endurashield are acceptable substitutes. No other paint brands shall be used. No bleed through of the pipe bituminous coating shall be permitted. Prepare pipe surface as recommended by the paint manufacturer. Paint color shall be Far West Paint #257, Delphinium Blue.

5.4.15 Backfill

5.4.15.1 Controlled Density Fill

Controlled Density Fill (CDF) shall conform to Section 2-09.3(1)E WSDOT/APWA Standard Specifications and as per Standard Detail 102.

5.4.15.2 Foundation Material

Foundation Material shall conform to Sections 9-03.17 or 9-03.18 WSDOT/APWA Standard Specifications.

5.4.15.3 Gravel Backfill for Bedding

Gravel Backfill for Bedding shall conform to Section 9-03.12(3) WSDOT/APWA Standard Specifications and as per Standard Detail 102.

5.4.15.4 Bank Run Gravel for Trench Backfill

Bank Run Gravel for Trench Backfill shall conform to Section 9-03.19 WSDOT/APWA Standard Specifications.

5.4.15.5 Trench Backfill

Trench Backfill shall conform to Sections 9-03.15 or 0-03.19 WSDOT/APWA Standard Specifications and as per Standard Detail 102.

5.5 CONSTRUCTION REQUIREMENTS

5.5.1 Administration

Refer to Section 1.9 of these Standards.

5.5.2 Grade and Alignment

Prior to any pavement cutting or removal or excavation for pipe laying, the developer shall verify in the presence of the Director or designee, the locations and depth of the existing water mains at the points where connections are to be made. The new main design profile shall be adjusted as necessary so neither a high spot nor a low spot is created in the main adjacent to the connection to the existing water mains.

5.5.3 Existing and Abandoned Utilities

The developer shall be responsible for determining the location of existing utilities and protecting them during construction. The developer shall verify all utility locations prior to construction by calling the Underground Locate service at 1-800-424-5555 or 811 at least 48 hours prior to any excavation.

The developer shall be responsible for all damages to all utilities (city-owned and others) due to the developer's activities. The developer shall notify the Director immediately and arrange for replacement of all damaged water system components. The developer shall coordinate directly with other utility agencies regarding damages to their respective systems.

Ends of abandoned water mains shall be plugged by a mechanical ductile iron plug or cap, or by filling with Class 3000 cement concrete for a minimum longitudinal length of 24 inches into the pipe end. Existing unused pipe within the footprint of a proposed building shall be completely removed or abandoned in place and filled completely with controlled density fill (CDF) by means of pressure grouting, and as determined by the City Inspector.

5.5.4 Trenches

See Standard Drawing 102.

Trench bottom width dimension shall be as follows with at least 1 foot of clearance on each side of the pipe:

Minimum: pipe diameter plus 2 feet

Maximum: pipe diameter plus 3 feet

5.5.5 Cribbing and Shoring

The developer is responsible for safety on the job site per Chapter 296-155 WAC.

The developer shall adequately shore trenches to provide safe working conditions in the trench and to protect the work, existing property, utilities and pavement. The shoring shall be according to the developer's design. The developer may elect to use a combination of shoring and 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 developer.

5.5.6 Unsuitable Material

When peat, soft clay, quicksand, or other unsuitable material as determined by a geotechnical engineer is exposed in a trench, the material shall be removed and replaced with Foundation Material Class A as specified in Section 3. All unsuitable material shall be loaded directly into trucks and hauled to an approved waste site obtained by the developer. Stockpiling of unsuitable material on the project site will not be allowed.

5.5.7 Trench Dewatering

Where water is encountered in the trench, it shall be removed during pipe-laying operations. Trench water or other deleterious materials shall not be allowed to enter the pipe at any time.

5.5.8 Bedding the Pipe

See Section 5-4.04.

5.5.10 Water/Sewer Crossing

Water mains crossing sewer lines shall be installed so that the bottom of the water main is at least 18 inches above the top of the sewer. An entire section of water pipe shall be positioned at the crossing so that the pipe section's midpoint is above the crossing point of the sewer pipe. The developer shall install such special structural support as conditions may warrant for the water and sewer pipe.

5.5.11 Pipe Wrap

In areas where corrosive soils exist or are found during water main installations, the Director may require the water main to be wrapped with a polyethylene encasement tube wrap per ANSI/AWAA C105/A21.5-99. Pipe-wrap joints shall be joined together with 10 mil thick black polyethylene tape conforming to ANSI/AWWA C105/A21.5-99.

5.5.12 Handling Pipe

All types of 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 the construction materials be dropped, skidded, or rolled against other pipe. Damaged pipe will be rejected, and must be removed from the project site within 24 hours.

Dirt or other foreign material shall be prevented from entering the pipes or pipe joints during handling or installation operations. Developers shall furnish and install a watertight plug of the appropriate size in the end of the water main anytime work is delayed or stopped.

5.5.13 Cutting Pipe

Pipe shall be cut with an abrasive saw or by a special 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 damaging the joint gasket. Threads shall be cleanly cut. Oxyacetylene torch cutting of ductile iron pipe will not be allowed.

5.5.14 Laying Pipe on Curves

Long radius curves, either horizontal or vertical, may be laid with Class 52 ductile iron pipe by deflecting the pipe sections at the joints. If the pipe is shown curved in the drawings and no special fittings are shown, the developer may assume that the curves can be made by deflections at the joints with standard lengths of pipe. If shorter pipe lengths are required, the drawings will indicate maximum lengths that may be used. The amount of deflection at each pipe joint when pipe is laid on a horizontal curve shall not exceed the manufacturer's printed recommended deflections.

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.

Maximum deflections at pipe joints and laying radius for various pipe lengths are specified in 5.2.7 of this chapter. Otherwise, deflections shall conform to the manufacturer's recommendations and AWWA standards for the given type of pipe. The developer shall not cover the pipe until the City Inspector has been able to examine the pipe deflection. If deflection exceeds the manufacturer's recommendations, then bends may be substituted if approved by the Director.

5.5.15 Thrust Blocks

As indicated on Standard Drawing 514, thrust blocks shall be placed at bends, tees, dead ends, crosses and as designated by the design engineer. Visqueen shall be used to cover and prevent fittings from contact with the thrust block concrete. All fittings, nuts and bolts, flanges and restraint devices shall be left accessible and free of concrete.

5.5.16 Connections to Existing Mains

The developer shall make all new taps and/or connections to existing water mains unless the Director approves otherwise. A City-approved private developer shall do all wet taps. The developer requesting the service shall bear all costs for the taps.

If the initial tap or extension requires shutting down an existing water main, the Director may require two weeks notification in order to place a public notice in the local paper. No taps that require shutting down a water main will be allowed on Friday or weekends.

The developer shall not operate any water system valves on existing mains. Designated city personnel will operate all valves to accomplish shutdowns and subsequent reactivations and flushing.

Also see Section 5.5.26 Hydrostatic Pressure Testing with Temporary Backflow Prevention.

After receiving satisfactory purity tests, the city inspector shall notify the developer. The inspector must be on site during the removal of the double check valve assembly and the final connection to the existing system.

5.5.17 Hydrants

Fire hydrants shall be installed in accordance with Standard Drawing 506.

If a hydrant is to be re-used, it must be pressure tested and be approved by the City Inspector. Existing hydrants in close proximity to new construction shall be replaced as necessary to conform to the current Standards and Specifications for hydrants. Hydrants shall be covered in bags until the water system is approved by the City Inspector.

5.5.18 Valve Boxes

The lug receiver slots shall be installed parallel to the direction of the water line flow. The valve and valve box shall be set plumb with the valve box centered on the operator nut. Valve boxes shall be set so that the cover will be flush with the finished pavement surface. All valves in unpaved areas shall have a 2-foot wide by 2-foot long by 4-inch-thick concrete pad placed around the valve box.

When the top of the valve operation nut is more than 3 feet below finished grade, a valve operator extension shall be installed per Standard Drawing 512. The minimum extension length shall be 12-inches.

The developer shall adjust valve boxes to finished grade. Backfill around the valve box shall be compacted to 95 percent.

5.5.19 Valve Marker Posts

Valve marker posts shall be set as directed by the City Inspector. See Standard Drawing 507.

5.5.20 Water Meters

5.5.20.1 Permanent Service Disconnection

With the Director's approval, a permittee may leave the corporation stop in place at the main and install a brass cap onto the corporation stop. Service lines from the main to private property must be removed.

5.5.20.2 Installation

See Standard Drawing 501 & 502.

5.5.20.3 Water Meter Boxes

Meter Box installation: Water meter boxes shall be installed onto a firm and non-yielding base to prevent meter boxes from settling. At locations that may be susceptible to extreme dampness or areas where ground water may collect or will not drain, supportive blocking may be required to be installed for added meter box support as directed by the City Inspector.

Meter setters must be installed as per Standard Detail 501. The meter setters angle stop and dual check assembly must be properly aligned to accept a water meter. All water meter setters must pass City inspection prior to a water meter being set. If misalignment or damage to a meter setter, the meter box elevation, or stability issues occur after inspection, and staff attempts to set a meter and cannot due to above mentioned or other damage, the developer will be billed for an added site visit for the next meter installation attempt.

5.5.21 Water Service Lines

Services shall be installed as shown on Standard Drawing 501 and 502. Services associated with a new water main installation shall be installed from the main to meter setter and be subject to purity and hydrostatic testing with the new water main. Embed the pipe in bedding sand.

5.5.22 Fire Protection Systems/Underground Fire Supply Lines

5.5.22.1 Installer Certification

The installer of the fire protection service underground lines shall be licensed and certified as required by the office of the State Fire Marshall.

If the installer is different from the designer, then the installer must stamp, sign and date the fire protection system drawings, in addition to the designer's stamp, signature, and-date, and provide the City a fully signed copy.

5.5.22.2 Exterior Fire Department Connections and Supply Lines

On the exterior FDC standpipe, the installation must include galvanized iron pipe fittings to allow for a 4-inch Storz 30-degree drop Fire Department Connection. The connection shall also include a locking FDC Storz cap system as per Standard Detail 510.

The fire protection service underground line shall be that portion of the line located behind a dedicated fire system valve located off a city water main connection. The dedicated fire line valve is considered private property with the fire protection system.

A temporary double check valve assembly (DCVA), not smaller than 4-inches, shall be installed between the city main and the new fire main to prevent cross contamination during new system testing and flushing.

In compliance with NFPA 24, hydrostatic pressure testing of the fire protection supply line and FDC line shall be a 2-hour test with a minimum pressure of 200

psi with 0 (zero) allowable loss. After hydrostatic testing, a drip check valve assembly shall be installed near the lowest portion of the FDC standpipe with a washed rock and fabric drainage pocket. Flushing of the FDC and supply line can then commence.

5.5.22.3 Fire Protection Service Line Restraint

Fire protection supply lines shall be restrained by thrust blocking on all mechanical joint fittings including mega lugs. All bell joints will have lock gaskets on both supply and FDC runs from the building exterior to the building interior floor flange.

5.5.22.4 Flush and Purity/Final Connection and Close out

As the supply line of the fire system is attached to the city water system, the developer shall conduct purity sampling after a full-flow flush with a target velocity of at least 10 feet per second. Also reference NFPA 24 required flush rates as per NFPA Table 10.0.2.1.3. The supply line and FDC runs shall be flushed at full flow with burlap bags attached to discharge hose ends to screen and inspect for debris. The flushing shall continue until the discharged water flow is debris free.

The pipe flushing discharge shall be directed to a City sewer system or discharged to a location approved by the Director. If flushing into the sanitary sewer system an approved air gap is required for discharge. The developer and City Inspector shall monitor the sewer system during the flushing procedure and act appropriately to assure no damage or overflow to the sewer system.

After hydrostatic pressure testing is completed and the water purity has been approved, the final connection shall be made in the presence of the City Inspector. The temporary double check valve assembly shall be removed, and pipe and sleeves (restrained) shall be installed and inspected for leaks under static line pressure. The City Inspector shall inspect that portion of the fire system exterior of the building up to the interior floor flange. After final inspection, the developer shall install a 2-inch diameter Schedule 40 PVC pipe and cap inside the private fire control valve box assembly accessible to within 8-inches below box lid. The developer shall use a permanent black marker to inscribe "Fire Valve" on the cap.

Final inspection sign-off and closeout occurs when the Developers Material and Test Certificate for Underground Piping Material Test Data Forms have been stamped with the Engineer's and installer's current state certification seal. Forms shall also include signatures and installation dates by the City Inspector, licensed installer, and property owner.

5.5.23 Typical Hydrostatic Pressure Testing with Temporary Backflow Prevention

See Section 5.5.19 Connections to Existing Mains.

The developer shall connect a temporary double check valve backflow assembly with two resilient wedge gate valves (minimum 4-inch diameter) to the end of the water line at the designated point of connection as shown on the approved drawings. A City-approved Certified Backflow Assembly Tester shall test the temporary backflow assembly and certify it. A list of City-approved testers is available through the City inspector. All associated costs are the developer's responsibility. The temporary double check valve backflow assembly will be required during pressure, flushing and purity tests.

Prior to flushing and disinfecting for new and reestablished systems, all water mains and appurtenances shall be pressure tested for leakage in accordance with City requirements. The water main and appurtenances shall be pressurized to a hydrostatic pressure of 250 psi, measured at the highest profile elevation in the water main. Domestic water mains require a one-hour pressure test, and fire protection supply lines require a two-hour test, during which time there cannot be any pressure loss.

The main shall be tested between valves or at a maximum distance of 500 feet along the main. Any leaks or imperfections shall be corrected before final acceptance. All air within the new water system shall be expelled prior to pressure testing.

As much 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 is inspected. The developer shall provide all necessary test equipment and shall perform all work required for the tests. Insofar as is practical, tests shall be made with pipe joints, fittings and valves exposed for inspection. The developer shall perform the test to assure that the equipment to be used for the test is adequate and in good operating condition, and the air in the line has been released before requesting the City Inspector to witness the test.

5.5.24 Flushing and Disinfection of Water Mains with Temporary Backflow Prevention and Final Connections

As sections of pipe are constructed and before pipelines are placed in service, they are to be sterilized per the requirements of section 7-11.3 of the WSDOT Specifications.

All new, cleaned or repaired water mains and backflow prevention assembly installations require flushing and disinfection per AWWA Standard C651.

In all disinfection processes, the developer shall take precaution in flushing the chlorinated water from the new mains or repairs to assure the chlorinated water does no physical or environmental damage to property, streams, storm sewers, or any waterways. Flushing water shall be disposed in accordance with Washington State Department of Ecology and the AWWA Standards. Flushing water may require a de-chlorination method or disposal in the City of Monroe sewer system. The Director shall approve the disposal method prior to the time of disposal.

After hydrostatic testing approval following flushing procedure, the permittee shall request that the City Inspector collect water samples from the new water system. The samples shall be collected in sterilized bottles and tested by a DOH testing lab as designated by the City of Monroe. All samples must meet the DOH quality standards

prior to water lines being placed into service. Currently, the City of Monroe has an accredited laboratory to test water purity samples with limited days and hours of operation. If the developer requests testing at times and dates that the City laboratory is closed, then the City inspector or water quality division designee may take the samples for testing to an alternative state accredited testing lab. When the City staff delivers samples to an alternative site, the developer will be billed by the City for alternative laboratory sample testing fees and the for the time it takes City staff to deliver the samples and to receive the results of such tests.

Upon completion of the purity test, if satisfactory results are achieved and verified, then the permittee may request a final connection to the City main. Pipe sleeves or other permanent fittings shall be cleaned with 5-6% chlorine solution in the presence of the City Inspector. The temporary double check valve assembly shall be removed in making the final connection to the existing main only during the presence of the City Inspector. The system shall then be refilled and flushed as necessary to expel any air to the satisfaction of the City Inspector. The final connection shall be safely accessible and inspected for leaks under static line pressure. With the City Inspector's approval, the connection shall be properly bedded with a dry sand material, or as specified in Standard Detail 102, supported, backfilled, and compacted. The system shall be left in service with the fire hydrants bagged until the entire system is approved.

The developer will be billed for the amount of water used during the testing and flushing procedure.

5.5.25 Required Documentation

The following steps must be completed before the improvements will be accepted and performance bond released:

1. All easements must be reviewed, approved, and recorded.
2. The City construction inspector must have received, reviewed, and approved the record drawings.
3. Receipt of a satisfactory maintenance bond.
4. Bill of Sale

Upon completion of the work, the developer shall be required to furnish the Director with a written guarantee (financial security) covering all materials and workmanship for a period of two years after the date of final acceptance or plat recording, whichever is later, and the developer shall make all necessary repairs during that period at his own expense if such repairs are necessitated as the result of furnishing poor materials and/or workmanship.

The Developer shall provide the City with a Bill of Sale for all portions of the system that will become the property of the City.

APPENDIX A – WATER CONSTRUCTION NOTES

The following standard notes are required on all Water Plans:

- A. All work and materials shall conform to the City of Monroe Public Works Design, Construction and Operations Standards, and the Washington State Standard Specifications for Road, Bridge, and Municipal Construction.
- B. All approvals and permits required shall be obtained by the developer prior to the start of construction.
- C. A preconstruction meeting shall be held with the City of Monroe Public Works Department prior to the start of construction.
- D. It is the responsibility of the developer to have a copy of the approved plans at the construction site at all times.
- E. Any changes to the design shall first be reviewed and approved by the Director.
- F. The water main shall be installed only after the site or roadway subgrade is backfilled, graded and compacted in cut and fill areas.
- G. All water mains shall be staked in the field under the supervision of a licensed land surveyor. The road centerline and curb line shall be staked to provide a reference point.
- H. The developer shall notify property owners in writing 10 days prior to beginning work in existing easements. The property owner must sign a letter indicating satisfaction with the restoration of the existing easement before the City will accept the water main project.
- I. Approximate locations of existing utilities have been obtained from available records and are shown for convenience. The developer shall be responsible for verification of locations and to avoid damage to any additional utilities not shown. If conflicts with existing utilities arise during construction, the developer shall notify the public works inspector and any changes required shall be approved by the Director prior to commencement of related construction on the project.
- J. Water main crossings with other utilities must be installed to provide a minimum of one (1) foot separation, measured at the two closest edges of the pipes, unless otherwise approved by the Director. For crossings with sewer mains, the utility separation shall conform to the requirements found in the Criteria for Sewage Works Design, Section C1-9.
- K. No connection to existing main lines will be allowed, except by means of an approved backflow prevention device, prior to satisfactory flushing, testing, disinfection, and receipt of satisfactory bacteriological tests.
- L. The city inspector shall be contacted a minimum of 48 hours to schedule a tap or connection to an existing water main. The inspector shall be present at the time of the tap or connection. If the initial tap or extension requires shutting down an existing water main, the City may require two weeks notification in order to provide adequate public notice. No taps to the existing water main will be allowed on Fridays or weekends. The City of Monroe Public Works Department shall operate all water valves in right-of-way and water main easements.
- M. Water mains located in soil fill areas shall be mechanically restrained
- N. No part of the water system shall be covered, concealed or put into use until it has been inspected and approved by the city inspector.

5.6 Standard Water Drawings

Drawing #	Description
501	3/4" x 5/8" x1" Water Service
502	1 1/2" x 2" Water Service
503	Residential Fire Sprinkler Details
504	Double Service Manifold
505	3", 4", 6" Water Service
505A	3", 4", 6" Water Meter Sections
506	Fire Hydrant Assembly
507	Fire Hydrant Guard Post and Valve Marker
508	Temporary Blow-off Assembly
509	Blow-Off Assembly
510	Fire Department Connection--4" FDC For Sprinkler and Standpipe
511	1" Air and Vacuum Release Valve
512	Valve Box & Extension
513	Tapping Tees
514	Horizontal Thrust Blocks
515	Blocking and Vertical Blocking Details
516	Blocking and Vertical Blocking Details
517L	DCVA 2.5" and Larger
517S	DCVA 2" and Smaller
518LI	Indoor DCDA 2.5" and Larger
518LO	Outdoor DCDA
519C	Interior RPDA 2" or Smaller
519LI	Indoor RPBA 2.5" and Larger
519LO	Outdoor RPBA 2.5" and Larger
519SI	Indoor RPBA 2" or Smaller
519SO	Outdoor RPBA 2" or Smaller
520LI	Indoor RPDA 2.5" and Larger
520LO	Outdoor RPDA 2.5" and Larger
521	Atmospheric Vacuum Breaker (AVB)
522	Pressure Vacuum Breaker Assembly
523	Spill Resistant Vacuum Breaker Assembly
524	Air Gap
525	PRV Station Plan
525A	PRV Station Plan and Longitudinal Section
525B	6" and 8" PRV Station Transverse Section
525C	6" and 8" PRV Station Misc. Details
526	Casing Detail